ENVIRONMENTAL PROTECTION PLAN
SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL AREA B
NAVAL BASE
NORFOLK, VIRGINIA

Prepared for:

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1.0 INTRODUCTION

1.1 PURPOSE

OHM Remediation Services Corp. (OHM), a subsidiary of OHM Corporation, is pleased to submit this Environmental Protection Plan (EPP) for the soil and debris removal action at the Camp Allen Landfill, Area B, Norfolk Naval Station in Norfolk, Virginia. The activities described herein are to be conducted as part of the tasks required by the Department of the Navy under Contract No. N62470-93-D-3032. The purpose of this plan is to present information needed to minimize the hazards to human health and the environment from fires, explosions, spills, releases of organic vapors, or any unplanned or sudden release of constituents of concern from the Camp Allen Landfill Area B.

This plan fulfills the requirements set forth in Section 01560 and 01561 of the Statement of Work, as well as meeting requirements outlined in the following documents:

- Code of Federal Regulations (CFR)
  - 29 CFR 1910 - Subpart G: Occupational Health and Environmental Control
  - 40 CFR 261: Identification and Listing of Hazardous Waste
  - 40 CFR 262: Generators of Hazardous Waste
  - 40 CFR 263: Transporters of Hazardous Waste
  - 40 CFR 264: Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
  - 49 CFR 178: Shipping Container Specification
- Corps of Engineers (COE)
  - COE EP-1165-2-304: 1976 Flood Plain Regulations for Flood Plain Management
- Naval Energy & Environmental Support Activity (NEESA)
  - NEESA PS-015: 1980 Disposal of Lead-Acid Battery Electrolyte, April 18

- Virginia Division of Soil and Water Conservation Commission (VSWCC)

  - VSWCC VESCH: 1992 Virginia Erosion and Sediment Control Handbook.

This plan is intended for use during the construction stage of the remedial action at the site. This plan establishes guidelines which must be followed during activities at the site and must be used in conjunction with the other project plans and documents.

1.2 PROJECT BACKGROUND

The eastern portion of the Camp Allen Landfill (Area B) (Figure 1) received wastes from a 1971 salvage yard fire. The Camp Allen Salvage Yard, which is still in operation, is located between Camp Allen Landfill Areas A and B. The salvage yard fire occurred in the northern portion of the yard. The salvage yard housed lubricating oil, organic solvents, paints, paint thinners, acids, caustics, and pesticides. The residue and debris resulting from this fire were buried in the eastern portion of the landfill. The Salvage Yard (IAS Site 22) is currently undergoing a separate environmental study [Preliminary Assessment/Site Investigation (PA/SI)]. Information on this study was not available at the time of the site assessment.

1.3 PREVIOUS INVESTIGATIONS

Previous investigations of hazardous waste sites at the Norfolk Naval Base (including Area B) have been conducted under an Initial Assessment Study, Site Suitability Assessment Study, Confirmation Study, and an Interim Remedial Investigation of the Camp Allen Landfill. A summary of previous investigations results are:

- The primary contaminant source area for Area B is located near Well GW-4. The nature of the source appears to be primarily volatile organics in nature.

- The water table aquifer was found to contain elevated volatile organic concentrations in and downgradient from the primary source areas.

- The water table aquifer appears to both discharge into drainage ditches surrounding the Camp Allen Landfill Site and recharge the Yorktown Aquifer via an erosional breach in the confining clay layer separating the aquifer regimes.

- Concentrations of volatile organics were also detected in the Yorktown Aquifer at monitoring points situated downgradient of the primary source areas.

- Surface water and sediment samples reveal elevated metal concentrations at the northern end of Area A and elevated volatile organic concentrations at Area B.

- Residential wells do not appear to be impacted by landfill-related contamination because the drainage ditches surrounding the landfill appear to intercept shallow ground water discharge.

- The confining clay unit below Area B appears to be absent in places allowing for downward migration of contaminants.

- Shallow ground water appears to flow rapidly away from Area B at an estimated rate of 1 to 50 feet per year.

- Deep ground water flow appears to be to the west-northwest at an estimated rate of 10 to 20 feet per year.

- There were pockets of metal debris (from previous landfilling operations) that appeared to be source areas and which warranted removal. These are identified as Areas 1 to 7 on Drawing RA-1.

1.4 SITE REMEDIATION ACTIVITIES

The interim remedial activities for the site generally consist of the following:

- Remove contaminated soil and debris to the required cleanup levels

- Decontaminate the removed debris and stage for disposal

- Transport the soil and debris to appropriate off-site disposal facilities

- Bulk existing drums - Treat water, dispose of solids

- Perform confirmation sampling and analysis to ensure cleanup levels are achieved

- Provide effective dewatering method and conduct general site activities (particularly materials handling) in an efficient manner so as to reduce amount of liquid waste generated

- Perform on-site treatment for the ground water removed for the excavation to achieve the required discharge criteria

- Perform all work in accordance with applicable federal, state, and local regulations.

2.0 ORGANIZATION STRUCTURE FOR IMPLEMENTATION

The following sections describe the personnel and required chain of command that will control and direct EPP activities at the site.

2.1 RESPONSIBLE PARTIES

2.1.1 Department of the Navy

Department of the Navy is the Owner of the site and the responsible party for the site remediation activities. The Navy has contracted OHM to perform the remediation activities. As part of the contractual arrangements with OHM, the Navy's technical representative will delegate the responsibility for the implementation of this EPP to OHM. Throughout the duration of the site remediation activities, OHM will notify the Navy of any EPP incident as soon as possible.

2.1.2 OHM

OHM is responsible for implementing EPP procedures and is responsible for all information contained in this EPP.

Figure 2 depicts OHM's organizational structure for EPP and emergency situations.

2.2 EMERGENCY SERVICES

A summary of local and state emergency service agencies is listed in Table 1. Individual emergency agencies and responsibilities are as follows.

2.2.1 Police

The Norfolk Naval Station Police will provide police support for blocking traffic, directing traffic, and other related duties during EPP situations. Unlawful entry into the site will also be reported to the Norfolk Naval Station Police.

2.2.2 Fire Department

All EPP situations requiring fire department personnel and equipment will be reported to the Norfolk Naval Station Fire Department.

2.3 COORDINATION RESPONSIBILITIES

All EPP provisions will be implemented by means of OHM's organizational structure shown on Figure 2. OHM is responsible for coordination, training, drills, notification, and other aspects of this EPP.

2.3.1 Project Manager

The Project Manager is ultimately responsible for completion of the project in accordance with the plans. He delegates the responsibility for the implementation, maintenance, and compliance of the project activities with the EPP and Site Health and Safety Plan to the site health and safety officer (SHSO).

2.3.2 Site Health and Safety Officer

The SHSO will be responsible for all EPP and health and safety activities for air monitoring activities, overseeing the decontamination of equipment and materials leaving the contaminated area and for providing and enforcing the use of personal protective equipment and clothing, decontamination procedures and emergency response procedures. A Health and Safety professional will be responsible for training of on-site personnel. The SHSO has the authority to stop any operation that threatens the health and/or safety of the team or surrounding populace. The daily EPP inspections and health and safety activities may be conducted by the SHSO or the on-site supervisor.

2.3.3 On-Site Supervisor

The on-site supervisor is responsible for field implementation of the EPP procedures and the health and safety program when the SHSO is not present. This responsibility includes advising site workers of the specific health and safety requirements and consulting with the SHSO regarding appropriate changes to the EPP and health and safety plan.

2.3.4 Emergency Coordinator (EC)

The emergency coordinator will implement and coordinate all EPP procedures during spills and releases. During an emergency, the EC will activate alarm systems, notify emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation. The EC will also be responsible for follow-up activities after the incident such as treating, storing, or disposing of residues and impacted soil, decontamination and maintenance of emergency equipment, and submission of any reports. The EC is also responsible for personnel training and evacuation drills. The on-site supervisor or the SHSO, depending on who is on site, will be the EC. The EC will be on-site during all remediation operations.

2.3.5 Site Personnel

All site personnel will be responsible for working in a safe and healthy manner. They will be required to comply with all applicable local, State, and Federal rules and regulations.

3.0 MATERIALS INVENTORY AND COMPATIBILITY

The following section contains information regarding the materials that may be involved in a spill or release. Table 2 lists quantities of the materials present on site by their type.

3.1 ON-SITE MATERIALS

Volatile organic compounds are the constituents of concern for the removal action. The VOCs consist of trichloroethene, 1,2-dichloroethene, toluene, ethylbenzene, xylene, and low levels of pesticide/PCB compounds. These compounds are present in both subsurface soils and ground water at the site. On-site materials consist of soil and construction debris.

3.2 ORGANIC VAPOR RELEASES

Organic vapor releases may occur during removal activities. Organic vapor concentrations in the air during excavation activities will be monitored using air monitoring equipment such as a photoionization detector (PID). Air monitoring requirements are described in Section 7.5.

3.3 FUEL AND FLAMMABLE LIQUIDS

To complete the project, OHM will construct an on-site fuel depot that will contain fuels and oils for construction vehicles. The types of materials that may be stored at the fuel depot are as follows:

- Diesel Fuel
- Gasoline
- Motor and Transmission oils
- Greases
- Used Oil.

3.4 OTHER MATERIALS OF CONCERN

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantity and type of these materials will be determined during remedial activities:

- Portland Cement
- Bentonite
- Agricultural Lime
- Fertilizer.

These materials will be used as construction materials during the removal action and restoration period.

3.5 MATERIAL COMPATIBILITY

The materials mentioned in Sections 3.1 to 3.4 are not anticipated to be mixed or combined during site operations. All of the compatibility data that exist for each material are noted on each MSDS provided in Appendix A.

4.0 EMERGENCY AND DECONTAMINATION EQUIPMENT

4.1 EMERGENCY EQUIPMENT

4.1.1 Small-Scale Emergency Equipment

Small-scale emergency equipment will include dry-chemical, ABC-rated fire extinguishers; spill control equipment; absorbent materials; decontamination equipment; breathing respirators; radio and telephone equipment; wind socks; and various hand tools. This equipment will be made accessible to all on-site workers. Locations of such equipment will be posted at OHM's trailer. A list of small equipment is provided in Table 3.

4.1.2 Large-Scale Emergency Equipment

Large-scale emergency equipment will include the same equipment used in the ongoing construction activities. The equipment will include frontend loaders, bulldozers, and excavators if equipment of such size and power is necessary. Other emergency equipment will be available from the local fire department and other agency's equipment if needed. A list of large equipment proposed for on-site use is provided in Table 3. Table 3 will be completed during the cost estimate phase of project work.

4.2 SPILL RESPONSE EQUIPMENT

OHM will provide adequate spill response equipment and materials. Spill response equipment will include absorbent materials, sand, chemical neutralizers, and other spill containment devices necessary to prevent spill migration. Other equipment will include construction equipment used in ongoing construction activities.

All equipment will be tested and maintained as necessary to assure its proper operation in time of emergency. After an emergency, all equipment will be decontaminated, cleaned, and fit for its intended use before normal operations resume.

4.3 DECONTAMINATION EQUIPMENT

Equipment necessary for decontamination activities will be provided, installed, and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Decontamination Pad and Sump
- Clean Water Supply
- Detergent Solution
- Brushes
- Waste Containers.

The decontamination/drying pad and temporary decontamination pad are depicted on Drawings RA-4 and RA-5.

5.0 SITE EVACUATION PLAN

5.1 SITE EVACUATION SIGNAL

All site personnel, including equipment operators, technicians, and supervisors will evacuate the site upon hearing the evacuation signal. The signal will consist of a continuous blast from an air horn. The blast will be at least 15 seconds in duration, and will be sounded from a location that broadcasts clearly to the entire site. The signal will be repeated at least two times to alert all personnel. Radio base station personnel will also broadcast a verbal evacuation command over the site channel to alert operators who may not hear the air horn signal. The evacuation signal will also be sent by visual means. Clutching throat with hands is the signal for site evacuation.

5.2 SITE EVACUATION AND ROUTES

After the evacuation signal is sounded, all personnel will immediately proceed to the meeting point. The meeting point is located north of the site near the main gate. A second alternate meeting point is located near the contractor office trailer. This area is to be used by site personnel working in the southern end of the site. One supervisory person will proceed to this location. Radio contact will be maintained between both meeting points. Wind direction will be noted during the evacuation by observing the wind socks. All attempts to reach the upwind meeting location must be taken. All equipment, trucks, and other internal combustion engines will be shut down prior to personnel evacuation if the equipment can be reached without risking personal safety. The evacuation routes are shown on Figure 3.

The EC will contact all pertinent naval authorities to inform them of the nature and extent of the emergency. A meeting point coordinator will be chosen at each meeting point. This person will either be the SHSO, EC, foreman, or other supervisor. The meeting point coordinator will follow actions described in Section 5.3.

5.3 POST EVACUATION ACTIONS

A head count of personnel assembled at the meeting points will be taken by the coordinator at each site after the evacuation. Information regarding missing and/or injured personnel will be brought to the immediate attention of the meeting point coordinator, who is the person in charge at the meeting point. No personnel will attempt to re-enter the site at this time. The EC or appointed representative will coordinate activities with U.S. Naval authorities. After the emergency has been resolved, the EC will indicate when personnel can enter the site and resume work.

5.4 SITE EVACUATION DRILL

All site personnel must be familiar with the evacuation signal and evacuation procedures prior to any site operations. The evacuation plan will be executed during an announced drill sometime within the first twenty days of site operations. This drill will be conducted after major activities (i.e., excavation, water treatment, etc.) have begun at the site. The EC will announce the drill time to all site personnel and will notify U.S. Navy authorities as to the nature and time of the drill. The drill will include contacting authorities to verify communication procedures.

6.0 SPILL PREVENTION AND RESPONSE

6.1 POTENTIAL SPILL SOURCES AND PREVENTION PRACTICES

The following section details OHM's procedures for implementing this portion of the EPP. Potential activities include containment, collection, and material disposal or reuse.

6.1.1 Excavation Areas

The excavation areas contain contaminated soil and construction debris that will be excavated for removal from the site and ultimate disposal. The potential spill source is runon, or water from the excavation. The excavation areas will be bermed if necessary to contain all source material within the excavation area. The erosion and sedimentation control plan outlines practices to divert runon from entering the excavations.

6.1.2 Fuel Storage

Vehicle fuels and oils will be stored in fuel depot areas in approved storage containers. The fuel tanks will be anchored to the ground, stabilized on skids, or placed on saddles to prevent overturning and rolling. Containers will be placed outside of the maximum turning radius of all vehicles, as well as turnaround or unloading zones. Secondary containment is required for all fuel containers larger than 5-gallons. Secondary containment will be 110% of the aggregate storage volume. All tanks will be placarded with the National Fire Safety system for hazardous material classification and the tanks will be properly electrically grounded.

6.1.3 On-Site Material Transportation

All source material will be transported to the drying/decontamination pad on site haul roads. OHM's practices will reduce source material spills. These practices include not overfilling trucks, drivers traveling at slow speeds, and having haul roads maintained in good condition.

6.2 EXTERNAL FACTORS

The following describes actions to be taken to alleviate effects to public health and safety or the environment from factors external to the site.

6.2.1 Power Outages

Power will be from utility service drops and/or contractor supplied generators. OHM will have access to a backup generator in case of failure of the primary service drops and/or generator(s) where such failure may impact the public health or safety of the environment.

6.2.2 Flooding

Flooding has the potential to be a spill instigation factor at this site.

6.2.3 Severe Weather

Short-duration, high-intensity rain showers may create unexpected erosion and drainage problems such as slope and containment berm erosion. Immediately after such events, all containment devices will be closely inspected for structural and practical integrity. Also, spillage or leakage will be immediately corrected. Repair to these containment devices will be made as soon as possible or at least before construction continues.

6.3 PROTECTION OF NATURAL RESOURCES

Protection of natural resources is mandated in Section 01560 - Environmental Protection of the Statement of Work. This includes land and water sources. Protection of water resources is covered under Section 8.0 - Erosion Sediment Control. Protection of land resources is also discussed in part.

In general, OHM will limit the extent of clearing operations to the areas required for access to the excavation areas, ancillary facilities, and support facilities. All reasonable attempts will be made to keep the excavation area sizes to a minimum; similarly, the size of staging and support zones will be kept to a minimum.

All reasonable attempts will be made to minimize landscape defacement. This will include the trimming of trees and brush instead of removal, wherever possible. Operation of equipment will be limited to the confines of the excavation areas to minimize the potential for residual damage to landscape features.

Although OHM will take all reasonable measures to assure no residual damage, it is inevitable that some damage will occur. In the event that damage is done to the landscape, the affected area or feature will be restored to the satisfaction of the Navy's technical representative as soon as the restoration is deemed practical. Damages trees and shrubs will be treated with approved measures by experienced workers. Plant life or trees damaged beyond repair will be cleared and replaced as directed.

Vegetation removed as part of the planned clearing will be replaced in accordance with Section 01561 of the Statement of Work.

6.4 DUST CONTROL AND EROSION PROTECTION

Water trucks with sprinkling attachments will be utilized, as necessary, to control dust in the excavation areas and haul roads, and during placement of fill materials in the excavation area. The water source for the trucks will be approved by the Navy prior to utilization. Water will be applied in sufficient quantity to prevent creation of dust, but excessive watering that may result in a muddy condition that may be transferred to the haul roads will not be permitted. Determination of the need for dust control will be the responsibility of the OHM site supervisor as dictated by changes in site conditions on a continuing basis.

7.0 PREVENTATIVE ACTIONS

7.1 INSPECTION

Daily inspections of site areas will be performed by OHM's site-supervisor to ensure that procedures for proper storage, handling, and transport of materials are being followed. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 7.5 will be used when necessary. Such areas include the following:

- Dewatering system
- Excavation areas
- Water treatment facility
- Drum storage area
- Fuel depots - Various fuels and oils

Other areas and items that will be monitored and noted in the site logbook:

- Site security facilities
- Evidence of spilled materials along drainage ditches
- Effectiveness of housekeeping practices
- Various shipping and storage containers used throughout the site
- Disposal staging areas
- Proper placards and labeling of truck and tank contents.

7.2 EQUIPMENT MAINTENANCE

All construction equipment will be properly maintained to ensure safe operation. Equipment (especially trucks) will be properly maintained to minimize spillage or leakage which may occur during on-site transport operations. Further preventive maintenance on trucks is described in Section 7.4.2.

7.3 CALIBRATION OF MONITORING EQUIPMENT

It is important that all environmental monitoring equipment be calibrated so that accurate readings of potential spilled or leaked materials may be detected upon inspection. Calibration frequency and procedures will be followed as per the manufacturer's recommendations. OHM will retain calibration records on site.

7.4 HOUSEKEEPING PROGRAM

OHM's housekeeping program includes many items such as: neat and orderly storage of materials, proper truck and tank placards, prompt removal of spillage, regular refuse pickup and disposal, maintenance of roads and surfaces, and provisions for the storage of material and equipment to keep them from protruding into walkways, or roads.

7.4.1 Small Spillage

Small spills may include solid materials or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained and collected and placed on the drying pad for later disposal. Excavation of pits will be performed such that exposed source material remains within the limits of excavation or below the limits of temporarily constructed soil berms. All spilled liquids will be contained and collected by absorbent materials and the materials taken to the drying pad area. Spilled fuel and impacted soil will be placed on the drying pad for later disposal.

7.4.2 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacturers' recommendations. Trucks will not be overloaded, since overloaded trucks increase the possibility of material spillage. Truck end gates will be inspected to ensure they close and seal properly.

7.4.3 Site Security

A gate is located on the entrance from B Street. A lock will be placed on this gate to further inhibit accidental or intentional entry. The site is currently fenced, therefore, no security guard will be present when OHM is not on site.

7.4.4 Temporary Vehicle Decontamination Stations

A temporary vehicle decontamination station will be provided at the site exit and near the excavation area to wash materials from vehicles tires. This will reduce the amount of material that falls onto the haul roads and B Street, which will be removed as described in the Small Spillage Section 7.4.1.

7.4.5 Drying/Decontamination Pad

An asphalt pad for drying materials and decontamination of construction rubble encountered during excavation activities will be constructed as shown on Drawing Nos. RA-1 and RA-4. This area will be strictly for drying material and construction rubble decontamination. No equipment will be decontaminated on the pad.

7.4.6 Worker Training

All employees with the potential of exposure to hazardous substances will be required to attend and complete an Occupational Health and Safety Administration (OSHA) 40-hour Health and Safety Course (Hazardous Waste Operations and Emergency Response) as per 29 CFR 1910-120. Employees having this training will attend an 8-hour OSHA refresher course if the 40-hour class was taken over 1 year before that employee is to be on site.

The site specific training program will involve at lease one hour of instruction per employee. At a minimum, the training program will ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communication and alarm procedures; response to fires and explosions; site evacuation procedures; and, shut-down of operations. In addition, the employee training program will address other aspects of the EPP, such as preventive maintenance, inspection and monitoring, housekeeping practices, etc.

Job specific EPP and health and safety instructions will be reviewed before beginning each new phase of work. Weekly, or more often if conditions require, the SHSO or on-site supervisor will conduct follow-up training related to the change in operations or any other training deemed necessary by the SHSO. OHM will hold daily safety meetings prior to work to discuss the current project site safety considerations.

Site evacuation training will be provided as described in Section 5.2.

7.5 AIR MONITORING REQUIREMENTS

Air monitoring will be performed as required in the site Health and Safety Plan. A PID will be used to provide real-time, semi-quantitative data on total organic vapor concentrations in and around the breathing zone of workers and downwind of site activities. This instrument will be calibrated daily and organic vapor concentration will be monitored during site activities.

The OHM HASP identifies additional air monitoring instrumentation. The HASP also defines action levels for upgrading employee protection and instituting emergency actions. The air monitoring will determine concentrations of site contaminants within the ambient air and workers' breathing zone. The air monitoring measurements will be compared to OSHA standards which are the basis for defining the site action levels. The SSO will make the decision regarding equipment upgrades and emergency action based on the air quality measurements.

A wind sock will be installed to monitor the wind direction. The wind direction will be noted by the EC and other evacuation leaders so that evacuation procedures place personnel upwind of the situation. The wind sock will be placed in the project trailer area.

8.0 EROSION AND SEDIMENTATION CONTROL

8.1 FEATURES OF PROJECT AREAS

8.1.1 General

This plan includes three drawings describing features of project areas (RA-1, RA-2, and RA-6) which are described further in Section 8.1.2. The erosion and sedimentation controls, project areas, etc., are depicted on these drawings.

8.1.2 Project Areas

Drawing RA-1 depicts the existing topography, as well as major project features. Wetlands, roadways, and other site features are also shown on Drawing RA-1. The proposed erosion and sedimentation controls for the removal action are shown on Drawing RA-2. Erosion and sedimentation control measure details are shown on Drawing RA-6.

8.2 SOIL CHARACTERISTICS

8.2.1 Soil Types

Four soil types are present at the Camp Allen Landfill. The four soil types are as follows:

- Urban Land
- Urban Land - Udorthents
- Udorthents, Loamy
- Udorthents, Clayey.

Udorthents, Loamy is the prominent soil located in Area B.

8.2.2 Physical Characteristics

The soil types, as described in the current USDA - Soil Conservation Service Soil Survey of Norfolk, are listed in the following sections.

8.2.2.1 Urban Land

Urban Land soils are altered, reworked, or removed soil material in "areas where more than 70 percent of the land surface is covered by asphalt, concrete, buildings, or other impervious materials" (USDA, 1983).

8.2.2.2 Urban Land - Udorthents

Urban Land - Udorthents soils "have been graded, cut, filled, or otherwise disturbed by construction and earthmoving activities" (USDA, 1983). This soil complex has an urban setting and occupies gentle slopes and areas of moderately well and poorly drainage Udorthents soils.

8.2.2.3 Udorthents, Loamy

Udorthents, Loamy soils are "soil material in areas where the soil has been altered during excavation or covered by earthly fill material" (USDA, 1983). This soil complex has an urban setting near transportation arteries, manmade waterways and mining activities. Generally, Udorthents are well-to-moderately-well-drained loamy and sandy material.

8.2.2.4 Udorthents, Clayey

Udorthents, Clayey soils consist "mostly of clayey fill material that has been placed on soils of various drainage classes on lowlying terraces, floodplains, and tidal marshes" (USDA, 1983). This soil complex has a slow-to-very-slow permeability allowing water to pond easily on its surface. This results in little threat of erosional episodes taking place. Due to the perpetual wetness and slow permeability of Udorthents, Clayey soils, their use for civil construction is limited.

Although the Columbia Group underlies the native soils discussed above at the Camp Allen Landfill Site, the uppermost deposits of the landfill are representative of fill material used to create the landfill, rather than Columbia Group lithology. Fill material at Areas A and B includes incineration ash, fly and bottom ash from the Navy power plant, over-age chemicals, spent chlorinated organic solvents, acids, caustics, paints, paint thinners, pesticides, asbestos, scrap metal, construction and demolition debris, lubricating oils, burned materials, and drummed or otherwise contained wastes.

8.3 PROJECT ACTIVITIES

8.3.1 Site Preparation

Construction activities that will impact runoff during site preparation include the following:

- Clearing and grubbing for decontamination pads, drying pad roads, and trailer area
- Permanent road construction
- Drum staging area construction

- Drying/decontamination pad construction
- Water treatment facility
- Dewatering system.

The drying/decontamination pad will be the location where excavated materials will be stockpiled/decontaminated prior to loading the materials into rolloff containers for off-site disposal. This area, along with the water treatment facility and dewatering system, will be constructed prior to any excavation activities. The drum staging area will be constructed concurrently with the drying/decontamination pad and water treatment facility.

The existing road will be surfaced with gravel as shown on Drawings RA-1 and RA-4 of the design drawings. The temporary vehicle decontamination station, as shown on Drawing RA-1, will be provided at the main gate to wash all project vehicles prior to exiting the site.

8.3.2 Drying/Decontamination Pad

The drying/decontamination pad will consist of an 80-foot by 100-foot asphalt pad separated into two sections by a curb. Each half of the pad will slope to a sump. The entire pad will be curbed around the perimeter. This pad will be used for drying soil from the excavation areas and also decontaminating/cleaning construction debris.

8.3.3 Water Treatment Facility

This area will be used to treat site water from the dewatering activities, drying pad, and decontamination pad. A process and instrumentation diagram for the water treatment facility is depicted on Drawing RA-7.

8.3.4 Soil and Debris Excavation

Excavation and removal of soil and debris from seven areas is the main remediation activity. The excavated soil will be stored on the drying pad to allow any free water to drain prior to off-site disposal. The construction debris will be cleaned (steam cleaned or water laser) on the drying/decontamination pad prior to off-site disposal.

8.4 RUNOFF

8.4.1 Project Area

All runoff from the disturbed project areas will be collected and treated through the water treatment facility. The erosion and sedimentation control facilities will minimize the runon affecting the site.

8.4.2 Upgradient Watershed

The existing drainage ditches and swales in the topography will be used to divert upgradient runon around the project site. The diverted water will follow the existing drainage flow pattern, conveyed into the pond in the northeast corner of the site and then into a box culvert under the adjacent salvage yard.

8.4.3 Impact

The Erosion and Sedimentation Control Plan will minimize the impact to the watershed from project activities.

8.5 EARTHMOVING ACTIVITIES

8.5.1 General

The anticipated project activities that require erosion and sedimentation controls are described in the following sections.

8.5.1.1 Site Preparation

The first tasks at the site will consist of site preparation activities. Project areas will be cleared and grubbed, and roads will be constructed. Site utilities and office trailer areas will be located and completed. Silt fence and straw bale dikes will be installed at the locations shown on the drawings and as needed to accommodate project site conditions. Surface water management features will be constructed. Aggregate will be placed on the site access road in accordance with the technical specifications and as shown on the design drawings. A temporary vehicle decontamination station will be constructed at the main gate to provide areas for project vehicles to wash mud and other debris off of their wheels prior to exiting the site.

In addition to the construction of the drying/decontamination pad, the water treatment area and the screening mechanism will be prepared for use during site preparation activities. These areas will be bermed (e.g., soil, asphalt, or other materials) around their perimeters so that all precipitation that comes in contact with stockpiled materials will be contained within the areas.

8.5.1.2 Soil and Debris Excavation

Prior to excavation activities at the seven areas, silt fence will be installed adjacent to the proposed lateral excavation limits, on the downslope side, as shown on Drawing RA-1. Silt fence will also be placed along the eastern perimeter of the site to prevent on-site materials from washing into the elementary drive or onto the diversion ditch that is located along the east side of the site. Additionally, soil berms will be constructed upslope of the excavation areas as shown on Drawing RA-1.

8.5.1.3 Site Regrading and Revegetation

The final task at the site will involve the regrading and revegetation of the excavation and project areas. Each excavation area will be graded to promote drainage away from the area as shown by the final contours on Drawing RA-3. The areas will be seeded and mulched in accordance with the technical specifications. All silt fence will be removed after vegetation is established. The areas disturbed for the ancillary features (drying pad, decontamination pad, trailers, etc.) will also be seeded after the facilities have been removed.

8.6 TEMPORARY CONTROL MEASURES

8.6.1 General

This section describes the various temporary erosion and sedimentation controls that will be used during earthmoving activities at the site. The specific use of the controls is described in Section 8.5. All controls will comply with the technical specifications presented in Appendix B.

8.6.2 Silt Fence

Silt fence will be utilized as a temporary sedimentation control measure around the project areas as shown on Drawing RA-2. Silt fence will also be placed as necessary to accommodate site conditions at the direction of the site engineer.

8.6.3 Straw Bale Barriers

Straw bales will be used in places where flow over disturbed areas must be minimized while vegetation is established. Locations of the straw bales are shown on Drawing RA-2.

8.6.4 Temporary Vehicle Decontamination Stations

A temporary vehicle decontamination station will be constructed at the main gate as described in Section 8.5.1.1. Wash water will be collected in sumps for transport to the water treatment facility. Sediment from this station will be bulked with excavation materials for off-site disposal. A temporary decontamination station will be established near each excavation area to wash the truck tires as they haul excavated materials to the screening mechanism.

8.7 PERMANENT CONTROL MEASURES

8.7.1 General

This section describes the various permanent erosion and sedimentation controls that will be used during and upon completion of earthmoving activities at the site. The specific use of the controls is described in Section 8.5. All controls will comply with the technical

specifications presented in the Statement of Work and the Virginia Erosion and Sediment Control Manual (VESCM).

8.7.2 Vegetative Establishment

All disturbed site areas will be vegetated upon project completion with the specified long-term seed mixture. No other permanent control measures are anticipated.

8.8 MAINTENANCE PROGRAM

8.8.1 General

This section describes the maintenance program for the erosion and sedimentation control measures at the site.

8.8.2 Temporary Control Measures

Maintenance of the erosion and sedimentation controls during the project will be performed by OHM. All controls will be inspected daily, as well as after each storm event. Sediment removed from controls will be collected and bulked with excavation materials for off-site disposal.

8.8.3 Permanent Control Measures

After project completion and demobilization, OHM will inspect the seeded and mulched areas on a bi-weekly basis for 10 weeks. If erosion is observed during the inspection, OHM will make necessary repairs to the seedbed and mulch the affected area.

TABLES

TABLES

TABLE 1

EMERGENCY INFORMATION

In the event of a fire, uncontrollable spill, explosion, or any occurrence that might be harmful to personnel or adjacent property, the SSHO will immediately notify the proper emergency services.

Emergency Notification Numbers

Fire Department	800-444-3333
Ambulance	800-444-3333
Police	800-444-3333
Medical	804-889-5000 (DePaul Medical Center)

Procedures for Reporting Incidents

Immediately call:

Project Manager	Joseph W. Colella 412-963-2300 (Office)
Health and Safety Officer	To Be Determined
Emergency Response Health & Safety Director	Kevin McMahon, M.S., C.I.H. 609-588-6375 (Office) 609-421-7523 (Pager)
U.S. Navy Contact	Susan Hauser Code 1822 804-322-4779
National Response Center	1-800-424-8802

TABLE 2

MATERIAL INVENTORY

MATERIAL	UNIT	QUANTITY	LOCATION
Impacted soil/construction rubble	cubic yards	4,600(1)	Excavation Area
Dewatering Fluids	gallons	(2)	Excavation Area/ Treatment Area
Diesel Fuel	gallons	(2)	Project Trailer Area
Gasoline	gallons	(2)	Project Trailer Area
Portland Cement	pounds	(2)	Project Trailer Area
Bentonite	pounds	(2)	Project Trailer Area
Lime, Fertilizer	pounds	(2)	Project Trailer Area
Water Treatment Reagents	gallons	(2)	Water Treatment Area
Carbon Drums	pounds	20,000	Water Treatment Area
IDW Drums:			
Solid	each	321	Drum Staging Area
Liquid	each	67	Drum Staging Area

Notes:

(1) Quantity based on 1:1 excavation slopes and proposed depths as shown on the design drawings.

(2) Ongoing activity. Quantities to be determined during removal activities.

TABLE 3

EQUIPMENT LIST

EQUIPMENT	USE	LOCATION
Large Equipment: Frontend Loader Excavators Backhoe Firefighting Equipment Tank Truck		
Small Equipment: Absorbent Materials Basket Stretchers Camera/Photo Equipment Chainsaw Chemical Neutralizers Decontamination Equipment with a clean water supply (70-80°F) First-Aid Supplies Lighting Equipment Medical Supplies Metal Saw (Power) ABC-Rated Portable Fire Extinguishers Radio Self-Contained Breathing Apparatus (SCBA) Submersible Pumps Welding/Cutting Equipment		

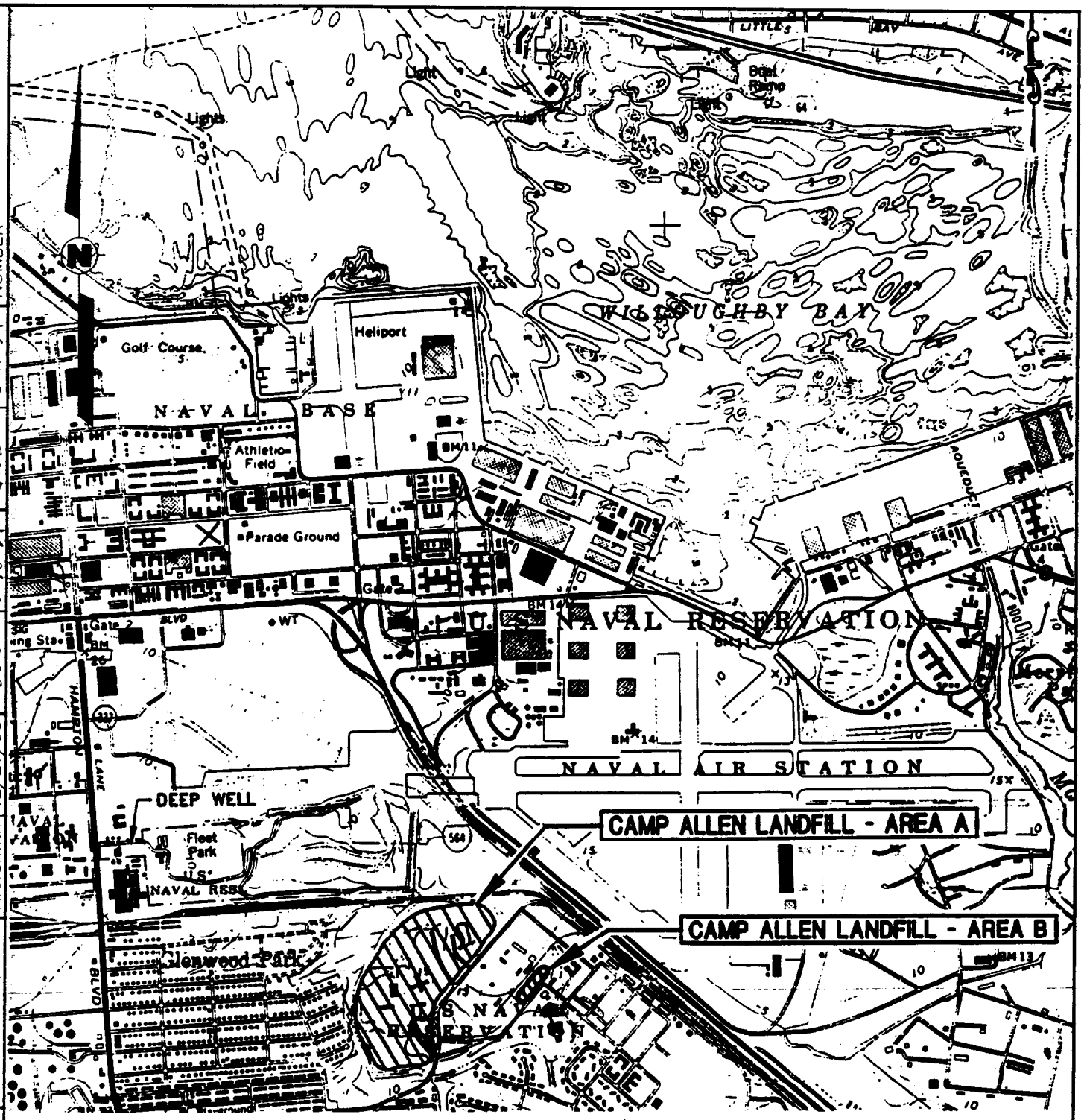
Notes:

(1) OHM will provide a detailed equipment list prior to mobilization.

(2) ABC-rated portable fire extinguishers to include two 20-pound units per trailer, one 10-pound unit in each piece of mobile equipment, and one 20-pound unit at each major mechanical operation (e.g., vacuum receiver, water treatment, and debris screening).

FIGURES

FIGURES



	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
OHM CORPORATION PITTSBURGH, PA	A.C.Smith 12/21/93	JJG 3-10-94	JWC 3-11-94	15444-A3

PLOT SCALE: 1" = 1"

FIGURE 1

SITE LOCATION MAP
SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL, AREA B, NAVAL BASE, NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

SCALE
0 2000 4000 FEET

REFERENCE:
U.S.G.S 7.5 MIN TOPOGRAPHIC MAP,
NORFOLK NORTH QUADRANGLE, VA
DATED: 1965 (PHOTOREVISED 1986)

OHM Corporation

OHM CORPORATION PITTSBURGH, PA	DRAWN BY	CHECKED BY		APPROVED BY		DRAWING NUMBER	15444-A2
	A.C.Smith	12/21/93	JJG	3-10-94	JWC	3-11-94	

PLOT SCALE: 1" = 1"

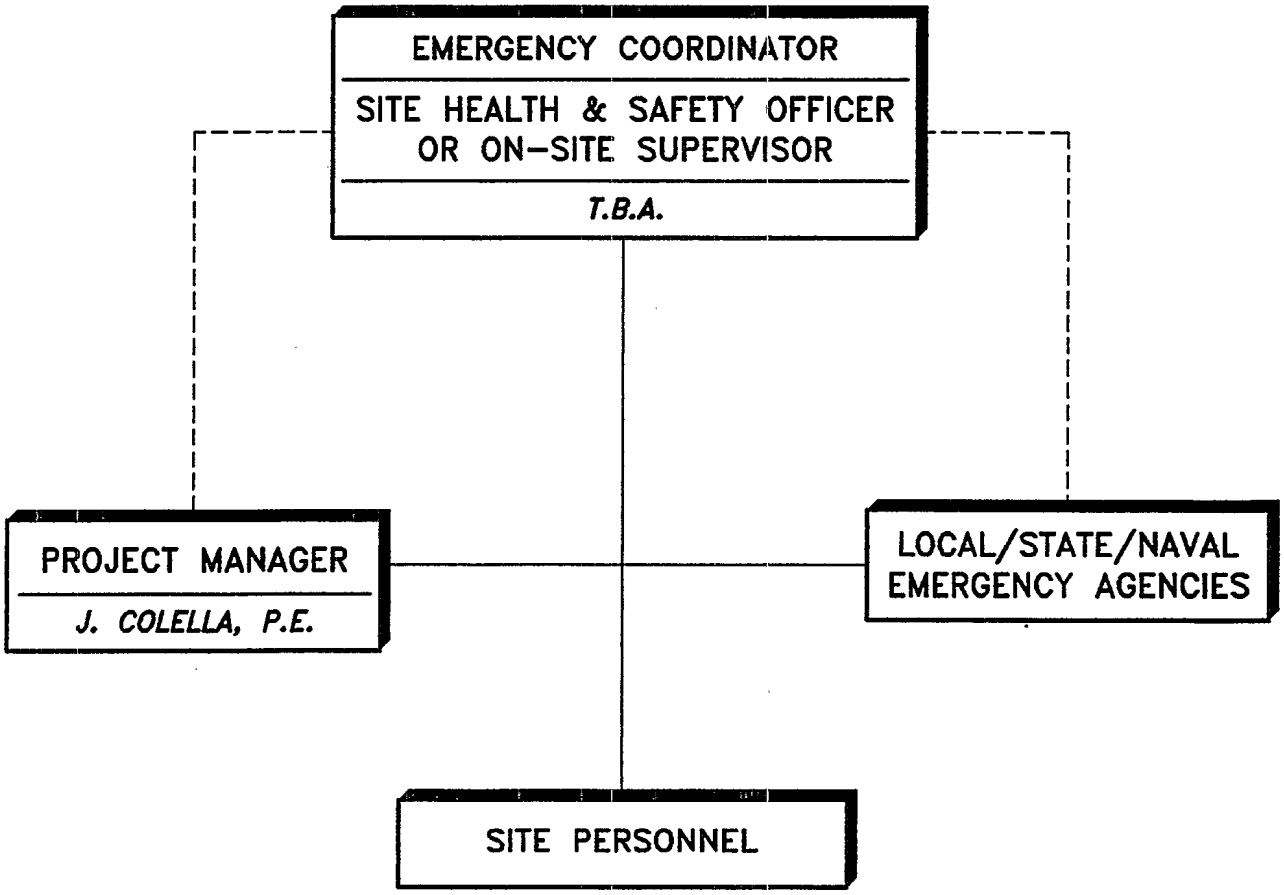


FIGURE 2

ENVIRONMENTAL PROTECTION PLAN
EMERGENCY COORDINATOR
ORGANIZATION CHART

SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL, AREA B, NAVAL BASE, NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

OHM Corporation

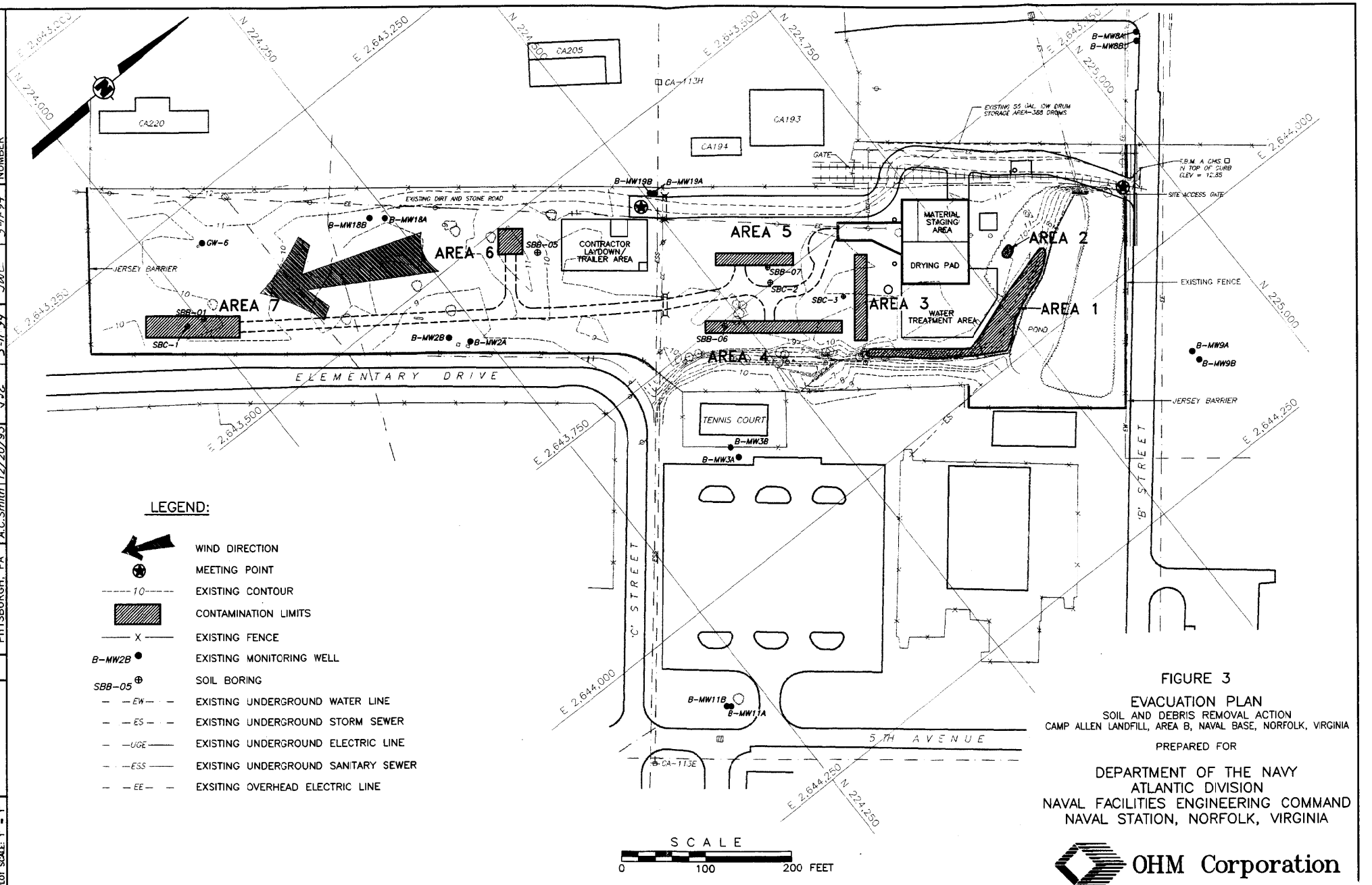


FIGURE 3

EVACUATION PLAN

SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL, AREA B, NAVAL BASE, NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

OHM Corporation

OHM CORPORATION PITTSBURGH, PA	DRAWN BY	CHECKED BY	APPROVED BY
	A.C.Smith 12/20/93	JJG 3-11-94	JWC 3-11-94

DRAWING NUMBER 15444-B3

PLOT SCALE: 1" = 1'

APPENDIX
A

APPENDIX A

MSDS INFORMATION

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 382

VINYL CHLORIDE
(Revision A)
Issued: August 1978
Revised: August 1988

SECTION 1. MATERIAL IDENTIFICATION

Material Name: VINYL CHLORIDE

Description (Origin/Uses): Widely used to make PVC resins and plastics; also used in organic synthesis.

Other Designations: VCM; Vinyl Chloride Monomer; Chloroethylene; Chloroethene; C_2H_3Cl; CAS No. 0075-01-4

NFPA

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS

H 2	R 1
F 4	I 4
R 1	S 3
PPG*	K 4
*See sect. 8	

SECTION 2. INGREDIENTS AND HAZARDS

	%	EXPOSURE LIMITS
Vinyl Chloride, CAS No. 0075-01-4	Ca 100	**OSHA PEL** 8-Hr TWA: 1 ppm* **ACGIH TLV, 1987-88** TLV-TWA: 5 ppm, 10 mg/m³ **Toxicity Data**** Rat, Oral, LD_{50}: 500 mg/kg

*The action level set by OSHA in 29 CFR 1910.1017 is 0.5 ppm. Exposures above this level are strictly regulated by extensive medical record keeping, reporting, surveillance, and other requirements. Consult 29 CFR 1910.1017 for details.

**See NIOSH, *RTECS* (No. KU9625000), for additional data with references to mutagenic, reproductive, and tumorigenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 61°F (16°C)
Water Solubility (%): Insoluble
Molecular Weight: 107 Grams/Mole
Vapor Density (Air = 1): 2.2

Appearance and Odor: A colorless gas; mild, sweet odor at high concentrations.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
-108.4°F (-78°C)	882°F (472°C)	% by Volume	3.6%	33%

Extinguishing Media: Vinyl chloride gas is a severe fire and explosion hazard; treat any fire involving it as an emergency. Try to shut off the flow of gas. Use a water spray to protect the personnel attempting this and to cool fire-exposed cylinders/containers of vinyl chloride.

Unusual Fire or Explosion Hazards: This heavier-than-air gas can flow along surfaces, reach distant sources of ignition, and flash back. Eliminate sources of ignition in the workplace, particularly in low-lying areas such as sumps, cellars, basement utility rooms, and underground piping systems.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Vinyl chloride is stable in closed, airtight, pressurized containers at room temperature under normal storage and handling conditions. It can undergo hazardous polymerization if it is heated or reacted with a polymerization catalyst, or if the concentration/activity of the added inhibitor becomes too low.

Chemical Incompatibilities: This material is incompatible with copper, aluminum, and other polymerization catalysts or free radical initiators like hydroquinone.

Conditions to Avoid: Do not allow sources of ignition such as open flame, unprotected heaters, lighted tobacco products, electric sparks, or excessive heat in work areas. Avoid prolonged exposure to air, especially in the presence of certain contaminants, because dangerous levels of polyperoxides may accumulate. Avoid exposure to sunlight; if the proper catalytic conditions occur, the vinyl chloride monomer may react with itself and undergo an explosive polymerization reaction. Violent ruptures of containers of this gas can occur.

Hazardous Products of Decomposition: During fires, vinyl chloride may decompose into toxic gases such as hydrogen chloride, carbon monoxide, and phosgene.

SECTION 6. HEALTH HAZARD INFORMATION

Vinyl chloride is listed as a carcinogen by the ACGIH, NTP, and IARC with sufficient epidemiological evidence from human studies.
Summary of Risks: Vinyl chloride depresses the central nervous system (CNS), causing effects that resemble mild alcohol intoxication; however, these effects can progress to narcosis, eventual collapse, and even death as the intensity and/or duration of the exposure continues. Thrombocytopenia (decrease in blood platelets) has been reported following exposures.
Medical Conditions Aggravated by Long-Term Exposure: Possible liver effects. **Target Organs:** Respiratory system, skin, eyes, kidneys, hematopoietic (blood) system, and musculoskeletal system. **Primary Entry:** Inhalation. **Acute Effects:** Headache, dizziness, lightheadedness, skin and eye irritation. **Chronic Effects:** Cancer, especially angiosarcoma of the liver.
FIRST AID: Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. **Skin.** Skin contact with liquid vinyl chloride causes frostbite (cryogenic injury). Treat this accordingly.
Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed.
Ingestion. Unlikely.
GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: *Treat any vinyl chloride gas leak as an emergency.* Preplan emergency responses and make sure all personnel know about them. Notify safety personnel, evacuate all nonessential personnel, provide maximum explosion-proof ventilation, and eliminate all sources of ignition immediately. Make sure cleanup personnel have protection against contact with this material and inhalation of its vapor (see sect. 8). **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations for disposal. Follow Federal, state, and local regulations.
OSHA Designations
Air Contaminant (29 CFR 1910.1000 Subpart Z)
Vinyl chloride is specifically regulated by OSHA at 29 CFR 1910.1017 as a suspected carcinogenic agent.
EPA Designations (40 CFR 302.4)
RCRA Hazardous Waste, No. U043
CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg), per Clean Water Act (CWA), section 307 (a); Clean Air Act (CAA), section 112; and Resource Conservation and Recovery Act (RCRA), section 3001.

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Consult the *NIOSH Pocket Guide to Chemical Hazards* for general recommendations on respirators. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves; boots; aprons; head covers; and clean, impervious, body-covering clothing to prevent any possibility of skin contact with vinyl chloride. All clothing must be flame resistant. **Ventilation:** Install and operate general and local ventilation systems powerful enough to maintain airborne levels of vinyl chloride below the OSHA PEL standard cited in section 2. All ventilation systems must be of maximum explosion-proof design, e.g., nonsparking, electrically grounded and bonded. **Safety Stations:** Make eyewash stations, safety showers, and washing facilities available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. **Other:** Design all engineering systems to be explosion-proof in areas where vinyl chloride gas may occur. Pressure check all pipes and equipment used with this gas and make sure that all connections are leak tight. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store vinyl chloride in a cool, dry, well-ventilated area away from sources of ignition and incompatible chemicals. Outside or detached storage is recommended. Shade containers from radiant heat and direct sunlight. **Special Handling/Storage:** Vinyl chloride is shipped/stored as a pressurized gas in cylinders or tank cars. Protect these containers against physical damage and regularly inspect them for cracks, leaks, or faulty valves. Ground and bond all containers used in shipping/transferring operations. Store cylinders upright; secure them tightly; do not drag or slide them; move them in a carefully supervised manner with a suitable hand truck. Monitor the activity and concentration of the added inhibitor to the vinyl chloride product. Follow your supplier's recommendations concerning proper shelf life, rotation of inventory, and maintenance of purity. **Engineering Controls:** Make all engineering systems (ventilation, production, etc.) of maximum explosion-proof design. **Comments:** Perform all operations with vinyl chloride carefully to prevent accidental ignition. Do not smoke in any use or storage area. Maintain the valve protection cap in place until immediately before using vinyl chloride. Insert a check valve or trap into the transferral line to prevent a dangerous backflow into the original container. Use pressure-reducing regulators when connecting cylinders to lower-pressure piping systems. Obtain detailed handling, shipping, and storage information from your supplier. A trained chemist or safety specialist familiar with the physical and chemical properties of this material should be present during all work operations.
Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Vinyl Chloride	**DOT Label:** Flammable Gas	**IMO Label:** Flammable Gas
DOT ID No. UN1086	**DOT Hazard Class:** Flammable Gas	**IMO Class:** 2.1

References: 1, 2, 12, 73, 84-94.

Prepared by PJ Igoe, BS
Industrial Hygiene Review: DJ Wilson, CIH
Medical Review: MJ Hardies, MD

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 683

POLYCHLORINATED BIPHENYLS (PCBs)

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

Material Name: POLYCHLORINATED BIPHENYLS (PCBs)

Genium

Description (Origin/Uses): Commercial PCBs are mixtures that were once widely manufactured by combining chlorine gas, iron filings, and biphenyls. Their high stability contributes to their intended commercial applications and their accidental, long-term adverse environmental and health effects. PCBs are useful as insulators in electrical equipment because they are electrically nonconductive. Their distribution has been limited since 1976. The Aroclor PCB codes identify PCBs by type. The first two digits of a code indicate whether the PCB contains chlorinated biphenyls (12), chlorinated terphenyls, (54), or both (25, 44); the last two digits indicate the approximate percentage of chlorine. Found in insulating liquid, synthetic rubber, plasticizers, flame retardants, floor tile, printer's ink, paper and fabric coatings, brake linings, paints, automobile body sealants, asphalt, adhesives, electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines, heat-transfer fluids, hydraulic fluids, lubricating and cutting oil, copying paper, carbonless copying paper, and fluorescent light ballasts.

Synonym: Chlorodiphenyls

Other Designations (Producer, Trade Name, Nation): Monsanto, Aroclor® (USA, Great Britain); Bayer, Clophen® (German Democratic Republic); Prodelec, Phenoclor®, Pyralene® (France); Kanegafuchi, Kanechlor®; Mitsubishi, Santotherm® (Japan); Caffaro, Fenclor® (Italy).

Trade Name	CAS No.	*RTECS* No.	Trade Name	CAS No.	*RTECS* No.
Aroclors	01336-36-3	TQ1350000	Aroclor 1242	53469-21-9	TQ1356000
Aroclor 1016	12674-11-2	TQ1351000	Aroclor 1248	12672-29-6	TQ1358000
Aroclor 1221	11104-28-2	TQ1352000	Aroclor 1254	11097-69-1	TQ1360000
Aroclor 1232	11141-16-5	TQ1354000	Aroclor 1260	11096-82-5	TQ1362000

HMIS			
H	1	R	1
F	1	I	3
R	0	S	1
PPG*		K	1

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

PCB-42% Chlorine/Aroclor 1242
CAS No. 53469-21-9
OSHA PEL (Skin*)
8-Hr TWA: 1 mg/m³
ACGIH TLV (Skin*), 1988-89
TLV-TWA: 1 mg/m³

PCB-54% Chlorine/Aroclor 1254
CAS No. 11097-69-1
OSHA PEL (Skin*)
8-Hr TWA: 0.5 mg/m³
ACGIH TLV (Skin*), 1988-89
TLV-TWA: 0.5 mg/m³

All PCBs/Aroclors
CAS No. 1336-36-3
NIOSH REL 1977
10-Hour TWA: 0.001mg/m³
Toxicity Data**
Mouse, Oral, LD_{50}: 1900 mg/kg

*This material can be absorbed through intact skin, which contributes to overall exposure.
**See NIOSH, *RTECS* (Genium ref. 90), at the locations specified in section 1 for additional data with references to tumorigenic, reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: Ranges from 527°F (275°C) to 725°F (385°C)
Solubility in Water (%): Insoluble
Pour Point: Ranges from -31°F (-35°C) to 87.8°F (31°C)
% Volatile by Volume: Ranges from 1.2 to 1.6
Molecular Weight (Average): Aroclor 1242: 258 Grams/Mole
Aroclor 1254: 326 Grams/Mole

Appearance and Odor: Clear to light yellow mobile oil to a sticky resin; a sweet "aromatic" odor. As the percentage of chlorine increases, the PCB becomes thicker and heavier; e.g., Aroclor 1254 is more viscous than Aroclor 1242.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*	Autoignition Temperature: Not Found	LEL: Not Found	UEL: Not Found

Extinguishing Media: Use water spray/fog, carbon dioxide (CO_2), dry chemical, or "alcohol" foam to extinguish fires that involve polychlorinated biphenyls. Although it is very difficult to ignite PCBs, they are often mixed with more flammable materials (oils, solvents, etc.) **Unusual Fire or Explosion Hazards:** If a transformer containing PCBs is involved in a fire, its owner may be required to report the incident to appropriate authorities. Consult and follow all pertinent Federal, state, and local regulations. **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode; fire fighters must also wear a complete set of protective clothing. **Comments:** The hazards of PCB fires are associated with the possibility of their being released into the environment where they and their products of degeneration can pose serious long-term health risks. These potential problems are heightened by the PCBs' resistance to biological and chemical degradation and by the possibility that they will contaminate underground water systems (see sect. 5)

*Ranges from 284°F (140°C) to 392°F (200°C).

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Polychlorinated biphenyls are very stable materials. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** PCBs can react dangerously with sodium or potassium. These reactions are part of an industrial process used to destroy PCBs; however, people have been killed by explosions at PCB treatment, storage, and disposal sites. **Conditions to Avoid:** Limit human exposure to PCBs to the lowest possible level; especially avoid contact with skin. **Hazardous Products of Decompositon:** Thermal-oxidative degradation of PCBs can produce toxic gases such as carbon monoxide, chlorine, chlorinated aromatic fragments, phenolics, aldehydes, and hydrogen chloride. Incomplete combustion of PCBs produces toxic compounds such as polychlorinated dibenzofuran (PCDF, the major product of combustion), and polychlorinated dibenzo-*p*-dioxin (PCDD or dioxin).

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: The EPA lists PCBs as carcinogens, and the IARC classifies them as probable human carcinogens (group 2B). **Summary of Risks:** Effects of accidental exposure to PCBs include acneform eruptions; eye discharge; swelling of the upper eyelids and hyperemia of the conjunctiva; hyperpigmentation of skin, nails, and mucous membrane; chloroacne; distinctive hair follicles; fever; hearing difficulties; limb spasms; headache; vomiting; and diarrhea. PCBs are potent liver toxins that can be absorbed through unbroken skin in hazardous amounts without immediately discernible pain or discomfort. Severe health effects can develop later. In experimental animals, prolonged or repeated exposure to PCBs by any route results in liver damage at levels that are less than those reported to have caused cancer in rodents. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, eyelids, blood, liver. **Primary Entry:** Inhalation, skin contact/absorption. **Acute Effects:** Skin and eye irritation, acneform dermatitis, nausea, vomiting, abdominal pain, jaundice, liver damage. **Chronic Effects:** Possible cancer (evidence of this is inconclusive); reproductive effects (jaundice, excessive secretion of tears, dermal chromopexy); and hepatitis. **FIRST AID: Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for 15 minutes. **Skin.** Rinse exposed skin with flooding amounts of water; wash with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support breathing as needed. Have qualified medical personnel administer oxygen as required. **Ingestion.** Induce vomiting by sticking your finger to the back of the exposed person's throat. Have him or her drink 1 to 2 glasses of milk or water. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** PCBs are poorly metabolized, soluble in lipids, and they accumulate in tissues or organs rich in lipids. Liver function tests can help to determine the extent of body damage in exposed persons. If electrical equipment containing PCBs arcs over, the PCBs or other hydrocarbon dielectric fluids may decompose and give off hydrochloric acid (HCl), a potent respiratory irritant.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: *Treat any accidental release of PCBs as an emergency. An SPCCP (spill-prevention control and countermeasure plan) must be formulated before spills or leaks occur.* PCBs are resistant to biodegradation, soluble in lipids, and chemically stable; as such they have become significant contaminants of global ecosystems. Releases of PCBs require immediate, competent, professional response from trained personnel. *Each release situation is unique and requires a specifically designed cleanup response.* General recommendations include adhering to Federal regulations (40 CFR Part 761). Notify safety personnel, evacuate nonessential personnel, ventilate the spill area, and contain the PCBs. All wastes, residues, and contaminated cleanup equipment from the incident are subject to EPA requirements (40 CFR 761). Consult your attorney or appropriate regulatory officials for information about reporting requirements and disposal procedures. **Waste Disposal:** Contact your hazardous waste disposal firm or a licensed contractor for detailed recommendations, especially when PCBs are unexpectedly discovered. Follow Federal, state, and local regulations. PCBs are biomagnified in the food chain; i.e., their concentration increases at each link. The disposal of PCBs or of PCB-contaminated materials is strictly regulated; violations of applicable laws can result in fines, lawsuits, and negative publicity. **Warning:** Accidental spills of PCBs that may affect water supplies must be reported to Coast Guard personnel at the National Response Center, telephone (202) 426-2675.

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).
EPA Designations (40 CFR 302.4)
CERCLA Hazardous Substance, Reportable Quantity: 10 lbs (4.54 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of PCBs is possible, wear a full face shield. Follow OSHA eye- and face-protections regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent any contact of PCBs with your skin. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standards cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contamination into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do not wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Heavily soiled clothing must be properly discarded in a manner consistent with applicable regulations. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in work areas.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage Segregation: Store PCBs in closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage. **Special Handling/Storage:** All storage facilities must have adequate containment systems (dikes; elevated, nonporous holding platforms; retaining walls) to prevent any major release of PCBs into the environment. Carefully design and implement these extra precautions now; do not wait until you have to respond to an accidental release of this material.

Transportation Data (49 CFR 172.101-2; PCBs were the first materials to be directly regulated by Congress by way of TSCA in 1976.)

DOT Shipping Name: Polychlorinated Biphenyls
DOT Hazard Class: ORM-E
ID No. UN 23115
DOT Packaging Requirements: 49 CFR 173.510

IMO Shipping Name: Polychlorinated Biphenyls
IMO Hazard Class: 9
IMDG Packaging Group: II

References: 1, 6, 26, 38, 84-94, 100, 101, 116, 117, 120, 122.

Prepared by PJ Igoe, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD

Technical Review: Northeast Analytical, Inc. (PCB and VOC Specialists), Schenectady, New York, Telephone: (518) 346-4592

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 359
ETHYLENE DICHLORIDE
(Formerly 1,2-Dichloroethane)
(Revision C)
Issued: November 1978
Revised: August 1987

SECTION 1. MATERIAL IDENTIFICATION

CHEMICAL NAME: ETHYLENE DICHLORIDE (Changed to reflect common industrial practice)

DESCRIPTION (Origin/Uses): Made from acetylene and HCl. Used as a degreaser, a scavenger in leaded gasoline, as an intermediate in the manufacture of vinyl chloride, in paint removers, in wetting and penetration agents, in ore flotation processes, as a fumigant, and as a solvent for fats, oils, waxes, and gums.

OTHER DESIGNATIONS: 1,2-Dichloroethane; *sym*-Dichloroethane; Dutch Liquid; Dutch Oil; EDC; Ethane Dichloride; Ethylene Chloride; 1,2-Ethylene Dichloride; Glycol Dichloride; $C_2H_4Cl_2$; NIOSH *RTECS* KI0525000; CAS #0107-06-2

MANUFACTURERS/SUPPLIERS: Available from several suppliers, including:
Dow Chemical USA, 2020 Dow Center, Midland, MI 48640; Telephone: (517) 636-1000

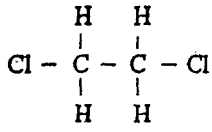
COMMENTS: Ethylene dichloride is a flammable, toxic liquid.

HMIS	
H	1
F	3
R	0
PPE*	
R	1
I	4
S	2
K	4

* See Sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

Ingredients	%	HAZARD DATA
Ethylene Dichloride, CAS #0107-06-2; NIOSH *RTECS* #KI0525000	100	ACGIH Values 1987-88 TLV-TWA: 10 ppm, 40 mg/m^3 OSHA PEL* 1986-87 8-Hr TWA: 50 ppm; Ceiling: 100 ppm (15 Min.) NIOSH REL 1986-87 10-Hr TWA: 1 ppm Ceiling: 2 ppm (15 Min.) Toxicity Data Man, Inhalation, TC_{Lo}: 4000 ppm/1 Hr Human, Oral, TD_{Lo}: 428 mg/kg Man, Oral, TD_{Lo}: 892 mg/kg Man, Oral, LD_{Lo}: 714 mg/kg Rat, Oral, LD_{50}: 670 mg/kg



*The maximum allowable peak concentration (above the ceiling level value) of ethylene dichloride is 200 ppm for 5 minutes in any 3-hour period.

COMMENTS: Additional data concerning toxic doses and tumorigenic, reproductive, and mutagenic effects is listed (with references) in the NIOSH *RTECS* 1983-84 supplement, pages 865-66.

SECTION 3. PHYSICAL DATA

Boiling Point ... 182.3°F (83.5°C)
Vapor Pressure ... 87 Torr at 77°F (25°C)
Water Solubility ... Soluble in about 120 Parts Water
Vapor Density (Air = 1) ... 3.4
Evaporation Rate (n-BuAc = 1) ... Not Listed
Specific Gravity ... 1.2569 at 69°F (20°C)
Freezing Point ... -31.9°F (-35.5°C)
Molecular Weight ... 98.96 Grams/Mole

Appearance and odor: Colorless, clear liquid. Sweet, chloroformlike odor is typical of chlorinated hydrocarbons. The recognition threshold (100% of test panel) for ethylene dichloride is 40 ppm. Odor detection probably indicates an excessive exposure to vapor. High volatility and flammability, coupled with its toxicity and carcinogenic potential, make this material a major health hazard.

COMMENTS: Ethylene dichloride is miscible with alcohol, chloroform, and ether.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
See Below	775°F (413°C)	% by Volume	6.2	15.9

EXTINGUISHING MEDIA: Use chemical, carbon dioxide, alcohol foam, water spray/fog, or dry sand to fight fires involving ethylene dichloride. Direct water sprays may be ineffective extinguishing agents, but they may be successfully used to cool fire-exposed containers. Use a smothering effect to extinguish fires involving this material. UNUSUAL FIRE/EXPLOSION HAZARDS: Ethylene dichloride is a dangerous fire and explosion hazard when exposed to sources of ignition such as heat, open flames, sparks, etc. Its vapors are heavier than air and can flow along surfaces to distant, low-lying sources of ignition and flash back. If it is safe to do so, remove this material from the fire area. Ethylene dichloride burns with a smoky flame.

SPECIAL FIRE-FIGHTING PROCEDURES: Wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or another positive-pressure mode.

COMMENTS: Flash Point and Method: 56°F (13°C) CC; 65°F (18°C) OC.

OSHA Flammability Class (29 CFR 1910.106): IB. DOT Flammability Class (49 CFR 173.115): Flammable Liquid

SECTION 5. REACTIVITY DATA

Ethylene dichloride is stable. Hazardous polymerization cannot occur.

CHEMICAL INCOMPATIBILITIES include strong oxidizing agents. Explosions have occurred with mixtures of this material and liquid ammonia or dimethylaminopropylamine. Finely divided aluminum or magnesium metal may be hazardous in contact with ethylene dichloride.

CONDITIONS TO AVOID: Eliminate sources of ignition such as excessive heat, open flames, or electrical sparks, particularly in low-lying areas, because the explosive, heavier-than-air vapors will concentrate there.

PRODUCTS OF HAZARDOUS DECOMPOSITION can include vinyl chloride, chloride fumes, and phosgene. Phosgene is an extremely poisonous gas. Products of thermal-oxidative degradation (i.e., fire conditions) must be treated with appropriate caution.

SECTION 6. HEALTH HAZARD INFORMATION

Ethylene dichloride is listed as an anticipated human carcinogen by the NTP and as a probable human carcinogen (Group 2B), by the IARC. It was found to be an animal-positive carcinogen by the IARC. NCI reported positive results (mouse, rat) from its carcinogenesis bioassay. SUMMARY OF RISKS: Ethylene dichloride is considered to be one of the more toxic of the common chlorinated hydrocarbons. Deaths from accidental ingestion of this material have been reported. Inhalation of vapors reportedly caused three fatalities. Excessive inhalation of ethylene dichloride vapors can cause respiratory irritation, intoxication, narcotic and anesthetic effects, vomiting, dizziness, depression, and diarrhea. The hepatoxic (injurious to liver) effects of this material are significant. The systemic effects from overexposure can appear in the liver, kidneys, digestive tract, blood, lungs, adrenal glands, and the central nervous system. Tests on animals have revealed reproductive failure and fetal resorption. There may be increased risk to nursing infants of exposed mothers. TARGET ORGANS: Central nervous system, eyes, kidneys, liver, heart, adrenal glands, and skin. PRIMARY ENTRY: Inhalation, absorption through skin, oral, or eye contact. ACUTE EFFECTS: Skin contact causes irritation, defatting, and, if repeated or prolonged, burning. Eye contact causes irritation and serious injury (clouding of the cornea) if it is not removed promptly. CHRONIC EFFECTS: Injuries to the liver (hepatoxicity) and kidneys, weight loss, low blood pressure, jaundice, oliguria (reduced excretion of urine), or anemia. MEDICAL CONDITIONS AGGRAVATED BY LONG-TERM EXPOSURE: Persons taking anticoagulants could experience an increase in tendency to bleed. Persons taking insulin face an increased risk of lowered blood sugar. FIRST AID: Be prepared to restrain a hyperactive victim. EYE CONTACT: Flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Get medical help.* SKIN CONTACT: Immediately flush the affected area with water. Wash thoroughly with soap and water. Remove and launder contaminated clothing before wearing it again; clean material from shoes and equipment. Get medical help.* INHALATION: Remove victim to fresh air; restore and/or support his breathing as needed. Get medical help.* INGESTION: Never give anything by mouth to someone who is unconscious or convulsing. Rinse victim's mouth with water. Oxygen and artificial respiration may be needed. Get medical help.* * GET MEDICAL ASSISTANCE = IN PLANT, PARAMEDIC, COMMUNITY. Get prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Before using ethylene dichloride, it is essential that proper emergency procedures be established and made known to all personnel involved in handling it. Notify safety personnel of ethylene dichloride spills or leaks and implement containment procedures. Remove and eliminate all possible sources of ignition such as heat, sparks, and open flames from the area. Cleanup personnel should use protection against inhalation of vapors and contact with liquid. Contain spills by using an absorbent material such as dry sand or vermiculite. Use nonsparking tools to mix waste material thoroughly with absorbent and place it in an appropriate container for disposal. Flush trace residues with large amounts of water. Do not flush waste to sewers or open waterways. WASTE DISPOSAL: Consider reclamation, recycling, or destruction rather than disposal in a landfill. Waste may be burned in an approved incinerator equipped with an afterburner and a scrubber. Follow Federal, state, and local regulations.

Ethylene dichloride is designated as a hazardous substance by the EPA (40 CFR 116.4). Ethylene dichloride is reported in the 1983 EPA TSCA Inventory.

EPA Hazardous Waste Number (40 CFR 261.33): U077

EPA Reportable Quantity (40 CFR 117.3): 5000 lbs (2270 kgs)

Aquatic Toxicity Rating, TLm 96: 1000 - 100 ppm

SECTION 8. SPECIAL PROTECTION INFORMATION

GOGGLES: Always wear protective eyeglasses or chemical safety goggles. Ethylene dichloride is particularly harmful to the eyes, and direct contact results in corneal opacity (permanent clouding of the eye). GLOVES: Wear impervious rubber gloves to prevent skin contact. RESPIRATOR: Use a NIOSH-approved respirator per the NIOSH *Pocket Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. Any detectable concentration of ethylene dichloride requires an SCBA, full facepiece, and pressure-demand/positive-pressure modes. Warning: Air-purifying respirators will not protect workers from oxygen-deficient atmospheres. OTHER: Wear rubber boots, aprons, and other protective clothing suitable for use conditions to prevent skin contact. Remove contaminated clothing and launder it before wearing it again. Discard contaminated shoes. VENTILATION: Provide maximum explosion-proof local fume exhaust ventilation systems to maintain the airborne concentrations of ethylene dichloride vapors below the exposure limits cited in section 2. Install properly designed hoods that maintain a minimum face velocity of 100 lfm (linear feet per minute). SAFETY STATIONS: Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. SPECIAL CONSIDERATIONS: Vapors are heavier than air and will collect in low-lying areas. Eliminate sources of ignition in these areas and again provide good ventilation there. COMMENTS: Practice good personal hygiene. Keep materials off of your clothes and equipment. Avoid transferring this material from hands to mouth while eating, drinking, or smoking. Immediately remove ethylene dichloride-saturated clothing to avoid flammability and health hazards. Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store ethylene dichloride in tightly closed containers in a cool, dry, well-ventilated area away from sources of ignition. Protect containers from physical damage and from exposure to excessive heat. Avoid direct physical contact with strong acids, bases, oxidizing agents, and reducing agents. SPECIAL HANDLING/STORAGE: Use nonsparking tools. Outside or detached storage is preferred. Store and handle ethylene dichloride in accordance with the regulations concerning OSHA class IB flammable liquids. ENGINEERING CONTROLS: During transfer operations involving ethylene dichloride, the liquid and its vapors must not be exposed to nearby sources of ignition from engineering systems that are not explosion proof. Preplan emergency response procedures.

TRANSPORTATION DATA (per 49 CFR 172.101-2):

DOT Hazard Class: Flammable Liquid

DOT Label: Flammable Liquid

IMO Class: 3.2

DOT Shipping Name: Ethylene Dichloride

DOT ID No. UN 1184

IMO Label: Flammable Liquid, Poison

References: 1-9, 12, 19, 21, 26, 43, 47, 73, 87-102. CK

Approvals JO. Accocco

Indust. Hygiene/Safety DW 11-18-87

Medical Review Geoff Goldsmith 11-30-87

Material Safety Data Sheet

From Genium's Reference Collection
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GENIUM PUBLISHING CORP.

No. 312
TRICHLOROETHYLENE
(Revision E)

Issued: July 1979
Revised: August 1987

SECTION 1. MATERIAL IDENTIFICATION

MATERIAL NAME: TRICHLOROETHYLENE

DESCRIPTION (Origin/Uses): Prepared from *sym*-tetrachloroethane by way of eliminating HCl by boiling with lime. Used to manufacture organic chemicals, pharmaceuticals; in degreasing and dry cleaning; and as a solvent for fats, waxes, rubbers, oils, paints, varnishes, ethers, and cellulose esters.

OTHER DESIGNATIONS: Ethylene Trichloride; TCE; Trichloroethene; 1,1,2-Trichloroethylene; C_2HCl_3; NIOSH *RTECS* #KX4550000; CAS #0079-01-6

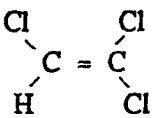
MANUFACTURER/SUPPLIER: Available from several suppliers, including: Dow Chemical USA, 2020 Dow Center, Midland, MI 48640; Telephone: (517) 636-1000; (800) 258-CHEM

COMMENTS: Trichloroethylene is a toxic solvent and a suspected occupational carcinogen.

HMIS			
H	2		
F	1	R	1
R	1	I	3
PPE*		S	1
* See sect. 8		K	0

SECTION 2. INGREDIENTS AND HAZARDS

Ingredients	%	HAZARD DATA
Trichloroethylene, CAS #0079-01-6; NIOSH *RTECS* #KX4550000	100	ACGIH Values 1987-88 TLV-TWA*: 50 ppm, 270 mg/m^3 TLV-STEL**: 200 ppm, 1080 mg/m^3 OSHA PEL 1986*** 8-Hr TWA: 100 ppm Ceiling: 200 ppm NIOSH REL 1986 10-Hr TWA: 25 ppm TOXICITY DATA Human, Oral, LD_{Lo}: 7 g/kg Human, Inhalation, TC_{Lo}: 6900 mg/m^3 (10 Min) Human, Inhalation, TC_{Lo}: 160 ppm/83 Min Human, Inhalation, TD_{Lo}: 812 mg/kg



* The TLV-TWA is set to control subjective complaints such as headache, fatigue, and irritability.

** The TLV-STEL is set to prevent incoordination and other beginning anesthetic effects from TCE. These levels should provide a wide margin of safety in preventing liver injury.

*** The OSHA PEL is 300 ppm for 5 minutes in any 2 hours.

SECTION 3. PHYSICAL DATA

Boiling Point ... 188.6°F (87°C)
Vapor Pressure ... 58 Torr at 68°F (20°C)
Water Solubility ... Insoluble
Vapor Density (Air = 1) ... 4.53
Evaporation Rate ... Not Listed
Specific Gravity ... 1.4649 at 68°F (20°C)
Melting Point ... -120.64°F (-84.8°C)
Molecular Weight ... 131.40 Grams/Mole

Appearance and odor: Colorless, nonflammable mobile liquid; sweetish odor like chloroform.

COMMENTS: TCE is highly soluble in lipids. A high vapor pressure at room temperature provides the potential for TCE vapors to contaminate use areas.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
Not Listed	770°F (410°C)	% by Volume	8%	10.5%

EXTINGUISHING MEDIA: TCE has no flash point in a conventional closed tester at room temperature, but it is moderately flammable at higher temperatures. Use dry chemical, carbon dioxide, alcohol foam, or other extinguishing agents suitable for the surrounding fire.

OSHA Flammability Class (29 CFR 1910.106): Not Regulated

UNUSUAL FIRE/EXPLOSION HAZARDS: During fire conditions TCE emits highly toxic and irritating fumes, including hydrochloric acid and phosgene. SPECIAL FIRE-FIGHTING PROCEDURES: Wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or another positive-pressure mode. At TCE vapor levels of 300-1000 ppm, fire fighters who lack the proper respiratory equipment may experience incoordination and impaired judgment.

DOT Flammability Class (49 CFR 173.115): Not Regulated

SECTION 5. REACTIVITY DATA

Trichloroethylene is stable. Hazardous polymerization can occur under certain circumstances (see Conditions to Avoid and Comments, below).

CHEMICAL INCOMPATIBILITIES include magnesium or aluminum powder, NaOH, KOH, or other strong alkaline materials. Reactions with alkaline materials may lead to the formation of dangerous explosive mixtures of chloroacetylenes.

CONDITIONS TO AVOID: When TCE is heated (as in the case with vapor degreasers) or exposed to sunlight, it requires extra stabilization against oxidation, degradation, and polymerization. It is slowly decomposed by light when moist.

PRODUCTS OF HAZARDOUS DECOMPOSITION include hydrochloric acid and phosgene under certain conditions at elevated temperatures.

COMMENTS: TCE is stable under normal handling and storage conditions, and hazardous polymerization is not expected to occur. However, failure of the stabilizer at elevated temperatures or other extreme conditions may allow polymerization to take place..

SECTION 6. HEALTH HAZARD INFORMATION

Trichloroethylene is listed as a carcinogen by the NTP, IARC, and OSHA. NIOSH recommends that trichloroethylene be treated as an occupational carcinogen. IARC carcinogenic results are animal suspect, animal positive, and human indefinite. SUMMARY OF RISKS: Moderate exposures to TCE cause symptoms similar to those of alcohol inebriation. Higher concentrations cause narcotic effects. Ventricular fibrillation has been cited as the cause of death following heavy exposures. TCE-induced hepato cellular carcinomas have been detected in mice during tests conducted by the National Cancer Institute (*Chem & Eng News* 54 [April 5, 1976]:4). Organ systems affected by overexposure to TCE are the central nervous system (euphoria, analgesia, anesthesia), degeneration of the liver and kidneys, the lungs (tachypnea), heart (arrhythmia) and skin (irritation, vesication, and paralysis of fingers when immersed in liquid TCE). Contact with the liquid defats the skin, causing topical dermatitis. Certain people appear to experience synergistic effects from TCE exposure concomitant with exposure to caffeine, alcohol, and other drugs. When combined with alcohol intake, toxic effects are increased and may cause a red, blotchy facial and upper body rash commonly called "degreaser's flush." Other reported symptoms of TCE exposure include abnormal fatigue, headache, irritability, gastric disturbances, and intolerance to alcohol. Toxic effects from testing of TCE on humans include hallucination, distorted perception, somnolence (general depressed activity), and jaundice. TARGET ORGANS: Respiratory system, central nervous system, heart, liver, kidneys, and skin. PRIMARY ENTRY: Ingestion, inhalation, skin contact. ACUTE EFFECTS: Headache, vertigo, visual disturbance, tremors, nausea, vomiting, dermatitis, dizziness, drowsiness, and irritation to the eyes, nose, and throat. CHRONIC EFFECTS: None Reported. MEDICAL CONDITIONS AGGRAVATED BY LONG-TERM EXPOSURE: Diseases of the liver, kidneys, lungs, and central nervous system. FIRST AID: EYE CONTACT: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Get medical help.* SKIN CONTACT: Wash thoroughly with soap and water. Remove and launder contaminated clothing before wearing it again; clean material from shoes and equipment. Get medical help.* INHALATION: Remove victim to fresh air; restore and/or support his breathing as needed. Do not give adrenalin to the victim. Get medical help.* INGESTION: Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing. A professional decision regarding whether or not to induce vomiting is required. Do not give adrenalin to the victim. Get medical help.*

*GET MEDICAL ASSISTANCE = IN PLANT, PARAMEDIC, COMMUNITY. Get prompt medical assistance for further treatment, observation, and support after first aid.

COMMENTS: Workers' responses to TCE vary significantly because of many factors, including age, health status, nutrition, and intake of alcohol, caffeine, and medicines. Do not use these substances before, during, or after exposure to TCE. If a worker displays any of the symptoms of exposure to TCE, thoroughly investigate all the possible contributing factors to determine, if possible, how much the work environment levels of TCE are responsible.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Inform safety personnel of any trichloroethylene spill or leak and evacuate the area for large spills. Cleanup personnel must use respiratory and liquid contact protection. Adequate ventilation must be provided. Confine the spilled TCE to as small an area as possible. Do not allow it to run off to sewers or open waterways. Pick up spilled TCE with a vacuum cleaner or an absorbent such as vermiculite.

DISPOSAL: Consider reclamation, recycling, or destruction rather than disposal in a landfill.

Trichloroethylene is designated as a hazardous substance by the EPA (40 CFR 116.4).

Trichloroethylene is reported in the 1983 EPA TSCA Inventory.

EPA Hazardous Waste Number (40 CFR 261.33): U228

EPA Reportable Quantity (40 CFR 117.3): 1000 lbs (454 kgs)

Aquatic Toxicity Rating, TLm 96: Not Listed

SECTION 8. SPECIAL PROTECTION INFORMATION

GOGGLES: Always wear protective eyeglasses or chemical safety goggles. Follow the eye and face protection guidelines of 29 CFR 1910.133. GLOVES: Wear impervious gloves. RESPIRATOR: Use a NIOSH-approved respirator per the *NIOSH Guide to Chemical Hazards* (Genium ref. 88) for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow the respirator guidelines in 29 CFR 1910.134. Any detectable concentration of TCE requires an SCBA, full facepiece, and pressure-demand/positive-pressure modes. WARNING: Air-purifying respirators will not protect workers from oxygen-deficient atmospheres. OTHER EQUIPMENT: Wear rubber boots, aprons, and other suitable body protection appropriate to the existing work environment. VENTILATION: Install and operate general and local exhaust ventilation systems of sufficient power to maintain airborne concentrations of TCE below the OSHA PEL standards cited in section 2. SAFETY STATIONS: Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. OTHER SPECIAL MODIFICATIONS IN THE WORKPLACE: Because of the unresolved controversy about the carcinogenic status of TCE, all existing personal protective equipment and engineering technology should be used to prevent any possibility of worker contact with this material.

COMMENTS: Practice good personal hygiene. Keep material off of your clothes and equipment. Avoid transfer of material from hands to mouth while eating, drinking, or smoking. Adhere to the sanitation requirements of 29 CFR 1910.141 and 29 CFR 1910.142.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Prevent TCE from coming into contact with strong caustics such as NaOH; KOH; chemically active metal like Ba, Li, Na, Mg, Ti; and powdered aluminum or magnesium in acidic solutions. SPECIAL HANDLING/STORAGE: Store this material in a cool, dry, well-ventilated area. Avoid elevated temperatures because products of toxic and corrosive decomposition from TCE may form. Monitor the level of any stabilizer component that may be added to the TCE. (Consult the technical data from the supplier to determine the specifics of any added stabilizer.) If applicable, follow the supplier's recommendation concerning proper rotation of stock, shelf-life requirements, and levels of stabilizers.

ENGINEERING CONTROLS IN THE WORKPLACE: Avoid collecting aluminum fines (very small particles) or chips in a TCE vapor degreaser. Monitor TCE stabilizer levels regularly. Only trained personnel should operate vapor degreasers.

TRANSPORTATION DATA (per 49 CFR 172.101-2):

DOT Hazard Class: ORM-A	DOT ID No. UN1710	IMO Class: 6.1
IMO Label: St. Andrew's Cross (X)*	DOT Shipping Name: Trichloroethylene	DOT Label: None

* Harmful - Stow away from foodstuffs (IMO Label, Materials of Class 6.1 Packaging Group III).

References: 1-9, 12, 14, 21, 73, 87-94. PI

Approvals JO Ricciocco

Indust. Hygiene/Safety 11-18-87

Medical Review M. Harbison

APPENDIX
B

APPENDIX B

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

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STD & SPEC 3.01

SAFETY FENCE

Definition

A protective barrier installed to prevent access to an erosion control measure.

Purpose

To prohibit the undesirable use of an erosion control measure by the public.

Conditions Where Practice Applies

Applicable to any control measure or series of measures which can be considered unsafe by virtue of potential for access by the public.

Planning Considerations

The safety of the public must always be considered at both the planning and implementation phases of a land-disturbing activity. If there is any question concerning the risk of a particular erosion control measure to the general public, the measure should be relocated to a safer area, or an appropriate safety fence should be installed to prevent undesired access. Many times, the danger posed by a control may not be easily seen by plan designers and reviewers - that is when the on-site contractor or inspector must correct such situations in the field. Properly designed and installed safety fences prevent the trespassing of people into potentially dangerous areas, such as children using a sediment basin or a stormwater retention structure as play areas. The installation of these fences will protect people from hazards and the owner from possible litigation.

Two different types of fence will be discussed in this specification. The designer, developer, and contractor should always be sure that the most appropriate type of fence is utilized for a particular need.

Design Criteria

1. Safety fences should be located so as to create a formidable barrier to undesired access, while allowing for the continuation of necessary construction operations.

2. Safety fences are most applicable to the construction of berms, traps, and dams. In use with those structures, safety fences should be located far enough beyond the outer toe of the embankment to allow for the passage of maintenance vehicles. Fences should not be installed across the slope of a dam or dike.

3. The height of the fence shall be a minimum of 5 feet for plastic fence and 6 feet for metal fence. A fence must never be so short as to become an attraction for children to climb on or over.

4. Signs noting potential hazards such as "DANGER-QUICKSAND" or "HAZARDOUS AREA - KEEP OUT" should be posted and easily seen by anyone approaching the protected area.

5. Plastic (polyethylene) fence may be used as safety fencing, primarily in situations where the need is for a temporary barrier (see Plate 3.01-1). The fence should meet the physical requirements noted in the following table:

TABLE 3.01-A

PHYSICAL PROPERTIES OF PLASTIC SAFETY FENCE

Physical Property	Test	Requirements
Recommended color	N/A	"International" orange
Tensile yield	ASTM D638	Average 2000 lbs. per 4 ft. width
Ultimate tensile strength	ASTM D638	Average 2900 lbs. per 4 ft. width
Elongation at break(%)	ASTM D638	Greater than 1000%
Chemical resistance	N/A	Inert to most chemicals and acids

Source: Conwed Plastics

6. Metal or "chain-link" fence should be used when a potentially dangerous control measure will remain in place permanently, such as a stormwater detention or retention basin (see Plate 3.01-1). However, they may also be used for measures which will only serve a temporary function, at the discretion of those responsible for project safety. The metal fence must meet the following physical requirements:

   a. Fabric shall be zinc-coated steel, 2-inch mesh, 9-gauge, minimum.

   b. Zinc coating shall have a minimum weight of 1.8 ounces per square foot.

   c. Posts shall be steel pipe, zinc-coated.

   d. Top nails shall be steel pipe, zinc-coated.

   e. Braces shall be made of zinc-coated steel.

   f. Gates shall be single or double swing, zinc-coated steel. They shall be a minimum of 12-feet wide.

Construction Specifications

1. Safety fences must be installed prior to the E&S measure becoming accessible.

2. The polyethylene web of the plastic safety fence shall be secured to a conventional metal "T" or "U" post driven into the ground to a minimum depth of 18 inches; posts should be spaced at 6-foot centers. See "perspective" view in Plate 3.01-1.

3. The metal safety fence shall be installed as per the following procedure:

   a. Line posts shall be placed at intervals of 10 feet measured from center to center of adjacent posts. In determining the post spacing, measurement will be made parallel with the ground surface. See "perspective" view in Plate 3.01-1.

   b. Posts will be set in concrete and backfilled or anchored by other acceptable means.

   c. Posts set in the tops of concrete walls shall be grouted into preformed holes to a minimum depth of 12 inches.

   d. All corner posts, end posts, gate posts, and pull posts shall be embedded, braced, and trussed as shown in the "Standard Fence - Chain Link" detail found in the latest version of the Virginia Department of Transportation (VDOT) Road and Bridge Standards.

   e. Fencing fabric shall not be stretched until at least 4 days after the posts are grouted into walls or 14 days after the posts are set into concrete.

   f. The fabric shall be stretched taut and securely fastened, by means of tie clips, to the posts at intervals not exceeding 15 inches and to the top rails or tension wires at intervals not exceeding 2 feet. Care shall be taken to equalize the tension on each side of each post.

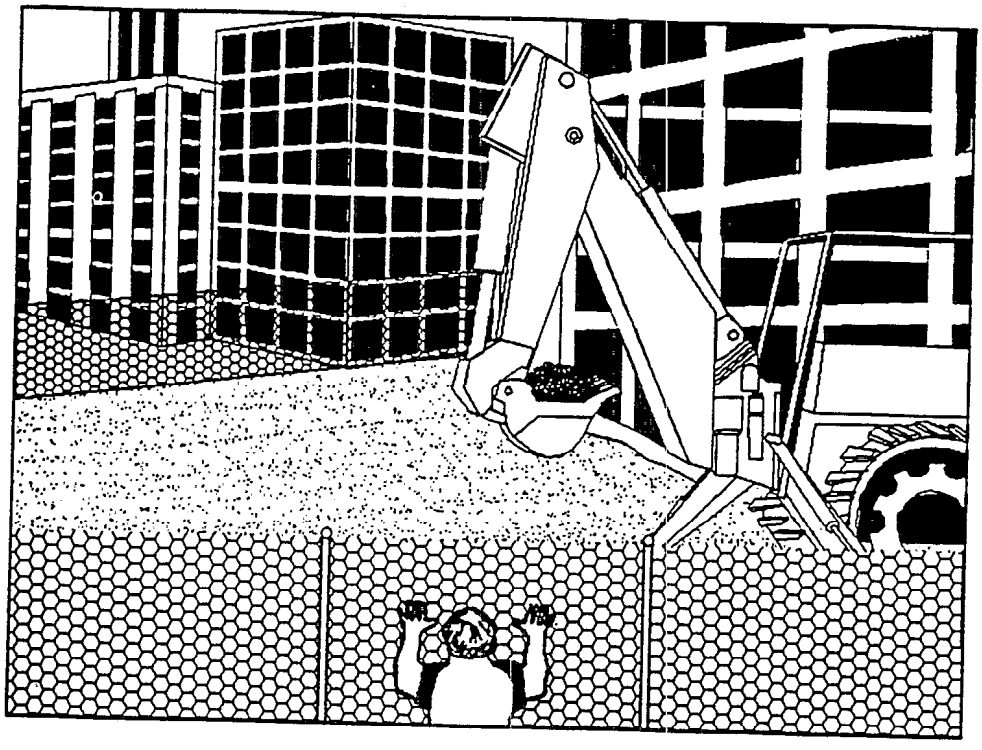
4. Applicable warning signs noting hazardous conditions must be installed immediately upon installation of safety fence.

Maintenance

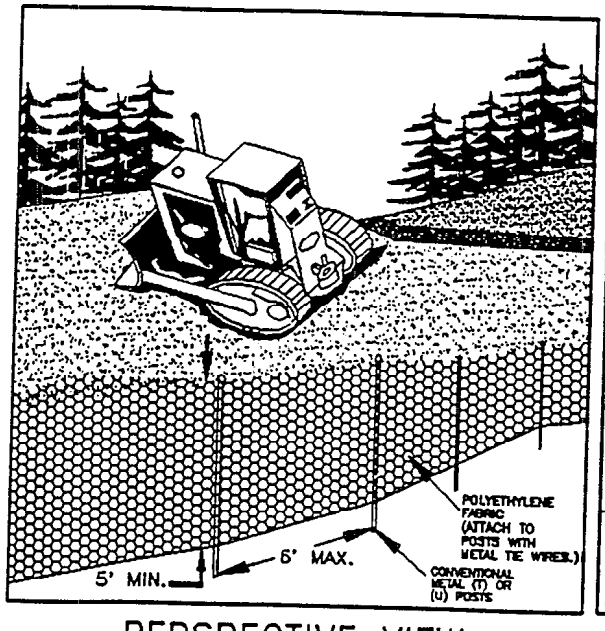
1. Safety fence shall be checked regularly for weather-related or other damage. Any necessary repairs must be made immediately.

2. Care should be taken to secure all access points (gates) at the end of each working day. All locking devices must be repaired or replaced as necessary.

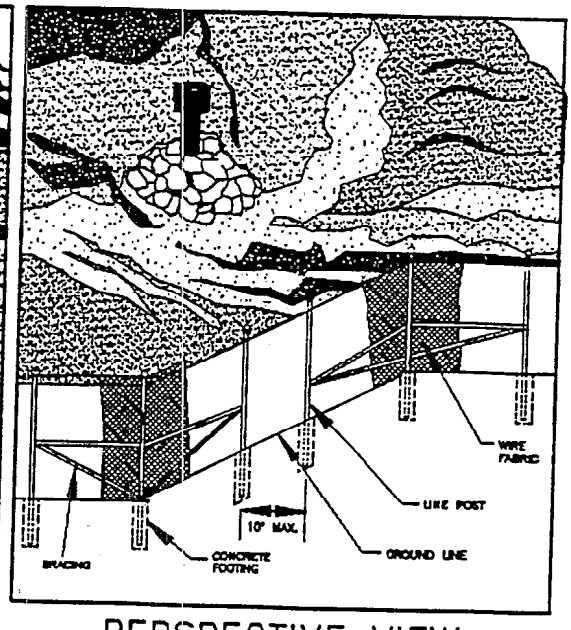
SAFETY FENCE



PERSPECTIVE VIEW



PERSPECTIVE VIEW
PLASTIC FENCE

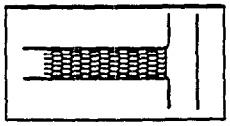


PERSPECTIVE VIEW
METAL FENCE

Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards

Plate 3.01-1

STD & SPEC 3.02



TEMPORARY STONE CONSTRUCTION ENTRANCE

CE

Definition

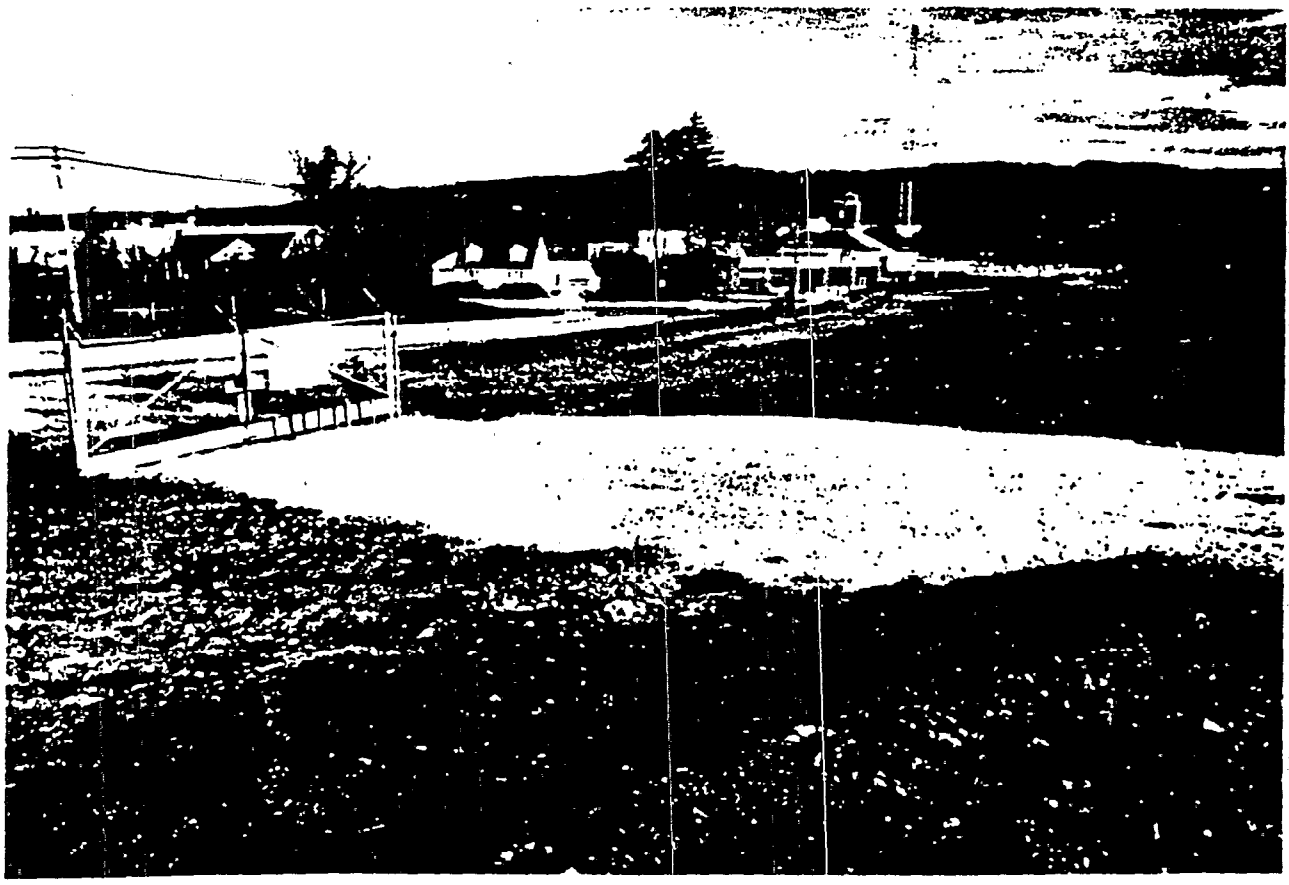
A stabilized stone pad with a filter fabric underliner located at points of vehicular ingress and egress on a construction site.

Purpose

To reduce the amount of mud transported onto paved public roads by motor vehicles or runoff.

Conditions Where Practice Applies

Wherever traffic will be leaving a construction site and move directly onto a public road or other paved area.



Planning Considerations

Minimum Standard #17 (MS #17) requires that provisions be made to minimize the transport of sediment by vehicular traffic onto a paved surface. Construction entrances provide an area where a significant amount of mud can be removed from construction vehicle tires before they enter a public road and, just as important, the soil adjacent to the paved surface can be kept intact. A filter fabric liner is used as a "separator" to minimize the dissipation of aggregate into the underlying soil due to construction traffic loads. If the action of the vehicles traveling over the gravel pad is not sufficient to remove the majority of the mud or there exists an especially sensitive traffic situation on the adjacent paved road, the tires must be washed before the vehicle enters the public road. If washing is necessary, provisions must be made to intercept the wash water and trap the sediment so it can be collected and stabilized. Construction entrances should be used in conjunction with the stabilization of construction roads (see Std. & Spec. 3.03, CONSTRUCTION ROAD STABILIZATION) to reduce the amount of mud picked up by construction vehicles and to do a better job of mud removal. Other innovative techniques for accomplishing the same purpose (such as a bituminous entrance) can be utilized, but only after specific plans and details are submitted to and approved by the appropriate Plan-Approving Authority.

Design Criteria

Aggregate Size

VDOT #1 Coarse Aggregate (2- to 3-inch stone) should be used.

Entrance Dimensions

The aggregate layer must be at least 6 inches thick; a minimum three inches of aggregate should be placed in a cut section to give the entrance added stability and to help secure filter cloth separator. It must extend the full width of the vehicular ingress and egress area and have a minimum 12-foot width. The length of the entrance must be at least 70 feet (see Plate 3.02-1).

Washing

If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the stone, then the tires of the vehicles must be washed before entering the public road. Wash water must be carried away from the entrance to a approved settling area to remove sediment. All sediment shall be prevented from entering storm drains, ditches, or watercourses. A wash rack may also be used to make washing more convenient and effective (see Plate 3.02-1).

Location

The entrance should be located to provide for maximum utilization by all construction vehicles.

Construction Specifications

The area of the entrance must be excavated a minimum of 3 inches and must be cleared of all vegetation, roots, and other objectionable material. The filter fabric underliner will then be placed the full width and length of the entrance.

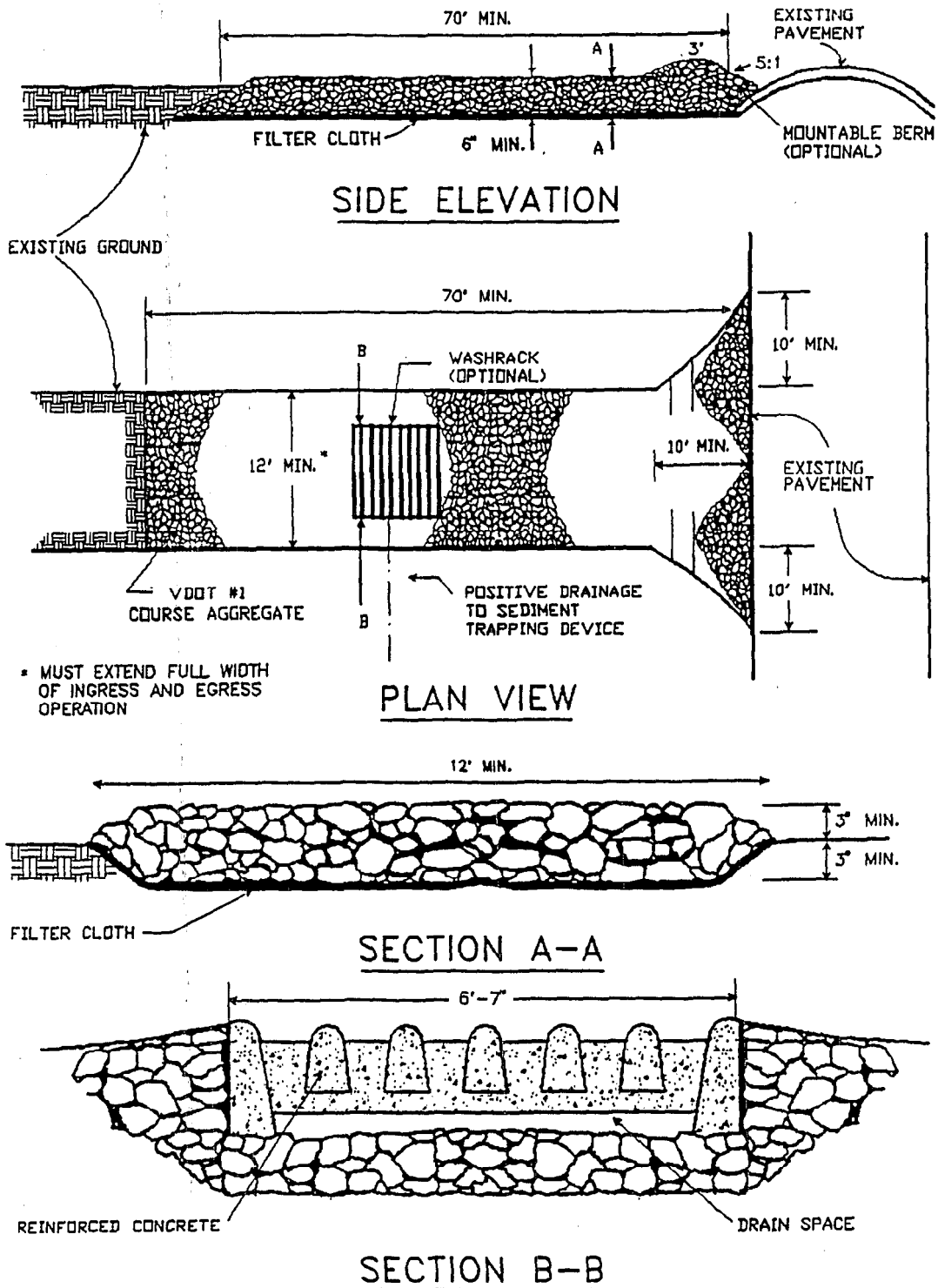
Following the installation of the filter cloth, the stone shall be placed to the specified dimensions. If wash racks are used, they should be installed according to manufacturer's specifications. Any drainage facilities required because of washing should be constructed according to specifications. Conveyance of surface water under entrance, through culverts, shall be provided as required. If such conveyance is impossible, the construction of a "mountable" berm with 5:1 slopes will be permitted.

The filter cloth utilized shall be a woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals and hydrocarbons, be mildew and rot resistant, and conform to the physical properties noted in Table 3.02-A.

Maintenance

The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment. All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

STONE CONSTRUCTION ENTRANCE



Source: Adapted from 1983 Maryland Standards for Soil Erosion and Sediment Control, and Va. DSWC

Plate 3.02-1

TABLE 3.02-A

CONSTRUCTION SPECIFICATIONS FOR FILTER CLOTH UNDERLINER

Fabric Properties[1]	Light-Duty Entrance[2] (Graded Subgrade)	Heavy-Duty Entrance[3] (Rough Graded)	Test Method
Grab Tensile Strength (lbs.)	200	220	ASTM D1682
Elongation at Failure (%)	50	220	ASTM D1682
Mullen Burst Strength (lbs.)	190	430	ASTM D3786
Puncture Strength (lbs.)	40	125	ASTM D751 (modified)
Equivalent Opening Size (mm)	40-80	40-80	U.S. Standard Sieve CW-02215

[1] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

[2] Light Duty Entrance: Sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Examples of fabrics which can be used are: Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[3] Heavy Duty Entrance: Sites with only rough grading and where most travel would be multi-axle vehicles. Examples of fabrics which can be used are: Trevira Spunbond 1135, Mirafi 600X, or equivalent.

Source: Virginia Highway and Transportation Research Council (VHTRC)

STD & SPEC 3.04

STRAW BALE BARRIER

STB

Definition

A temporary sediment barrier consisting of a row of entrenched and anchored straw bales.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas of limited extent in order to prevent sediment from leaving the construction site.

2. To decrease the velocity of sheet flows.

Conditions Where Practice Applies

1. Below disturbed areas subject to sheet and rill erosion.

2. Where the size of the drainage area is no greater than one-fourth of an acre per 100 feet of barrier length; the maximum slope length behind the barrier is 100 feet; and the maximum slope gradient behind the barrier is 50 percent (2:1).

3. Where effectiveness is required for less than 3 months.

4. Under no circumstances should straw bale barriers be constructed in live streams or in swales where there is the possibility of a washout.

5. The measure should not be used where water may concentrate in defined ditches and minor swales.

6. Straw bale barriers shall not be used on areas where rock or another hard surface prevents the full and uniform anchoring of the barrier.

Planning Considerations

Based on observations made in Virginia, Pennsylvania, Maryland and other parts of the nation, straw bale barriers have not been as effective as many users had hoped they would be - especially when used to slow down and filter concentrated flows. They should be used judiciously and with caution as erosion control measures. There are three major reasons for such ineffectiveness.

First, improper utilization of straw bale barriers has been a major problem. Straw bale barriers have been used in streams and drainageways where high water depth and velocities have destroyed or damaged the control. Secondly, improper placement and installation of the barriers, such as staking the bales directly to the ground with no soil seal or entrenchment, has allowed undercutting and end flow. This has resulted in additions of, rather than removal of, sediment from runoff waters. Finally, inadequate maintenance lowers the effectiveness of these barriers. Trapping efficiencies of carefully installed straw bale barriers on one project in Virginia dropped from 57% to 16% in one month due to lack of maintenance.

There are serious questions about the continued use of straw bale barriers as they are presently installed and maintained. Averaging from $3 to $6 per linear foot, the thousands of straw bale barriers used annually in Virginia represent such a considerable expense that optimum installation procedures should be emphasized.

Design Criteria

A formal design is not required. However, an effort should be made to locate the straw bale barrier, as well as other perimeter controls, at least 5 to 7 feet from the base of disturbed slopes with grades greater than 7%. This will help prevent the measure from being rendered useless following the initial movement of soil.

Construction Specifications

Sheet Flow Application

1. Bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

2. All bales shall be either wire-bound or string-tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings (see Plate 3.04-1).

3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier (see Plate 3.04-1).

4. Each bale shall be securely anchored by at least two stakes (minimum dimensions 2 inches x 2 inches x 36 inches) or standard "T" or "U" steel posts (minimum weight of 1.33 pounds per linear foot) driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

5. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency.

6. Inspection shall be frequent and repair or replacement shall be made promptly as needed.

7. Straw bale barriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

Maintenance

1. Straw bale barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.

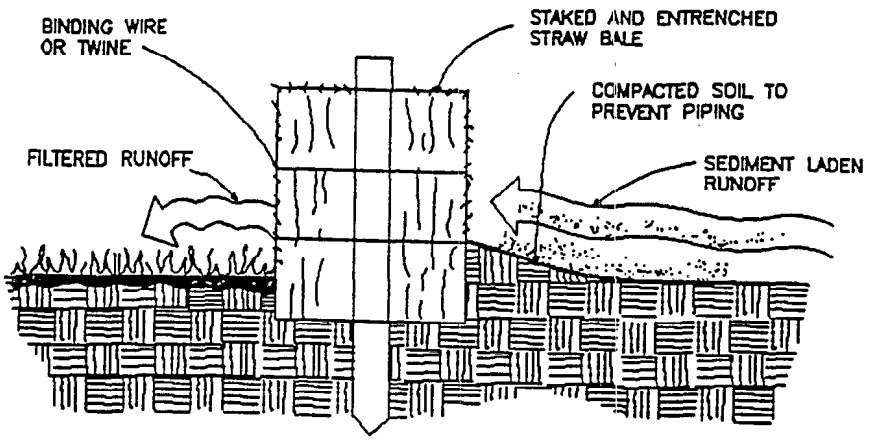
2. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales.

3. Necessary repairs to barriers or replacement of bales shall be accomplished promptly.

4. Sediment deposits should be removed after each rainfall. They must be removed when the level of deposition reaches approximately one-half the height of the barrier.

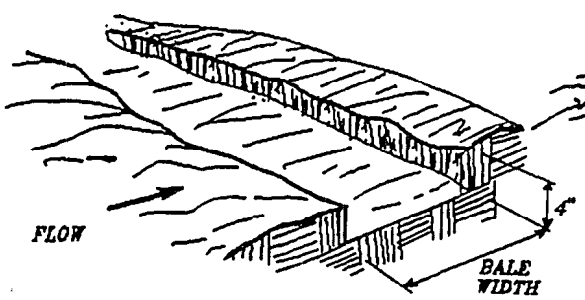
5. Any sediment deposits remaining in place after the straw bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

STRAW BALE BARRIER

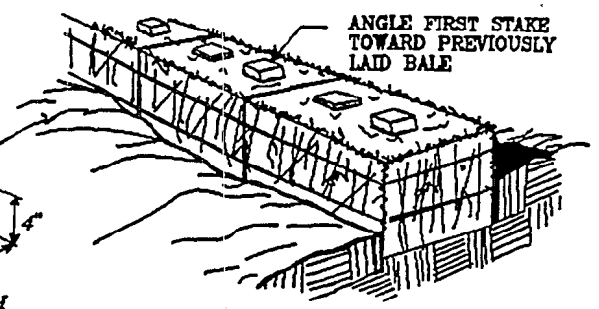


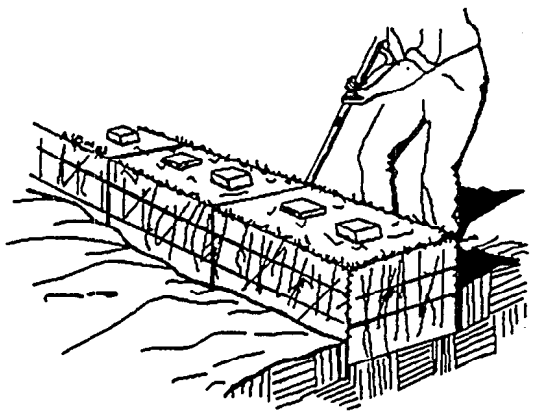
PROPERLY INSTALLED STRAW BALE
(CROSS SECTION)

1. EXCAVATE THE TRENCH.

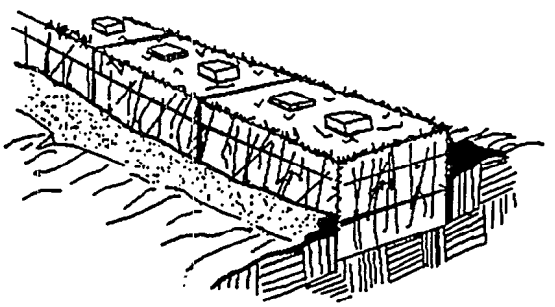


2. PLACE AND STAKE STRAW BALES.





3. WEDGE LOOSE STRAW BETWEEN BALES.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

CONSTRUCTION OF STRAW BALE BARRIER

Source: Va. DSWC

Plate 3.04-1

STD & SPEC 3.05

SILT FENCE

SF

Definition

A temporary sediment barrier consisting of a synthetic filter fabric stretched across and attached to supporting posts and entrenched.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.

2. To decrease the velocity of sheet flows and low-to-moderate level channel flows.

Conditions Where Practice Applies

1. Below disturbed areas where erosion would occur in the form of sheet and rill erosion.

2. Where the size of the drainage area is no more than one quarter acre per 100 feet of silt fence length; the maximum slope length behind the barrier is 100 feet; and the maximum gradient behind the barrier is 50 percent (2:1).

3. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 1 acre and flow is no greater than 1 cfs.

4. Silt fence will not be used in areas where rock or some other hard surface prevents the full and uniform depth anchoring of the barrier.

Planning Considerations

Laboratory work at the Virginia Highway and Transportation Research Council (VHTRC) has shown that silt fences can trap a much higher percentage of suspended sediments than straw bales, though silt fence passes the sediment-laden water slower. Silt fences are preferable to straw barriers in many cases because of their durability and potential cost savings. While the failure rate of silt fences is lower than that of straw barriers, many instances have been observed where silt fences are improperly installed, inviting failure and sediment loss. The installation methods outlined here can improve performance and reduce failures.

As noted, flow rate through silt fence is significantly lower than the flow rate for straw bale barriers. This creates more ponding and hence more time for sediment to fall out. Table 3.05-A demonstrates these relationships.

Both woven and non-woven synthetic fabrics are commercially available. The woven fabrics generally display higher strength than the non-woven fabrics and, in most cases, do not require any additional reinforcement. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength, while the reactions of non-woven fabrics to these conditions are variable. The same is true of testing under extensive ultraviolet radiation. Permeability rates vary regardless of fabric type. While all of the fabrics demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

Design Criteria

1. No formal design is required. As with straw bale barriers, an effort should be made to locate silt fence at least 5 feet to 7 feet beyond the base of disturbed slopes with grades greater than 7%.

TABLE 3.05-A

TYPICAL FLOW RATES AND FILTERING EFFICIENCIES OF PERIMETER CONTROL

Material	Flow Rate (gal./sq.ft./min)	Filter Efficiency(%)
Straw	5.6	67
Synthetic Fabric	0.3	97

Source: VHTRC

2. The use of silt fences, because they have such a low permeability, is limited to situations in which only sheet or overland flows are expected and where concentrated flows originate from drainage areas of 1 acre or less.

3. Field experience has demonstrated that, in many instances, silt fence is installed too short (less than 16 inches above ground elevation). The short fence is subject to breaching during even small storm events and will require maintenance "clean outs" more often. Properly supported silt fence which stands 24 to 34 inches above the existing grade tends to promote more effective sediment control.

Construction Specifications

Materials

1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the requirements noted in Table 3.05-B.

2. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0° F to 120° F.

3. If wooden stakes are utilized for silt fence construction, they must have a diameter of 2 inches when oak is used and 4 inches when pine is used. Wooden stakes must have a minimum length of 5 feet.

TABLE 3.05-B

PHYSICAL PROPERTIES OF FILTER FABRIC IN SILT FENCE

Physical Property	Test	Requirements
Filtering Efficiency	ASTM 5141	75% (minimum)
Tensile Strength at 20% (max.) Elongation*	VTM-52	Extra Strength - 50 lbs./linear inch (minimum) Standard Strength - 30 lbs./linear inch (minimum)
Flow Rate	ASTM 5141	0.2 gal./sq.ft./ minute (minimum)
Ultraviolet Radiation Stability %	ASTM-G-26	90% (minimum)

* Requirements reduced by 50% after six months of installation.

Source: VHTRC

4. If steel posts (standard "U" or "T" section) are utilized for silt fence construction, they must have a minimum weight of 1.33 pounds per linear foot and shall have a minimum length of 5 feet.

5. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.

Installation

1. The height of a silt fence shall be a minimum of 16 inches above the original ground surface and shall not exceed 34 inches above ground elevation.

2. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

3. A trench shall be excavated approximately 4-inches wide and 4-inches deep on the upslope side of the proposed location of the measure.

4. When wire support is used, standard-strength filter cloth may be used. Posts for this type of installation shall be placed a maximum of 10-feet apart (see Plate 3.05-1). The wire mesh fence must be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of two inches and shall not extend more than 34 inches above the original ground surface. The standard-strength fabric shall be stapled or wired to the wire fence, and 8 inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.

5. When wire support is not used, extra-strength filter cloth shall be used. Posts for this type of fabric shall be placed a maximum of 6-feet apart (see Plate 3.05-2). The filter fabric shall be fastened securely to the upslope side of the posts using one inch long (minimum) heavy-duty wire staples or tie wires and eight inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees. This method of installation has been found to be more commonplace than #4.

6. If a silt fence is to be constructed across a ditch line or swale, the measure must be of sufficient length to eliminate endflow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope (see Plate 3.05-2). Extra-strength filter fabric shall be used for this application with a maximum 3-foot spacing of posts.

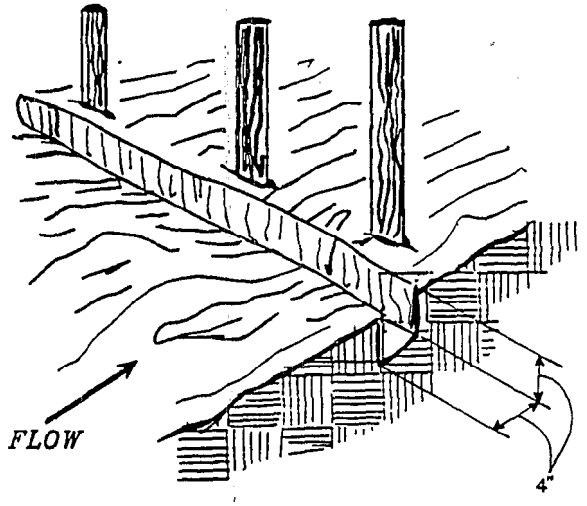
   All other installation requirements noted in #5 apply.

7. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric.

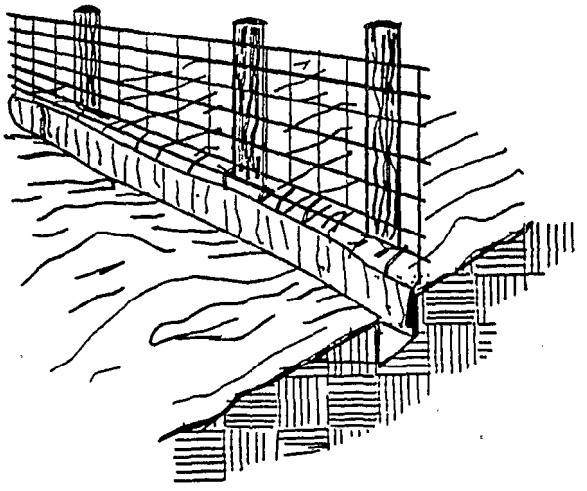
8. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)

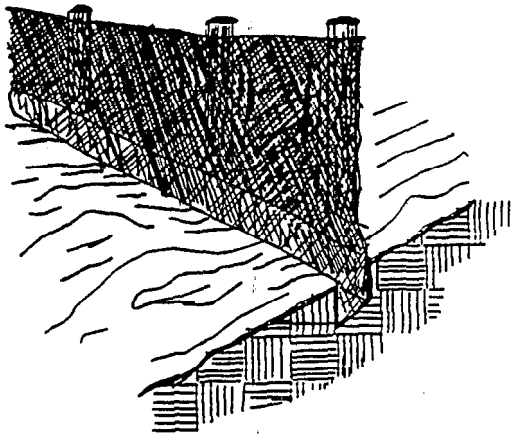
1. SET POSTS AND EXCAVATE A 4"X4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.



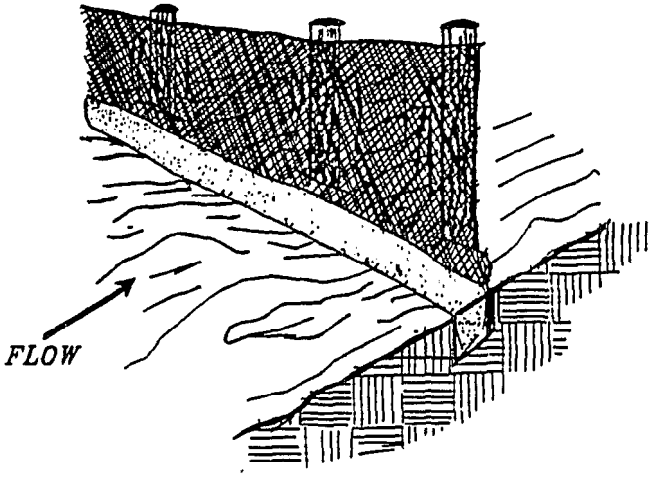
2. STAPLE WIRE FENCING TO THE POSTS.



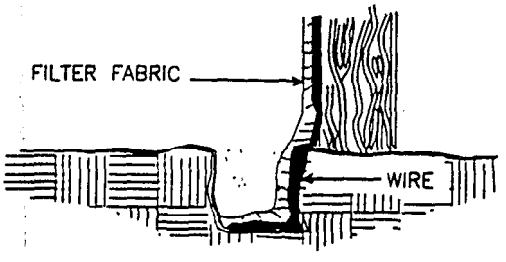
3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



EXTENSION OF FABRIC AND WIRE INTO THE TRENCH.

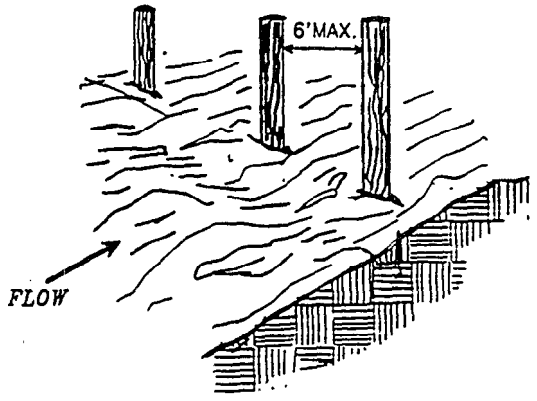


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

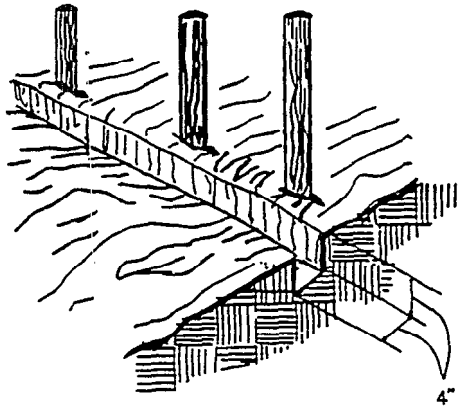
Plate 3.05-1

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

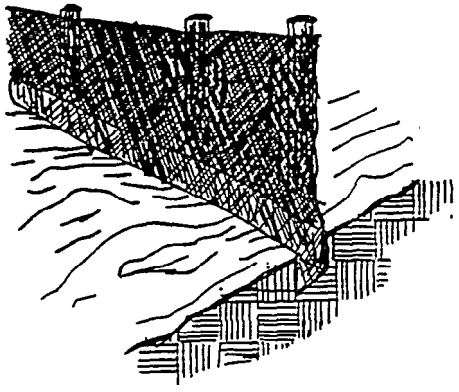
1. SET THE STAKES.



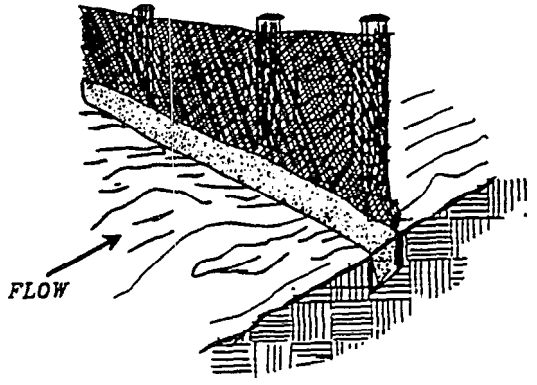
2. EXCAVATE A 4"X 4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.



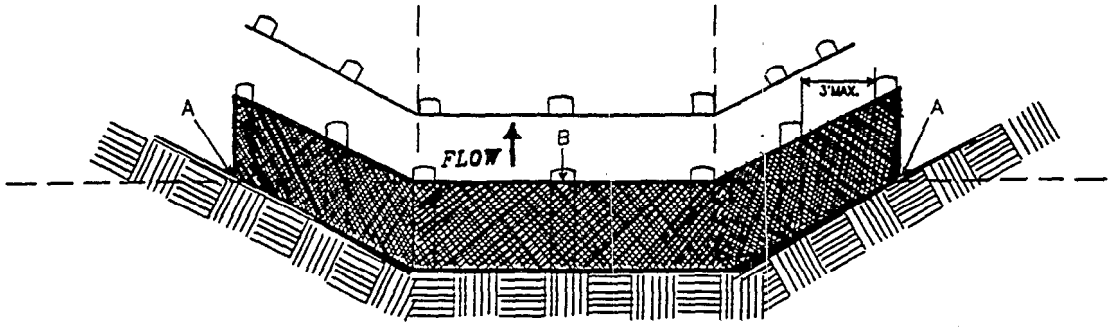
3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)



POINTS A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-2

Maintenance

1. Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

2. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.

3. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.

4. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

5. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

STD & SPEC 3.09

TEMPORARY DIVERSION DIKE

Definition

A temporary ridge of compacted soil constructed at the top or base of a sloping disturbed area.

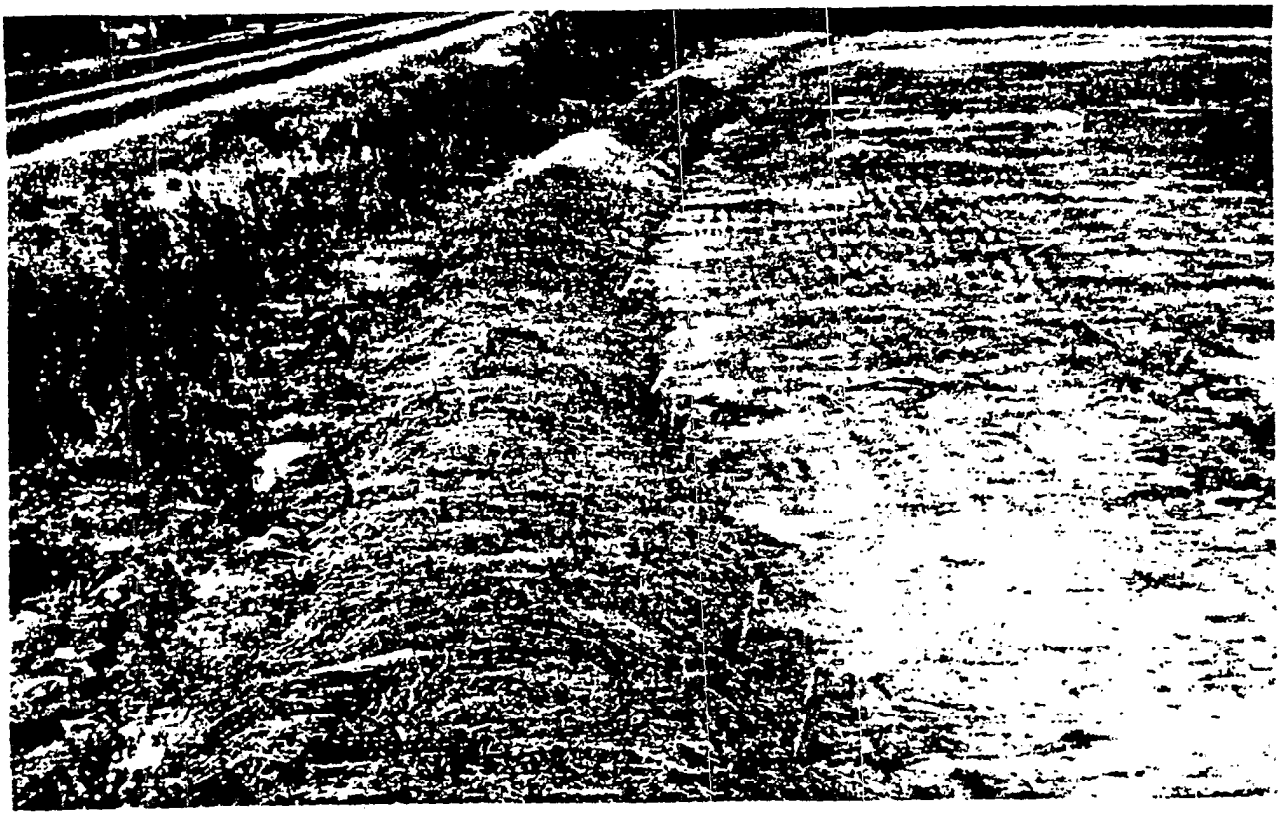
Purposes

1. To divert storm runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet.

2. To divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin.

Conditions Where Practice Applies

Wherever stormwater runoff must be temporarily diverted to protect disturbed areas and slopes or retain sediment on site during construction. These structures generally have a life expectancy of 18 months or less, which can be prolonged with proper maintenance.



Planning Considerations

A temporary diversion dike is intended to divert overland sheet flow to a stabilized outlet or a sediment-trapping facility during establishment of permanent stabilization on sloping disturbed areas. When used a the top of a slope, the structure protects exposed slopes by keeping upland runoff away. When used at the base of a slope, the structure protects adjacent and downstream areas by diverting sediment-laden runoff to a sediment trapping facility.

As per M.S. #5, it is very important that a temporary diversion dike be stabilized immediately following installation with temporary or permanent vegetation to prevent erosion of the dike itself. The gradient of the channel behind the dike is also an important consideration. The dike must have a positive grade to assure drainage, but if the gradient is too great, precautions must be taken to prevent erosion due to high-velocity channel flow behind the dike. The cross-section of the channel which runs behind the dike should be of a parabolic or trapezoidal shape to help inhibit a high velocity of flow which could arise in a vee ditch.

This practice is considered an economical one because it uses material available on the site and can usually be constructed with equipment needed for site grading. The useful life of the practice can be extended by stabilizing the dike with vegetation. Diversion dikes are preferable to silt fence because they are more durable, less expensive, and require much less maintenance when constructed properly. Along with a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13), they become a logical choice for a control measure once the control limits of the silt fence or straw bale barrier have been exceeded.

Temporary diversion dikes are often used as a perimeter control in association with a sediment trap or a sediment basin, or a series of sediment-trapping facilities, on moderate to large construction sites. If installed properly and in the first phase of grading, maintenance costs are very low. Often, cleaning of sediment-trapping facilities is the only associated maintenance requirement.

As specified herein, this practice is intended to be temporary. However, with more stringent design criteria, it can be made permanent in accordance with DIVERSIONS (Std. & Spec. 3.12).

Design Criteria

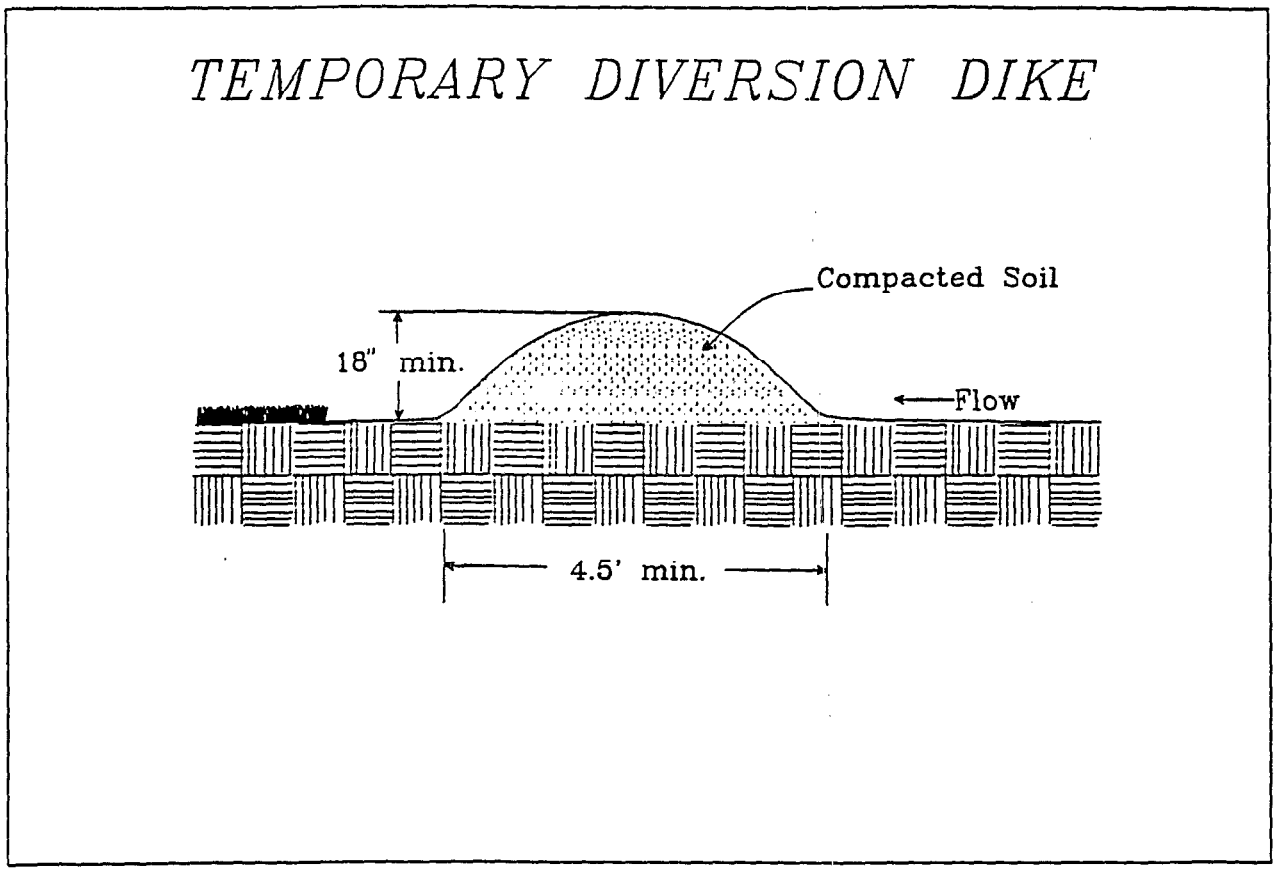
No formal design is required. The following criteria shall be met:

Drainage Area

The maximum allowable drainage area is 5 acres.

Height

The minimum allowable height measured from the upslope side of the dike is 18 inches (see Plate 3.09-1).



Source: Va. DSWC Plate 3.09-1

Side Slopes

1½:1 or flatter, along with a minimum base width of 4.5 feet (see Plate 3.09-1).

Grade

The channel behind the dike shall have a positive grade to a stabilized outlet. If the channel slope is less than or equal to 2%, no stabilization is required. If the slope is greater than 2%, the channel shall be stabilized in accordance with Std. & Spec. 3.17, STORMWATER CONVEYANCE CHANNEL.

Outlet

1. The diverted runoff, if free of sediment, must be released through a stabilized outlet or channel.

2. Sediment-laden runoff must be diverted and released through a sediment-trapping facility such as a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13) or TEMPORARY SEDIMENT BASIN (Std. & Spec. 3.14).

Construction Specifications

1. Temporary diversion dikes must be installed as a first step in the land-disturbing activity and must be functional prior to upslope land disturbance.

2. The dike should be adequately compacted to prevent failure.

3. Temporary or permanent seeding and mulch shall be applied to the dike immediately following its construction.

4. The dike should be located to minimize damages by construction operations and traffic.

Maintenance

The measure shall be inspected after every storm and repairs made to the dike, flow channel, outlet or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the measure shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

STD & SPEC 3.10

TEMPORARY FILL DIVERSION

Definition

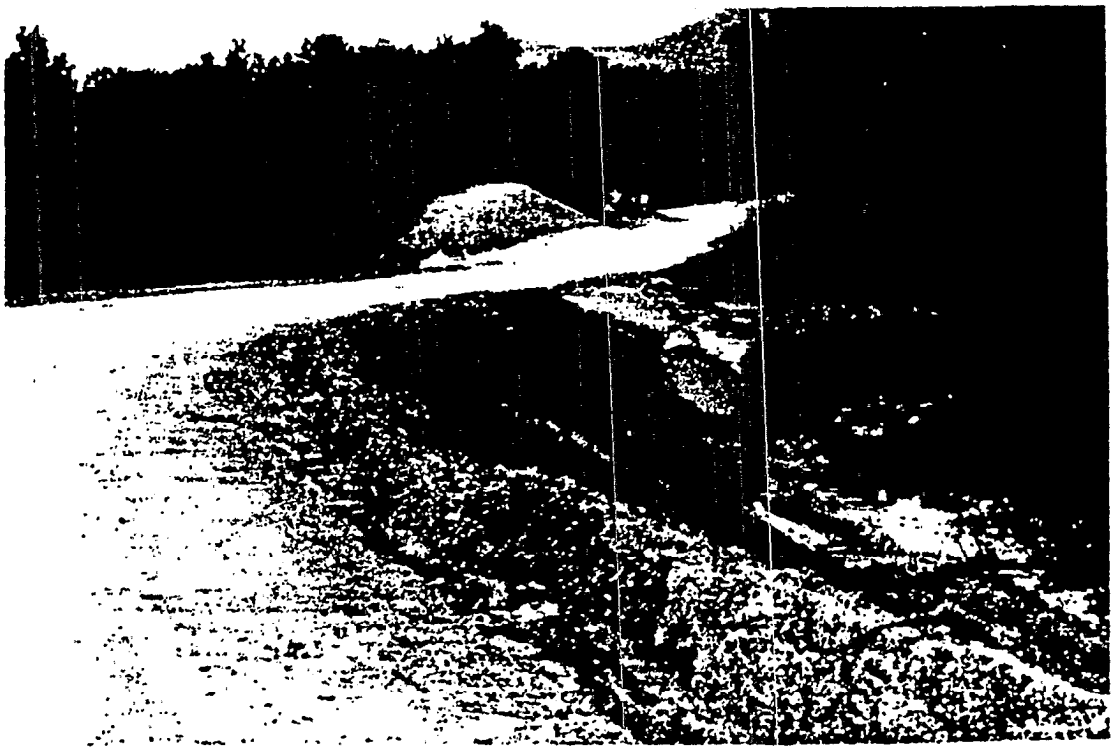
A channel with a supporting ridge of soil on the lower side, constructed along the top of an active earth fill.

Purpose

To divert storm runoff away from the unprotected slope of the fill to a stabilized outlet or sediment-trapping facility.

Conditions Where Practice Applies

Where the drainage area at the top of an active earth fill slopes toward the exposed slope and where continuous fill operations make the use of a DIVERSION (Std. & Spec. 3.12) unfeasible. This temporary structure should remain in place for less than one week.



Planning Considerations

One important principle of erosion and sediment control is to keep stormwater runoff away from exposed slopes. This is often accomplished by installing a dike, diversion, temporary slope drain or paved ditch at the top of a slope to carry the runoff away from the slope to a stabilized outlet. In general, these measures are installed after the final grade has been reached. On cuts, the measures may be installed at the beginning since the work proceeds from the top to the bottom of the slope, and the measures have little chance of being covered or damaged. On fills, the work proceeds from the bottom to the top and the elevation changes daily. It is therefore not feasible to construct a compacted dike or permanent diversion which may be covered by the next day's activity.

The temporary fill diversion is intended to provide some slope protection on a daily basis until final elevations are reached and a more permanent measure can be constructed. This practice can be constructed by the use of a motor grader or a small dozer. To shape the diversion, the piece of machinery used may run near the top edge of the fill with its blade tilted to form the channel as depicted in Plate 3.10-1. This work would be done at the end of the working day and provide a channel with a berm to protect the slope. Wherever possible, the temporary diversion should be sloped to direct water to a stabilized outlet. If the runoff is diverted over the fill itself, the practice may cause erosion by concentrating water at a single point.

Good timing is essential to fill construction. The filling operation should be completed as quickly as possible and the permanent slope protection measures and slope stabilization measures installed as soon after completion as possible. With prompt and proper construction, the landowner or contractor will save both time and money in building, repairing and stabilizing the fill area. The longer the time period for construction and stabilization extends, the more prone the fill operation is to be damaged by erosion. Repairing the damages adds additional time and expense to the project.

Design Criteria

No formal design is required. The following criteria shall be met:

Drainage Area

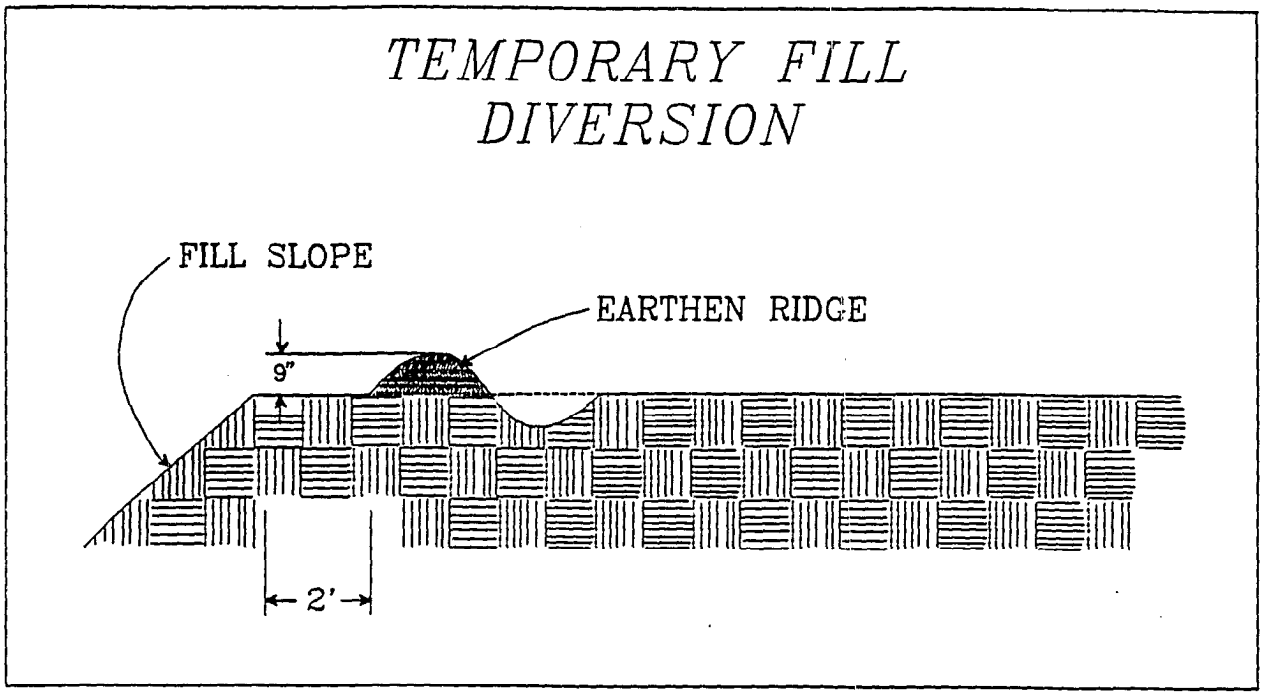
The maximum allowable drainage area is 5 acres.

Height

The minimum height of the supporting ridge shall be 9 inches (see Plate 3.10-1).

Grade

The channel shall have a positive grade to a stabilized outlet.



Source: Va. DSWC Plate 3.10-1

Outlet

The diverted runoff should be released through a stabilized outlet, slope drain or sediment trapping measure.

Construction Specifications

1. The diversion shall be constructed at the top of the fill at the end of each work day as needed.

2. The diversion shall be located at least 2 feet inside the top edge of the fill (see Plate 3.10-1).

3. The supporting ridge shall be constructed with a uniform height along its entire length. Without uniform height, the fill diversion may be susceptible to breaching.

Maintenance

Since the practice is temporary and under most situations will be covered the next work day, the maintenance required should be low. If the practice is to remain in use for more than

one day, an inspection will be made a the end of each work day and repairs made to the measure if needed. The contractor should avoid the placement of any material over the structure while it is in use. Construction traffic should not be permitted to cross the diversion.

STD & SPEC 3.39

DUST CONTROL

DC

Definition

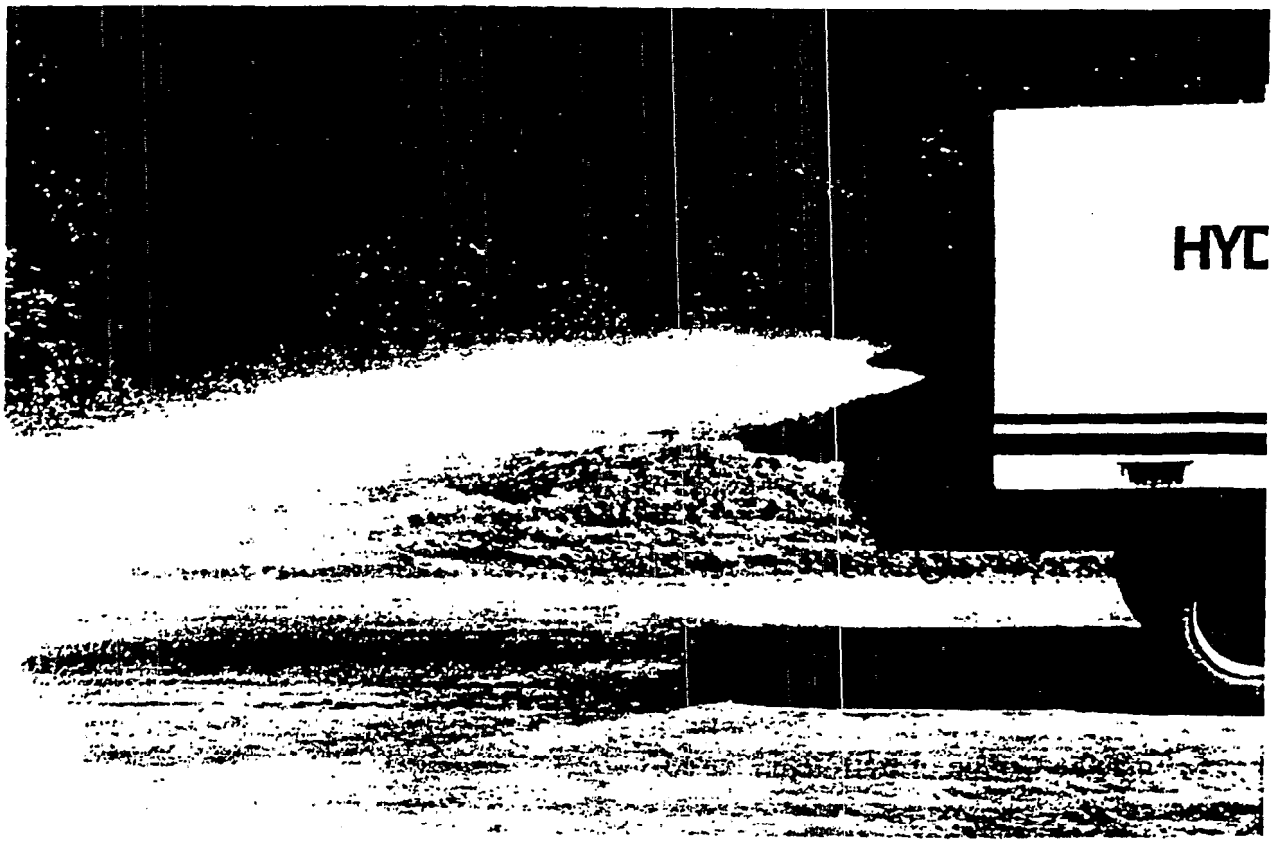
Reducing surface and air movement of dust during land disturbing, demolition and construction activities.

Purpose

To prevent surface and air movement of dust from exposed soil surfaces and reduce the presence of airborne substances which may present health hazards, traffic safety problems or harm animal or plant life.

Conditions Where Practice Applies

In areas subject to surface and air movement of dust where on-site and off-site damage is likely to occur if preventive measures are not taken.



Planning Considerations

Construction activities inevitably result in the exposure and disturbance of soil. Fugitive dust is emitted both during the activities (i.e., excavation, demolition, vehicle traffic, human activity) and as a result of wind erosion over the exposed earth surfaces. Large quantities of dust are typically generated in "heavy" construction activities, such as road and street construction and subdivision, commercial or industrial development, which involve disturbance of significant areas of the soil surface. Research of construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction. Earth-moving activities comprise the major source of construction dust emissions, but traffic and general disturbance of the soil also generate significant dust emissions.

In planning for dust control, limiting the amount of soil disturbance at any one time should be a key objective. Therefore, phased clearing and grading operations and the utilization of temporary stabilization in accordance with MS #1 can significantly reduce dust emissions. Undisturbed vegetative buffers (minimum 50-foot widths) left between graded areas and protected areas can also be very helpful in dust control.

Temporary Measures Used During Construction

1. Vegetative Cover - In areas subject to little or no construction traffic, a vegetatively stabilized surface will reduce dust emissions (see TEMPORARY SEEDING, Std. & Spec. 3.31).

2. Mulch - When properly applied, mulch offers a fast, effective means of controlling dust. Not recommended for areas within heavy traffic pathways. Binders or tackifiers should be used to tack organic mulches (see MULCHING, Std. & Spec. 3.35).

3. Tillage - This practice is designed to roughen and bring clods to the surface. It is an emergency measure which should be used before wind erosion starts. Begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows, and similar plows are examples of equipment which may produce the desired effect.

4. Irrigation - This is the most commonly used dust control practice. Site is sprinkled with water until the surface is wet. Repeat as needed. It offers fast protection for haul roads and other heavy traffic routes.

5. Spray-On Adhesives - Tremendous progress has been made in recent years in the development of products of this type. Most are effective on "mineral" soils and are ineffective on "muck" soils. These coherics are derived from a variety of compounds, both organic and synthetic based. Many of the adhesives will withstand heavy traffic loads. The organics include derivatives from pine tar and vegetable gum; synthetics may be acrylic or petroleum based.

The following table list various adhesives and provides corresponding information on mixing and application:

TABLE 3.39-A

ADHESIVES USED FOR DUST CONTROL

Adhesive	Water Dilution (Adhesive: Water)	Type of Nozzle	Application Rate Gallons/Acre
Anionic Asphalt Emulsion	7:1	Coarse Spray	1,200
Latex Emulsion	12.5:1	Fine Spray	235
Resin in Water	4:1	Fine Spray	300
Acrylic Emulsion (Non-Traffic)	7:1	Coarse Spray	450
Acrylic Emulsion (Traffic)	3.5:1	Coarse Spray	350

Source: Va. DSWC

6. Stone - Stone can be used to stabilize roads or other areas during construction using crushed stone or coarse gravel (see CONSTRUCTION ROAD STABILIZATION, Std. & Spec. 3.3).

7. Barriers - A board fence, wind fence, sediment fence, or similar barrier can help to control air currents and blowing soil. Place barriers perpendicular to prevailing air currents at intervals of about 15 times the barrier height. Where dust is a known problem, existing windbreak vegetation should be preserved.

8. Calcium Chloride - This chemical may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage. Application rates should be strictly in accordance with suppliers' specified rates.

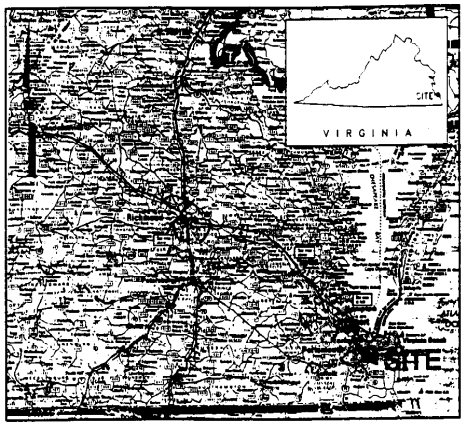
Permanent Methods

1. Permanent Vegetation - The application of PERMANENT SEEDING (see Std. & Spec. 3.32) and saving existing trees and large shrubs can help reduce soil and air movement from construction sites.

2. Stone - Crushed stone or coarse gravel can be used as a permanent cover which will provide control of soil emissions.

APPENDIX
C

DRAWINGS



SITE VICINITY MAP

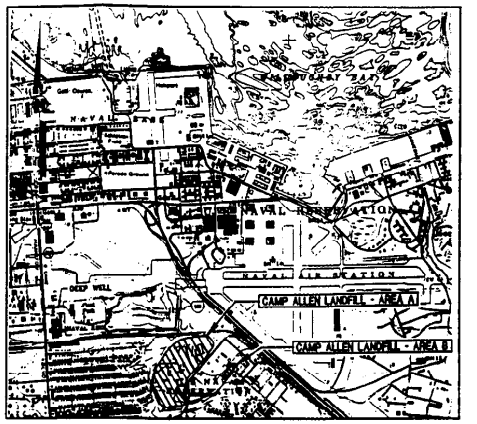
SCALE
0 25 50 MILES

INDEX OF DRAWINGS

OHM DRAWING NUMBER	SHEET REFERENCE NUMBER	DESCRIPTION
15444-T1	RA-0	TITLE SHEET
15444-D1	RA-1	SITE OPERATIONAL PLAN
15444-D5	RA-2	PROPOSED EXCAVATION LIMITS
15444-D6	RA-3	PROPOSED FINAL GRADING PLAN
15444-D8	RA-4	DRYING PAD-PLAN, SECTIONS AND DETAILS
15444-D7	RA-5	DECONTAMINATION PAD-PLANS, SECTIONS, AND DETAILS
15444-D9	RA-6	MISCELLANEOUS DETAILS
15444-D10	RA-7	PROCESS AND INSTRUMENTATION DIAGRAM

NOTE:

USE THESE DRAWINGS WITH USE PLAN, HEALTH AND SAFETY PLAN, ENVIRONMENTAL PROTECTION PLAN, AND CONTRACTOR'S SAMPLING AND ANALYSIS PLAN FOR THIS PROJECT.



SITE LOCATION MAP

SCALE
0 2000 4000 FEET

SOIL AND DEBRIS REMOVAL ACTION

CAMP ALLEN LANDFILL, AREA B
NAVAL BASE, NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
JOSEPH W. COLELLA
No. 27115-E

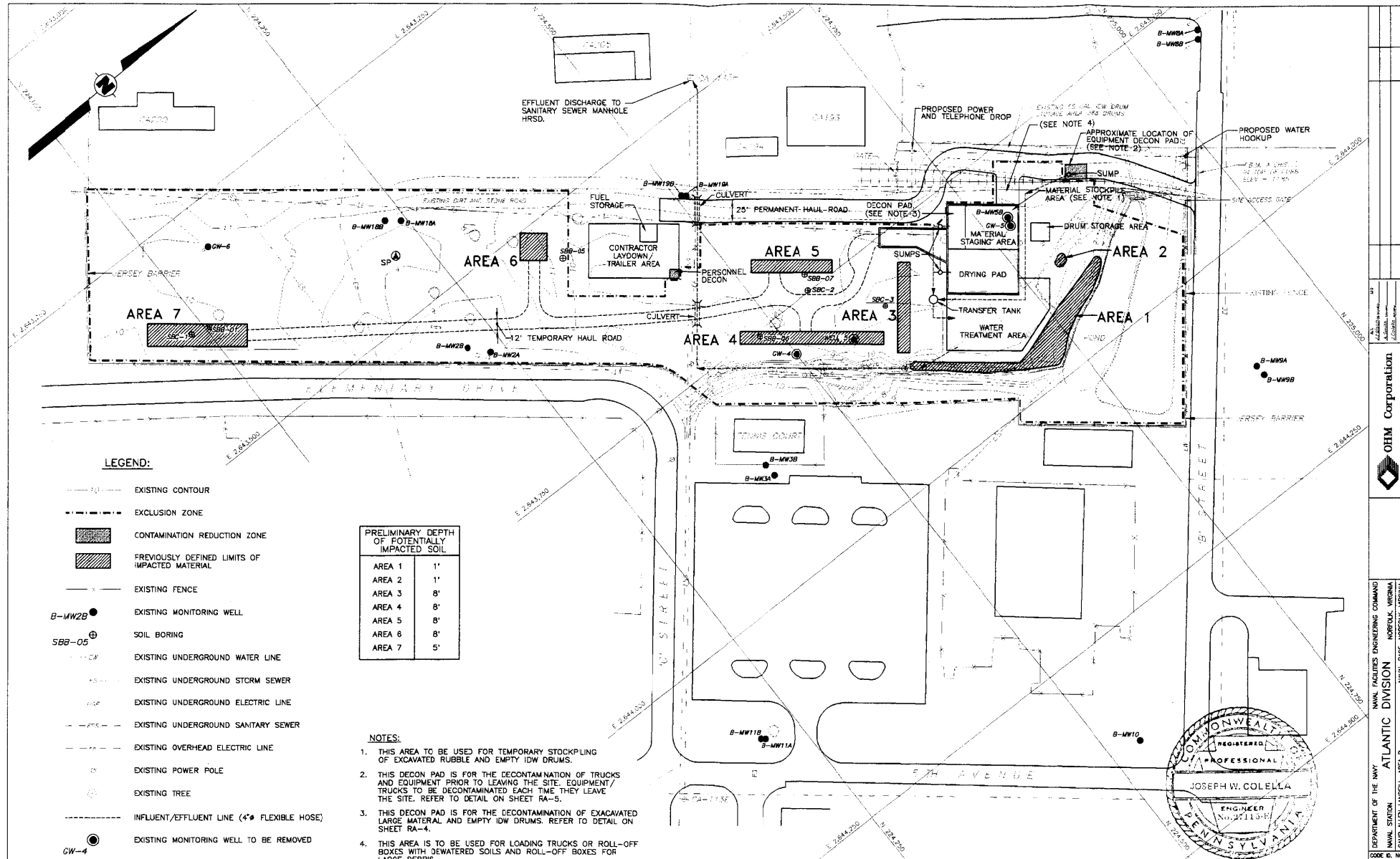
OHM Corporation
A/E CONTRACT NO. N62470-93-D-3032

REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVED BY

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B NAVAL BASE, NORFOLK, VIRGINIA
SOIL AND DEBRIS REMOVAL ACTION
TITLE SHEET

CODE ID. NO. 80091 SIZE D
SCALE: AS SHOWN
EFD NO.
STA. PROJECT NO.
SPEC NO.
CONSTR. CONTRACT NO. N62470-93-D-3032
NAVFAC DRAWING NO.
SHEET OF
RA-0



LEGEND:

- EXISTING CONTOUR
- EXCLUSION ZONE
- CONTAMINATION REDUCTION ZONE
- PREVIOUSLY DEFINED LIMITS OF IMPACTED MATERIAL
- EXISTING FENCE
- B-MW2B — EXISTING MONITORING WELL
- SBB-05 — SOIL BORING
- EXISTING UNDERGROUND WATER LINE
- EXISTING UNDERGROUND STORM SEWER
- EXISTING UNDERGROUND ELECTRIC LINE
- EXISTING UNDERGROUND SANITARY SEWER
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING POWER POLE
- EXISTING TREE
- INFLUENT/EFFLUENT LINE (4"ø FLEXIBLE HOSE)
- GW-4 — EXISTING MONITORING WELL TO BE REMOVED

PRELIMINARY DEPTH OF POTENTIALLY IMPACTED SOIL	
AREA 1	1'
AREA 2	1'
AREA 3	8'
AREA 4	8'
AREA 5	8'
AREA 6	8'
AREA 7	5'

NOTES:

1. THIS AREA TO BE USED FOR TEMPORARY STOCKPILING OF EXCAVATED RUBBLE AND EMPTY IDW DRUMS.
2. THIS DECON PAD IS FOR THE DECONTAMINATION OF TRUCKS AND EQUIPMENT PRIOR TO LEAVING THE SITE. EQUIPMENT/TRUCKS TO BE DECONTAMINATED EACH TIME THEY LEAVE THE SITE. REFER TO DETAIL ON SHEET RA-5.
3. THIS DECON PAD IS FOR THE DECONTAMINATION OF EXACAVATED LARGE MATERAL AND EMPTY IDW DRUMS. REFER TO DETAIL ON SHEET RA-4.
4. THIS AREA IS TO BE USED FOR LOADING TRUCKS OR ROLL-OFF BOXES WITH DEWATERED SOILS AND ROLL-OFF BOXES FOR LARGE DEBRIS.
5. TOPOGRAPHY AND EXCAVATION AREA LOCATIONS WERE PROVIDED BY BAKER ENVIRONMENTAL, INC. DRAFT FINAL REMEDIAL INVESTIGATION REPORT, CAMP ALLEN LANDFILL, NORFOLK NAVAL BASE.
6. FOR WATER TREATMENT PLANT PROCESS FLOW, SEE SHEET RA-7.
7. THE WATER TREATMENT PAD WILL CONSIST OF 6 INCH LAYER OF CRUSHED STONE.

REFERENCE:

TOPOGRAPHY AND EXCAVATION AREA LOCATIONS WERE TAKEN FROM "REMEDIAL INVESTIGATION REPORT, CAMP ALLEN LANDFILL, NORFOLK NAVAL BASE" PREPARED BY BAKER YOUNG INC., 1992.

SCALE
50 0 50 100 FEET

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JOSEPH W. COLELLA
ENGINEER
No. 27115-E

REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVED BY

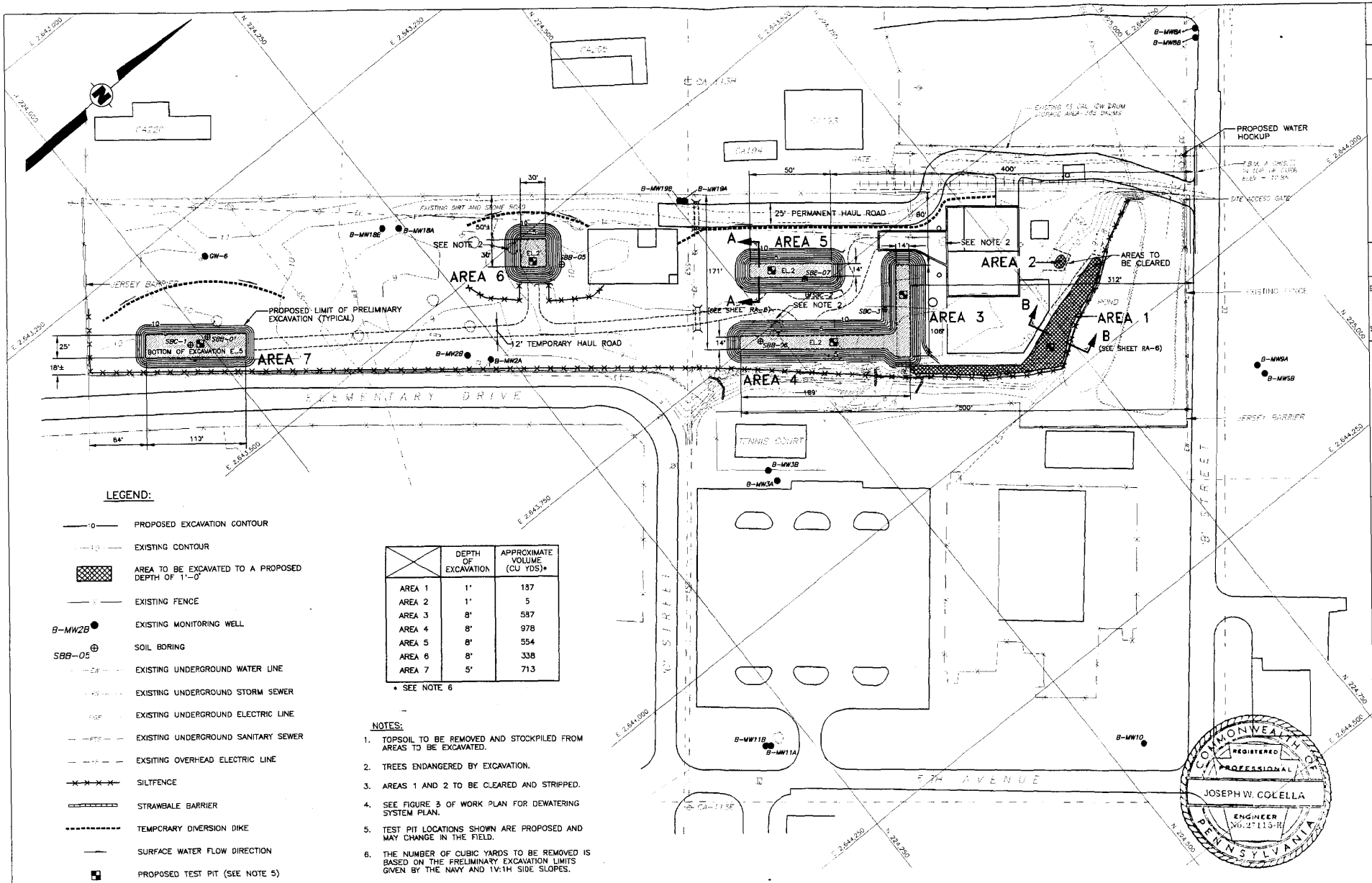
OHM Corporation
A/E CONTRACT NO. N62470-93-D-3032

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NORFOLK, VIRGINIA
NAVAL STATION
NAVAL BASE, NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B

SOIL AND DEBRIS REMOVAL ACTION

SITE OPERATIONAL PLAN

CODE ID. NO. 80091	SIZE D
SCALE:	AS SHOWN
EFD NO.	
STA. PROJECT NO.	
SPEC NO.	
CONSTR. CONTRACT NO.	N62470-93-C-3032
NAVFAC DRAWING NO.	
SHEET	OF
	RA-1



LEGEND:

- PROPOSED EXCAVATION CONTOUR
- EXISTING CONTOUR
- AREA TO BE EXCAVATED TO A PROPOSED DEPTH OF 1'-0"
- EXISTING FENCE
- B-MW2B — EXISTING MONITORING WELL
- SBB-05 — SOIL BORING
- EXISTING UNDERGROUND WATER LINE
- EXISTING UNDERGROUND STORM SEWER
- EXISTING UNDERGROUND ELECTRIC LINE
- EXISTING UNDERGROUND SANITARY SEWER
- EXSIITING OVERHEAD ELECTRIC LINE
- SILTFENCE
- STRAWBALE BARRIER
- TEMPCRARY DIVERSION DIKE
- SURFACE WATER FLOW DIRECTION
- PROPOSED TEST PIT (SEE NOTE 5)

	DEPTH OF EXCAVATION	APPROXIMATE VOLUME (CU YDS)*
AREA 1	1'	187
AREA 2	1'	5
AREA 3	8'	587
AREA 4	8'	978
AREA 5	8'	554
AREA 6	8'	338
AREA 7	5'	713

* SEE NOTE 6

NOTES:

1. TOPSOIL TO BE REMOVED AND STOCKPILED FROM AREAS TO BE EXCAVATED.
2. TREES ENDANGERED BY EXCAVATION.
3. AREAS 1 AND 2 TO BE CLEARED AND STRIPPED.
4. SEE FIGURE 3 OF WORK PLAN FOR DEWATERING SYSTEM PLAN.
5. TEST PIT LOCATIONS SHOWN ARE PROPOSED AND MAY CHANGE IN THE FIELD.
6. THE NUMBER OF CUBIC YARDS TO BE REMOVED IS BASED ON THE PRELIMINARY EXCAVATION LIMITS GIVEN BY THE NAVY AND 1V:1H SIDE SLOPES.
7. WHERE THE EXCAVATION VOLUME IS LESS THAN 500 CUBIC YARDS, ONE TEST PIT WILL BE CONSTRUCTED IN ORDER TO REPRESENT MATERIAL TO BE REMOVED.

REFERENCE:
TOPOGRAPHY AND EXCAVATION AREA LOCATIONS WERE TAKEN FROM "REMEDIAL INVESTIGATION REPORT, CAMP ALLEN LANDFILL, NORFOLK NAVAL BASE" PREPARED BY BAKER YOUNG INC., 1992.

SCALE
50 0 50 100 FEET

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JOSEPH W. COLELLA
ENGINEER
No. 27115-R

REVISIONS

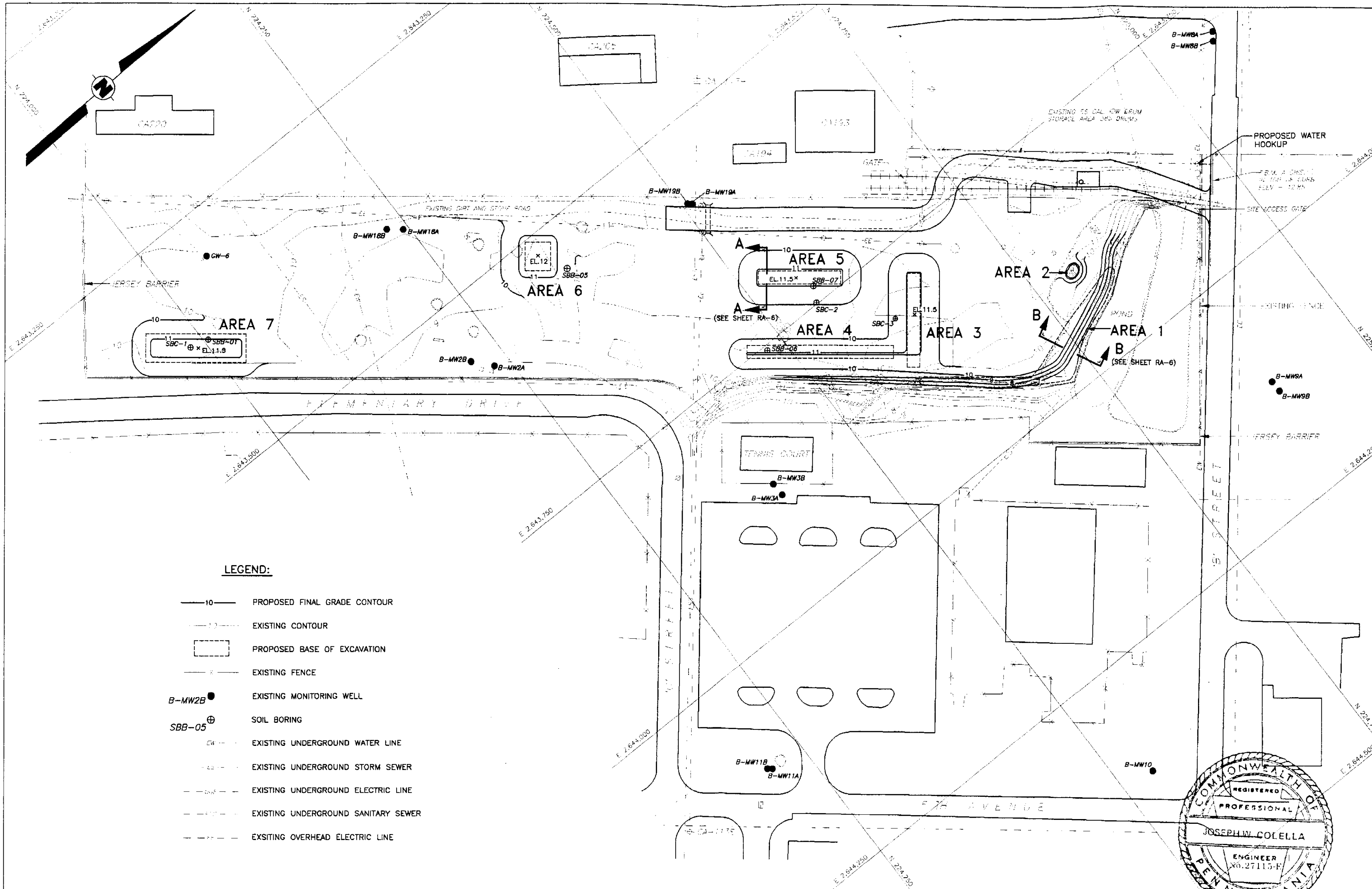
DESCRIPTION	SYMBOL	DATE	APPROVED BY

OHM Corporation
AVE CONTRACT NO. N62470-93-D-3032
ACTIVITY — SATISFACTORY TO: DATE:
FOR CTO POR COMMANDER NAVFAC DATE:

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION NORFOLK, VIRGINIA
NAVAL STATION NAVAL BASE, NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B
SOIL AND DEBRIS REMOVAL ACTION

PROPOSED PRELIMINARY EXCAVATION CONTOURS

CODE ID. NO. 80091 SIZE D
SCALE: AS SHOWN
EFD NO.
STA. PROJECT NO.
SPEC NO.
CONTR. CONTRACT NO.
N62470-93-D-3032
NAVFAC DRAWING NO.
SHEET OF
RA-2



LEGEND:

- PROPOSED FINAL GRADE CONTOUR
- EXISTING CONTOUR
- PROPOSED BASE OF EXCAVATION
- EXISTING FENCE
- B-MW2B EXISTING MONITORING WELL
- SBB-05 SOIL BORING
- EXISTING UNDERGROUND WATER LINE
- EXISTING UNDERGROUND STORM SEWER
- EXISTING UNDERGROUND ELECTRIC LINE
- EXISTING UNDERGROUND SANITARY SEWER
- EXSITING OVERHEAD ELECTRIC LINE

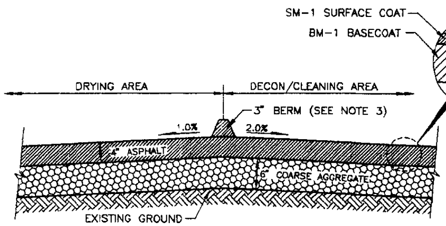
REFERENCE:
TOPOGRAPHY AND EXCAVATION AREA LOCATIONS WERE TAKEN FROM "REMEDIAL INVESTIGATION REPORT, CAMP ALLEN LANDFILL, NORFOLK NAVAL BASE" PREPARED BY BAKER YOUNG INC., 1992.

SYMBOL	DESCRIPTION	DATE	APPROVED BY
	REVISIONS		

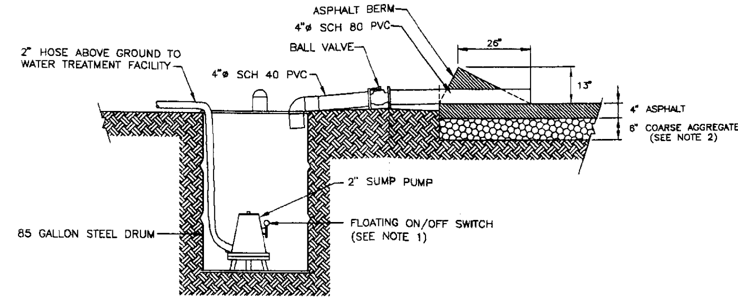
OHM Corporation
A/E CONTRACT NO. N62470-93-D-3032

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B NAVAL BASE, NORFOLK, VIRGINIA
SOIL AND DEBRIS REMOVAL ACTION
PROPOSED FINAL GRADING PLAN

CODE ID. NO. 80091	SIZE D
SCALE: AS SHOWN	
EFD NO.	
STA. PROJECT NO.	
SPEC NO.	
CONSTR. CONTRACT NO. N62470-93-D-3032	
NAVFAC DRAWING NO.	
SHEET OF	
RA-3	



SECTION (A)
N. T. S.



SECTION (B)
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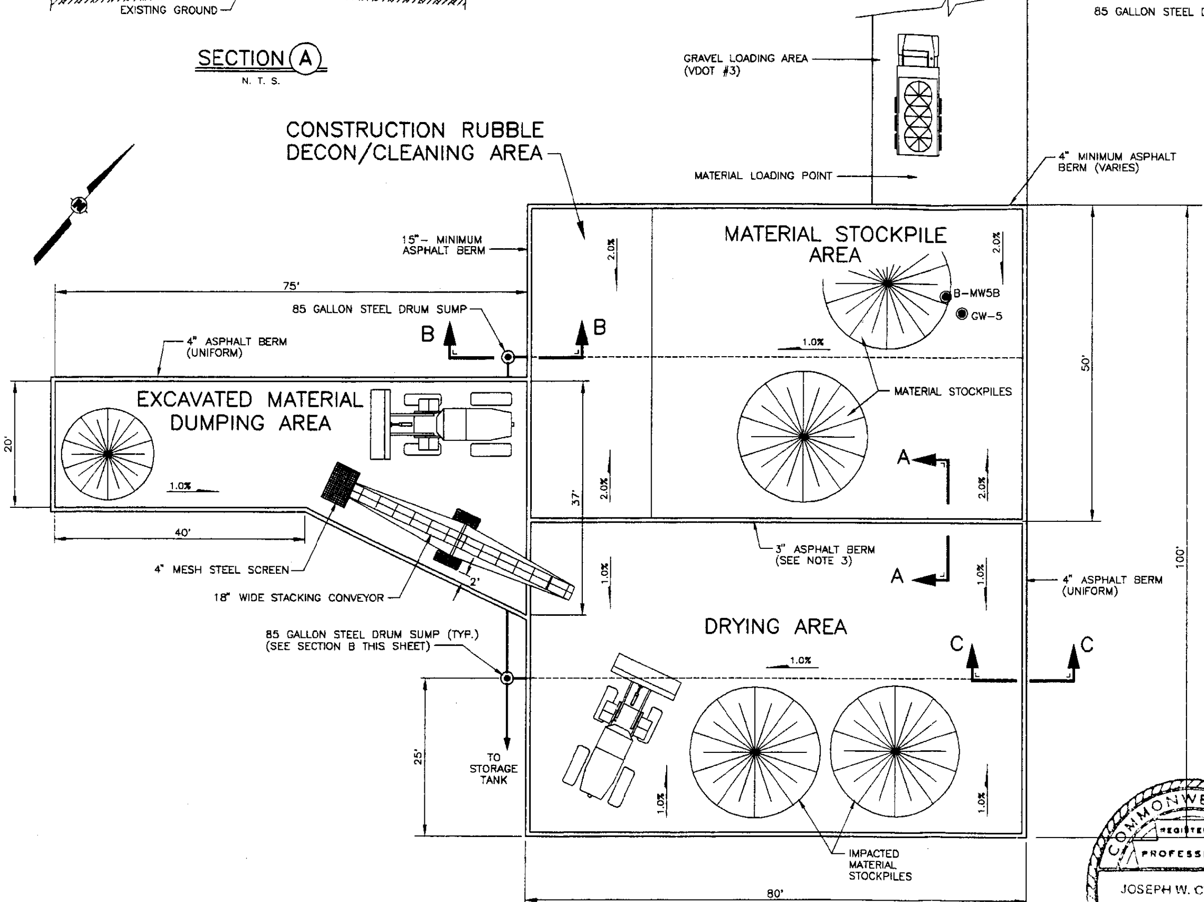
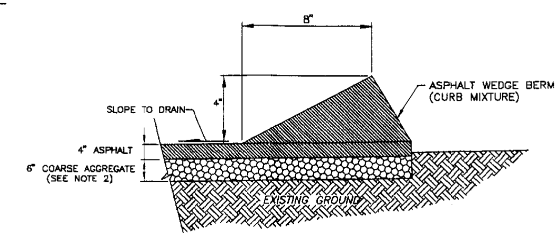
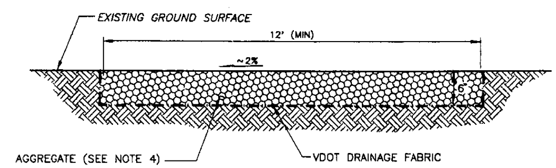


PLAN-DRYING/DECONTAMINATION PAD

SCALE
10 0 10 20 FEET



SECTION (C)
N. T. S.



TYPICAL TEMPORARY CONSTRUCTION ENTRANCE SECTION
N. T. S.

NOTES:

1. ON/OFF OPERATION OF PUMP IS CONTROLLED BY FLOAT SO THAT PUMP STARTS WHEN SUMP WATER LEVEL REACHES 4" BELOW SUMP INLET AND SHUTS OFF WHEN WATER LEVEL DROPS TO PUMP DISCHARGE LEVEL.
2. THE 6-INCH THICKNESS OF THE COARSE AGGREGATE SUBBASE SHOWN MAY BE MODIFIED IN THE FIELD TO 8 INCHES DEPENDING ON THE FIRMNESS OF THE NATURAL SUBGRADE.
3. THE DRYING AREA IS DESIGNED FOR WATER CONTAINMENT DURING A 10 YEAR STORM EVENT, AND IS SEPARATED FROM THE DECONTAMINATION AREA BY A 3" BERM.
4. VDOT #57 AGGREGATE WILL BE USED FOR ENTRANCE ROAD AND WATER TREATMENT PAD CONSTRUCTION. VDOT #3 AGGREGATE WILL BE USED FOR ACCESS ROAD CONSTRUCTION.
5. MONITORING WELLS B-MW5B AND GW-5 TO BE REMOVED PRIOR TO CONSTRUCTION OF DRYING/DECONTAMINATION PAD.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JOSEPH W. COLELLA
ENGINEER

REVISIONS

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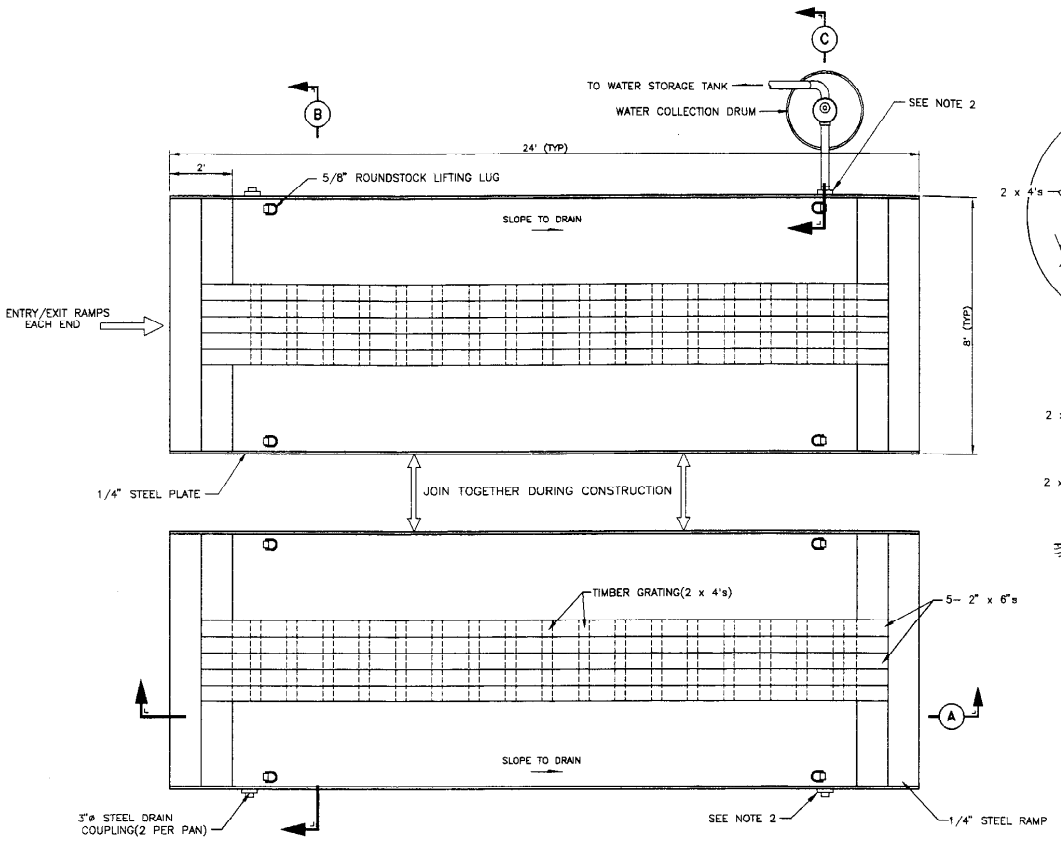
A/E CONTRACT NO. N62470-93-D-3032

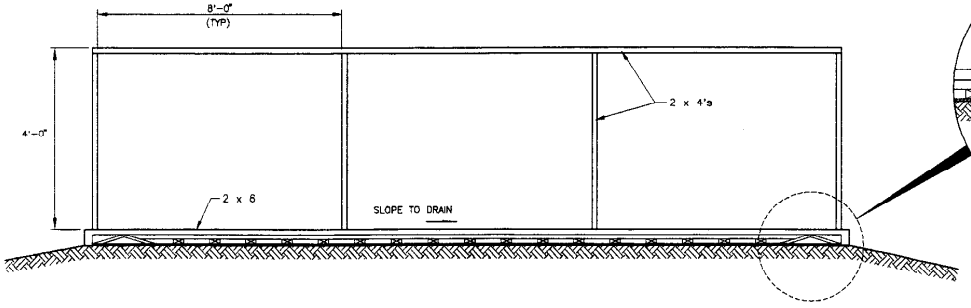
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION — ATLANTIC DIVISION — NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B — NAVAL BASE, NORFOLK, VIRGINIA
SOIL AND DEBRIS REMOVAL ACTION
DRYING PAD - PLAN, SECTIONS, AND DETAILS

CODE ID. NO. 80091	SIZE D
SCALE: AS SHOWN	
EFD NO.	
STA. PROJECT NO.	
SPEC NO.	
CONSTR. CONTRACT NO. N62470-93-D-3032	
NAVFAC DRAWING NO. NAVFAC	
SHEET OF	
RA-4	



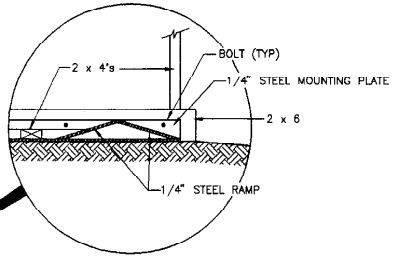
PLAN – DECONTAMINATION PAD

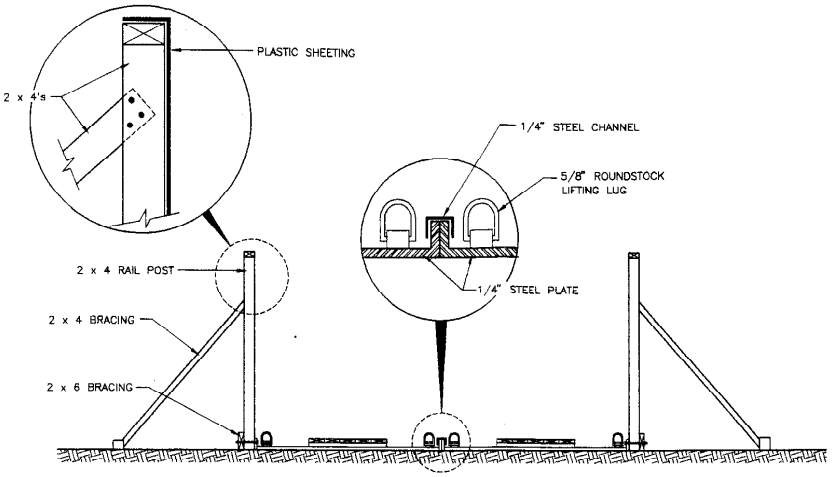
SCALE: 1/2"=1'-0"



SECTION (A)

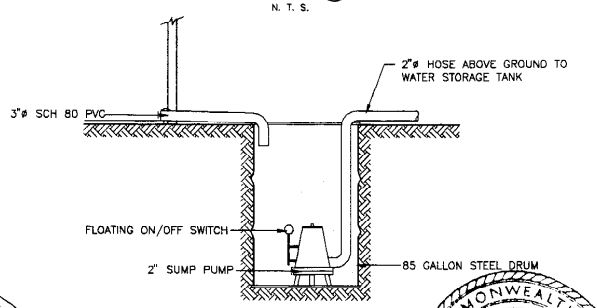
N. T. S.





SECTION (B)

N. T. S.



SECTION (C)

N. T. S.

NOTES:

1. ON/OFF OPERATION OF PUMP IS CONTROLLED BY FLOAT SO THAT PUMP STARTS WHEN SUMP WATER LEVEL REACHES 4" BELOW SUMP INLET AND SHUTS OFF WHEN WATER LEVEL DROPS TO PUMP DISCHARGE LEVEL.
2. DRAIN COUPLING IS TO BE FITTED WITH QUICK DISCONNECT AND 3"ø SCH 80 PVC (INNER COUPLING) OR 3"ø RUBBER DISCHARGE HOSE (OUTER COUPLING) TO SUMP. THE OUTER DRAIN COUPLING IS TO BE USED ONLY AFTER VEHICLE HAS LEFT THE PAD. PLUG ALL DRAINS NOT BEING USED.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JOSEPH W. COLELLA
ENGINEER
No. 27115-E

REVISIONS

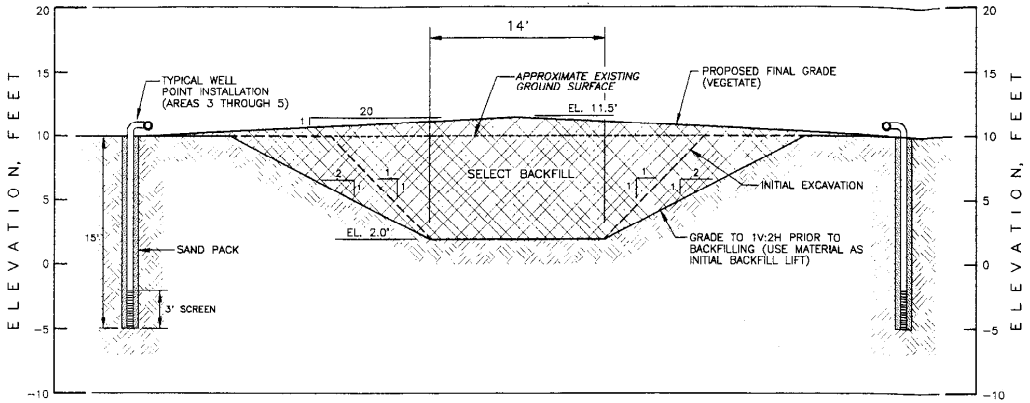
SYMBOL	DESCRIPTION	DATE	APPROVED BY

OHM Corporation
A/E CONTRACT NO. N62470-93-D-3032

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION — ATLANTIC DIVISION — NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B — NAVAL BASE, NORFOLK, VIRGINIA
SOIL AND DEBRIS REMOVAL ACTION
DECONTAMINATION PAD – PLAN,SECTIONS, AND DETAILS

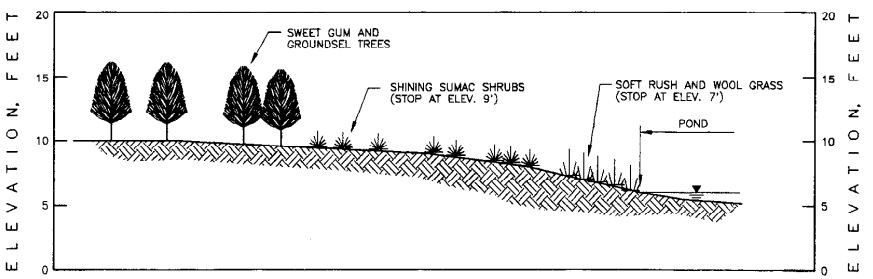
CODE ID. NO. 80091	SIZE D
SCALE:	AS SHOWN
EFD NO.	
STA. PROJECT NO.	
SPEC NO.	
CONSTR. CONTRACT NO.	N62470-93-D-3032
NAVFAC DRAWING NO.	
SHEET	OF

RA-5



SECTION (A)
TYPICAL FOR AREAS 3 THROUGH 7

SCALE
5 0 5 10 FEET



SECTION (B)
TYPICAL WETLANDS SECTION

SCALE
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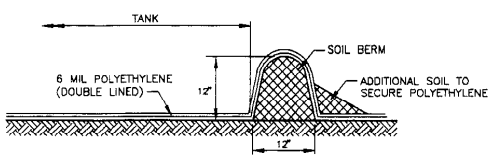
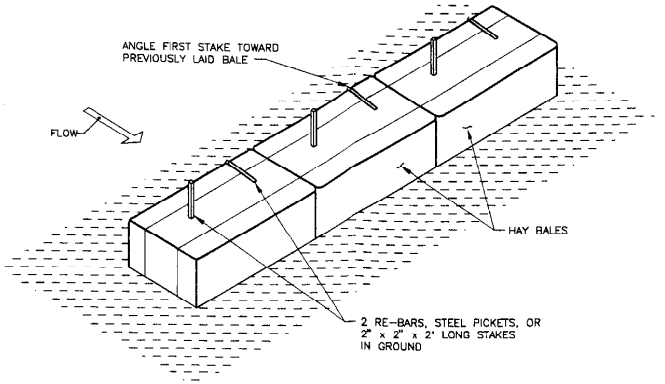


TYPICAL FUEL STORAGE SECONDARY CONTAINMENT
N. T. S.

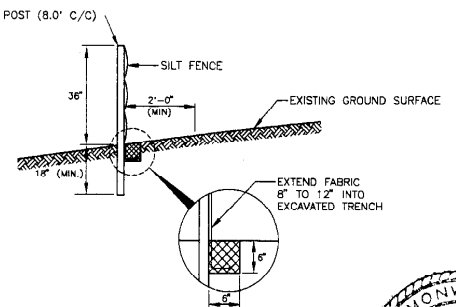


ANCHORING DETAIL

DETAIL (2) STRAW BALE BARRIER INSTALLATION
N. T. S.

NOTES:

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES WILL BE KEYED INTO THE GROUND.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. BALES TO BE PLACED AS SHOWN ON THE PLANS OR OTHERWISE AS DIRECTED BY THE SITE SUPERVISOR.



DETAIL (1) SILT FENCE INSTALLATION
N. T. S.

NOTES:

1. TAKE ALL SLACK OUT OF FABRIC BEFORE ATTACHING TO STAKES.
2. FENCE TO BE PLACED AS SHOWN ON THE PLANS OR AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.
3. SILT FENCE WILL BE REMOVED AFTER SEEDING HAS ACHIEVED ADEQUATE GROWTH TO PREVENT EROSION OR AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JOSEPH W. COLELLA
ENGINEER

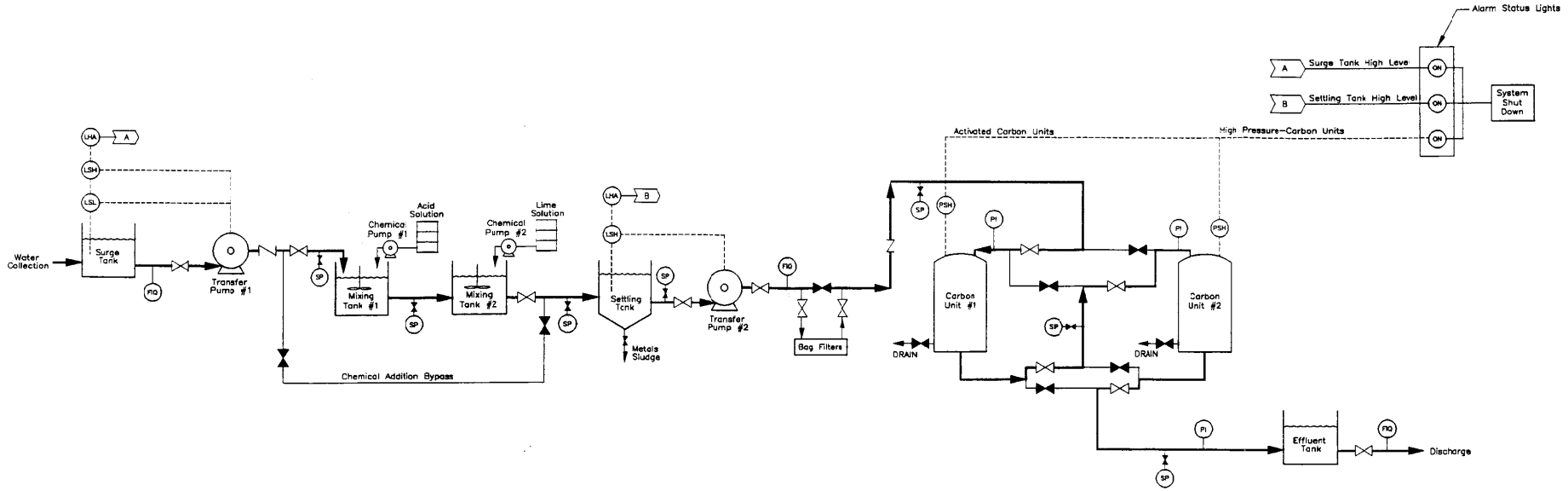
REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVED BY

OHM Corporation
A/E CONTRACT NO. N62470-93-D-3032
AUTH'Y: SATISFACTORY TO: DATE:
FOR BID FOR COMMANDER NAVFAC DATE:

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION NORFOLK, VIRGINIA
NAVAL STATION NAVAL BASE, NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B
SOIL AND DEBRIS REMOVAL ACTION
MISCELLANEOUS DETAILS

CODE ID. NO. 80091	SIZE D
SCALE:	AS SHOWN
EFD NO.	
STA. PROJECT NO.	
SPEC NO.	
CONSTR. CONTRACT NO.	N62470-93-D-3032
NAVFAC DRAWING NO.	
SHEET	OF
	RA-6



LEGEND

SYMBOL	DESCRIPTION
○	INSTRUMENT/LIGHT IS MOUNTED LOCALLY
—⋈—	VALVE (NORMALLY OPEN)
—⋈—	VALVE (NORMALLY CLOSED)
—⊣/⊢—	CHECK VALVE
A	LINE CONTINUATION
⊙	PUMP

SYMBOL	DESCRIPTION
LHA	HIGH LEVEL ALARM
LSH	HIGH LEVEL SWITCH
LSL	LOW LEVEL SWITCH
PI	PRESSURE INDICATOR
PSH	HIGH PRESSURE SWITCH
SP	SAMPLE PORT POINT
FIQ	TOTAL FLOW INDICATOR

LINE TYPES	
———	MAIN PROCESS LINE
———	SECONDARY PROCESS LINE
- - - - - - -	SIGNAL PATHS

REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVED BY

OHM Corporation
N.A. CONTRACT NO. N62470-93-D-3032
ACTIVITY - SATISFACTORY TO: DATE
FOR USE FOR CONSTRUCTION: NAVFAC DATE

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION NORFOLK, VIRGINIA
NAVAL STATION NAVAL BASE, NORFOLK, VIRGINIA
CAMP ALLEN LANDFILL, AREA B
SOIL AND DEBRIS REMOVAL ACTION
PROCESS AND INSTRUMENTATION DIAGRAM

CODE ID. NO. 80091 SIZE D
SCALE: AS SHOWN
DTD NO.
STA. PROJECT NO.
SPEC. NO.
CONSTR. CONTRACT NO. N62470-93-D-3032
NAVFAC DRAWING NO.
SHEET OF
RA-7