

**US NAVY NORTHERN DIVISION  
REMEDIAL ACTION CONTRACT (RAC)  
CONTRACT NO. N62472-94-D-0398  
DELIVERY ORDER NO. 0013**

**WORK PACKAGE NO. 2  
SUPPORT AND WASTE HANDLING**

**TANK FARM NO. 4 REMEDIAL ACTIONS  
NAVAL EDUCATION AND TRAINING CENTER (NETC)  
NEWPORT, RHODE ISLAND**

**May 1996**

Prepared by

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Revision

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ND96-055  
5/30/96

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### WORK PACKAGE NO. 2 COMPONENTS

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## **1.0 INTRODUCTION**

### **1.1 Project Background**

The Naval Education Training Center (NETC-Newport) Tank Farm No. 4 is a 90-acre site located in the Town of Portsmouth, Rhode Island. The tank farm contains 12 large underground storage tanks (USTs), numbered 37 through 48, and was constructed in the early 1940's for fuel oil storage. The USTs were in operation until the late 1970s.

Following the enactment of revised UST regulations in 1992, the Navy initiated the process for permanent closure of the tanks. Under Remedial Action Contract N62472-94-D-0398, Delivery Order No. 0013, Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) was selected as the Contractor to complete the closure of twelve USTs in Tank Farm No. 4.

### **1.2 Overview of Work Package No. 2**

Work Package No. 2 identifies locations for placement of various facilities and contains the details to provide or install the support and waste handling facilities necessary to support project activities. Work Package No. 2 activities will be preceded by Work Package No. 1 activities which include wetlands delineation, power supply from off-site, clearing, mowing, fencing, surveying, etc. Work Package No. 2 includes documents and drawings related to installation or provision of support and waste handling facilities. The major activities included in this Work Package are as follows:

- Construction of visitors/workers parking area, subcontractor trailer/laydown area, administration parking area, drum storage area, contaminated soil storage area, equipment decontamination pad and access roads to tanks and water treatment facility area
- Improvement of entrance and loop roads including construction of pullover areas for trucks at the entrance road
- Installation of administration trailer, lunch/office trailer, personnel shower trailer and facility signage
- Placement of portable toilets, roll-off containers, dumpsters, and above ground fuel storage tank
- Installation of sewer system and water distribution system
- Installation of on-site electrical distribution system and telephone system
- Installation/construction of UST access openings and other tank cleaning support facilities

### **1.3 Work Package No. 2 Components**

This section provides an itemization of Work Package No. 2. The work package No. 2 components, to support overall project schedule, including those that have been previously reviewed and issued, are included herein. Each component forms a separate document that may be revised on an individual basis; the Submittal Register should be referred to identify the latest issued revision of each component.

### 1.3.1 Site Logistic Work Packages (SLWPs)

A number of activities including supply, design and installation of various components will be performed by Foster Wheeler Environmental to meet project requirements. These activities are detailed in the SLWPs. SLWPs associated with the Work Package No. 2 are as follows:

- SLWP-1284-13-01 Site Layout
- SLWP-1284-13-02 On-Site Temporary Utilities

### 1.3.2 Subcontracts and Procurement

To support the procurement effort, Statements of Work (SOWs) have been prepared for subcontracted services or major items with performance requirements. For specialty tasks which will be performed, or supported, by subcontractors, the following SOWs will be used initially for procurement purposes and subsequently to monitor subcontractors' field activities:

- SOW-1284-13-06 On-Site Electrical Services

### 1.3.3 Drawings

The drawings associated with Work Package No. 2 are as follows:

- 1284.0013.C2 Site Layout Plan
- 1284.0013.C3 Site Utilities Layout and Details - Water & Sewer
- 1284.0013.C4 Project Details
- 1284.0013.E2 Electrical Single Line Diagram
- 1284.0013.E3 On-Site Electrical Power Layout

## 1.4 Data Gaps

The following identifies data gaps existing at the time of issuance of this Work Package. These data gaps will not restrain construction efforts except in areas as noted below. Foster Wheeler Environmental is continuing to work with the Navy to close these data gaps.

### 1.4.1 Potential Deletion of Sanitary Sewer Tie-In

The originally envisioned tie-in point for treated water discharge was the sewer forced main directly in front of Tank Farm No. 4 on Defense Highway. Pursuant to discussions with NETC personnel, it was identified that a 75 gpm flow limitation would be imposed if the forced main was the tie-in point. Since 300 gpm is required to support the Project Schedule, an alternate discharge methodology has been proposed. It is assumed that an abandoned 16-inch fuel line from Tank Farm No. 4 to Tank Farm No. 5 can be utilized to allow discharge to a gravity sewer manhole, which would allow a 300 gpm discharge. This line has been previously cleaned and hydrostatically tested. RFI-1284-0013-001 was prepared requesting the records of the cleaning and testing to allow usage of this line. It is assumed that this information will be available in time to support initial discharge.

#### 1.4.2 City of Newport POTW Permit

A POTW (Publicly Owned Treatment Works) Permit application was prepared by Foster Wheeler Environmental and forwarded to NETC on March 22, 1996. This Permit application was forwarded to the Newport POTW on April 3, 1996. Prior to discharge, this Permit must be received and reviewed to ensure assumptions made in the development of project plans are valid.

## **2.0 PROJECT EXECUTION - WORK PACKAGE NO. 2**

### **2.1 Site Layout Activities**

Site Layout activities are required to provide support facilities for the effective completion of the tank closure activities. Foster Wheeler Environmental will provide equipment, materials, and supplies and will utilize local labor to install facility components. Alternately, Foster Wheeler Environmental may issue purchase orders to subcontract services or to purchase equipment, materials and supplies. The site layout activities are identified in the Site Layout SLWP. The site layout activities include the following:

- Construction of visitors/workers parking area, subcontractor trailer/laydown administration parking area, drum storage area, contaminated soil storage area, equipment decontamination pad and access roads to tanks
- Improvement of entrance and loop roads including construction of pullover areas for trucks at the entrance road
- Installation of administration trailer, lunch/office trailer, personnel shower trailer, telephone lines and facility signage
- Placement of portable toilets, roll-off containers and dumpsters
- Installation/construction of UST access openings and other support tank cleaning support facilities

### **2.2 On-Site Temporary Water and Sewer Services**

On-site temporary utilities that will be provided include a water distribution system and a sewer system to discharge treated water to the City of Newport POTW. The water distribution system and sewer system will be above ground except at road crossings. At road crossings, the lines will be placed inside a steel sleeve and ramped, bermed over, or buried 2 feet underground based upon site requirements. The design of these utility systems assumes no freeze protection is required since activities are not expected to be conducted in harsh winter months. These systems will be installed to allow emptying of piping via gravity drainage or by blowoff valves.

The flow withdrawal from the tie-in point (fire hydrant) on a 12-inch main along the Defense Highway is limited to 200 gallons per minute (gpm). Tank ballasting activities require 200 gpm and will limit all other water usage on-site, including tank and pipe wash, personnel showers, equipment decon and dust suppression. Therefore, the majority of the tank ballasting activities will occur on weekends.

Sewer discharge to the POTW is limited to 100 gpm during the daytime (0600-1800 hours) on weekdays and to 300 gpm at all other times. Pending Navy approval, the existing 16-inch fuel

line, located along the Defense Highway, will be used for treated water discharge. This existing fuel line is located 700 feet southwest of the entrance gate and leads to a chamber in the vicinity of a gravity manhole at Tank Farm No. 5. Foster Wheeler Environmental will install these systems as detailed in the SLWP-1284-13-02.

### **2.3 On-Site Temporary Electrical Services**

Site power supply sources, a 500 kVA main transformer and a 75 kVA auxiliary transformer for the administration area, will be installed as part of the 13.8 kV Line Extension SOW, Work Package No. 1. The supply, design and installation of the on-site electrical distribution system will be provided by a subcontractor per SOW-1284-13-06. Power will be supplied to the Water Treatment Facility (WTF) for distribution to WTF components by the WTF Subcontractor. Power distribution for tank cleaning activities, activities in WTF area and WTF interfacing systems will also be provided. The power distribution system provided via this SOW includes a main power distribution panel (PDP) at the main transformer (500 kVA) and auxiliary PDPs at each tank location. Three main portable electrical distribution skids consisting of motor starters, power receptacles and step-down transformers to control and power electrical equipment will be provided. These skids will be transported to the three USTs to be cleaned. The skids, connected to the local PDP via plugs, will provide outlets to energize the pumps, blower, etc. required at each location.

Three additional portable auxiliary electrical distribution skids consisting of a motor starter and receptacles will be provided to permit ring drain system operation on up to three additional tanks/pump rooms.

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REMEDIAL ACTION CONTRACT (RAC)  
CONTRACT NO. N62472-94-D-0398  
DELIVERY ORDER NO. 0013**

**SITE LOGISTICS WORK PACKAGE  
FOR  
SITE LAYOUT  
SLWP-1284-13-01**

**TANK FARM NO. 4 REMEDIAL ACTIONS  
NAVAL EDUCATION AND TRAINING CENTER (NETC)  
NEWPORT, RHODE ISLAND**

**May 1996**

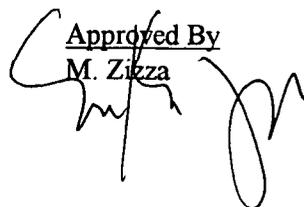
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Project Details	Dwg. No. 1284.0013.C4

## **1.0 INTRODUCTION**

The Foster Wheeler Environmental Team will perform closure activities for the 12 underground fuel storage tanks in Tank Farm No. 4, Naval Education and Training Center (NETC), Portsmouth, Rhode Island. The work is being performed under Remedial Action Contract N62472-94-D-0398, Delivery Order No. 0013. Closure activities will include removal and disposal of UST contents, UST cleaning and repair, followed by pump room equipment removal, cleaning and repairing. The "shunt and loop" piping and a concrete oil/water separator will also be removed. It is envisioned that one 10-hour shift of up to 40 laborers and equipment operators, will be employed four days a week. The Water Treatment Facility (WTF) will operate 24 hours a day, seven days a week. The Foster Wheeler Environmental Team will provide professional personnel on-site to provide construction supervision, health and safety, quality control, engineering, logistics and transportation management through completion of operations.

This document describes the overall layout and activities required to sustain site operations throughout the site activities including: sequence of operations, site layout and support facilities, zones of operation, site security, traffic management, and communication. The Site Layout Plan (Dwg. No. 1284.0013.C2) and Project Details (Dwg. No. 1284.0013.C4) depict the layout of facilities and key areas of operation.

## **2.0 RELATED PROJECT DOCUMENTS**

### **2.1 Related Codes and Standards**

The Codes and Standards listed below form a part of this SLWP to the extent referenced, with the current edition of each reference being utilized:

- National Fire Protection Association (NFPA) Section 30 - Above Ground Fuel Tank
- OSHA 29 CFR 1910 and 1926, including OSHA 29 CFR 1910.106d—Flammable and Combustible Liquids; Container and Portable Tank Storage

### **2.2 Related Project Plans**

The Project Plans listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- Work Plan for Remediation Actions at NETC Tank Farm 4
- Site Health and Safety Plan (SHSP)
- Environmental Protection Plan (EPP)
- Quality Control Plan (QCP)
- Sampling and Analysis Plan (SAP)
- Waste Management Plan (WMP)

### **2.3 Related Standard Operating Procedures (SOPs)**

The following SOPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SOP-1284-13-01 Ring Drain System
- SOP-1284-13-02 Water Removal
- SOP-1284-13-03 Product Removal

- SOP-1284-13-04 Product Residual Removal
- SOP-1284-13-05 Tank Cleaning
- SOP-1284-13-06 Tank Repair
- SOP-1284-13-07 Pipe Draining and Free Liquid Removal
- SOP-1284-13-08 Piping Excavation and Removal
- SOP-1284-13-09 Pump Room and CT Chamber Demolition
- SOP-1284-13-10 Soil Handling and Storage
- SOP-1284-13-11 Water Treatment Facility
- SOP-1284-13-12 Steel Processing and Handling

#### **2.4 Related Site Logistics Work Packages (SLWPs)**

The following SLWPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SLWP-1284-13-02 On-Site Temporary Utilities
- SLWP-1284-13-04 Tank Cleaning Systems Facilities
- SLWP-1284-13-05 Water Treatment Facility

#### **2.5 Related Statements of Work (SOWs)**

The following SOWs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced:

- SOW-1284-13-01 Fencing Repairs/Modifications
- SOW-1284-13-02 13.8 kV Line Extension
- SOW-1284-13-04 Surveying Services
- SOW-1284-13-05 Site Clearing
- SOW-1284-13-06 On-Site Electrical Services
- SOW-1284-13-09 Asbestos Abatement Services
- SOW-1284-13-11 Water Treatment Facility
- SOW-1284-13-12 Waste Transportation and Disposal Services
- SOW-1284-13-13 Demolition Scrap Metal Recycling
- SOW-1284-13-14 Paving Services

### **3.0 SEQUENCE OF OPERATIONS**

The operations to be conducted at the site are as follows: 1) Mobilization and Site Preparation; 2) Tank Closure; 3) Pump Chamber Closure; 4) Shunt and Loop Piping Removal and Demolition of Oil/Water Separator; and 5) Demobilization and Site Restoration. Work will be performed under the protocol in 29 CFR 1910.120.

#### **3.1 Mobilization and Site Preparation**

Upon notice to proceed and prior to any site activities, the Site Health and Safety Officer will initiate the Site Health and Safety Program. Personnel, facilities and equipment will be mobilized to the site to install the support facilities. Mowing and clearing will be performed for fencing, parking and utility lines (SOW-1284-13-05). A fencing contractor will repair the holes in the existing fence and install a gate across the site access road (SOW-1284-13-01). Power supply from off-site and telephone services will be installed.

Grading and surfacing will be performed, as necessary, for the installation of the support trailers, parking, tank access roads, laydown areas and the WTF. Site roads will be repaired, improved or constructed as required. General site erosion controls will be installed as necessary. Signage at the fence and other work/support areas will be installed as required by the SHSP.

The administration area, contaminated soil and drummed waste areas, and support facilities at the tank sites will be constructed. The power supply for the administration trailers will be provided by two 60 kVA generators for an interim period until a 75 kVA transformer, to be supplied as part of the SOW-1284-13-02, is connected. The on-site electrical services, sewer line and water lines will also be installed. The portable toilets and dumpsters will be provided as required. Once the required support facilities are in place, personnel and equipment will be mobilized to perform tank closure activities.

### **3.2 Tank Closure**

The water from Tank 43 will be pumped to Tank 47 as per SOP-1284-13-02 and the product and product residual will be removed as per SOP-1284-13-03 and -04, respectively, for off-site recycling/disposal (SOW 1284-13-12). Tank 43 will then be used to store contaminated site water prior to treatment in the WTF. Tank 44 will be cleaned, if and when necessary, for storing treated effluent. Product removed from the tank will be handled according to applicable OSHA, EPA and DOT regulations. Closure operations will be performed in sequence beginning with suspected leaking tanks Nos. 38, 42, 45, and 48. The sequence of closure among the non-leaking tanks will be defined by the project schedule and will be based on the proximity of equipment and support services. The last tank to be closed will be Tank No. 43.

The sequence of operations at each tank is as follows: 1) Remove surface soil and cut/remove two openings in the tank roof (SOP-1284-13-05); 2) Remove contaminated water (SOP-1284-13-02); 3) Pump ring drain to lower local water table as necessary (SOP-1284-13-01); 4) Remove product and product residual (SOP-1284-13-03,04); 5) Purge the head space of the UST and Pump Chamber (SOP-1284-13-05); 6) Pressure wash the UST interior (SOP-1284-13-05); 7) Repair UST interior (SOP-1284-13-06); 8) Perform RIDEM closure inspection; 9) Document the UST cleaning and repair; 10) Water fill UST to previous water table (SOP-1284-13-01); and 11) Close UST with cathodic-protected steel plates, and backfill soil (SOP-1284-13-05). It is anticipated that cleaning crews will be operating in up to three tanks concurrently. Once the tank is pumped, cleaned, repaired and sealed, the crew will move to the next tank. The pump-room crew will begin work to close the pump-room chamber. Additional information of the tank cleaning facilities is included in SLWP-1284-13-04.

### **3.3 Pump Chamber Closure**

The pump chamber associated with each UST will be continually pumped free of water to activate the ring drain system. The fuel line and bottom sediment and water lines will be cleaned and equipment removed. Blind flanges will be placed on the incoming loop and shunt lines and on the line connecting the pump chamber to the tank. The pump chamber will then be pressure washed, inspected and repaired. The pump chamber will be sealed with the original concrete lid, if possible or with a steel plate. When all tanks and pump chambers have been closed, the field activities will focus on the removal of the underground piping. Details of the pump room closure are included in SOP-1284-13-09.

### **3.4 Shunt and Loop Piping Removal**

Asbestos abatement will be performed in the CT chambers before any other pipe removal work is initiated. Valves will then be removed and the liquid allowed to drain in a liner constructed catch basin within the CT chamber or pump room (SOP-1284-13-07). The oil will be cleaned up (small quantities) or pumped to the

surface for collection and disposal. The straight runs of pipe between CT chambers will be cleaned and removed. The wash water will be transported to the WTF. The buried pipelines between the CT chambers will then be excavated and the asbestos insulated piping removed, bagged and disposed by the asbestos abatement subcontractor (SOW-1284-13-09). The remaining steel pipe will be removed (SOP-1284-13-12) and stockpiled for recycling (SOW-1284-13-13). After the trench excavation and removal is complete, the concrete floor of the CT chamber will be broken to allow drainage and the chamber will be filled with clean common fill (SOP-1284-13-09). The asphalt pavement will be replaced where the trench crosses the loop road (SOW-1284-13-14). The liquid and residuals from the existing oil/water separator will be removed for off-site disposal. The inside concrete surfaces will be pressure washed and wash water will be pumped to UST 43. The concrete floor will be broken and then backfilled with clean common fill. All asbestos work will be performed under 29 CFR 1910.1001.

### **3.5 Demobilization and Site Restoration**

Demobilization and site restoration will be performed after UST closure and wastewater treatment operations are complete. Construction equipment will be decontaminated, and a decontamination certificate will be issued by Foster Wheeler Environmental. The decon wastewater will be treated in the WTF. The treatment facility will then be decontaminated, disconnected from utilities and dismantled. The remaining support trailers and facilities will be disconnected from utilities and removed from the site. Areas which have been disturbed and not previously restored will be restored. The stone-covered support areas, parking lots, and tank access roads will not be removed or restored. These areas will remain available for subsequent site remediation activities performed by the Navy. Other disturbed areas will be regraded and revegetated. Additional information regarding site restoration is included in the EPP.

## **4.0 SITE LAYOUT AND SUPPORT FACILITIES**

The layout of facilities and utilities to support closure activities and disposal/treatment of waste materials is configured to provide safe and efficient management of personnel, equipment and materials at the site. The layout of facilities and key areas of operation are shown on the Site Layout Plan (Dwg. No. 1284.0013.C2) and Project Details (Dwg. No. 1284.0013.C4). The temporary facilities and services provided include: roads, offices, telephones, water, showers, toilets, electricity and lighting, an above ground fuel storage tank, waste handling and decontamination. Upon completion of the closure activities the site utilities, decontamination pad and WTF stabilized area will be removed and restored. The power line extension to the 500 kVA transformer, parking areas and tank access roads will remain in-place. The location and specifications of the temporary utilities are described in SLWP-1284-13-02.

### **4.1 Access Roads**

An existing paved road provides access to the site from Defense Highway and connects to a paved loop road within the tank farm. These roads presently are wide enough to accommodate a single lane of traffic. As part of this project, crushed stone extensions will be made to provide truck pullout zones at both ends of the access road to accommodate two way traffic. The loop road provides one-way access (site control to be established in a counter-clockwise direction) to each tank area. Stabilized access ways and laydown areas, comprised of crushed stone, will be installed at each tank area. Access road to WTF will be installed as necessary. Project Details (Dwg. No. 1284.0013.C4) shows the options for construction of the graveled access ways including: 4 inches to 8 inches of gravel; additional use of filter fabric; and use of cobblestone for bridging road areas as required.

## **4.2 Offices**

Temporary office facilities will be located along the access road near the junction with the loop road. Two trailers will provide space for construction management, health and safety, quality control, logistics, and administrative personnel. The trailers will be equipped with desks, chairs, file cabinets, telephones, HVAC and electrical service. Computers, typewriter, telefax, photocopier and other electrical office equipment will be available in the administration trailer, Trailer No. 1. A worker lunch room area will be located in Trailer No. 2. The power for the administration trailers will be supplied by two 60 kVA generators for an interim period until a 75 kVA transformer, to be supplied as part of the SOW-1284-13-02, is connected.

## **4.3 Telephones**

Incoming telephone service will be established along the electric poles installed for the 13.8 kV extension to Trailer No. 1 and 2 in the administration/support area and to the WTF. Four telephone lines will be installed in the administration trailer to provide voice communications, computer network connections and telefax service. Additionally, one line will be provided to the WTF. The local telephone company will be contacted to install telephone lines.

## **4.4 Water and Sewer**

Drinking water will be provided by a contracted water delivery service. Sufficient quantities of water will be kept on-site in the mini-decon trailers and the administrative and support area to supply employees with adequate drinking water. Stationary coolers will be located in office trailers and the personnel shower trailer. A portable cooler will be located in the mini-personnel decontamination trailer near the tank exclusion zone.

Non-potable water service will be drawn from the hydrant near Defense Highway, brought overland to the administration/support area and extended to the personnel and equipment decontamination areas and work zones. Water brought to the tank area will supply the tank/pipe washing system and will be used for dust control operations. Dust control on-site will be performed as needed by covering soil piles and applying water to excavation areas. The method used will depend on the activities being conducted, weather conditions and other criteria as appropriate.

The treated effluent from two frac tanks at the WTF will be pumped to an existing, abandoned, on-site 16-inch fuel line (CT chamber A-10), certified by the Navy as a clean pipe, via new 6-inch above-ground PVC pipe. The 16-inch fuel line will convey treated water to CT chamber A-19 at Tank Farm No. 5. A new 6-inch above-ground line (approximately 600 feet) will be installed to convey treated water from CT chamber A-19 to an existing gravity sewer manhole. This manhole will convey treated water to a Navy pump station, which in turn discharges to the City of Newport POTW. Details of these installations are included in SLWP-1284-13-02.

## **4.5 Personnel Shower Facilities**

The personnel shower facilities will be located near the WTF. The shower trailer will contain four private shower facilities. The trailers will be configured to provide separate, private facilities for male and female workers as required. An emergency shower will be located in the mini-decontamination trailer located at each tank cleaning site. Since personnel decontamination is performed elsewhere, the effluent from the shower trailer will be directed into the UST 43 at the WTF for treatment and subsequent disposal into the sewer.

#### 4.6 Toilet Facilities

Portable toilet facilities will be provided at the administration/support zone, the WTF area and near the mini-decontamination trailer outside the exclusion zone. The number of toilets provided will be sufficient to serve the number of workers on site and provide separate facilities for male and female workers.

#### 4.7 Site Electrical and Lighting System

Electrical service will extend from the 13.8 kV pole line to a 500 kVA transformer near the WTF. Power will be extended from the transformer to a main electrical panel near the WTF. Buried electrical service lines extending from the main electrical panel near the WTF to local electrical panels at each tank site and at miscellaneous areas will be installed. Portable skids having motor starters, receptacles, etc. will be used to supply power from local electrical panels for equipment and lighting. The power supply will be provided for the WTF in order for the WTF Subcontractor to distribute power to the WTF. Power from the 13.8 kV line will drop to a pole-mounted 75 kVA transformer at the administration and support area. The support trailers will contain electrical panels for the distribution of power for lighting, HVAC, and electrical outlets. Where applicable, outlets will be Ground Fault Current Interruptor (GFCI) equipped. Details of these installations are contained in SOW-1284-13-02 and SOW-1284-13-06.

#### 4.8 Waste Handling Facilities

Waste streams generated during operations will be periodically removed to appropriate storage prior to removal off-site or on-site treatment. The WTF will operate 24-hours per day, seven days a week. The collection and treatment of wastewater streams from the site are listed in Table 4-1.

Table 4-1  
Wastewater Collection and Treatment

Source of Wastewater	Collection/Treatment	Disposal Method	Testing Required	Permit Required
Dust Suppression	Existing Surface Drainage	Natural Drainage	No	No
Site Dewatering	Existing Surface Drainage	Natural Drainage	No	No
Storm Water	Existing Surface Drainage	Natural Drainage	No	No
Personnel Showers	UST 43 and WTF	POTW	Yes	Yes
Decontamination	UST 43 and WTF	POTW	Yes	Yes
Groundwater Pumping from Ring Drain	UST 43 and WTF	POTW	Yes	Yes
Tank/Pipe Wash Water	UST 43 and WTF	POTW	Yes	Yes
Asbestos Abatement Water	5 $\mu$ Filter, UST 43 and WTF	POTW	Yes	Yes
Contaminated Tank Water	UST 43 and WTF	POTW	Yes	Yes

The WTF will be located on a stabilized area near Tank No. 43. The WTF area preparation will include clearing, grading, 4-inch of sand layer, 60 mil polymeric membrane liner, a sand layer to protect the liner and a 6-inch stone layer. The WTF area will be protected from run-on and will have a sump with a pump to collect and discharge runoff and spills to UST 43. Tank No. 43 will receive contaminated water from pumping, cleaning and decontamination operations and feed the WTF. The primary process units of the WTF are: oil/water separator, filter bag system, and Granulated Activated Carbon (GAC) filters. Water collected from ring drain pumping will also be treated at the WTF. Stormwater and surface site dewatering will be directed to a culvert providing site drainage. Two 20,000 gallon frac tanks will store treated water

for discharge to the sewer (SOW-1284-13-11). Water from the personnel showers and filtered water from the asbestos abatement subcontractor will be also be discharged to UST 43. Water samples will be taken at the frac tanks to verify compliance with permit requirements and as described in the SAP. The WTF requirements are provided in SLWP-1284-13-05 and SOW-1284-13-11.

Temporary storage facilities are constructed near the WTF for collection of contaminated soil and drummed waste. Clean excavated overburden soil from the tank openings will be stored outside the exclusion zone in stable piles for use in backfilling operations. Contaminated soil will be transported to the contaminated soil storage area (SOP-1284-13-10). The contaminated soil will be segregated by contaminant level, placed on a storage pad, bermed and lined with 30 mil HDPE, and covered with 10 mil polyethylene. A typical soil stockpile is shown on Dwg. No. 1284.0013.C4. A similar facility will be constructed for collection of drummed waste. Drummed waste is generated by removal of oil-contaminated debris from the tanks. Contaminated soils and drummed waste will be stored and disposed in accordance with the WMP. Product oil and product residuals will be pumped directly to a frac tank or a tanker for off-site recycling or disposal.

#### **4.9 Decontamination Facilities**

An equipment decontamination zone will be located next to the WTF near Tank No. 43. This facility will be used for the final decontamination of equipment leaving the site. It is anticipated that oil and fuel trucks leaving the site will not require decontamination during routine pumping and fuel delivery operations, given that fuel tanks are located in the operational support zone. It is also anticipated that general delivery trucks leaving the site will not require decontamination.

The equipment decontamination pad leaving the site will be constructed to provide secured collection of water used in the decontamination of construction equipment, pumps and pipe cleaning equipment. The collection surface will be constructed of 60-mil high density polyethylene (HDPE) placed over 6 inches of clean sand. The liner will be covered with an additional 6 inches of sand, a separation barrier and 3 inches of crushed rock (see Dwg. No. 1284.0013.C4). The 20-foot by 30-foot pad will be bermed on four sides with hay bales and sloped approximately 1%. The pad will drain to one corner for collection in a sump. Water collected in the sump will be pumped with a submersible pump to Tank No. 43. The hay bale anchors will be removed from one corner of the pad to allow equipment and personnel to enter and exit. The berm and anchors will be replaced before decontamination activities begin. Water will be provided to the decontamination pad via the water main extended through the utility corridor from a hydrant near Defense Highway. A flexible hose will be attached to the water main to feed the pressure washing system. Stormwater collected in the sump will be pumped and transported by hose to Tank No. 43.

The construction of the equipment decontamination pad will be under the supervision of the Foster Wheeler Environmental Site Manager. The Site Engineer and crew will be responsible for the construction of the decontamination facility in accordance with the Site Layout Plan (Dwg. No. 1284.0013.C2) and Project Details (Dwg. No. 1284.0013.C4). The Quality Control System Manager will be responsible for monitoring construction to ensure that work is performed in accordance with the attached plan and all applicable project documents. The HSO will ensure conformance to applicable regulation. Construction of the equipment decontamination pad will include the following activities:

- Grading for an approximate 1% slope and removal of brush and rocks larger than approximately two inches in diameter
- Placement of approximately 6 inches of clean sand and smoothing
- Placement of hay bale berms on four sides
- Installation of pre-seamed HDPE 60-mil sheeting

- Anchor plastic over hay bale berms and under hay bale anchor
- Installation of sump
- Installation of submersible pump and connection hose to Tank No. 43
- Placement of wood planks, as required, prior to equipment decontamination to protect liner

A mini-trailer for personnel decontamination will be available abutting the tank exclusion zone for emergency decontamination and relief from heat and cold stress. Personnel will pass through the contamination reduction zone and enter the mini-decontamination trailer to remove PPE. The shower in the mini-decontamination trailer is available for emergency decontamination. Personnel may routinely shower at the personnel shower trailer near the WTF.

## 5.0 MATERIAL SPECIFICATION

The following list of material and equipment is recommended for the execution of this SLWP. Additional quantities of material/equipment, if required, and actual quantity will be based on field requirements. This list is intended as a recommendation only. Equivalent materials and equipment may be substituted during field operation if changes have been approved by the Site Manager, after consultation with the appropriate disciplinary leads.

### 5.1 Materials

Natural fill materials will be analyzed and certified to be free of hazardous materials:

- Geotextile Fabric - Mirafi 500X or equivalent
- Stone - 2-inch(-); maximum of 2-inch and minimum of ½-inch
- Cobble Stone - 4-inch; minimum 3.5-inch and maximum 6-inch
- Sand - drainage grade; maximum particle size 3/8-inch and allowable amount of material passing a No. 200 sieve shall not exceed 5%
- Hay Bales - string tied
- 60-mil, 30-mil and 10-mil Preseamed HDPE Liner
- Flexible Hose - 1.5-inch suction type
- Submersible Sump Pump for 1.5-inch Hose - "Little Giant" or equivalent, minimum 10 gpm
- Silt Fence
- Transfer Hoses
- PVC Pipe for Water Distribution and Sewer System
- Chain Falls
- Roll-Off Containers
- Dumpsters
- Tank Lights (Intrinsically Safe)

### 5.2 Equipment

- Office Trailers - 2 (12-foot by 60-foot)
- Office Equipment - 7 desks, 10 office chairs, 2 PCs with modem and printer, 1 laptop, telefax, floor-standing copy machine, 3 8-foot tables, 30 chairs, 2 file cabinets
- Mini-Decontamination Trailers - 3 (12-foot by 18-foot) with shower
- Shower Trailer - 1 (12-foot by 60-foot) with four showers
- Fire Extinguishers - 7 (UL 299 Dry Chemical) - ABC - 10 or 20 lb., as required
- Portable Toilets - 5

- Diesel Fuel Tank -1000 gal with stand and berm meeting NFPA requirements
- Excavator - Caterpillar 325 or equivalent
- Dozer - Caterpillar D5 or equivalent
- Rubber-Tired Backhoe - Case 580 or equivalent
- Front-End Loader - John Deere 644 or equivalent
- Tractor Mounted Trencher - Ditch witch or equivalent
- Hand-Held, Two-Way Radios - 20 (Motorola or equivalent)
- 60 kVA Generators (2) - GFCI equipped
- Site Trucks (2)
- Air Monitoring Equipment
- Sampling Equipment
- Gantry Cranes (3)
- Confined Space Entry Equipment
- Tank Access Plates (24)
- Health and Safety Supplies

## **6.0 ZONES OF OPERATION**

The site operations require specific controls for entry and exit from work areas or sources of contamination. The zones of operation and the controls which exist in each zone is described below. A more detailed explanation of the zones is provided in SHSP.

### **6.1 Exclusion Zones**

An exclusion zone is delineated where personnel and equipment may be exposed to hazardous materials or mechanical, physical, electrical or biological hazards. The perimeter of the zone may change in accordance with the type and location of operations being conducted on-site. An exclusion zone will be located as per the SHSP. High visibility fence will be used to define the boundary of the zones. PPE will be required within the zone, and respiratory protection may be required. Work areas will be established as required around the shunt and loop trenches and CT chambers during excavation and asbestos abatement and around the oil/water separator during demolition. The location of these areas will be determined by construction management and health and safety personnel based on the conditions encountered and air monitoring readings. Only personnel meeting specific training requirements and medical surveillance requirements may enter the exclusion zone.

### **6.2 Decontamination Zones**

Decontamination of equipment leaving the tank will be performed within the tank as part of the tank washing process. The equipment decontamination pad will be constructed for equipment that can not be decontaminated in the tanks. A contamination reduction zone (CRZ) will be established at the site to eliminate migration of contaminants. Personnel will remove PPE in the contamination reduction zone and enter the mini decontamination trailer for further clean-up and respirator storage. The shower in the mini-trailer will be used primarily for emergency decontamination. Personnel will normally shower in the personnel shower trailer near the WTF.

### **6.3 Administration/Support Zones**

The primary administrative/support zone is located along the access road between the entrance gate and the loop road. This area will provide parking for employees, offices, lunch areas and materials/supplies

storage. One lunch/office trailer, one administration area, toilet facilities, and a dry storage building are located in the primary support area. An employee/visitors parking area will be located near the existing oil/water separator.

#### **6.4 Operational Support Zone**

The operational support zone includes the location and operation of the WTF and storage of the site fuel supply. The WTF is described in SLWP-1284-13-05. Diesel for the sludge removal operations will be supplied to the site on an as-needed basis. Vehicles and other fuel powered equipment will be refueled on a routine basis by a subcontractor who will deliver fuel based on usage rates for the equipment on site. Refueling operations will take place within the confines of the exclusion zone as required. Some diesel fuel will be stored in an above ground tank (AST) in a bermed area near the WTF. The AST will fully comply with NFPA 30 requirements. Small amounts of fuel required for hand-held and portable equipment may be kept on-site in OSHA approved safety containers provided they are stored in metal flammable storage cabinets complying with OSHA 29 CFR 1910.106d and NFPA 30 requirements.

#### **6.5 Staging and Loading Zones**

Roll-off containers will be placed near the tanks and the contaminated soil storage area. The roll-offs will be designated to receive different types of waste including: shunt and loop piping, asbestos covered piping, PPE, and miscellaneous non-contaminated construction debris. Roll-off containers will be placed along the concrete trench to receive metal for recycling and asbestos abatement material. Oil/sludge pumped from the tanks will be removed from the site by vacuum trucks during pumping operations or into two 20,000 gal frac tanks as per SPCC Plan. Spill containment will be incorporated at the tank valves.

### **7.0 SITE SECURITY AND ACCESS CONTROLS**

The Tank Farm No. 4 site will be restricted to those personnel and vehicles essential to site operations and authorized visitors. Security is provided by seven-foot high chain-link fencing around the active work areas and controlled gate access. The gate will remain open during normal hours of operation, four days a week and remain closed at all other times. NETC security personnel will perform periodic site surveillance. Security lighting will be provided at the administration trailers and the WTF. The lighting will be directed away from residences adjoining the site. All personnel entering the site must sign in with Foster Wheeler Environmental management personnel. Visitors should be accompanied by Foster Wheeler Environmental personnel when walking to the working areas.

### **8.0 TRAFFIC MANAGEMENT**

Traffic impact is anticipated to be minimal. The primary vehicle traffic at the site will be workers arriving and departing the site on the work schedule and truck traffic removing recovered product and other waste intermittently throughout the day. The access road will be modified to provide a truck pullover area at each end to allow two way travel. The loop road will provide one-way travel counter clockwise around the tank farm. The laydown areas adjacent to each tank farm will allow staging of vacuum trucks waiting to load waste oil. The two parking areas at the administration area and near the oil/water separator will reduce the amount of traffic on the loop road. Construction management personnel will determine the requirements for vehicle and equipment movement within the exclusion zone and post signs, fences and barriers as required. Changes in traffic patterns are expected during excavation of the shunt and loop piping. The

traffic pattern, will be set daily by the construction manager during this phase of the project. Changes in the traffic pattern will be addressed in the daily Health and Safety meeting.

Heavy/large loads regulations may be pertinent during the delivery of equipment and trailers. RI DOT regulations specify maximum heights of 13.5 feet, maximum width of 8.5 feet, and a maximum length of 48.5 feet. Variances can be obtained for exceedances through communications with the state by telephone at (401) 277-2970 x2029 or x3029.

## **9.0 RADIO COMMUNICATION**

Radio communication will be established between work crews and base support personnel. As a minimum, the Site Manager, Superintendent, Health and Safety Officer, Site Quality Control Manager, Field Engineer and each Crew Foreman will carry a portable radio. Operations will require the use of 5 channels for site and work area communications. All radios used in the tanks will be intrinsically safe.

**US NAVY NORTHERN DIVISION  
REMEDIAL ACTION CONTRACT (RAC)  
CONTRACT NO. N62472-94-D-0398  
DELIVERY ORDER NO. 0013**

**SITE LOGISTICS WORK PACKAGE  
FOR  
ON-SITE TEMPORARY UTILITIES  
SLWP-1284-13-02**

**FOR TANK FARM NO. 4 REMEDIAL ACTIONS  
NAVAL EDUCATION AND TRAINING CENTER (NETC)  
NEWPORT, RHODE ISLAND**

**May 1996**

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All

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## 1.0 INTRODUCTION

Foster Wheeler Environmental will perform closure activities for the 12 underground storage tanks (USTs) in Tank Farm No. 4, Naval Education and Training Center (NETC), Portsmouth, Rhode Island. The work is being performed under Remedial Action Contract No. N62472-94-D-0398, Delivery Order No. 0013. Closure activities will include removal and disposal of UST contents, UST cleaning and repair, and pump room cleaning, equipment removal and repair. This Site Logistics Work Package (SLWP) serves as the basis of design and installation of the on-site temporary water and sewer utilities at Tank Farm No. 4.

Tank closure operations are supported by several temporary utilities including water, sewer, electrical, and telephone. Temporary on-site electrical lines will be installed by a subcontractor and are described in the Statement of Work SOW-1284-13-06. A purchase order will be issued by the field office to a local telephone company to install telephone lines. Incoming telephone service will be established to Trailer No. 1 and 2 in the administration/support area and to the Water Treatment Facility (WTF). The water withdrawal from the tie-in point (fire hydrant) on the 12-inch main is limited to 200 gallons per minute (gpm). The water distribution system will provide water to each tank, the personnel shower trailer, decontamination pad, and the mini-decontamination trailers. Water will also be used for dust suppression. Tank ballasting activities require 200 gpm and will limit all other water usage on-site. Therefore, the majority of the tank ballasting activities will occur on weekends.

An existing abandoned 16-inch fuel line, located along the Defense Highway 700 feet southwest of the entrance gate, leading to a chamber in the vicinity of a gravity manhole at Tank Farm No. 5 will be used for treated effluent discharge pending Navy approval. The gravity sewer line discharges sanitary wastewater to the City of Newport POTW via the Navy lift station near Tank Farm No. 5. The water distribution system and sewer system will be laid above ground except at road crossings. At road crossings, these lines will be placed inside a steel sleeve and ramped, bermed over, or buried a minimum of 24-inch below the grade based upon site needs. The design of these utility systems is based on the assumption that no freeze protection is required since the activities are not expected to be conducted in harsh winter months. These systems will be installed to allow emptying of pipes via gravity drainage or by blowoff valves.

## 2.0 RELATED PROJECT DOCUMENTS

### 2.1 Related Codes and Standards

The codes and standards listed below form a part of this SLWP to the extent referenced. The current edition of each reference shall be utilized.

ASTM D 1785	(1991) Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D 2241	(1989) Poly (Vinyl Chloride) (PVC) Pressure Related Pipe (SDR series)
ASTM F 477	(1990) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM D 2466	(1990) (Rev. A) Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 3139	(1989) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

## **2.2 Related Project Plans**

The project plans listed below were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced.

- Work Plan for Remedial Actions at NETC Tank Farm No. 4
- Site Health and Safety Plan (SHSP)
- Environmental Protection Plan (EPP)
- Quality Control Plan (QCP)
- Sampling and Analysis Plan (SAP)

## **2.3 Related Standard Operating Procedures (SOPs)**

The following SOPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced.

- SOP-1284-13-05 Tank Cleaning
- SOP-1284-13-08 Piping Excavation and Removal
- SOP-1284-13-11 Water Treatment Facility

## **2.4 Related Site Logistics Work Packages (SLWPs)**

The following SLWPs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced.

- SLWP-1284-13-01 Site Layout
- SLWP-1284-13-04 Tank Cleaning Systems Facilities
- SLWP-1284-13-05 Water Treatment Facility

## **2.5 Related Statements of Work (SOWs)**

The following SOWs were developed specifically for the Tank Farm No. 4 project and form a part of this SLWP to the extent referenced.

- SOW-1284-13-05 Site Clearing
- SOW-1284-13-15 Tank Cleaning
- SOW-1284-13-06 On-site Electrical Services
- SOW-1284-13-11 Water Treatment Facility

## **3.0 TEMPORARY WATER DISTRIBUTION SYSTEM**

### **3.1 Design Criteria**

Continuous water distribution is required for the closure of Tank Farm No. 4. Based on information provided by the Navy, the maximum amount of flow to be taken from a fire hydrant on the 12-inch main will be limited to 200 gpm. Foster Wheeler Environmental will install a temporary system capable of distributing 200 gpm of total flow to service the following facilities or functions:

- 12 UST Areas

- Equipment Decontamination Facility
- Personnel Shower Facility
- Mini-Decontamination Trailers
- Dust Suppression
- Asbestos Abatement Decontamination

Table 3-1 presents an estimate of peak water demands as well as anticipated water usage during work shift hours and non-work shift hours. Note that it is anticipated that tank ballasting activities will be limited during work shift to ensure sufficient water is available to support other site activities.

Fire protection is provided for the support facilities with portable fire extinguishers. Fire protection for the tank operations will be provided by local Fire Department. Therefore, the temporary water distribution system will not be designed to meet fire fighting needs at the tanks and other temporary facilities.

Based on information provided by the Navy, the water pressure at the 12-inch water main along the Defense Highway is 60 psi ( $\pm 5$  psi). The elevation at the source fire hydrant is approximately 20 feet. The elevation at Tank 45 is approximately 120 feet, which is the highest point for the water distribution system. Thus, the maximum static lift for the distribution system is 100 feet.

### 3.2 System Design

A 6-inch PVC pipe will tie-in to the fire hydrant located approximately 750 feet from the site entrance. The water distribution system will be laid above-ground except when crossing the road. At road crossings, the water line will be placed inside a steel sleeve and ramped, bermed over, or buried two feet underground based upon location-specific requirements. The 6-inch PVC pipe will be extended to the administration support area where it diverges to run to the outside of the loop road and directly to the WTF area.

The distribution system will complete two loops of 6-inch pipe to provide water to each tank and the required support areas. A 6-inch extension pipeline will be run from a tee in the loop to the edge of each tank. Reducing fittings are placed at the end of each extension for attachment of a 4-inch hose. The 4-inch hose will be used to supply ballast water to the tanks and as an outlet for other on-site water uses such as dust suppression and asbestos abatement decon water. Tapped fittings will be provided for attachment of 1-inch hose for the mini decontamination trailers and shower trailer. The tie-in location and the water distribution system layout are depicted in the Site Utilities Layout and Details (Dwg. No. 1284.0013.C3).

A backflow preventer meeting the Rhode Island Department of Health (RIDOH) and NETC requirements will be installed on the 6-inch PVC line to prevent backflow into the 12-inch water main. Another backflow preventer will be placed on the 6-inch line near Administration Trailer and 2-inch tee/pipe connection will be provided upstream of this backflow preventer to supply water to the Personnel Shower Trailer. A water meter, to be supplied by the Navy, will be located at the point of origin of the 6-inch PVC line. Backflow prevention for the personnel shower trailer and mini-decon trailers will be provided by clean break in a water supply line to the day-tanks serving the trailers. The loop system and associated ball or gate valves provide the flexibility to close-off portions of the line during excavation of shunt and loop piping. The isolation valves will be provided as shown on the drawings. The locations of these isolation valves and need for additional valves will be determined in the field. The pipe will be supported by the ground surface; however, either fill material or railroad ties will be used to support the pipe in low areas in accordance with the manufacturer's specifications. Concrete support, sand bags, or

Table 3-1

Water Usage Estimate

1. Peak Water Demand of Water Users

Water Usage	Number of Users	Usage per User (gpm)	Peak Load (gpm)
Dust Suppression	1 2-inch hose	40	40
Tank Ballast	1 6-inch hose	200	200
Equipment Decontamination Pad	1 pressure washer	10	10
Personnel Showers	4 showers	2.5	10
Tank and Pipe Wash	6 pressure washers	10	60
			Total = 320

2. Anticipated Water Usage During Work Shift

Water Usage	Average Number of Users	Average Load (gpm)	Peak Load (gpm)
Dust Suppression	1 hose	40	40
Tank Ballast	1 hose	80	200
Equipment Decontamination Pad	1 pressure washer	10	10
Personnel Showers	4 showers	10	10
Tank and Pipe Wash	6 pressure washers	60	60
		Total = 200	Total = 320

3. Anticipated Water Usage During Evenings and Weekends

Water Usage	Average Number of Users	Average Load (gpm)	Peak Load (gpm)
Tank Ballast	1	200	200
		Total = 200	Total = 200

other methods will be provided at bends to restrain against thrust. Pressure/vacuum relief vents will be placed at the highest elevations in each loop and the top of the trunk line to provide protection against water hammer. Blowoff valves will be placed at the lowest elevation for each loop and the trunk line to allow for draining. One or both loops of the water distribution system may be constructed and operated as necessary. The pressure drop calculations for the water distribution system are provided in Appendix A.

### **3.3 Distribution Line Details and Material Requirements**

Pipe line materials will be procured from a vendor and installation will be completed by Foster Wheeler Environmental construction personnel. Non-permanent, restrained-joint PVC pressure pipe has been selected in order to minimize the assembly and disassembly effort required to install, relocate and remove the system. This type of piping has been typically used in above-ground, exposed installations and installations that require disassembly and possible reuse. Manufacturer's Specifications are provided in Appendix B.

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1785. Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations. Gate valves shall be designed for a working pressure of not less than 200 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening.

Details of the estimated quantity of the planned water line are as follows. Additional items, if necessary, and actual quantities will be based upon the site needs.

- 6-inch restrained-joint PVC pressure pipe (non-permanent joint) - 5,300 feet (approx.)
- Quantity of 4-inch hose = 3 x 100 feet
- Quantity of 1-inch hose = 4 x 50 feet
- Flow meter to be supplied by NETC (1)
- Backflow preventers (2)
- 6-inch check valve (1)
- 1-inch check valve (4)
- 45° elbow (8)
- 90° elbow (4)
- PVC gate or ball valve, 150 psi (25)
- 6-inch by 4-inch link reducing joint (12)
- Link joint, male x flange (19)
- 6-inch by 6-inch with 1-inch outlet Link tapped joint, F x M (16)
- 6-inch by 6-inch with 3/4-inch outlet Link tapped joint, F x M (4)
- 6-inch by 6-inch by 6-inch tee (24)
- 3/4-inch air/vacuum valve (4)
- 6-inch cap (6)
- Splines (800)

### **3.4 Installation Requirements**

The pipeline will be constructed under the supervision of the Foster Wheeler Environmental Construction Superintendent. The Construction Superintendent and crew will be responsible for proper installation of the pipeline in accordance with the manufacturer's written guidelines.

The water line will be installed above-ground and placed outside the loop road and directly up to the WTF area. Restrained joints will be used for resisting thrust forces at the elbows if required. The piping is self-restrained under pressures up to 200 psi. If additional restraints are required they will be applied, such as jersey barriers, sand bags, wood staking, or equivalent. At road crossings, the water line will be placed inside a steel sleeve and ramped, bermed over, or buried two feet underground. The pipe will cross the loop road in two places. Additional road crossing may be required if the water line traverses the tank access roads that may be required for access to USTs. If water service is required during the winter months, frost protection provision will be made using heat tracing insulation, soil cover or equivalent.

### **3.5 Installation Procedure**

The following is a general installation procedure for the temporary water line.

Materials delivered to site will be inspected for damage, unloaded and stored with minimum handling. Materials will be stored on site in enclosures or under protective covering. Rubber gaskets will be stored under cover out of direct sunlight. No materials will be stored directly on the ground. Inside of pipes, fittings, and valves will be kept free of dirt and debris. Pipe will be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories will be thoroughly cleaned of foreign matter and will be kept clean during laying operations by plugging or other approved method. Before installation, the pipe will be inspected for defects.

Polyvinyl Chloride (PVC), pipe and fittings will be handled and stored in accordance with the manufacturer's recommendations. Maximum offset in alignment between adjacent pipe joints will be as recommended by the manufacturer, but in no case will it exceed 5 degrees. Connections between different types of pipe and accessories will be made with transition fittings.

After delivery, valves will be drained to prevent freezing and will have the interiors cleaned of all foreign matter before installation. Valves will be fully opened and fully closed to ensure that all parts are in working condition.

Plugs, caps, tees and bends deflecting 11¼ degrees or more, either vertically or horizontally, on lines 4 inches in diameter or larger will be provided with thrust restraints. Valves will be securely anchored or will be provided with thrust restraints to prevent movement. Thrust restraints will be either thrust blocks or restrained joints.

Restrained joints and push-on joints specified by the pipe manufacturer will be used. For pipe-to-pipe push-on joint connections, only pipe with push-on joint ends having factory-made bevel will be used. An approved lubricant recommended by the pipe manufacturer for push-on joints will be used. Push-on joints for pipe-to-pipe joint connections will be assembled in accordance with the requirements of manufacturer for laying the pipe and for pipe joint assembly. Push-on joints for connection to fittings, valves and other accessories will be assembled in accordance with the requirements.

### **3.6 Testing Requirements**

The installed segments including valves will be subjected to an in-service leak test as described below:

After the pipe is laid and the joints completed, the newly laid piping or any valved section of piping will, unless otherwise specified, be subjected for 1 hour to a normal working pressure. Each valve will be opened and closed several times during the test. Joints showing visible leakage will be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, and valves discovered in consequence of this pressure test will be removed and replaced with sound material, and the test will be repeated until the test results are satisfactory.

## **4.0 TEMPORARY SEWER SYSTEM**

### **4.1 Design Criteria**

Treated effluent from two Frac tanks at the WTF will be pumped to the existing on-site 16-inch fuel line via a new 6-inch above-ground force main. The pump system details are provided in SLWP-1284-13-11. The 16-inch fuel line has been certified as a clean pipe line by the Navy. The 16-inch fuel line will carry treated effluent from CT Chamber A-10 (tie-in point along the Defense Highway at Tank Farm No. 4) to the CT Chamber A-19 at Tank Farm No. 5. A new 6-inch above-ground pipe (approximately 600 LF) will be installed to discharge treated water from the 16-inch fuel line in CT Chamber A-19 to an existing manhole discharging into the gravity sewer line. The gravity sewer line discharges sanitary wastewater to the City of Newport POTW via the Navy lift station near Tank Farm No. 5. Continuous discharge of treated effluent is required to support the tank closure activities. The treated effluent discharge schedule is as follows:

- Weekdays (0600-1800 hours): 100 gpm
- Weekdays (1800-0600 hours): 300 gpm
- Weekends and holidays: 300 gpm
- Average daily discharge weekdays: 288,000 gals.
- Average daily discharge weekends and holidays: 432,000 gals.
- Working pressure not to exceed 150 psi

The ground elevations and distances between various locations for the sewer system based upon NETC existing condition drawings are as follows:

- Frac tanks: 65-foot elevation (el.)
- Tie-in point on 16-inch fuel line at Defense Highway: 20-foot el.
- Sewer pipe length between Frac tanks and tie-in point: 1,700 linear feet (LF)
- Chamber A-19: 60-foot el.
- Gravity sewer manhole: 70-foot el.
- Sewer pipe length between A-19 and gravity manhole: 600 LF
- 16-inch fuel line length between tie-in point and A-19: 6,600 LF

### **4.2 System Design**

A 6-inch PVC pipe will tie-in to the 16-inch fuel line at a tie-in point along the Defense Highway. The 16-inch line runs along the Defense Highway to Tank Farm No. 5. At CT Chamber A-19, the 16-inch fuel line will tie-in to a new 6-inch 600 LF PVC line, to be installed by Foster Wheeler Environmental,

will discharge the treated effluent to a gravity manhole. The sewer line will be laid above-ground except when crossing on-site roads. At road crossings, the sewer line will be placed inside a steel sleeve and ramped, bermed over, or buried a minimum 24-inch below the grade based upon site needs. A gate or ball valve will be installed on a 6-inch PVC line at the tie-in point to isolate the new pipe sections. The tie-in location and the sewer pipe layout are depicted in the Site Utilities Layout and Details (Dwg. No. 1284.0013.C3). Foster Wheeler Environmental may select 6-inch flexible suction hose in lieu of 6-inch PVC pipe, if necessary, for certain portions of the sewer system to allow for ease of relocation of sewer in the construction/traffic area.

#### **4.3 Sewer Line Details and Material Requirements**

Pipe line materials will be procured from a vendor and installation will be completed by Foster Wheeler Environmental construction personnel. Non-permanent, restrained-joint PVC pressure pipe has been selected in order to minimize the assembly and disassembly effort required to install and remove the system. This type of piping has been typically used in above-ground, exposed installations and installations that require disassembly and possible reuse. Manufacturer's Specifications are provided in Appendix B.

Pipe, couplings and fittings shall be manufactured of material conforming to ASTM D 1789. Joints, fittings, and couplings shall be as specified for PVC pipe. Joints connecting pipe of differing materials shall be made in accordance with the manufacturer's recommendations. Gate valves shall be designed for a working pressure of not less than 200 psi. Valve connections shall be as required for the piping in which they are installed. Valves shall have a clear waterway equal to the full nominal diameter of the valve, and shall be opened by turning counterclockwise. The operating nut of wheel shall have an arrow, cast in the metal, indicating the direction of opening.

Details of the estimated quantity of the planned sewer line are as follows. Additional items, if necessary, and actual quantities will be based upon the site needs:

- 6-inch restrained joint PVC pressure pipe (non-permanent joint)
- 6-inch flexible suction hose with Quick Disconnect (QD) fittings on each end
- Total distance for 6-inch line = 2,300 feet (approx.)
- 6-inch check valve (1)
- 90 degree elbow (6)
- Link Tee M x M x M (4)
- PVC gate or ball valve, 150 psi (6)
- Link joint, male x flange (6)
- Link nipples M x M thread (6)
- 16-inch flanges with 6-inch male QD fittings (2)
- Link joint cap (2)
- QD fitting female x female pipe thread
- Splines (50)

#### **4.4 Installation Requirements**

The pipeline will be constructed under the supervision of the Foster Wheeler Environmental Construction Superintendent. The Construction Superintendent and crew will be responsible for proper installation of the pipeline in accordance with the manufacturer's written guidelines.

The Sewer line will be installed above-ground from the WTF area to the entrance area and placed along the entrance road. The sewer line will run along the Defense Highway to the sewer tie-in point. Restrained joints will be used for resisting thrust forces at the elbows, if required. The piping is self-restrained under pressures up to 200 psi. If additional restraints are required they will be applied, such as jersey barriers, sand bags, wood staking, or equivalent. At roadway crossings, the sewer line will be placed inside a steel sleeve and ramped, bermed over, or buried two foot underground. The pipe will cross the loop road in two places. Additional road crossings may be required if the sewer line traverses the tank access roads. If this sewer line is required during the winter months, frost protection provisions will be made using heat tracing, insulation, soil cover or equivalent.

#### **4.5 Installation Procedure**

The following is a general installation procedure for the temporary sewer line:

Materials delivered to site will be inspected for damage, unloaded and stored with minimum handling. Materials will be stored on site in enclosures or under protective covering. Rubber gaskets will be stored under cover out of direct sunlight. No materials will be stored directly on the ground. Inside of pipes, fittings, and valves will be kept free of dirt and debris. Pipe will be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories will be thoroughly cleaned of foreign matter and will be kept clean during laying operations by plugging or other approved method. Before installation, the pipe will be inspected for defects. Rubber gaskets that are not to be installed immediately will be stored in a cool and dark place.

Polyvinyl Chloride (PVC), pipe and fittings will be handled and stored in accordance with the manufacturer's recommendations. Maximum offset in alignment between adjacent pipe joints will be as recommended by the manufacturer, but in no case will it exceed 5 degrees. Connections between different types of pipe and accessories will be made with transition fittings.

After delivery, valves will be drained to prevent freezing and will have the interiors cleaned of all foreign matter before installation. Valves will be fully opened and fully closed to ensure that all parts are in working condition.

Plugs, caps, tees and bends deflecting 1 1/4 degrees or more, either vertically or horizontally, on lines 4 inches in diameter or larger will be provided with thrust restraints. Valves will be securely anchored or will be provided with thrust restraints to prevent movement. Thrust restraints will be either thrust blocks or restrained joints.

Restrained joints and push-on joints will be as designed by the pipe manufacturer. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of manufacturer for laying the pipe and for pipe joint assembly. Assemble push-on joints for connection to fittings, valves and other accessories in accordance with the requirements. If sewer line relocation is required, the line will be flushed with clean water and then disassembled in accordance with the manufacturer's specifications. Prior to final removal off-site, the line will be flushed with clean water, disassembled, and visually inspected for signs of contamination. Any visible contamination will be removed before final disposition of the pipe.

#### **4.6 Testing/Inspection Requirements**

The installed segments including valves will be subject to in-service leak testing and routine inspection. After the pipe is laid and the joints completed, the newly laid piping or any valved section of piping will, unless otherwise specified, be subjected for 1 hour to a normal working pressure. Each valve will be opened and closed several times during the test. Exposed pipe, joints, fittings, and valves will be carefully examined during the test. Joints showing visible leakage will be replaced or remade as necessary. Cracked or defective pipe, joints, fittings, and valves discovered in consequence of this pressure test will be removed and replaced with sound material, and the test will be repeated until the test results are satisfactory. Foster Wheeler Environmental personnel will routinely inspect the sewer lines to locate leaks. The method of routine inspection will be determined in the field.

## **Appendix A**

### **Engineering Calculations**



BY K. SHAH DATE 4-18-96

SHEET 1 OF 3

CHKD. BY M. DIPPRE DATE 5-22-96

OFS NO. 1284.0013.0103 DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC TANK FARM NO. 4

SUBJECT EXPECTED FLOW TO TANK 45 - PIPE EQUIVALENT METHOD

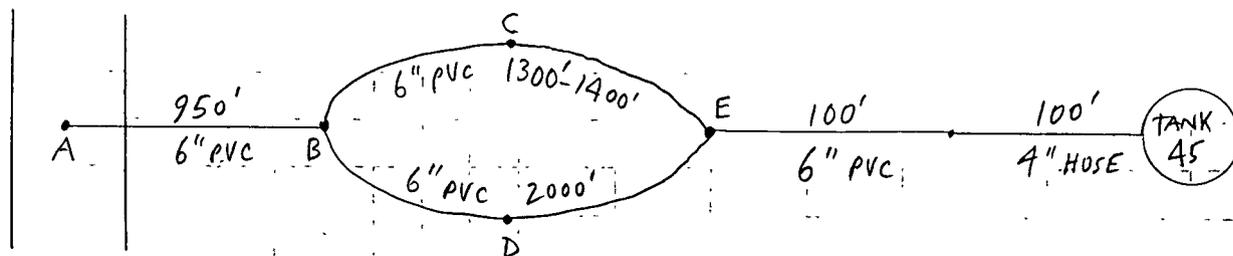
Given: Pipe network as shown. Types of pipe as shown:

PVC PIPE, 6"

Hose, corrugated, 4"

Find: Expected flow.

Solution: Draw system schematic:



SUPPLY  
HEADER 16"  
EL. 20'  
P = 130'

① Assume 10' loss between (B) and (E);

$$h_{L\ BCE} = \frac{-10'}{1300'} = \frac{7.7'}{1000'}$$

$$h_{L\ BDE} = \frac{10'}{2000'} = \frac{5.0'}{1000'}$$

USING THESE VALUES IN HAZEN-WILLIAMS NOMOGRAPH:

$$Q_{BCE} = 220 \text{ gpm}$$

$$Q_{BDE} = 180 \text{ gpm}$$

$$Q_E = 400 \text{ gpm}$$

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BY K. SHAH DATE 4-18-96

SHEET 2 OF 3

CHKD. BY M. DIPPRE DATE 5-22-96

OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC TANK FARM NO. 4

SUBJECT EXPECTED FLOW TO TANK 45

Solution. (continued) :

For total flow of 400 gpm and 6" PVC pipe,

$$h_L = \frac{10.0'}{1000'} \quad (\text{per Attachment 1})$$

-equivalent length of 6" pipe to replace loop =

$$\frac{10.0'}{10.0'} (1000') = 1000'$$

② Assume 200 gpm through 4" hose.

Per Civil Engr Design Manual,  $C=100$  for rough pipe.

Use  $C=100$  for corrugated hose.

$$h_{L \text{ hose } C=100} = h_{L \text{ pipe } C=150} \left( \frac{150}{100} \right)^{1.85} = 2.12 h_{L \text{ pipe}}$$

$$h_{L \text{ pipe, 4" }} = \frac{19'}{1000'}$$

$$h_{L \text{ hose 4" }} = \left( \frac{19'}{1000'} \right) (2.12) = \frac{40.3'}{1000'}$$

$$h_{L 6"} = \frac{2.5'}{1000'}$$

$$\text{equiv. length} = \left( \frac{40.3'}{2.5'} \right) 100' = 1612'$$

③ Total equiv. length = 950' + 1000' + 100' + 1612'

$$\underline{\text{Total equiv. length} = 3662'}$$

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BY K. SHAH DATE 4-18-96

SHEET 3 OF 3

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OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC TANK FARM NO. 4

SUBJECT EXPECTED FLOW TO TANK 45

Solution. (continued) :

④ Use Bernoulli's equation :

$$\frac{P_A}{\gamma} + z_A + \frac{V_A^2}{2g} = \frac{P_G}{\gamma} + z_G + \frac{V_G^2}{2g} + f \frac{L}{D} \frac{V_G^2}{2g} \quad (1.2)$$

-which includes 20% Additional friction losses for valves and fittings

$$130' + 20' + 0 = 0 + 120' + \frac{V_G^2}{2g} + 0.02 \left( \frac{3662'}{0.5'} \right) \frac{V_G^2}{2g} \quad (1.2)$$

-with  $f = 0.02$  for turbulent flow, smooth pipe.

$$130 = \frac{V_G^2}{2g} (1 + 176)$$

$$30 = 177 \cdot \frac{V_G^2}{2g}$$

$$V_G^2 = 10.9 \text{ ft}^2/\text{sec}^2$$

$$\underline{V_G = 3.30 \text{ ft/sec}}$$

-  $Q = AV$

$$= \frac{\pi}{4} \left( \frac{6.115}{12} \text{ ft} \right)^2 (3.30 \text{ ft}) \left( \frac{449 \text{ gpm}}{\text{ft}^3/\text{sec}} \right)$$

$$\underline{\underline{Q = 302. \text{ gpm}}}$$



BY M. DIPPRE DATE 5-22-96

SHEET 1 OF 4

CHKD. BY K. SHAM DATE 5/23/96

OFS NO. 1284.0013.0103 DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC TANK FARM 4

SUBJECT EXPECTED FLOW TO TANK 45 - TRIAL / ERROR HEAD LOSS BALANCE METHOD

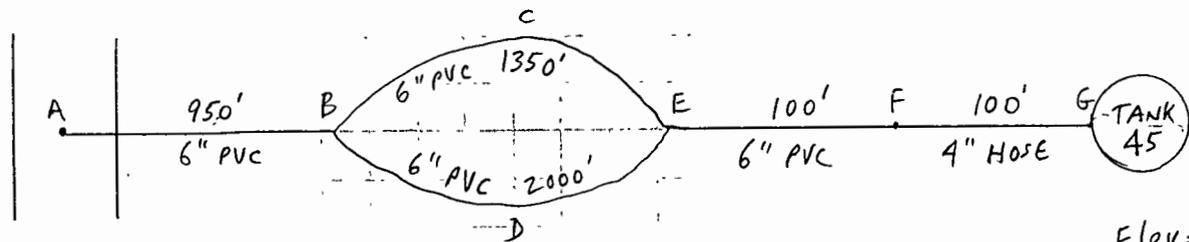
METHOD

Given: Pipe network as shown. Types of pipe as shown:

- PVC PIPE, 6"
- HOSE, CORRUGATED, 4"

Find: Expected flow.

Solution: Draw system schematic:



SUPPLY  
HEADER 16"

Elev = 20'  
P = 130 ft

Elev = 120'  
P = 0

The method of solution will be to:

- 1) Assume a flow
- 2) Calculate losses
- 3) See if Bernoulli eqn. balances
- 4) Repeat 1) and 2) until 3) is true.

Write Bernoulli eqn. from (A) to (G):

$$\frac{P_A}{\gamma} + z_A + \frac{V_A^2}{2g} = \frac{P_G}{\gamma} + z_G + \frac{V_G^2}{2g} + h_{L A-G}$$

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BY M. DIPPRE DATE 5-22-96

SHEET 2 OF 4

CHKD. BY K. SHAM DATE 5/24/96

OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC TANK FARM 4

SUBJECT EXPECTED FLOW TO TANK 45

Solution (continue):

Assumes: 300 gpm

Since (A) is inside supply header,  $N_A \approx 0$

$$130 + 20 + 0 = 0 + 120 + \frac{N_E^2}{2g} + h_{L A-G}$$

- Using AQUAMINE friction loss NOMOGRAPH (ATT. 1, CLASS 160)

$$h_{L A-B} = \left( \frac{0.56'}{100'} \right) \times 950' = 5.32'$$

- for  $h_{L B-E}$ , the flow divides according to friction such that  $h_{L B-C-E} = h_{L B-D-E}$ . Using the AQUAMINE friction NOMOGRAPH, AT VARIOUS FLOWS,

$$\begin{aligned} \text{find } Q_{B-C-E} &= 165 \text{ gpm} & h_L &= 0.19' / 100' \\ Q_{B-D-E} &= 135 \text{ gpm} & h_L &= 0.13' / 100' \end{aligned}$$

$$\text{hence } h_{L B-C-E} = h_{L B-D-E} = \left( \frac{0.19'}{100'} \right) (1350') = 2.57'$$

$$- h_{L E-F} = \left( \frac{0.56'}{100'} \right) \times 100' = 0.56'$$

- for  $h_{L F-G}$ , Assume  $C = 100$  which is smoothness factor for old pipe:  $h_{L F-G} = h_{L 100} \left( \frac{150}{100} \right)^{1.85} = 2.1 h_L$ ,  
SINCE hose is corrugated

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BY M. DIPPRE DATE 5-22-96

SHEET 3 OF 4

CHKD. BY K. SHAH DATE 5/24/96

OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT \_\_\_\_\_

PROJECT \_\_\_\_\_

SUBJECT \_\_\_\_\_

Solution: (continued)

$$\text{hence } h_{L_{F-G}} = 2.1 \left( \frac{4.0'}{100'} \right) (100') = 8.4'$$

total head losses:

$$h_{L_{A-G}} = 5.32' + 2.57' + 0.56' + 8.4'$$

$$\underline{h_{L_{A-G}} = 16.8'}$$

Now, add 20% more loss for valves/fittings:  
(conservative since long line with few fittings)

$$130 + 20 + 0 = 0 + 120 + \frac{N_G^2}{2g} + 16.8 (1.2)$$

$$\frac{N_G^2}{2g} = \frac{7.56^2}{2(32.2)} = 0.90'$$

$$150' \neq 141.'$$

hence, flow > 300 gpm

Repeat for 350 gpm:

$$h_{L_{A-B}} = \left( \frac{0.75}{100'} \right) (950') = 7.13'$$

$$h_{L_{B-C-E}} = \left( \frac{0.25}{100'} \right) (1350') = 3.38'$$

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BY M. DIPPRE DATE 5-22-96

SHEET 4 OF 4

CHKD. BY K. SHAM DATE 5/24/96

OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT \_\_\_\_\_

PROJECT \_\_\_\_\_

SUBJECT \_\_\_\_\_

Solution (continue) :

$$h_{L F-G} = 2.1 \left( \frac{5.5'}{100'} \right) (100') = 11.6'$$

$$h_{L E-F} = \left( \frac{0.75'}{100'} \right) (100') = 0.75'$$

$$\Sigma h_{L A-G} = 7.13' + 3.38' + 11.6' + 0.75'$$

$$\underline{\Sigma h_{L A-G} = 22.9'}$$

$$130 + 20 + 0 = 0 + 120 + 0.90' + 22.9'(1.2)$$

$$\underline{150 \neq 148.4'}$$

Hence, estimated  $Q \cong 365$  gpm by extrapolation



BY M. DIPPRE DATE 5-23-96

SHEET 1 OF 3

CHKD. BY K. SHAM DATE 5/24/96

OFS NO. 1284.0013.0103 DEPT. NO. \_\_\_\_\_

CLIENT NAVY

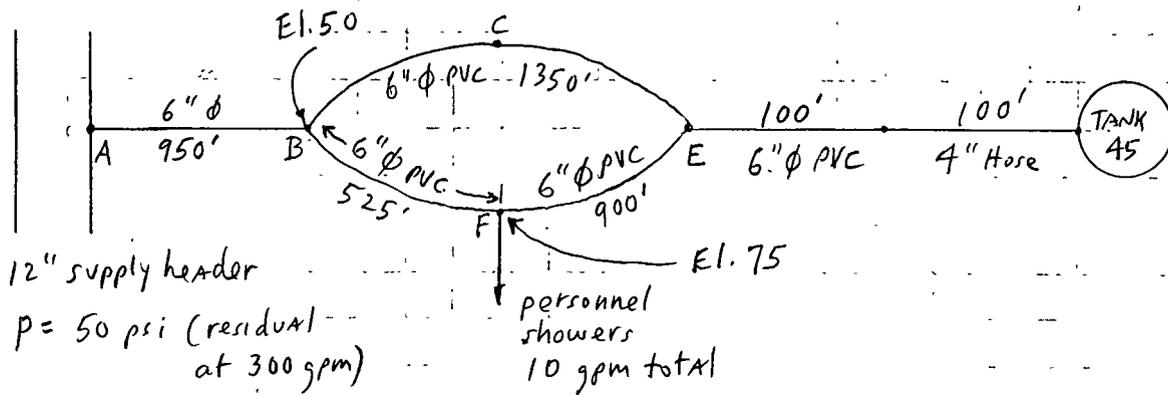
PROJECT NETC - TANK FARM NO. 4

SUBJECT DETERMINE PRESSURE AT PERSONNEL SHOWER TAKEOFF

Given: Pipe network as shown. Type of pipe is AQUAMINE<sup>®</sup>, Class 160. Flow in main line from hydrant is 300 gpm. (per previous calcs.)

Find: Pressure at personnel shower takeoff from 6" line at Elev. 75

Solution:



12" supply header

$P = 50$  psi (residual at 300 gpm)

Elev. = 20'

Since 300 gpm has been previously calculated, determine pressure at B, assuming 20% loss for fittings/valves, etc.,

$$\frac{P_A}{\gamma} + Z_A + \frac{V_A^2}{2g} = \frac{P_B}{\gamma} + Z_B + \frac{V_B^2}{2g} + 1.2 h_{L_{A-B}}$$

EBASCO SERVICES INCORPORATED

BY M. DIPPRE DATE 5-23-96

SHEET 2 OF 3

CHKD. BY R. SHAI DATE 5/24/96

OFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC - TANK FARM No. 4

SUBJECT DETERMINE PRESSURE AT PERSONNEL SHOWER TAKEOFF

Solution (continued):

$$50(2.31) + 20 + \frac{V_A^2}{2g} = \frac{P_B}{\gamma} + 50 + \frac{V_B^2}{2g} + 1.2 h_{L A-B}$$

$$\text{now, } \frac{V_A^2}{2g} = \frac{V_B^2}{2g}$$

$$115' + 20' = \frac{P_B}{\gamma} + 50' + 1.2 h_{L A-B}$$

$$h_{L A-B} = \left( \frac{0.56'}{100'} \right) 950' = 5.32'$$

$$135' = \frac{P_B}{\gamma} + 50' + 1.2(5.32)$$

$$\underline{\underline{\frac{P_B}{\gamma} = 78.6 \text{ ft}}}$$

Determine split flow: Assume 10 gpm has insignif. effect upon split at B.

$$\text{Try } Q_{BCE} = 155. \text{ gpm}$$

$$Q_{BFE} = 145. \text{ gpm}$$

$$h_{L BCE} = \left( \frac{0.17'}{100'} \right) 1350' = 2.29'$$

$$h_{L BFE} = \left( \frac{0.15'}{100'} \right) 1425' = 2.14'$$

which is close, Assume  $Q_{BFE} = 147. \text{ gpm}$

EBASCO SERVICES INCORPORATED

BY M. DIPPRE DATE 5/23/96

SHEET 3 OF 3

CHKD. BY K. SHOH DATE 5/24/96

OFS NO. \_\_\_\_\_

DEPT. NO. \_\_\_\_\_

CLIENT NAVY

PROJECT NETC - TANK FARM NO. 4

SUBJECT DETERMINE PRESSURE AT PERSONNEL SHOWER TAKEOFF

Solution (continued) :

Now calculate pressure at point F :

$$\frac{P_B}{\gamma} + z_B + \frac{V_B^2}{2g} = \frac{P_F}{\gamma} + z_F + \frac{V_F^2}{2g} + 1.2 h_{L_{B-F}}$$

$$78.6' + 50' + \frac{V_B^2}{2g} = \frac{P_F}{\gamma} + 75' + \frac{V_F^2}{2g} + 1.2 h_{L_{B-F}}$$

$$\text{now } \frac{V_B^2}{2g} = \frac{V_F^2}{2g}$$

$$128.6' = \frac{P_F}{\gamma} + 75' + 1.2 h_{L_{B-F}}$$

$$h_{L_{B-F}} = \left( \frac{0.15'}{100'} \right) 525'$$

$$\underline{h_{L_{B-F}} = 0.79'}$$

$$128.6' = \frac{P_F}{\gamma} + 75' + 1.2 (0.79)$$

$$\underline{\frac{P_F}{\gamma} = 52.7'}$$

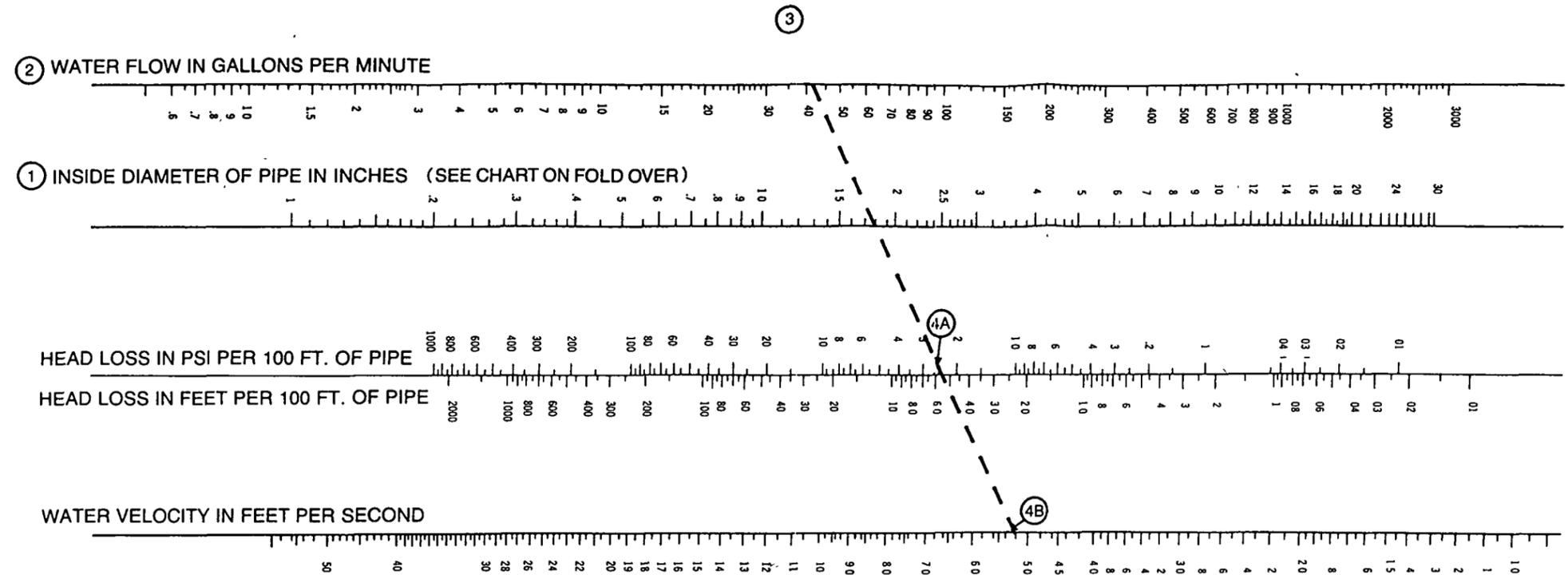
$$\underline{\underline{P_F = 22.8 \text{ PSI}}}$$

- Which is the worst case, full 300 gpm into Tank 46

∴ PRESSURE AT PERSONNEL SHOWER TAKEOFF IS ADEQUATE



# Friction Characteristics of Water Flow Through Rigid Plastic Pipe



**HOW TO USE THIS NOMOGRAPH**

1. Select the desired pipe size inside diameter.
2. Determine the amount of water to flow through the pipe
3. Place a straight-edge on these two points.
4. The points at which the straight-edge intersects the head-loss line and the velocity line give these two values under the given conditions.

**EXAMPLE:**

- |  |    |
|--|----|
| 1 1/2" PR 160 A Pipe (I.D. = 1.747")               | 1  |
| 40 Gal Per Min. Service                            | 2  |
| 1. Line up these points with a straight-edge       | 3  |
| 2. Read 2.6 PSI (or 6 ft.) from the Head Loss Line | 4A |
| 3. Read 5.38 Ft. Per Sec. from the Velocity Line   | 4B |

**SPECIFICALLY FOR PVC**

$$f = .0985 \frac{b^{1.85}}{d^{4.866}}$$

THE VALUES OF THIS GRAPH ARE BASED ON THE WILLIAMS AND HAZEN FORMULA

$$f = 2083 \left( \frac{100}{C} \right)^{1.85} \times \frac{1.85}{4.8655}$$

- f = Friction head in feet of water per 100 feet of pipe
- d = Inside diameter of pipe in inches
- q = Flow in gallons per minute
- c = Constant for inside roughness of the pipe (150 for PVC)



BY M. WALTER DATE 4/18/96SHEET 1 OF 1CHKD BY M. DIPPRE DATE 5-20-96OFS NO 1284.0013.0103 DEPT NO \_\_\_\_\_CLIENT NETC - NewportPROJECT TANK FARM No 4SUBJECT WATER DISTRIBUTION SYSTEM - WATER HAMMER CALCS.

This calculation package was prepared to support the following design criteria

- 1) Appropriate size of pipe in order to deliver 200 gpm to furthest and highest point in the water distribution system.
- 2) Determine appropriate psi rating for pipe.

### Conclusions:

**CASE I** - For initial pressure conditions between 50 & 60 psi and elevation gain ~100' the following pipe specification will deliver between 200 & 340 gpm to TANK # 45 (worst case)

- 6" main line
- 6" shunt to Tank
- 4" hose at pipe end (75' hose)

- Calculation of loop system indicates additional pressure head available if two legs of the loop ARE open and supplying flow. The field crew has the option of building pipe system as needed or entire system from the beginning

**CASE II** - Water hammer using gate valves will be very small. Corners should be thrust secured. Psi rating of 160 psi is sufficient. (Vendor options 160, 200, 250 psi) GATE valves rated at 150 psi are sufficient

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY M. WALTER DATE 4-12-96

SHEET 1 OF 2

CHKD BY M. DIPPRE DATE 5-20-96

OFS NO. \_\_\_\_\_ DEPT NO \_\_\_\_\_

CLIENT NETC - NEWPORT TANK FARM # 4

PROJECT SLWP Temp Utilities

SUBJECT WATER Hammer calculations - instantaneous closure

FIND: MAXIMUM pressure <sup>rise</sup> anticipated during water hammer in pipe system, worst CASE instantaneous closure.

- Assume:
- 1)  $E_p$  = bulk modulus of elasticity in pipe = 400,000 psi (vendor)
  - 2)  $D_o$  = Outside diameter of pipe = 7.84"
  - 3)  $D_i$  = Inside diameter of pipe = 5.845" for 250 psi rating  
5.993" for 200 psi rating  
6.115" for 160 psi rating
  - 4) Closure of Valve is instantaneous
  - 5)  $Q$  = 350 gpm

Solve for  $\Delta P$  where:

$$\Delta P = -\rho c \Delta V$$

$$c = \sqrt{\frac{E_s}{\rho [1 + (E_p/E_s)(D_o + D_i)(D_o - D_i)]}}$$

$$V = Q/A$$

$$\Delta V = \frac{667}{\pi (\frac{6.483}{2})^2} = \frac{667}{3.14} = 12.4 \frac{ft^3}{s} = 4.18 \frac{ft}{sec}$$

- $\Delta P$  = change in pressure
- $\rho$  = density of water = 1.937
- $c$  = sonic velocity
- $\Delta V$  = change in velocity
- $E_s$  = Bulk mod of  $E_{H_2O}$  in water
- $E_p$  = Bulk modulus of Elasticity of pipe
- $D_o$  = Outside diameter
- $D_i$  = Inside diameter
- $Q$  = 200 gpm = 200(3.34)  $\frac{ft^3}{s}$
- $A$  =  $\pi r^2$

$$c = \sqrt{\frac{319,000 \text{ psi} (144 \text{ in}^2/\text{ft}^2)}{1.937 \text{ slugs}/\text{ft}^3 [1 + (\frac{319,000}{400,000})(7.84 + 5.845)(7.84 - 5.845)]}} = \sqrt{\frac{45.9 E6 \text{ psf}}{[1 + (0.798)(13.7)(2)]} 1.937}$$

$$c = \sqrt{\frac{45.9 E6 \text{ psf}}{44.3 \text{ slugs}/\text{ft}^3}} = 1.02 E3 \text{ slug}^{1/2}/\text{ft}$$

$$\Delta P = -1.937 \frac{\text{slugs}}{\text{ft}^3} (1020)$$

$12.4 \frac{ft^3}{s} = 4.18 \frac{ft}{sec}$  MD  
 $24.5 E3 \text{ psf}$  MD  
 $8.26 E3 \text{ psf}$  MD  
 $\frac{24.5 E3}{144} = 170 \text{ psi} = 57.4 \text{ psi} = \text{PRESSURE RISE}$  MD

$$\Delta V = \frac{\Delta Q}{A} = \frac{350 \text{ gal/min}}{\frac{\pi}{4} \left( \frac{5.845}{12} \right)^2 \text{ ft}^2} \times \frac{\text{min}}{60 \text{ sec}} \times \frac{\text{ft}^3}{7.48 \text{ gal}}$$

$$\underline{\underline{\Delta V = 4.18 \text{ ft/sec}}}$$

Pg 1 A

M. DIPPRE

5-20-96

# FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY M. WALTER DATE 4-12-96

CHKD BY M. DIPPRE DATE 5-20-96

SHEET 2 OF 2

DEPT. NO. \_\_\_\_\_

OFS NO. \_\_\_\_\_

CLIENT NETC - NEWPORT TANK FARM # 4

PROJECT SLWP Temp Utilities

SUBJECT WATER HAMMER Calculation - Slow closure

FIND: Maximum pressure <sup>rise</sup> in pipe assuming slow closure MD

Assume: slow closure of gate valve where  $t_c > 2L/c_p$

Calculate  $t_c$  &  $2L/c_p$  where:

$$C_p = C \sqrt{1 + \frac{D}{t} \frac{E_v}{E}}$$

$$C_p = 4720 \sqrt{1 + \frac{7.84 \cdot 300000}{.39 \cdot 400000}}$$

$$C_p = 1180 \text{ fps}$$

$t_c$  = time of closure, 30 sec

$L$  = length of pipe = 1000 ft

$C_p$  = Velocity of pressure wave

$E_v$  = Volume modulus of water = 300,000 psi

$C$  = 4720 fps for water MD

$E$  = mod of Elas for pipe = 400,000 psi

$D$  = Outside diam pipe

$t$  = wall thickness pipe = 0.39" MD

slow closure  $\Delta P$

$$P_h = \rho C_p V = 1.94 (1180) (12.4) = 28,400 \text{ psf} = 197 \text{ psi}$$

$V = 12.4$  fps from p1

$\rho = 1.94$

$C_p = 1180$  fps

$$P_h = 28,400 \text{ psf} = 197 \text{ psi}$$

$$9,570 \text{ psf} = 66.5 \text{ psi}$$

$$P'_h = \frac{2L}{t_c} \rho C_p V = \frac{2000}{30 \text{ sec}} (1180) (12.4) = 11 \text{ psi}$$

$$P_h = \frac{2000}{30 \text{ sec}} (1180) (12.4) = 11 \text{ psi}$$

$$3.75 \text{ psi} = \text{PRESSURE RISE}$$

$$t_c = 30 \text{ sec}$$

$$2L/c_p = \frac{2000}{1180} = 1.7$$

$$\therefore 30 > 1.7 \quad t_c > 2L/c_p$$

OK MD

Conclusion: GATE valves will ensure slow closure. Certainly > 1.7 sec. Pipe rated for 160 psi should suffice. (options 160, 200, 250 psi)

## **Appendix B**

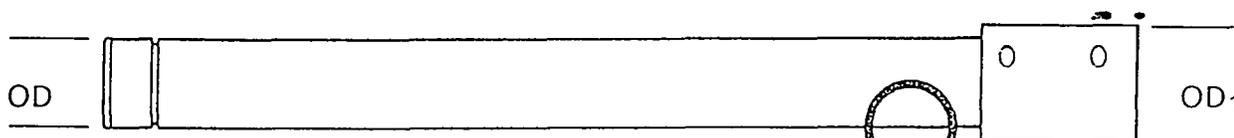
### **Manufacturer's Specifications**

# Performance Characteristics And Specifications

PVC Pipe is made from a special formulation of Poly (Vinyl Chloride) Type 1, Grade 1 2000 psi design stress material, Class 12454B in accordance with ASTM D-1784. PVC formulation contains additional impact modifiers and ultraviolet inhibitors to give it higher impact strength over a longer period of time.

extruded to meet all PVC Pipe requirements as specified in the ASTM Standard Specification D-2241 for Poly (Vinyl Chloride) Plastic Pipe, (pressure rated SDR pipe). joints and couplings meet ASTM D3139 standards for Joints. For Plastic Pressure Pipes Using Flexible Elastomeric Seals. O-Rings meet ASTM F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining PVC Pipe.

PVC Pipe has Potable Water Service Certification in accordance with NSF No. 14 (National Sanitation Foundation Standard) for Thermoplastic materials, pipe fittings, valves, traps and joining materials.

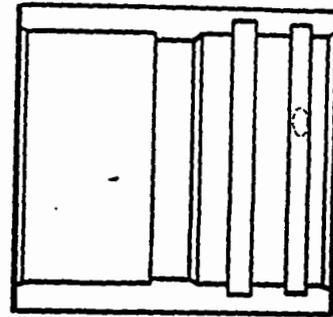


## Typical Property Values

Property	Value	ASTM No.
Tensile strength	7,000 psi	D-638
Modulus of elasticity	400,000 psi	D-638
Izod impact	0.65 ft. lbs /in. of notch	D-256
Deflection temp.	150°F.	D-648
Flammability	Self-extinguishing	D-635
Chemical resistance	B	D-543

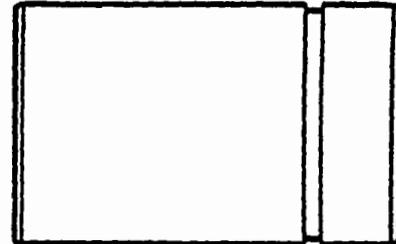
Size	O.D.		O.D. <sub>1</sub>		Class 160 Wall Thickness		Class 200 Wall Thickness		Class 250 Wall Thickness	
	in.	cm	in.	cm	in.	cm	in.	cm	in.	cm
2"	2.375	6.033	3.200	8.128	-	-	.113	.287	.140	.356
3"	3.500	8.890	4.380	11.125	-	-	.167	.424	.206	.523
4"	4.500	11.430	5.470	13.894	.173	.439	.214	.543	.265	.673
6"	6.625	16.828	7.840	19.914	.255	.648	.316	.803	.390	.991
8"	8.625	21.908	10.190	25.883	.332	.843	.410	1.04	-	-
10"	10.750	27.305	12.200	30.988	.511	1.300	-	-	-	-
12"	12.750	32.385	14.420	36.627	.606	1.539	-	-	-	-

## Link x Glue Coupling



SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	X GLUE COUPLING _____	250 PSI _____	2AGC20
3" _____	X GLUE COUPLING _____	250 PSI _____	3AGC21
4" _____	X GLUE COUPLING _____	250 PSI _____	4AGC22
6" _____	X GLUE COUPLING _____	250 PSI _____	6AGC23
8" _____	X GLUE COUPLING _____	200 PSI _____	8AGC24
10" _____	X GLUE COUPLING _____	160 PSI _____	10AGC25
12" _____	X GLUE COUPLING _____	160 PSI _____	12AGC26

## Link Nipple Groove x Glue Ends



SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	X GLUE NIPPLE _____	250 PSI _____	2AGN30
3" _____	X GLUE NIPPLE _____	250 PSI _____	3AGN31
4" _____	X GLUE NIPPLE _____	250 PSI _____	4AGN32
6" _____	X GLUE NIPPLE _____	250 PSI _____	6AGN33
8" _____	X GLUE NIPPLE _____	200 PSI _____	8AGN34
10" _____	X GLUE NIPPLE _____	160 PSI _____	10AGN35
12" _____	X GLUE NIPPLE _____	160 PSI _____	12AGN36

# GATE VALVE

• Unique sliding plug design provides greater seating area than conventional gate valves • New plug and seat permits throttling and eliminates chatter • ANSI face-to-face dimensions on models through 8" • Non-rising stem with position indicator • Competitively priced with cast iron • Rated for full vacuum service

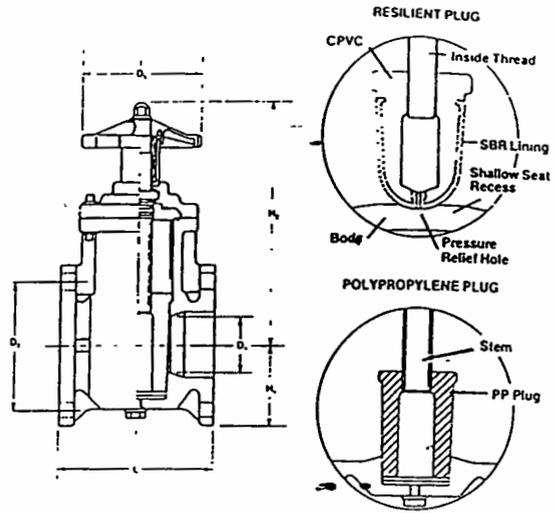


## OPERATING PRESSURE VS. TEMPERATURE (PSI, WATER, NON-SHOCK)

Size	30°F-120°F
1 1/2"	150
2"	150
3"	150
4"	150
6"	150
8"	150
10"	110
12"	70
14"	70

## SPECIFICATIONS

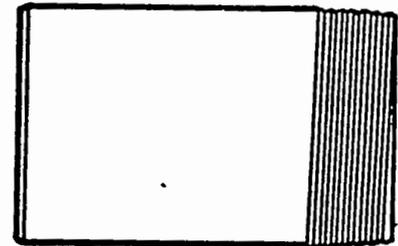
SIZE: 1 1/2"-14"  
 MODELS: Flanged (ANSI) Wafer Optional  
 BODY: PVC  
 PLUG: PP or CPVC-SBR lined  
 SEALS: EPDM



## DIMENSIONS (IN INCHES)

Size	Weight (lbs.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	L	H <sub>1</sub>	H <sub>2</sub>	Cv Values
1 1/2"	5.50	1.50	3.88	4.72	6.50	2.50	9.26	140
2"	7.50	1.77	4.75	5.12	7.00	3.00	10.15	230
3"	13.50	2.64	6.00	6.69	8.00	3.75	12.20	580
4"	20.00	3.46	7.50	7.68	9.00	4.50	13.78	1100
6"	40.10	5.12	9.50	10.63	10.50	5.50	17.52	2100
8"	66.20	6.61	11.75	12.20	11.50	6.75	22.72	3900
10"	115.80	8.27	14.25	14.17	14.96	8.00	27.17	6100
12"	146.70	10.04	17.00	16.14	15.75	9.50	31.50	8700
14"	187.40	11.69	18.75	17.91	16.93	10.50	35.82	12200

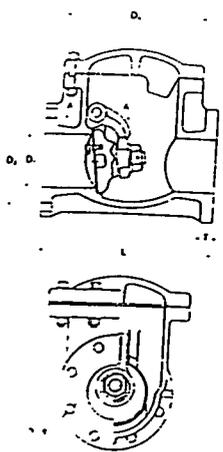
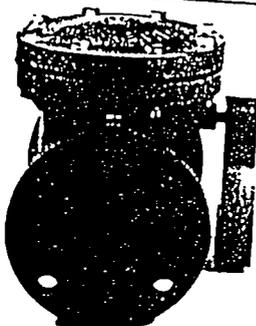
# Nipple Plain Male x Male Pipe Thread



SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	GLUE X THREADED NIPPLE	250 PSI	2TGN60
3"	GLUE X THREADED NIPPLE	250 PSI	3TGN61
4"	GLUE X THREADED NIPPLE	250 PSI	4TGN62
6"	GLUE X THREADED NIPPLE	250 PSI	6TGN63
8"	GLUE X THREADED NIPPLE	200 PSI	8TGN64
10"	GLUE X THREADED NIPPLE	160 PSI	10TGN65
12"	GLUE X THREADED NIPPLE	160 PSI	12TGN66

# SWING CHECK VALVE

• Offers minimal flow resistance • May be installed in horizontal or vertical lines • Disc seats tightly  
 • Top entry permits cleaning without removing valve from the line • Rated for full vacuum service • Optional  
 external lever and weight or external spring to assist the disc in closing faster



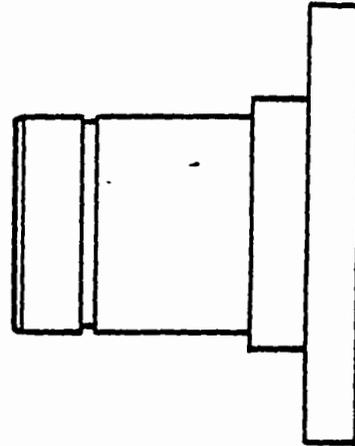
## SPECIFICATIONS

SIZES: 3/4"-8"  
 MODELS: Flanged (ANSI)  
 BODIES: PVC, PP, PVDF  
 SEATS: EPDM, Teflon<sup>®</sup>, VITON<sup>®</sup>  
 SEAL: EPDM, Teflon<sup>®</sup>, VITON<sup>®</sup>

Size	Weight (lbs.)	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	L	T	H <sub>2</sub>
3/4"	1.8	0.79	2.76	3.39	5.51	0.59	3.54
1"	3.6	0.98	3.13	5.12	6.30	0.63	4.72
1 1/2"	6.0	1.57	3.88	5.71	7.09	0.71	5.43
2"	8.9	1.97	4.75	7.09	7.87	0.79	6.46
2 1/2"	11.3	2.56	5.50	7.87	9.45	0.87	6.61
3"	12.2	3.15	6.00	8.07	10.24	0.87	6.73
4"	21.0	3.94	7.50	10.43	11.81	0.94	8.39
5"	36.1	4.92	8.50	12.99	13.78	0.94	9.76
6"	46.0	5.91	9.50	14.57	15.75	0.98	11.14
8"	75.2	7.87	11.75	16.73	19.69	1.18	13.23

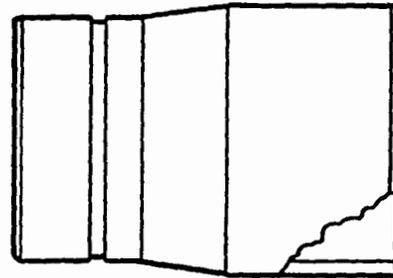
Size	PVC				PP				PVDF							
	Elastomer			Teflon <sup>®</sup>	Elastomer			Teflon <sup>®</sup>	Elastomer				Teflon <sup>®</sup>			
	30°F	70°F	105°F	120°F	30°F	-5°F	105°F	140°F	175°F	-5°F	140°F	175°F	190°F	210°F	-5°F	210°F
3/4"	150	150	100	85	150	100	90	70	150	120	100	85	85			
1"	150	150	100	85	150	100	90	70	150	120	100	85	85			
1 1/2"	150	150	100	85	150	100	90	70	150	120	100	85	85			
2"	150	150	100	85	150	100	90	70	150	120	100	85	85			
2 1/2"	150	100	100	85	150	100	80	70	150	120	90	55	85			
3"	150	100	100	70	150	85	70	70	150	100	80	55	85			
4"	100	70	70	70	100	70	60	60	150	100	80	40	70			
5"	100	70	70	60	100	65	40	60	100	85	60	40	70			
6"	100	70	60	40	100	50	35	40	100	85	60	30	60			
8"	70	40	40	40	70	40	30	30	100	70	50	30	40			

## Link Joint Male x Flange Transition Fitting



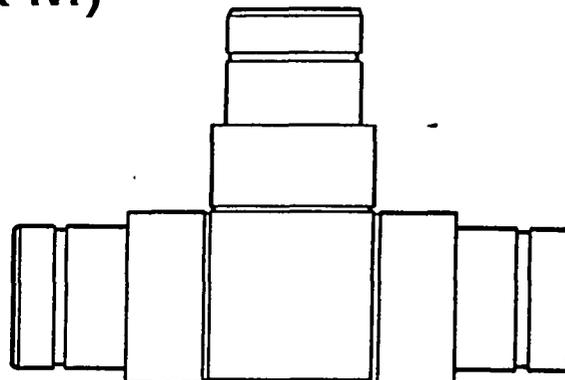
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	X FLANGE TRANSITION _____	250 PSI _____	2AFT20
3" _____	X FLANGE TRANSITION _____	250 PSI _____	3AFT21
4" _____	X FLANGE TRANSITION _____	250 PSI _____	4AFT22
6" _____	X FLANGE TRANSITION _____	250 PSI _____	6AFT23
8" _____	X FLANGE TRANSITION _____	200 PSI _____	8AFT24

## Link By Glue Joint



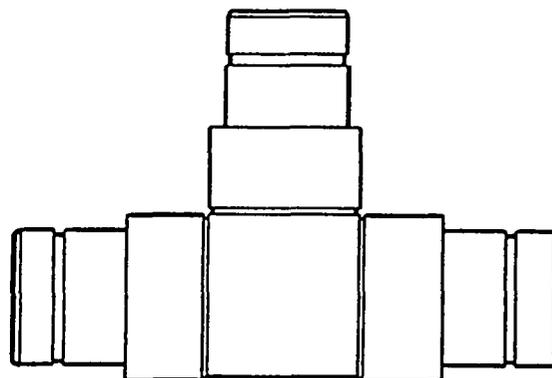
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	X GLUE TRANSITION _____	250 PSI _____	2AGT70
3" _____	X GLUE TRANSITION _____	250 PSI _____	3AGT71
4" _____	X GLUE TRANSITION _____	250 PSI _____	4AGT72
6" _____	X GLUE TRANSITION _____	250 PSI _____	6AGT73
8" _____	X GLUE TRANSITION _____	200 PSI _____	8AGT74

## Link Tee (M x M x M)



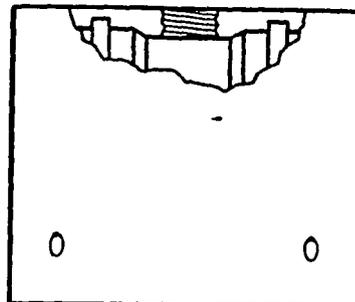
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	TEE (MxMxM) _____	250 PSI _____	2AT110
3" _____	TEE (MxMxM) _____	250 PSI _____	3AT111
4" _____	TEE (MxMxM) _____	250 PSI _____	4AT112
6" _____	TEE (MxMxM) _____	250 PSI _____	6AT113
8" _____	TEE (MxMxM) _____	200 PSI _____	8AT114

## Link Reducing Tee (M x M x M)



SIZE	DESCRIPTION	PSI RATING	PART NO.
3" x 3" x 2" _____	REDUCING TEE (MxM) _____	250 PSI _____	332RT2
4" x 4" x 2" _____	REDUCING TEE (MxM) _____	250 PSI _____	442RT3
4" x 4" x 3" _____	REDUCING TEE (MxM) _____	250 PSI _____	443RT4
6" x 6" x 2" _____	REDUCING TEE (MxM) _____	250 PSI _____	662RT5
6" x 6" x 3" _____	REDUCING TEE (MxM) _____	250 PSI _____	663RT6
6" x 6" x 4" _____	REDUCING TEE (MxM) _____	250 PSI _____	664RT7
8" x 8" x 4" _____	REDUCING TEE (MxM) _____	200 PSI _____	884RT8
8" x 8" x 6" _____	REDUCING TEE (MxM) _____	200 PSI _____	886RT9

## Link Outlet Coupling (F x F) Tapped Female Pipe Threads



SIZE	TAPPED TRANSITION THREADS NPT	PSI RATING	PART NO.
2 x 2	3/4" OUTLET	200 PSI	2TT400
2 x 2	1" OUTLET	200 PSI	2TT401
3 x 3	1 1/2" OUTLET	160 PSI	3TT402
4 x 4	1 1/2" OUTLET	160 PSI	4TT403
6 x 6	1 1/2" OUTLET	200 PSI	6TT404
6 x 6	2" OUTLET	160 PSI	6TT405
8 x 8	1 1/2" OUTLET	200 PSI	8TT406
8 x 8	2" OUTLET	160 PSI	8TT407

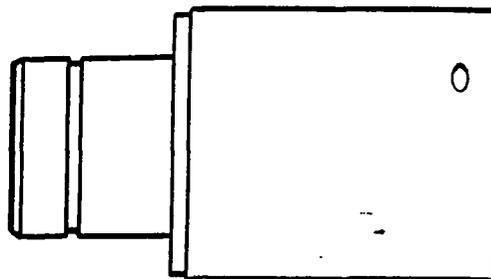
## Straws (Splines)

SIZE	PART NO.
2" SPLINES	A2SPL7
3" SPLINES	A3SPL7
4" SPLINES	A4SPL7
6" SPLINES	A6SPL7
8" SPLINES	A8SPL7
10" SPLINES	A10SPL7
12" SPLINES	A12SPL7

## "O" Rings

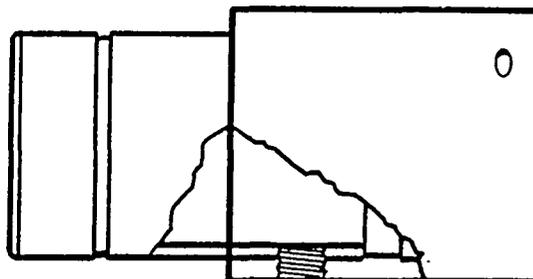
SIZE	PART NO.
2" O' RING	A20RG8
3" O' RING	A30RG8
4" O' RING	A40RG8
6" O' RING	A60RG8
8" O' RING	A80RG8
10" O' RING	A100RG8
12" O' RING	A120RG8

## Link Reducing Joint



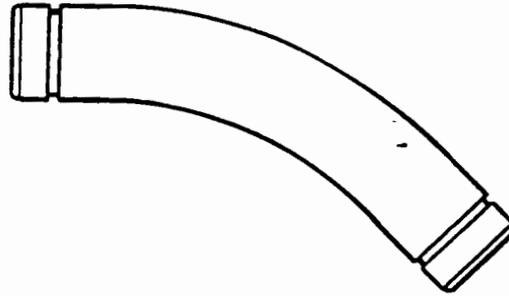
SIZE	DESCRIPTION	PSI RATING	PART NO.
4" x 2"	X AQUA TRANSITION	250 PSI	6RT4X2
4" x 3"	X AQUA TRANSITION	250 PSI	7RT4X3
6" x 2"	X AQUA TRANSITION	250 PSI	8RT6X2
6" x 4"	X AQUA TRANSITION	250 PSI	0RT6X4
8" x 4"	X AQUA TRANSITION	200 PSI	1RT8X4
8" x 6"	X AQUA TRANSITION	200 PSI	2RT8X6

## Link Tapped Joint (F x M)



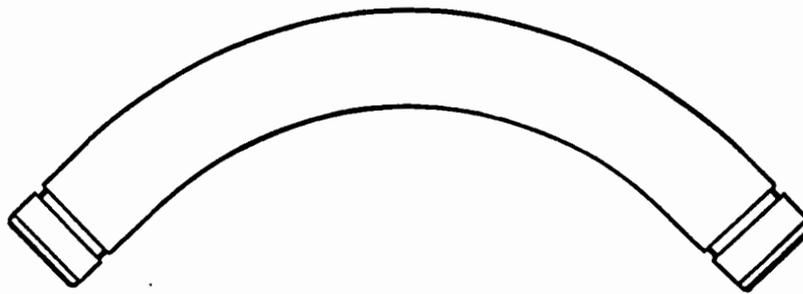
SIZE	TAPPED COUPLING THREADS NPT	PSI RATING	PART NO.
2 x 2	3/4" OUTLET	250 PSI	2TC300
2 x 2	1" OUTLET	250 PSI	2TC301
3 x 3	3/4" OUTLET	250 PSI	3TC302
3 x 3	1" OUTLET	250 PSI	3TC303
3 x 3	1 1/2" OUTLET	250 PSI	3TC304
4 x 4	3/4" OUTLET	250 PSI	4TC305
4 x 4	1" OUTLET	250 PSI	4TC306
4 x 4	1 1/2" OUTLET	250 PSI	4TC307
6 x 6	3/4" OUTLET	250 PSI	6TC308
6 x 6	1" OUTLET	250 PSI	6TC309
6 x 6	1 1/2" OUTLET	250 PSI	6TC310
8 x 8	1 1/2" OUTLET	200 PSI	8TC311
8 x 8	2" OUTLET	200 PSI	8TC312

## Link 45° Sweep (M x M)



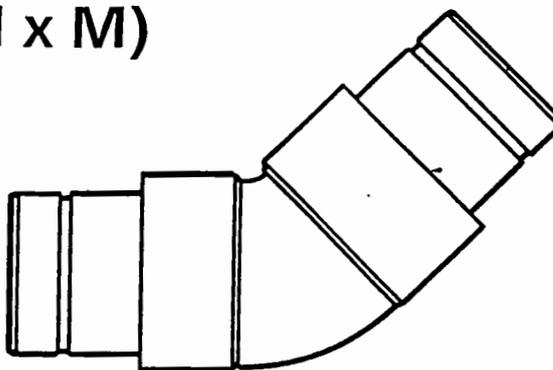
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	45° SWEEP (MxM) _____	250 PSI _____	245S10
3" _____	45° SWEEP (MxM) _____	250 PSI _____	345S11
4" _____	45° SWEEP (MxM) _____	250 PSI _____	445S12
6" _____	45° SWEEP (MxM) _____	250 PSI _____	645S13
8" _____	45° SWEEP (MxM) _____	200 PSI _____	845S14

## Link 90° Sweep (M x M)



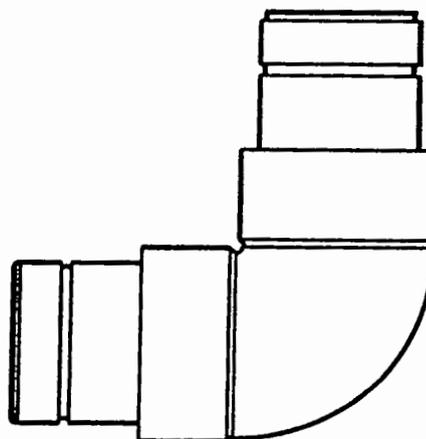
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	90° SWEEP (MxM) _____	250 PSI _____	290S90
3" _____	90° SWEEP (MxM) _____	250 PSI _____	390S91
4" _____	90° SWEEP (MxM) _____	250 PSI _____	490S92
6" _____	90° SWEEP (MxM) _____	250 PSI _____	690S93
8" _____	90° SWEEP (MxM) _____	200 PSI _____	890S94

## Link 45° Elbow (M x M)



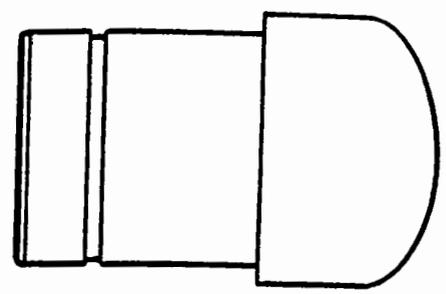
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	45° ELL (MxM) _____	250 PSI _____	245L80
3" _____	45° ELL (MxM) _____	250 PSI _____	345L81
4" _____	45° ELL (MxM) _____	250 PSI _____	445L82
6" _____	45° ELL (MxM) _____	250 PSI _____	645L83
8" _____	45° ELL (MxM) _____	200 PSI _____	845L84

## Link 90° Elbow



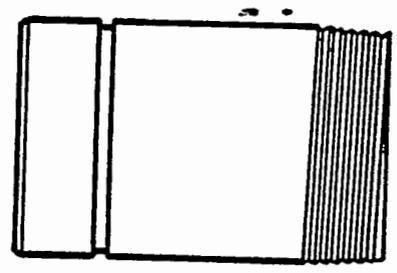
SIZE	DESCRIPTION	PSI RATING	PART NO.
2" _____	90° ELL (MxM) _____	250 PSI _____	290L70
3" _____	90° ELL (MxM) _____	250 PSI _____	390L71
4" _____	90° ELL (MxM) _____	250 PSI _____	490L72
6" _____	90° ELL (MxM) _____	250 PSI _____	690L73
8" _____	90° ELL (MxM) _____	200 PSI _____	890L74

# Link End Cap M

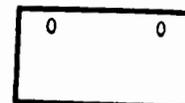
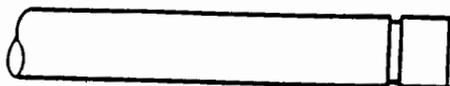
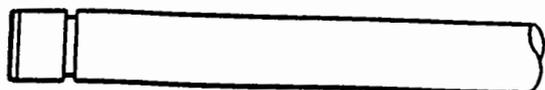


SIZE	DESCRIPTION	PSI RATING	-PART NO.
2"	END CAP	250 PSI	2EC100
3"	END CAP	250 PSI	3EC101
4"	END CAP	250 PSI	4EC102
→ 6"	END CAP	250 PSI	6EC103
8"	END CAP	200 PSI	8EC104
10"	END CAP	160 PSI	10EC105
12"	END CAP	160 PSI	12EC106

# Link Nipple M x M Pipe Threads

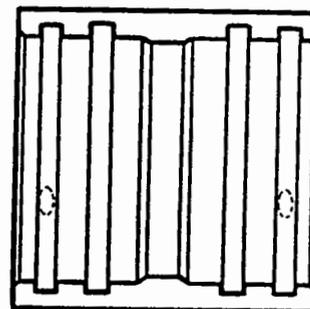


SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	X THREADED NIPPLE	250 PSI	2ATN50
3"	X THREADED NIPPLE	250 PSI	3ATN51
4"	X THREADED NIPPLE	250 PSI	4ATN52
→ 6"	X THREADED NIPPLE	250 PSI	6ATN53
8"	X THREADED NIPPLE	200 PSI	8ATN54
10"	X THREADED NIPPLE	160 PSI	10ATN55
12"	X THREADED NIPPLE	160 PSI	12ATN56



DIA.	DESCRIPTION	LENGTH	PSI RATING	SDR	PART NO.
2"	PIPE	20'	250 PSI	SDR 17	217250
2"	PIPE	20'	200 PSI	SDR 21	221200
3"	PIPE	20'	250 PSI	SDR 17	317250
3"	PIPE	20'	200 PSI	SDR 21	321200
4"	PIPE	20'	250 PSI	SDR 17	417250
4"	PIPE	20'	200 PSI	SDR 21	421200
4"	PIPE	20'	160 PSI	SDR 26	426160
6"	PIPE	20'	250 PSI	SDR 17	617250
6"	PIPE	20'	200 PSI	SDR 21	621200
6"	PIPE	20'	160 PSI	SDR 26	626160
8"	PIPE	20'	200 PSI	SDR 21	821200
8"	PIPE	20'	160 PSI	SDR 26	826160
10"	PIPE	20'	160 PSI	SDR 26	1026160
12"	PIPE	20'	160 PSI	SDR 26	1226160

## Coupling (O-Rings Installed)



SIZE	DESCRIPTION	PSI RATING	PART NO.
2"	COUPLINGS	250 PSI	2AAC10
3"	COUPLINGS	250 PSI	3AAC11
4"	COUPLINGS	250 PSI	4AAC12
6"	COUPLINGS	250 PSI	6AAC13
8"	COUPLINGS	200 PSI	8AAC14
10"	COUPLINGS	160 PSI	10AAC15
12"	COUPLINGS	160 PSI	12AAC16

# KINETIC AIR/VACUUM VALVE

1/2" thru 4" Inlet Size  
Standard NPT Outlet



FIG. 930

## NPT OUTLET AIR/VACUUM VALVE

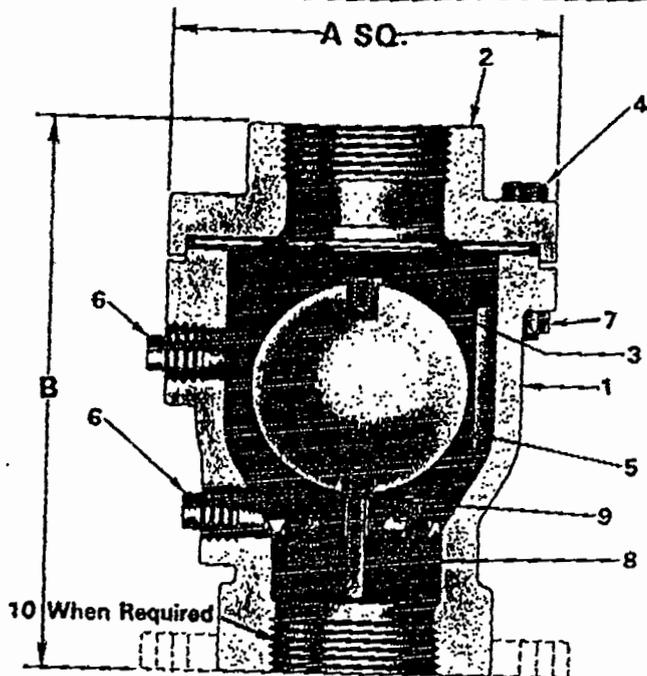


FIG. 930 (4" Flange Dimension Per ANSI B16.1 Class 125 (CL.250 Optional))

### GENERAL DIMENSIONS

SIZE	A (SQUARE)	B (HEIGHT)	WEIGHT (LBS.)	
			NPT	FLG
1/2", 3/4" & 1"	3 7/8"	7 1/8"	10	NA
2"	5 3/8"	8 3/8"	20	28
3"	6 5/8"	10 5/8"	40	52
4"	8 1/4"	12 5/8"	NA	85

### ENGINEERING SPECIFICATION

The Air/Vacuum valve shall employ the KINETIC principle to automatically exhaust large quantities of air during the filling of a pipeline or vessel and to allow air to re-enter during draining or when a negative pressure occurs. Valves shall be designed to exhaust air at up to sonic velocity without blowing shut.

The inlet shall be the nominal size of the valve and the outlet shall be the same size as the inlet. The float shall be spherical, be capable of withstanding a test pressure of 1000 psig and shall seal against a renewable resilient seat.

The body and cover shall be constructed of cast iron conforming to ASTM A126, Class B. The float shall be made of stainless steel. When specified, a protective cowl shall be provided on the outlet.

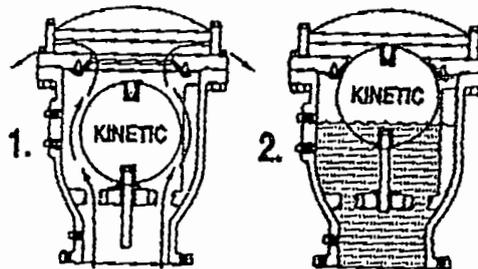
KINETIC Air/Vacuum valves shall be as manufactured by GA Industries, Inc., Mars, PA, their Figure 930 (formerly Figure 121K-SO).

### PARTS LIST

1. BODY - Cast Iron A126 Class B
2. COVER - Cast Iron A126 Class B
3. SEAT - Buna-N/18-8 Stainless Steel
4. COVER BOLTS - Steel Grade 2
5. FLOAT BALL - 304 Stainless Steel
6. PIPE PLUG - Steel (Commercial)
7. COVER NUTS - Steel Grade 2
8. FLOAT GUIDE - UHMW PE
9. CUSHION - Buna-N
10. REDUCING BUSHING - Steel (Commercial)

### ENGINEERING DATA

#### Kinetic Operating Principle -



1. During the exhausting sequence, the air flowing around the Buoy ball produces a resultant downward force which maintains the ball in the open position.
2. The buoyant force of the ball will seal the exhaust orifice when water reaches the ball.

#### Pressure Rating:

- NPT Inlet Body rated to 300 psi WOG; tested to 450 psi.
- CL.125 FLG Inlet Body rated to 200 psi WOG; tested to 300 psi.
- CL.250 FLG Inlet Body rated to 400 psi WOG; tested to 600 psi.
- Ball Float tested to 1000 psi.

#### Connections:

- NPT Inlet x NPT Outlet - Standard, 1/2" thru 3" Size
- CL.125 FLG Inlet x NPT Outlet - Standard, 4" Size
- CL.125 FLG Inlet x NPT Outlet - Optional, 2" and 3" Size
- CL.250 FLG Inlet x NPT Outlet - Optional, 2" thru 4" Size

#### Options:

- For Optional Outlet Cowl, Specify Fig. 930-C.
- For Optional CL.125 FLG Outlet, Specify 930-J, Sizes 2" thru 4".
- FOR SIZING AND LOCATING, SEE PAGES 36-37.

ATTACHMENT A

US NAVY NORTHERN DIVISION  
REMEDIAL ACTION CONTRACT (RAC)  
CONTRACT NO. N62472-94-D-0398  
DELIVERY ORDER NO. 0013

STATEMENT OF WORK  
FOR  
ON-SITE ELECTRICAL SERVICES  
SOW-1284-13-06

TANK FARM NO. 4 REMEDIAL ACTIONS  
NAVAL EDUCATION AND TRAINING CENTER (NETC)  
NEWPORT, RHODE ISLAND

April 1996

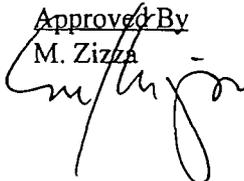
Prepared by

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Revision  
0

Date  
4/29/96

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M. Zizza 

Pages Affected  
All

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## **1.0 GENERAL DESCRIPTION**

### **1.1 Purpose**

This Statement of Work (SOW) provides the Subcontractor with a description of on-site electrical distribution installation services required to support Remediation activities at the U.S. Navy Northern Division (the Navy) Naval Education and Training Center (NETC) Tank Farm 4, located in Portsmouth, Rhode Island (the Site).

The necessary services will consist of installation of power feeder loops and power distribution panels to supply 460V power near tanks, design and installation of electrical system for all electrical equipment, associated with tank cleaning operation as shown on Dwgs. #1284-0013-E2 and E3.

### **1.2 Site Location**

The Site is located approximately 25 miles southeast of Providence, Rhode Island in the Town of Portsmouth, Rhode Island (Newport County) as shown in Figure 1-1. The Defense Highway is to the north/northwest of the Site, a residential area is located to the southeast of the Site, and undeveloped woodlands are located north/northeast of the Site. Located to the south and to the north are NETC Tank Farm 5 and Tank Farm 3, respectively. Refer to Figure 1-2 for the Site Plan.

### **1.3 Project Description**

The NETC Tank Farm 4 consists of approximately 90 acres of open land containing 12 large reinforced concrete underground storage tanks (USTs) owned and controlled by the Navy. The tank farm was constructed by the Navy in 1941 and was used to store liquid petroleum products. However, the USTs have not been in use since the 1970s.

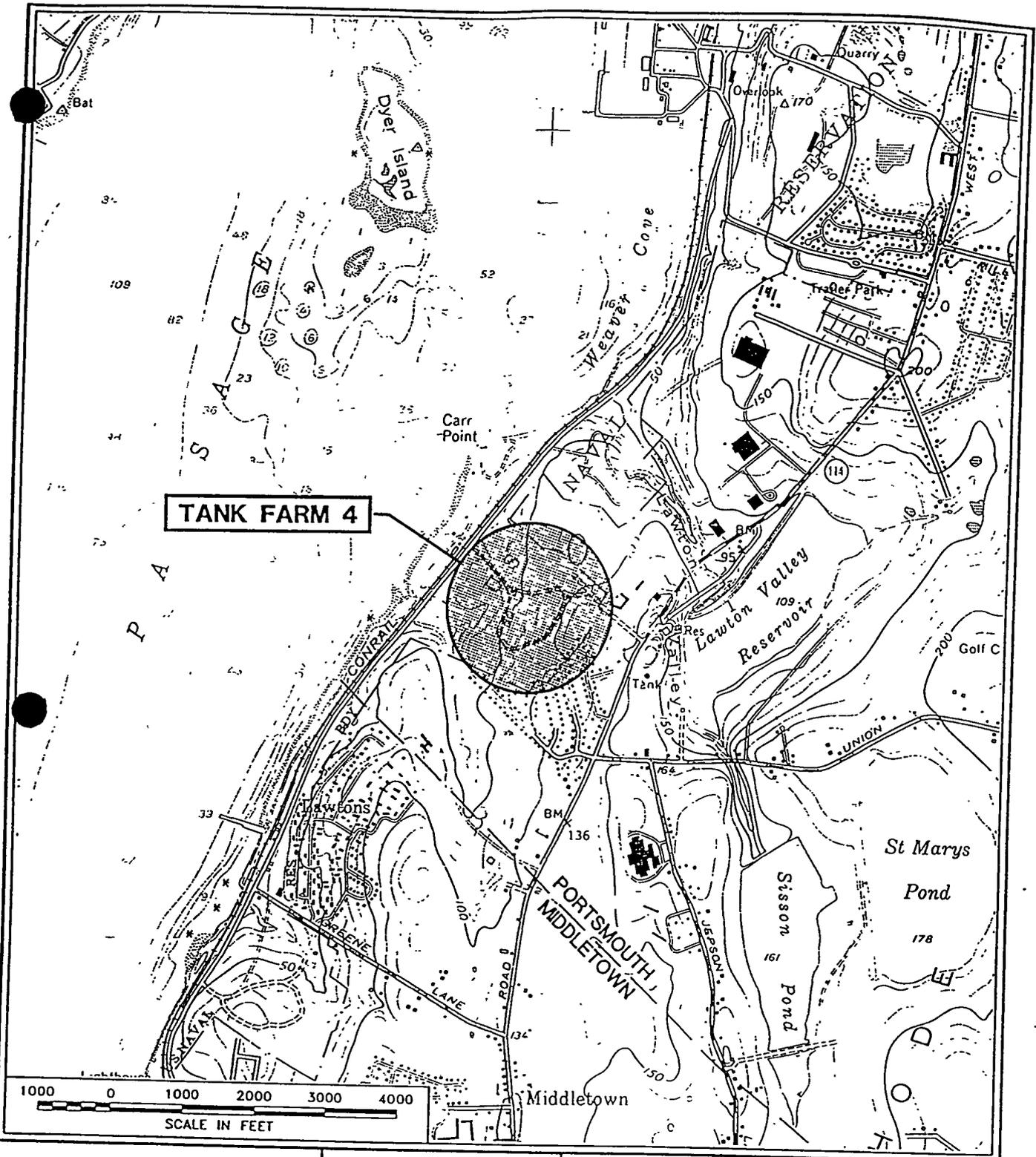
In 1992, the State of Rhode Island enacted UST regulations, and therefore the USTs at NETC Tank Farm 4 became subject to the closure requirements contained within the UST regulations. The Navy initiated the process for permanent closure of the USTs, and in 1996 Foster Wheeler Environmental was selected as the Contractor to complete the closure of the USTs in NETC Tank Farm 4. Closure activities will include removal of all contents from the USTs and cleaning and repairing the USTs. The contaminants of concern at the Site are those associated with petroleum based products and asbestos pipe insulation.

Other Site structures include a decommissioned electrical substation, and an abandoned oil-water separator. A paved access road leads into the Site and loops around the Site providing access to the USTs. The outer perimeter of the Site is covered with dense brush and is heavily wooded. A perimeter fence surrounds the site along three (3) sides and most of the Site is covered with tall grass, dense brush, and small diameter trees.

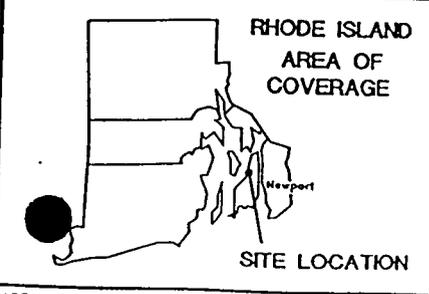
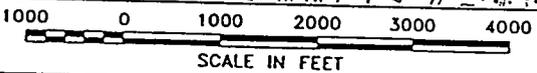
### **1.4 Definitions**

#### **1.4.1 The Term "Subcontractor"**

The term "Subcontractor" shall mean the person, persons, partnership, corporation, or business organization engaged on behalf of Foster Wheeler Environmental pursuant to a contract for performance of work described in this SOW.



**TANK FARM 4**



**FIGURE 1-1**  
 Naval Education and Training Center  
 Newport, Rhode Island  
**SITE LOCATION MAP**

SCALE: AS SHOWN      PROJ. NO. 1284.0013.0103



#### **1.4.2 The Term "Contractor"**

The term "Contractor" shall mean Foster Wheeler Environmental or the person delegated responsible charge of work by Foster Wheeler Environmental, or its authorized agents and assistants, acting jointly or severally within the scope of the particular duties and authorities delegated to them.

### **2.0 SCOPE OF WORK**

The work to be accomplished by the Subcontractor under this SOW includes all design, materials, labor, supervision, drawings, installation, testing and delivery of the following:

- a. 460V power distribution feeders;
- b. 460V power distribution panels;
- c. Electrical distribution system for tank cleaning equipment; and
- d. Electrical distribution system for miscellaneous areas.

#### **2.1 460V Power Distribution Feeders**

The Subcontractor shall provide 460V power distribution using 3/C #500 MCM and 1 #2 ground multi-conductor, direct burial cable. Conductor shall be stranded copper with 600V type XHHW insulation. Cable shall be U.L. listed for direct burial. Subcontractor shall lay cable at a minimum depth of 24" below grade. When passing over shunt/loop piping or crossing road run cable in 4" RGS (Rigid Galvanized Steel) conduit. For routing of cable see electrical power layout drawing # 1284-0013-E3. The routing is shown schematically only. Subcontractors shall determine exact routing in the field.

#### **2.2 460V Power Distribution Panels**

The Subcontractor shall provide power distribution panels as shown on Dwg. #1284-0013-E2. Exact location of these panels shall be determined in the field. The Subcontractor shall supply and connect main distribution panel 'PDP-1' to the 500 KVA transformer, supplied and installed by Foster Wheeler Environmental. PDP shall be designed and supplied by the Subcontractor as required to allow adequate number of receptacles for connection of electrical distribution system and other auxiliaries required to support tank cleaning operations. The Subcontractor shall provide junction boxes for splicing of feeder cables and necessary supports for distribution panels.

#### **2.3 Electrical Distribution System for Tank Cleaning Equipment**

The Subcontractor shall design, supply and install electrical distribution system from local power distribution panels to all electrical equipment installed at the tank. Typical electrical equipment and estimated electrical loads at each tank are as follows:

**Table 1  
Electrical Loads for Tank Area**

<b>Electrical Equipment at Each Tank</b>	<b>Power Requirement Per Equipment</b>
Mini decon trailer	60 amp., 120/240 volt
Exhaust fan, explosion proof	30 HP, 3P/60/460V
Centrifugal Pump (30 gpm)	5 HP, 3P/60/460V
Centrifugal pump for ring drain system (300 gpm)	7.5 HP, 3P/60/460V
Two (2) steam cleaning units, 3000 psi, 8 gpm*	15 HP, 42 amps, 3P/460V (100 amp at start)
Tank lighting - 3 explosion proof fixtures	250 W, 120 V

\* The vendor information on steam cleaning equipment is attached in Appendix B.

Three tanks will be worked on at a time. Once these tanks are cleaned, this equipment will be moved to another set of tanks to be cleaned.

Three (3) main portable electrical distribution skids shall be designed and supplied, consisting of motor starters, power receptacles and step-down transformer to control and power electrical equipment associated with tank cleaning identified in Table 1 above. The skid shall be provided with cords and locking plugs for easy connection and disconnection of the power from the PDP. These skids will only be located in non-hazardous electrical areas.

An additional three (3) portable auxiliaries electrical distribution skids, consisting of motor starter for ring drain pump and 120V receptacles shall be designed and supplied for use at any other selected tank's ring drain system operation. The 120V receptacle will also be used for tank lighting.

#### **2.4 Electrical Distribution System for Miscellaneous Areas**

Personnel Shower Trailer requires 100A, 120/240 volt electrical service. The Subcontractor shall provide 50 KVA, 1 phase, 480-120/240V step-down transformer, 120/240 distribution panel with 200A, 2-pole main breaker and branch breakers as required in NEMA-3R enclosure and shall connect wires and PVC conduit from distribution panel to the power panel of the Personnel Shower Trailer.

The Subcontractor shall provide 480V power receptacle for portable steam cleaning equipment (7.5HP, 480V, 3P) for the equipment decon area. Subcontractor shall also provide 110/240V power receptacles in weatherproof enclosure for sump pump for equipment decon pad and for sump pump for wastewater treatment facility.

#### **3.0 CODES AND STANDARDS**

All equipment and installation shall be designed, manufactured and tested in accordance with the latest applicable NEMA, ANSI, NEC, NESC, IEEE standards and shall meet all local and state codes.

#### **4.0 HEALTH AND SAFETY**

All site activities shall be subject to the requirements of the Site Health and Safety Plan (SHSP) which will be provided to the Subcontractor upon contract award. Subcontractor personnel must meet the

applicable requirements of this plan and follow the directions of the Site Health and Safety Officer (SHSO) to protect personnel and/or the environment. A copy of the SHSP will be available at the Foster Wheeler Environmental Boston Office for contractor's review, if he so desires prior to bid submittal.

Prior to initiating field activities, the Subcontractor shall submit activity hazard analyses (AHA) to Foster Wheeler Environmental for review and acceptance and shall review the SHSP and certify, in writing, an understanding and intent to comply with all applicable requirements. An example of the AHA format is included in Appendix C. Foster Wheeler Environmental will have the authority to audit and terminate the Subcontractor's field operations if such audit determines that the operations violate the SHSP, OSHA regulations, or Site work practices.

The construction of the electrical system described in this SOW will occur in a non-hazardous waste environment using typical construction health and safety work practices.

The Subcontractor will be required to comply with all applicable OSHA 1910 and 1926 regulations in addition to the requirements of the SHSP. All Subcontractor employees will be required to attend Site-Specific Safety and Health Training (approximately one hour) prior to initially starting work on the Site. In addition, the Subcontractor's personnel will be required to attend daily safety briefings, for approximately twenty (20) minutes at the start of each day, to be conducted by Foster Wheeler Environmental. Subcontractors may be requested by Foster Wheeler Environmental to present a safety briefing based upon their scope of work.

## **5.0 RESPONSIBILITIES OF THE SUBCONTRACTOR**

### **5.1 Subcontract Services**

The work shall include, but not be limited to, providing design, supervision, labor, materials, equipment, services, and support facilities necessary to complete the tasks described in Section 2.0. The Subcontractor will be required to coordinate the work described herein with construction efforts that will be performed by others concurrently at the Site. All power lines shall be installed a minimum of 24" below grade. When crossing road or shunt/loop piping, the powerlines shall be installed below ground in 4"RGS conduit. The Subcontractor shall also provide supports for the above-ground conduit installation.

### **5.2 Submittals**

Subcontractor shall prepare the following submittals for review and acceptance by Foster Wheeler Environmental:

1. Electrical distribution system for tank cleaning equipment single line drawing;
2. Portable electrical distribution skid (main and auxiliary) layout drawing;
3. Power layout drawing showing complete power feeders run to the equipment, support details, and location of portable electrical distribution skid;
4. Electrical area classification drawing, if needed; and
5. Complete Bill of Material of all items furnished including distribution panels, starters, receptacles, wires, conduits, fittings, etc.

Design drawings and calculations shall be prepared under the supervision of and shall be stamped and signed by a professional Electrical Engineer who is registered in the State of Rhode Island.

### 5.3 Permits

Subcontractor shall apply for and obtain all required permits and pay all necessary fees relating to the work described in this SOW with the exception of working in or near wetlands. Permits for work in or near wetlands at the Site will be the responsibility of Foster Wheeler Environmental. Subcontractor shall comply with requirements set forth in the Wetlands Permit.

### 5.4 Security

The Subcontractor shall be responsible for providing security for all Subcontractor-owned equipment and materials at the Site. Vandalism or loss of equipment shall not be justification for stopping or delaying work.

### 5.5 Utilities

The Subcontractor shall furnish all utility services necessary, with the exception of temporary facilities as indicated in Paragraph 6.7, for the performance of the work described in this SOW.

### 5.6 Quality Control

The Subcontractor shall perform high quality work in accordance with this SOW and all permits or applications required. All field activities shall be conducted in an efficient and professional manner with minimal damage to the environment. All deficiencies in materials, activities, or workmanship shall be corrected by the Subcontractor at no additional cost to Foster Wheeler Environmental or the Navy.

A Quality Control Plan (QCP) has been prepared by Foster Wheeler Environmental for this project. The Subcontractor will be required to attend a quality control coordination meeting. The Subcontractor will also be required to make available all aspects of the work for inspection by Foster Wheeler Environmental quality control staff for conformance with the quality control aspects of the plan. Any unauthorized deviations from the specifications will be reported to the Subcontractor in writing, for correction at the Subcontractor's expense.

During the performance or at the completion of work, as appropriate, the following will be required from the Subcontractor:

- A Certificate of Compliance stating: "All work provided under the Subcontract complies with all requirements of the drawings and specifications including Foster Wheeler environmental and the Navy"; and
- Documents identifying any deviations and their acceptance.

## **5.7 Project Meetings**

The Subcontractor will be required to attend the following meetings at the outset of the project and during the performance of the work:

- Site specific Health and Safety training.
- A quality control coordination meeting with the Navy and Foster Wheeler Environmental; and
- Daily safety briefings with Foster Wheeler Environmental when working on-site.

## **5.8 Working Hours**

Normal working hours for the Site shall be Monday through Friday, 7:00 a.m. to 5:30 p.m.

## **6.0 RESPONSIBILITIES OF FOSTER WHEELER ENVIRONMENTAL**

### **6.1 Site Access**

Access to the Site shall be arranged by Foster Wheeler Environmental through the Navy prior to the commencement of the work. Subcontractor personnel shall not enter onto any portion of the Site without first obtaining approval from Foster Wheeler Environmental. Subcontractor equipment shall meet OSHA or industry safety standards, and access to the Site is permitted only with Foster Wheeler Environmental's approval. Site clearing in the power distribution area will be provided by Foster Wheeler Environmental.

### **6.2 Project Plans**

Upon contract award, Foster Wheeler Environmental will provide the Subcontractor with the following project plans:

- SHSP
- QCP

### **6.3 Site Manager**

A Site Manager, responsible for all site activities, will be assigned to the project and will act as the interface point for correspondence between the Subcontractor and Foster Wheeler Environmental. A Foster Wheeler Environmental Site Engineer will assist in the coordination of the Subcontractor's activities and the work of others being performed concurrently.

### **6.4 Staging and Storage Areas**

The Subcontractor will be provided with an area for use as working and staging areas. The Site Manager will designate this area prior to Subcontractor mobilization. No storage of equipment or stockpiling of material will be permitted within the Navy-owned right-of-way. Excessive stockpiling of material will not be allowed.

## 6.5 Review of Shop Drawings

Foster Wheeler Environmental will provide the shop drawings submitted by the Subcontractor to the Navy for review and comment. The Subcontractor will be required to resolve comments with Foster Wheeler Environmental and the Navy and incorporate the resolutions into subsequent submittals for final acceptance.

## 6.6 Quality Control

As described in Section 8.6, Foster Wheeler Environmental will be responsible for the coordination of quality control activities at the Site.

## 6.7 Temporary Facilities

Portable toilet facilities will be provided. Subcontractor will also be provided with access to the telephone (local calls only), photocopier, and fax.

## 7.0 WORK SCHEDULE

The work schedule for this project is critical and the milestones described herein must be met.

**Table 2  
Work Schedule**

	<b>Description</b>	<b>Milestone</b>
1.	Submit all drawings and Bill of material	Within one (1) week of award
2.	Foster Wheeler Environmental to review and provide comments	Within one (1) week of receipt
3.	Subcontractor to update and submit	Within three (3) working days of receipt of comments
4.	Navy to review revised submittal	Within one (1) week of receipt
5.	Mobilize to Site	Within three (3) working days of NTP
6.	Install and test electrical distribution system	Within three (3) weeks after approval of submittals

## 8.0 TESTING AND INSPECTION

- a. Subcontractor shall Megger test all cables after installation.
- b. Subcontractor shall measure ground resistance of all ground rods, resistance shall be less than 5 ohm.
- c. Subcontractor shall be responsible for obtaining all local permits and inspection.
- d. After all local inspections have been completed and power has been energized, a complete operational test (starting of pump, fans, etc.) shall be made.
- e. Subcontractor shall furnish his standard test and inspection forms, signed and witnessed by Foster Wheeler Environmental.

## 9.0 MEASUREMENT AND PAYMENT

The work shall be measured and paid in accordance with the payment tasks included herein and the submitted breakdown provided in the Price Quotation Form. The following payment tasks have been identified:

1. **Submittals**

Payment to be made upon acceptance of all submittals as described in SOW Section 5.2.

2. **Mobilization**

Payment to be made upon successful mobilization.

3. **Installation of Power Feeders and Distribution Panels**

Payment to be made upon successful installation of power feeders and distribution panels inclusive of all accessories and appurtenances.

4. **Fabrication of Portable Electrical Skids**

Payment to be made upon successful fabrication, supply and on-site testing of portable electrical skids, (3 main and 3 auxiliary).

5. **Installation of Electrical System for Miscellaneous Areas**

Payment to be made upon successful completion of electrical system for miscellaneous area.

6. **Final Payment**

Final payment (10%) to be made upon receipt of final documentation and resolution of all punchlist items.

All of the above payment task milestones are subject to acceptance/approval by Foster Wheeler Environmental and the Navy of the payment item indicated.

APPENDIX A

## **Appendix A**

### **Drawings**

The following drawings are attached and form part of this SOW.

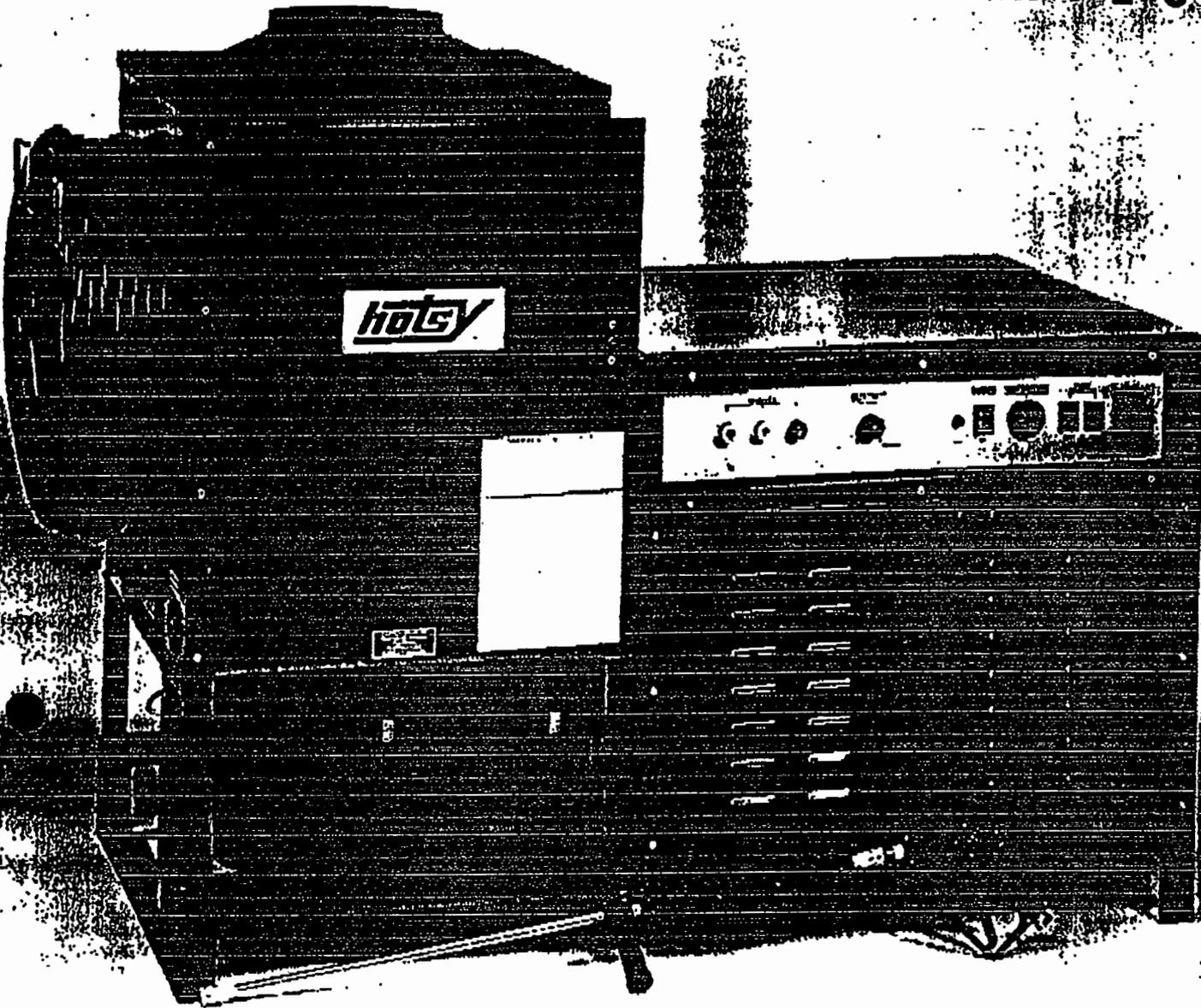
Dwg. No. 1284-0013-E2

Electrical Single Line Diagram

Dwg. No. 1284-0013-E3

Electrical Power Layout

APPENDIX B

**HOTSY****5600/5700****S E R I E S****HOTSY FEATURES:**

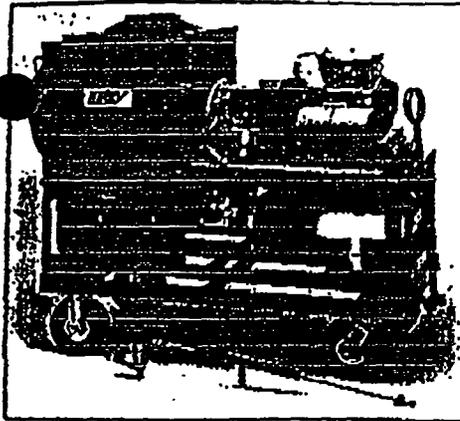
- Up to 8 GPM at 3000 PSI
- High-power electric motors or gasoline engines
- Reliable Hawk® triplex, positive-displacement pump
- Oil, natural gas or LP-fired water heaters
- Adjustable temperature with precision safety controls
- Rust-proof fuel and float tanks
- Heavy-duty construction
- Stationary or portable
- Full line of Hotsy detergents and accessories available

**HOTSY NO-COST BENEFITS:**

- Free demos at your site
- Over 50 models to choose from
- Factory-trained service people
- Pre-delivery dealer prep
- On-site machine checkout
- Operator training
- Local parts inventory
- Fuel, detergent & labor savings
- Quality warranty program

***Today's Best Value in High-Volume, High-Pressure Hot-Water Washers***

**Models 5640, 5730, 5732, 5733, 5735**



Model 5640 with optional wheel kit.

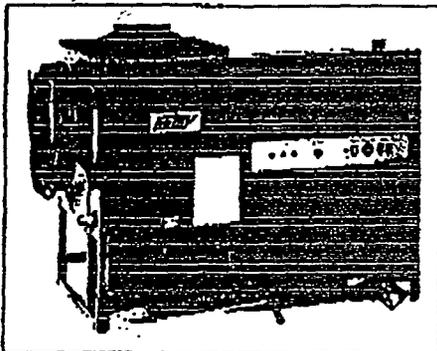
**Big Volume, Big Pressure and Rugged Construction**  
 The value-packed 5600 and 5700 Series includes five models, giving you a broad choice of heavy-duty machines for your toughest cleaning tasks. The oil-fired Model 5640, powered by a gasoline engine, offers 8 GPM, 3000 PSI performance, while the electric-motor powered 5700 Series provides 8 GPM at 3000 PSI using oil, natural gas, or optional LP fuel. These are rugged machines, with the power to blast away dirt, grease and grime under the toughest conditions.

**Dependable Hawk® Triplex Pump**  
 Our Hawk triplex, positive-displacement pump outputs a continuous 3000 PSI to handle virtually any cleaning job around. The Hawk pump is your assurance of pressure-packed cleaning combined with long, trouble-free life.

**Vertically-fired Coils**  
 Our 5600/5700 Series machines are constructed with Hotsy's specially designed heating coil, which operates in a highly efficient upright burner. They're made of a continuous length of hydraulic tubing. And they're burst-pressure rated to 14,900 PSI—well above the operating pressure of these machines.

**Accessories to Match Your Application**  
 Hotsy's custom accessories tailor your installation to fit your requirements, making your cleaning job faster, easier and better. Choose from extra hose lengths, hose reels, multiple guns, wand extensions, thermal shut-down kit, quick couplers, downstream detergent injectors, foam applicators, wet sand-blasters and rotating brush.

**Clean Better with Hotsy Detergents**  
 Hotsy has a broad selection of biodegradable detergents formulated specifically for high-temperature, high-pressure cleaning. Exclusive advanced-formula HCC additives continuously clean the lime and mineral buildup that can occur in your machines' coils and fittings.



Model 5730 oil-fired pressure washer

This cleaning action reduces replacement costs and improves machine performance. Most Hotsy detergents are USDA and Canadian Agriculture approved. And they're concentrated, so a little goes a long way.

**Ask for a FREE Demo Today!**  
 Hotsy washers are affordable and versatile, handling dozens of cleaning chores you haven't even thought of. Your Hotsy Distributor will prove it with a FREE DEMO at your site and at your convenience. Call today to see a Hotsy in action.

- 5640: 6 GPM, 3000 PSI, 24 HP gasoline engine; 740,000 BTU/hr. oil-fired water heater; shipping weight 1110 lbs.
- 5730: 8 GPM, 3000 PSI, 15 HP, 230V, 3 phase electric motor; 740,000 BTU/hr. oil-fired water heater; shipping weight 915 lbs.
- 5732: 8 GPM, 3000 PSI; 15 HP, 230V, 3 phase electric motor; 657,000 BTU/hr. natural-gas-fired water heater (LP gas-fired optional); shipping weight 965 lbs.
- 5733: 8 GPM, 3000 PSI; 15 HP, 460V, 3 phase electric motor; 740,000 BTU/hr. oil-fired water heater, shipping weight 930 lbs.
- 5735: 8 GPM, 3000 PSI; 15 HP, 460V, 3 phase electric motor; 657,000 BTU/hr. natural-gas-fired water heater (LP gas-fired optional); shipping weight 870 lbs.

SPECIFICATIONS	
Water Pump Volume	5640: 6 GPM (22.7 lpm); 360 GPH (1362 lph) 5700 Series: 8 GPM (30.28 lpm); 480 GPH (1815.7 lph)
Water Pump Pressure	3000 PSI (210.9 kg/cm <sup>2</sup> )
Water Pump	Hawk triplex, positive-displacement pump; ceramic plungers; brass manifold; oil-bath crankcase.
Pump Drives:	
5640	24 HP gasoline engine; electric start, loss battery, alternator included. 11.5 gallon, removable, rust-proof, polyethylene gas tank with fuel gauge in cap.
5730 & 5732	15 HP electric motor, 230V, 60Hz, 3 phase; 234 frame, "C" face; open drip-proof. Thermal overload protection on starter motor.
5733 & 5735	Same as 5730 & 5732 wired for 460V.
Oil-Fired Water Heater	740,000 BTU/hr. UL-listed burner, pressure-atomizing type, with automatic electronic ignition. Choice of #1 or #2 diesel fuel, kerosene or #1 home heating oil as fuel. Fuel filter standard, 17-gallon fuel-oil tank.
Gas-Fired Water Heater	657,000 BTU/hr. AGA-listed gas controls; ring-type burner with aspirating spuds; natural draft; natural gas standard; LP gas optional.
Heating Coil	Vertically-fired; 1" OD; hydrostatic-pressure tested; 14,900 PSI burst-pressure rated. Situated in a full-length, sheetmetal wrap, requiring no outer wrap insulation. Coil length 183 ft.
Stack Size (Diameter)	16" oil-fired; 16" gas-fired (gas-fired units require dual diameters).
Controls	Adjustable temperature controller, safety pressure relief valve, pressure switch, ON/OFF electric-motor switch, ON/OFF water-heater switch, detergent valve, motor-overload relay and automatic anti-rusting float valve.
Float Tank	Removable, rust-proof polyethylene.
Wand Assembly	Trigger-gun control with cool grip, quick coupled to a heavy-duty wand with insulated grips.
Nozzles	Three stainless steel; 0°, 15° and 40°
Hose	1/2" ID, 50 ft., wire braid, 3500 PSI working pressure; burst pressure is at least 4 times working pressure; oil and chemical resistant. Swivel fittings both ends.
Portability	Optional
Alternator	Standard with gasoline engines. Provides 115V power to the burner.
Optional Accessories	Thermal shut-down kit, multiple-gun operation, extra hose lengths, hose reels, wand extensions, quick couplers, downstream detergent injector, wet sandblaster, rotating brush and foam applicator.
Construction	Heavy-gauge steel, angle-iron frame.
Finish	High-gloss, powder coat.
Dimensions	5640: L-64" (162.6 cm); W-35" (88.9 cm); H-55" (139.7 cm) 5700 Series: L-57" (145 cm); W-22" (56 cm); H-50" (127 cm)

\*Engine performance may vary with high altitudes. This may affect output volume and pressure.

Model 5733 natural-gas fired washer is shown on reverse side.

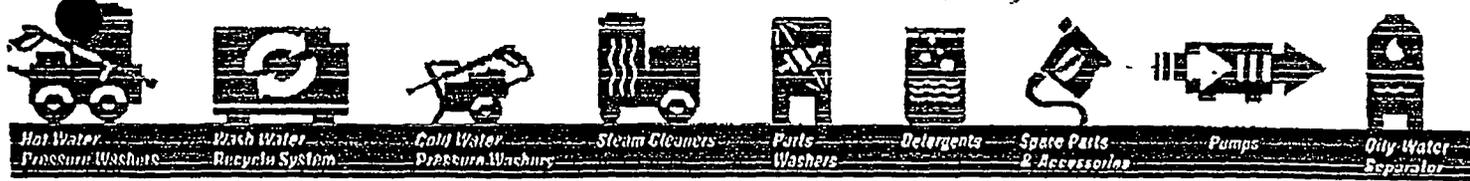
*Motor mounted on unit  
 use 90 amp breaker  
 for supply*



**THE HOTSY CORPORATION**  
 21 Inverness Way East, Englewood, Colorado 80112-5796  
 (303) 782-5200 FAX (303) 782-0547

Model 5640 printed in USA. Effective 2/99. Specifications and product descriptions subject to change without notice. ©1999 The Hotsy Corporation

**America's #1 Manufacturer of Cleaning Systems.**

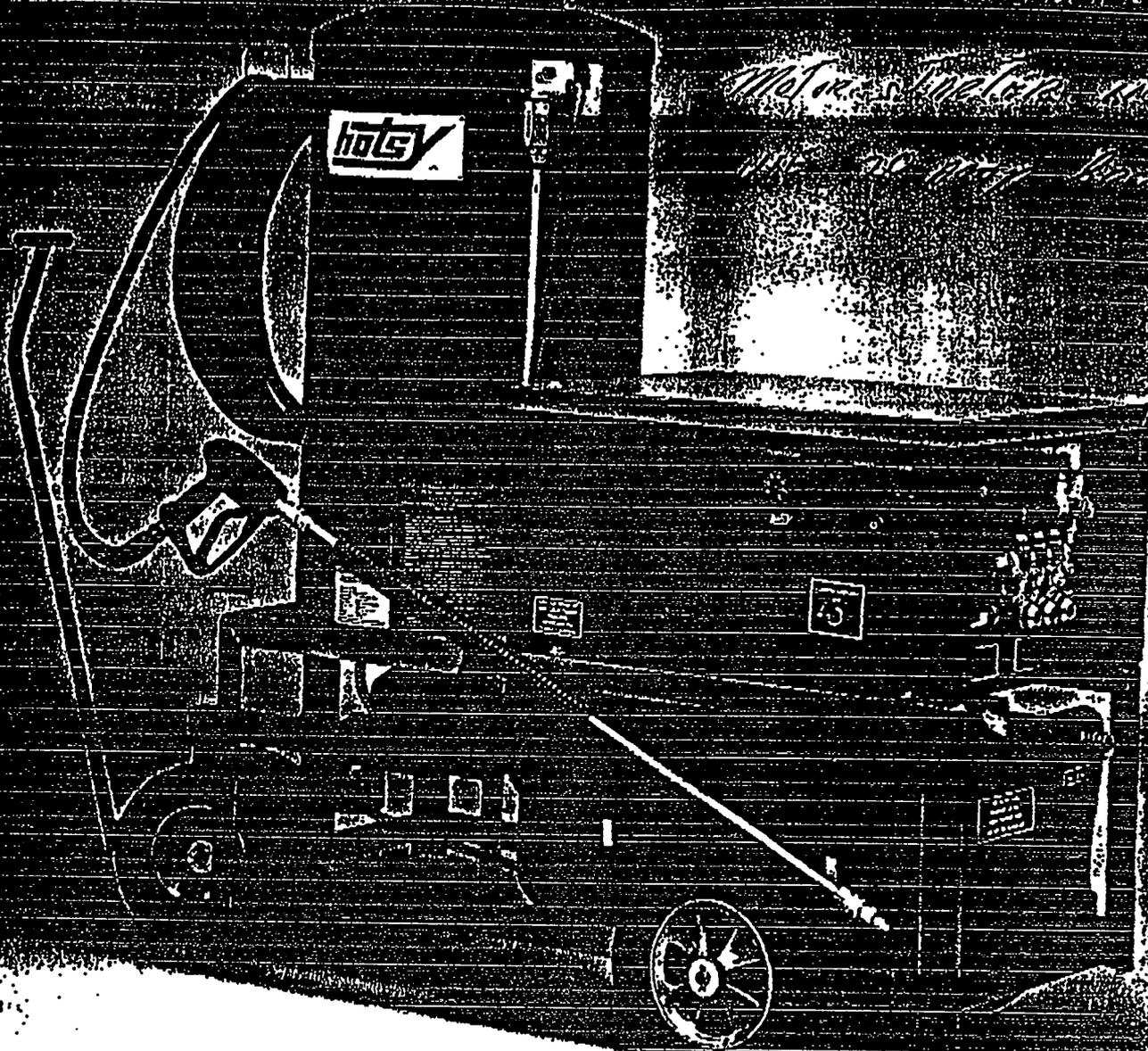


**HOTSY**

FAX 4012956430

HYLAND : HOTSY

P04

**900****SERIES***Hot water. Hot air. Hot steam.*  
*Use to clean anything.***HOTSY FEATURES:**

- 230-, 208/230- & 440-volt electric motors
- Hawk triplex, high-performance pumps
- Vertically-fired oil, LP or natural-gas water heaters
- Rust-proof fuel & float tanks
- Fuel gauge on fuel-tank cap
- Precision safety controls
- Heavy-duty construction
- Stationary or portable
- Full line of Hot'sy accessories
- Hot'sy detergents for all applications

**UNPAID-FOR BENEFITS:**

- Free Demos on site
- Over 50 models to choose from
- Factory-trained service people
- Pre-delivery Dealer-Prep
- Professional installation
- On-site machine checkout
- Operator training
- Local parts inventory
- Fuel, detergent & labor savings
- Quality warranty program

**Competitively Priced For The Best Value For Your Dollar Now**

- Hotsy's high-powered, hot-water, high-pressure washers designed for heavy-duty equipment and "off-the-road" cleaning.
- 80% of Hotsy parts — components, chassis, safety controls, coils, pumps — are manufactured by Hotsy or built to Hotsy design.
- Motor and water heaters perform precisely to Hotsy specifications.
- High-performance Hawk triplex pump delivers 4 GPM at 2000 PSI.
- Hawk pump delivers quiet, efficient operation, with minimal vibration and great durability.
- Hotsys are safe and easy to operate. Simple instructions are printed on the machine as well as in the Operating Manual.
- Hotsy's trigger gun conserves and controls water flow.
- Adjustable safety temperature controller lets you choose different temperatures for different cleaning jobs.
- Operators can add detergent easily for a variety of applications.
- Add these Hotsy accessories to help clean faster, easier and better: Adjustable spray-pattern nozzle...portable gear...extra hose lengths...hose reels...wand extensions...quick couplers...downstream detergent injector...wet sandblaster...rotating brush...foam applicator...and many, many more.



- Hotsys perform best with Hotsy detergents... formulated for Hotsys, by Hotsy, to be fast-acting, thorough cleaners.
- Hotsy detergents are highly concentrated and economical to use... a little Hotsy detergent goes a long, long way.
- Exclusive Advanced Formula HCC additives in Hotsy detergents continuously clean the rim and soap buildup in your machine... reducing wear, tear and downtime.
- There's a wide variety of Hotsy detergents for a wide variety of cleaning jobs and they're all formulated for high-temperature, high-pressure cleaning.
- Available in a variety of packages to meet your needs, Hotsy detergents are safe... biodegradable, USDA approved and most have Canadian Agriculture approval.
- Hotsys are versatile, handling dozens of cleaning chores you haven't even thought of! We'll prove it with FREE DEMO on site, at your place of business. Your Hotsy Man will also help you choose the Hotsy accessories and Hotsy detergents that are best for you. Ask for a FREE DEMO today!

MODELS	
980/981	987/989
990/991	993/994
997/999	

<b>980</b>	1-phase, 230V, electric motor; oil-fired water heater; shipping weight, 520 lbs.
<b>981</b>	1-phase, 230V, electric motor; LP-gas-fired water heater (natural gas optional); shipping weight, 480 lbs.
<b>987</b>	1-phase, 230V, electric motor; oil-fired water heater; CSA Approved; shipping weight, 525 lbs.
<b>989</b>	1-phase, 230V, electric motor; natural-gas-fired water heater; CSA Approved; shipping weight, 495 lbs.
<b>990</b>	3-phase, 208/230V, electric motor; oil-fired water heater; shipping weight, 505 lbs.
<b>991</b>	3-phase, 208/230V, electric motor; LP-gas-fired water heater; shipping weight, 461 lbs.
<b>993</b>	3-phase, 440V, electric motor; oil-fired water heater; shipping weight, 520 lbs.
<b>994</b>	3-phase, 440V, electric motor; LP-gas-fired water heater (natural gas optional); shipping weight, 475 lbs.
<b>997</b>	3-phase, 208/230V, electric motor; oil-fired water heater; CSA Approved; shipping weight, 510 lbs.
<b>999</b>	3-phase, 208/230V, electric motor; natural-gas-fired water heater; CSA Approved; shipping weight, 480 lbs.

**SPECIFICATIONS**

Water Pump Volume	4 GPM (15.1 lpm); 240 GPH (908.4 lph)
Water Pump Pressure	2000 PSI (140.5 kg/cm <sup>2</sup> ) <b>3000 PSI</b>
Water Pump	Hawk triplex, positive-displacement pump; ceramic plungers; brass manifold; oil-bath crankcase.
Electric Pump Motor	SEEP, 230 V, 208/230V or 440V; 60 Hz, 1 or 3 P; electric motor; drip proof. <b>7.5 HP</b>
Oil-Fired Water Heater	325,000 BTU/hr. UL listed burner, pressure-atomizing type, with automatic electric ignition. Your choice of #1 or #2 diesel, kerosene or #1 home heating oil as your fuel. Fuel filter standard. 11.5-gallon, removable, rust-proof, non-contaminating, polyethylene, fuel-oil tank standard. Fuel gauge in cap. Models 987 & 989 CSA Approved.
Gas-Fired Water Heater	350,000 BTU/hr. AGA-listed gas controls, ring-type with aspirating spuds, natural draft. LP gas standard. Vapor-type, LP-gas tank required, but not included. Natural gas optional. Models 989 & 998 CSA Approved.
Heating Coil	Vertically-fired; 7/8" OD; hydrostatic-pressure tested; 14,900 PSI burst-pressure rated. Heating coil is sheathed in a full-length, sheet-metal wrap. Equipped with an independently-welded, heat-retention baffle plate.
Stack Sizes (Diameters)	8" oil fired; 10" gas fired (gas-fired units require draft diverters).
Controls	Adjustable temperature controller, safety pressure relief valve, pressure switch, ON/OFF electric motor switch with overload protection, unloader, water heater switch, detergent valve and automatic, non-contaminating float valve.
Float Tank	Removeable, rust-proof polyethylene.
Wand Assembly	Trigger gun control with cool grip, heavy-duty wand with insulated grips.
Nozzles	Three stainless steel; 0°, 15° and 40°.
Hose	3/8" ID, 50 ft., wire braid, 5,000 PSI working-pressure rated; burst pressure is at least 4 times working pressure; oil and chemical resistant. Swivel fittings both ends.
Portability	Optional.
Optional Accessories	Adjustable spray-pattern nozzle, portable gear, extra hose lengths, hose reels, wand extensions, quick couplers, downstream detergent injector, wet sandblaster, rotating brush and foam applicator.
Construction	Heavy-gauge sheet; angle-iron frame.
Finish	High-gloss powder coat.
Dimensions	L-45" (114.3 cm); W-18" (45.72 cm); H-40" (101.6 cm).

Cover Photo: Hotsy Model 990



**THE HOTSY CORPORATION**

21 Inverness Way East, Englewood, Colorado 80112-5796  
(303) 792-6200 • TWX 910/935-0792 • FAX 303/792-6547

Hotsy Equipment Co.  
346 Smith St.  
North Kingstown, RI 02852  
Phone: (401) 295-9700  
Fax: (401) 295-6430

APPENDIX C

## ACTIVITY HAZARD ANALYSIS

Project: TANK FARM 4 CLOSURE, NETC - NEWPORT  
 Activity: MOBILIZATION

Location: NEWPORT, RI

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
<ol style="list-style-type: none"> <li>1. Preparation of work area. (Hazards 1-3 apply)</li> <li>2. Transportation of equipment and delivery of materials (Hazards 1-5 apply)</li> <li>3. Construction of decontamination pad (Hazards 1-8 apply)</li> </ol>	<ol style="list-style-type: none"> <li>1. Back Injuries</li> <li>2. Slips/Trips/Falls</li> <li>3. Pinch/Cut/Smash</li> <li>4. Vehicular Traffic</li> <li>5. Heavy Equipment (rollovers, overhead hazards, spills, struck by or against)</li> <li>6. Noise</li> <li>7. Electrocution</li> <li>8. Fire</li> </ol>	<ol style="list-style-type: none"> <li>1. Site personnel will be instructed on proper lifting techniques; Mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available; Instruct personnel on proper lifting techniques.</li> <li>2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.</li> <li>3. Cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools</li> <li>4. Spotters will be used when backing up trucks and moving equipment</li> <li>5. Equipment will have rollover protective structures and seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; all slings chains and ropes will be rated for the load in which it is expected to lift; spills and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; avoid equipment swing areas; know hand signals; all equipment will be equipped with backup alarms</li> <li>6. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers</li> <li>7. Ground fault circuit interrupters will be used; cords will be kept off of and out of wet areas unless they are approved submersible type; cords will be inspected prior to use; damaged equipment will be tagged and taken out of service</li> <li>8. Smoking will not be allowed in work area; 10-lb. ABC type fire extinguishers shall be readily available</li> </ol>
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> <li>1. Hand and Power Tools</li> <li>2. Level D PPE</li> <li>3. First Aid Kits</li> <li>4. GFCIs and Extension Cords</li> <li>5. Portable Eyewash</li> <li>6. Fire Extinguishers</li> <li>7. Heavy equipment</li> </ol>	<ol style="list-style-type: none"> <li>1. Initial inspections will be required prior to use of hand and power tools.</li> <li>2. Monthly inspections will be performed on fire extinguishers.</li> <li>3. Daily safety and weekly inspections will be performed on first aid kits.</li> <li>4. Extension cords will be inspected prior to each use.</li> <li>5. Heavy equipment will be inspected prior to each use.</li> <li>6. Portable eye wash will be inspected monthly.</li> <li>7. GFCIs will be inspected monthly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Personnel have read and comply with SHERP</li> <li>2. Site specific training</li> <li>3. Qualified operators will be used for heavy equipment operation</li> <li>4. Instruct personnel on proper use of fire extinguishers</li> <li>5. At least 2 individuals on-site will have current CPR and First aid training</li> <li>6. Personnel will be trained to use power tools safely</li> <li>7. Personnel will be trained on proper use of extension cords</li> </ol>

**ATTACHMENT B**

PRICE QUOTATION FORM  
ON-SITE ELECTRICAL SERVICES  
NAVAL EDUCATION TRAINING CENTER (NETC)  
Newport, Rhode Island

ON-SITE ELECTRICAL SERVICES PAYMENT TASKS	TASK PRICE
1. Acceptance of all submittals as described in SOW section 5.2	
2. Mobilization	
3. Installation of power feeders and distribution panels inclusive of all accessories and appurtenances	
4. Fabrication of portable electrical skids a. Main Skids (3) \$ _____ each x3 skids= b. Auxiliary Skids (3) \$ _____ each x3 skids=	
5. Installation of electrical system for miscellaneous areas	
6. Final payment, 10 percent of total contract value	
<b>TOTAL PRICE</b>	

In addition, the Subcontractor shall provide the following information for additional work that may need to be performed on a time and material basis:

1. Labor rates

- a. On-Site Electrician Rate \_\_\_\_\_ \$/hr
- b. On-Site Foreman Rate \_\_\_\_\_ \$/hr
- c. On-Site Apprentice Rate \_\_\_\_\_ \$/hr
- d. Journeyman \_\_\_\_\_ \$/hr
- e. Laborer \_\_\_\_\_ \$/hr

2. Fixed unit rate for supply and installation of the following items:

- a. Motor Starter \$ \_\_\_\_\_
- b. Distribution Panel (Local) \$ \_\_\_\_\_
- c. Receptacles 120V \$ \_\_\_\_\_
- d. Receptacles 460V \$ \_\_\_\_\_

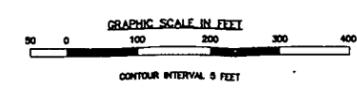
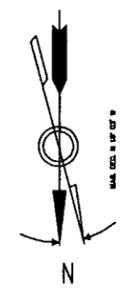
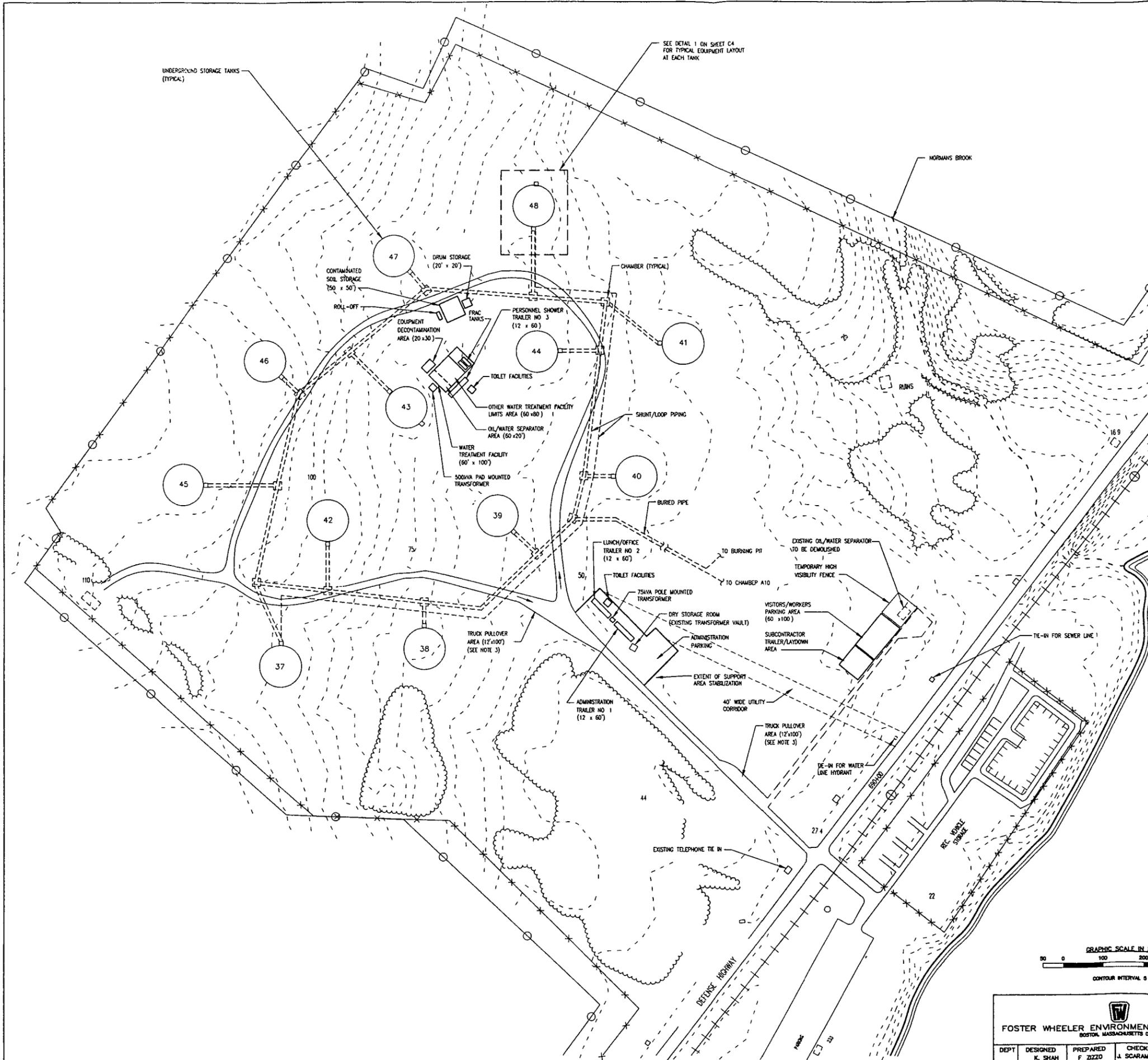
BY	ZONE	REVISION	DATE	APPROVED

**LEGEND**

- BUILDING OR STRUCTURE
- ROAD OR PAVED AREA
- TRAIL OR EARTH ROAD
- PROPERTY BOUNDARY & FENCE LINE
- FENCE
- NAVY PROPERTY BOUNDARY LINE
- RESERVATION BOUNDARY
- RAILROAD
- STREAM
- SHORE LINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSION CONTOUR
- SPOT GRADE ELEVATION ON SPOT
- WOODED AREA
- MARSH LAND

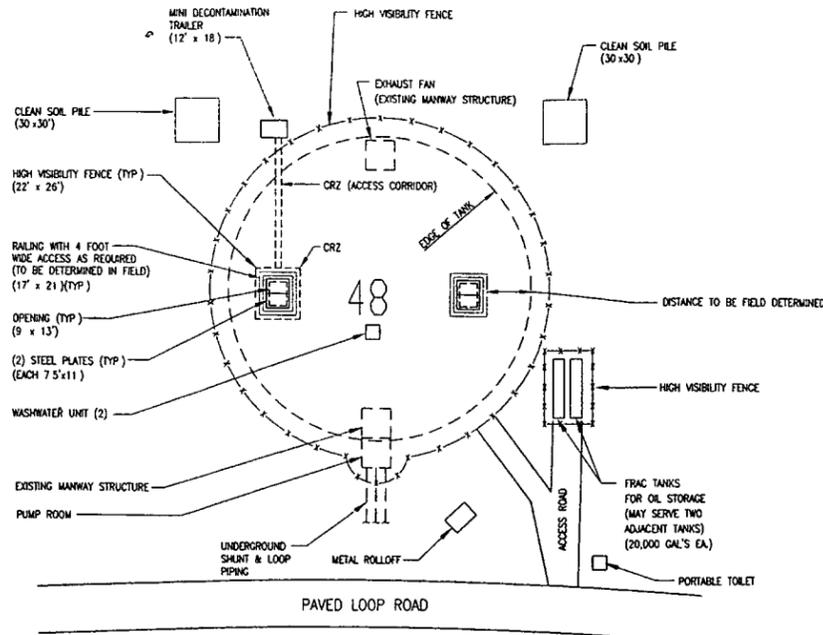
**NOTES**

- 1 LOCATION OF EQUIPMENT WILL BE FIELD ADJUSTED AS NECESSARY
- 2 GRAVEL ACCESS ROAD WILL BE LOCATED IN THE FIELD
- 3 WETLANDS PERMIT REQUIRED PRIOR TO CONSTRUCTION (WHERE NOTED)
- 4 FOR GENERAL NOTES SEE SHEET C0



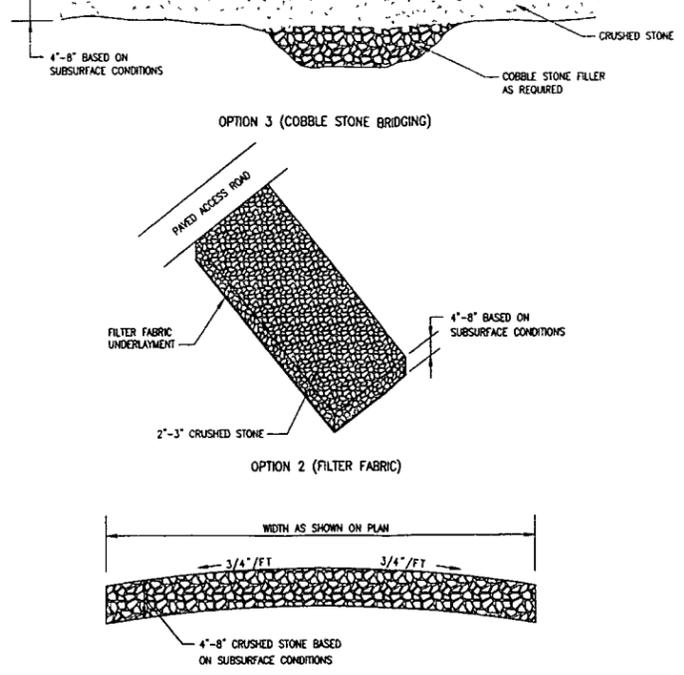
 <b>FOSTER WHEELER ENVIRONMENTAL CORPORATION</b> BOSTON, MASSACHUSETTS 02210					
DEPT.	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
AS SHOWN	K. SHAH	F. ZIZZO	J. SCARAMUZZO	M. ZIZZA	9/20/06
SCALE:	DRAWING NUMBER:	CAD FILE NUMBER:	SH. 1 OF 1	REV	0
AS SHOWN	1284.0013.C2	C2.DWG			

NETC DWG. NO.	XXXXXX	DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
DSGN.	XXXXX	NAVAL EDUCATION AND TRAINING CENTER	
DR.	XXXX	NEWPORT, RHODE ISLAND	
BR.		<b>TANK FARM 4 CLOSURE</b> NAVY REMEDIAL ACTION CONTRACT DELIVERY ORDER NO. 13 <b>SITE LAYOUT PLAN</b>	
DIR.			
APPROVED	DATE		
SATISFACTORY TO		SIZE	CODE IDENT. NO.
		F	80091
DATE		CONSTR. CONTR. NO.	XXXXXX
		SPEC.	XXXXXX
		SHEET 1 OF 1	

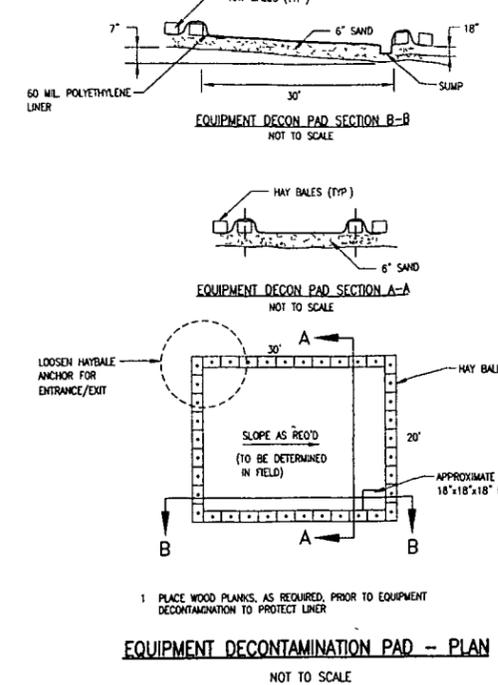


NOTE: TANK IS DESIGNED FOR LIVE LOAD OF 275 LBS. PER SQUARE FOOT ON TOP OF ROOF PER NETC DRAWING NO 5000-57 "PRE-STRESSED CONCRETE FUEL OIL STORAGE TANKS", REV E, DATED 8/5/42

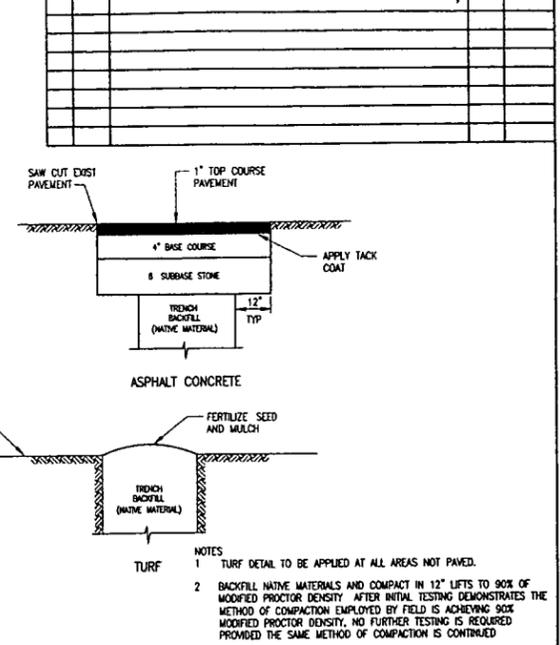
**DETAIL 1**  
TYPICAL EQUIPMENT LAYOUT AT EACH TANK LOCATION



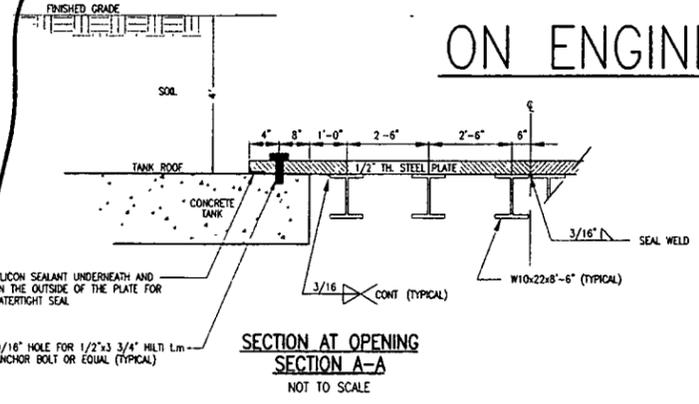
**ACCESS ROAD DETAIL**  
NOT TO SCALE



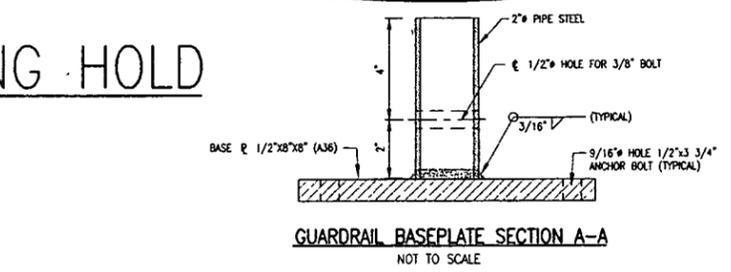
**EQUIPMENT DECONTAMINATION PAD - PLAN**  
NOT TO SCALE



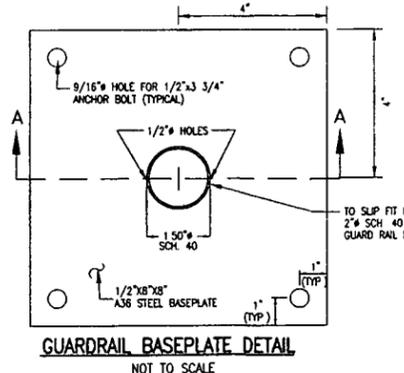
**TRENCH SURFACE RESTORATION**  
NOT TO SCALE



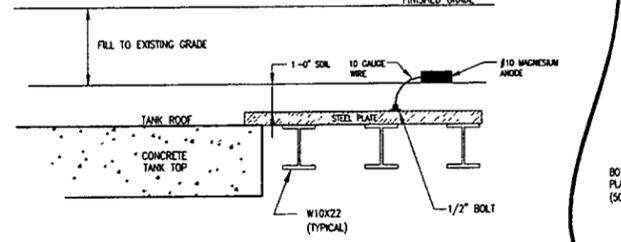
**SECTION AT OPENING SECTION A-A**  
NOT TO SCALE



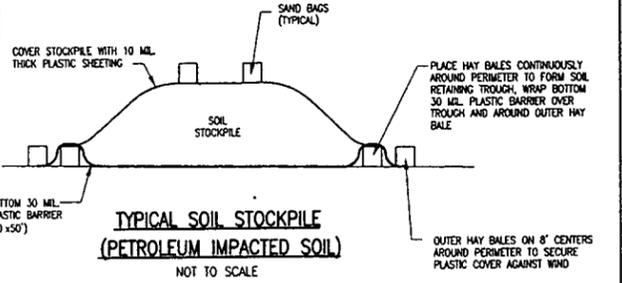
**GUARDRAIL BASEPLATE SECTION A-A**  
NOT TO SCALE



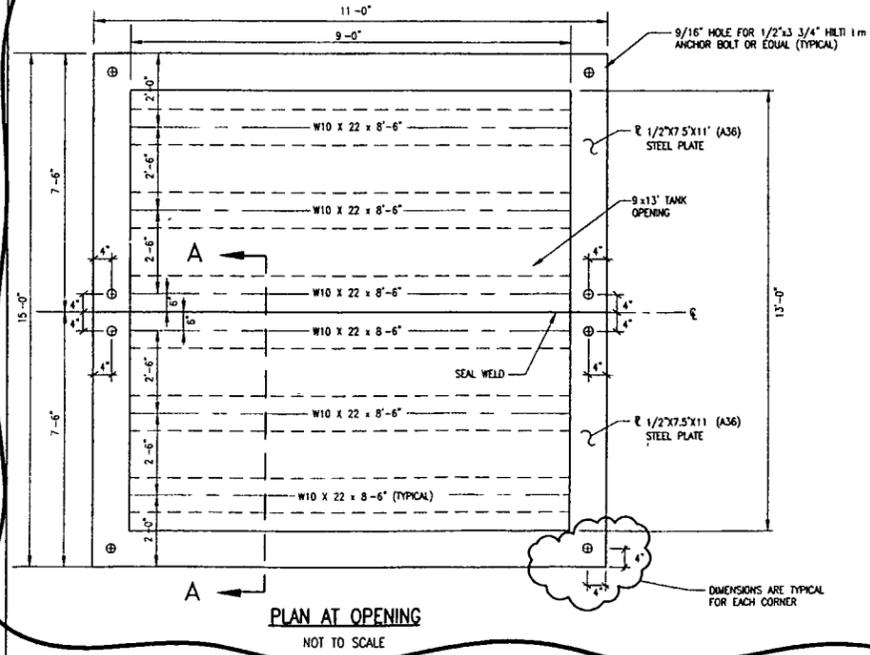
**GUARDRAIL BASEPLATE DETAIL**  
NOT TO SCALE



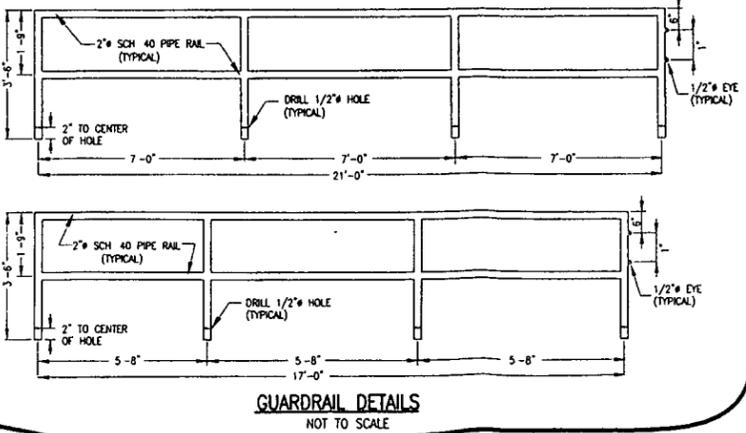
**CATHODIC PROTECTION DETAIL**  
NOT TO SCALE



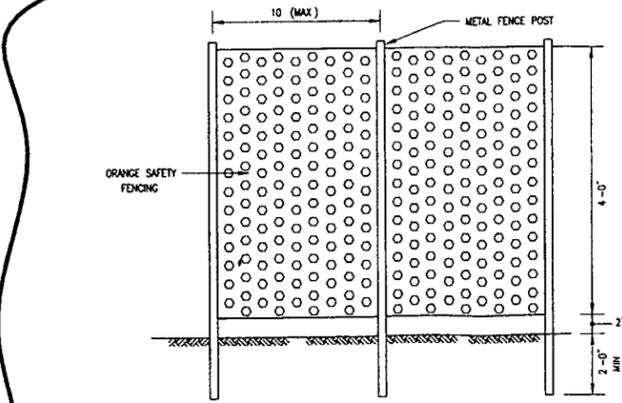
**TYPICAL SOIL STOCKPILE (PETROLEUM IMPACTED SOIL)**  
NOT TO SCALE



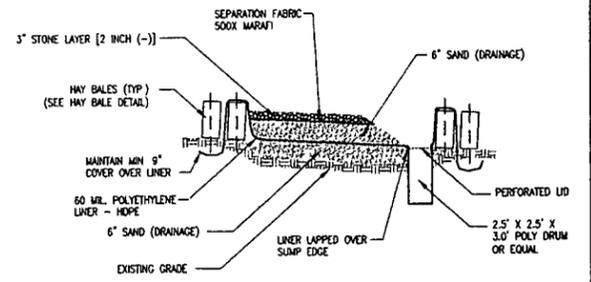
**PLAN AT OPENING**  
NOT TO SCALE



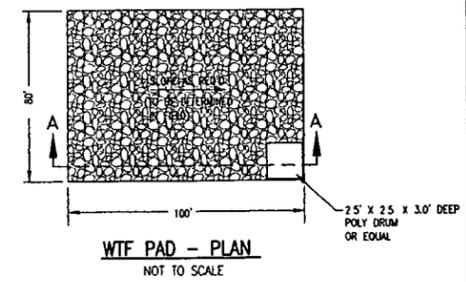
**GUARDRAIL DETAILS**  
NOT TO SCALE



**SAFETY FENCE DETAIL**  
NOT TO SCALE



**WTF PAD SECTION A-A**  
NOT TO SCALE



**WTF PAD - PLAN**  
NOT TO SCALE



FOSTER WHEELER ENVIRONMENTAL CORPORATION 478 ATLANTIC AVENUE ROSLINDEN, MASSACHUSETTS 02068					
DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
	K. SHAH	F. ZIZZO	J. SCARAMUZZO	M. ZIZZA	5/30/06
SCALE:	DRAWING NUMBER:	CAD FILE NUMBER	SH 1 OF 1	REV	
NOT TO SCALE	1284.0013.04	C4.DWG		0	

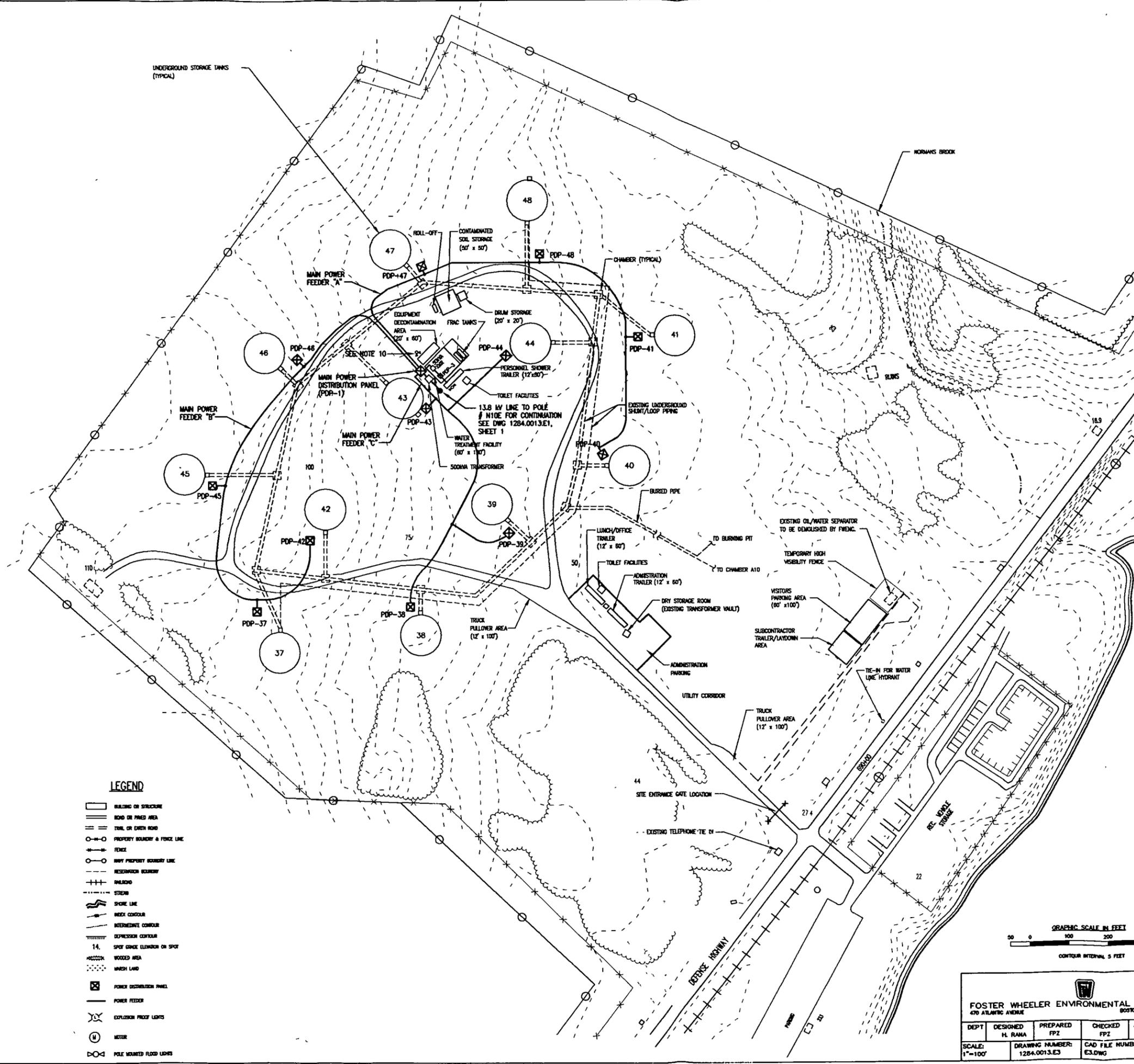
NETC DWG. NO. XXXXXX		DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND NAVAL EDUCATION AND TRAINING CENTER NEWPORT, RHODE ISLAND	
DSGN.	XXXXXX	TANK FARM 4 CLOSURE NAVY REMEDIAL ACTION CONTRACT DELIVERY ORDER NO.13 PROJECT DETAILS	
DR.	XXXX	APPROVED	DATE
DIR.		SATISFACTORY TO	
DATE		SIZE	CODE IDENT NO.
		F	80091
		SCALE	XXXX
		CONSTR. CONTR. NO.	XXXXXX
		SHEET	1 OF 1



REV	ZONE	DESCRIPTION	DATE	APPROVED

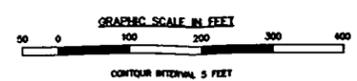
**GENERAL NOTES**

1. COMPLETE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE NATIONAL ELECTRIC CODE (NEC) AND ANY PREVAILING STATE AND LOCAL CODES.
2. MAIN POWER FEEDERS ROUTING AND LOCATION OF POWER DISTRIBUTION PANELS ARE SHOWN DIAGRAMMATICALLY ONLY. EXACT ROUTING AND LOCATIONS TO BE DETERMINED IN FIELD TO AVOID INTERFERENCE WITH PIPING, EQUIPMENT AND STRUCTURAL WORK.
3. RUN DIRECT BURIED MAIN POWER FEEDER CABLE AT A MINIMUM DEPTH OF 24" BELOW GRADE, WHEN PASSING OVER SHUNT/LOOP PIPING OR CROSSING ROAD, RUN CABLE IN 4" RGS CONDUIT.
4. ONLY MAIN POWER FEEDERS AND POWER DISTRIBUTION PANELS ARE SHOWN ON THE DRAWINGS. LIGHTING, PORTABLE SKID MOUNTED STARTERS AND RECEPTACLES REQUIRED FOR TANK CLEANING OPERATION ARE NOT SHOWN. CONTRACTOR TO DESIGN AND SUPPLY THREE (3) MAIN PORTABLE SKIDS, THREE (3) MAIN PORTABLE SKIDS, AREA LIGHTING (120) AND ALL NECESSARY CONDUIT AND WIRES.
5. FOR SKIDS, ELECTRICAL LAYOUT SEE DETAIL 1 AND DETAIL 2 ON DWG. #1284.0013.E2
6. FOR ELECTRICAL SINGLE LINE DIAGRAM, SEE DWG. #1284.0013.E2
7. INSTALL ALL POWER DISTRIBUTION PANELS, STARTERS/RECEPTACLES FOR MOTORS AND ELECTRICAL EQUIPMENT A MINIMUM OF 25 FT. AWAY FROM ANY TANK VENT OPENINGS TO AVOID CLASSIFIED AREA INSTALLATION.
8. ALL CONDUITS SHALL BE SCHEDULE 40 PVC, UNLESS OTHERWISE NOTED.
9. ALL SECONDARY POWER CABLES SHALL BE STRANDED COPPER CONDUCTOR WITH 600V TYPE THHN/THWN INSULATION.
10. THE SUBCONTRACTOR SHALL SUPPLY FOUR (4) POLE MOUNTED FLOOD LIGHTS (250W) AT TANK FOR GENERAL AREA LIGHTING.



**LEGEND**

[Symbol]	BUILDING OR STRUCTURE
[Symbol]	ROAD OR PAVED AREA
[Symbol]	TRAIL OR EARTH ROAD
[Symbol]	PROPERTY BOUNDARY & FENCE LINE
[Symbol]	FENCE
[Symbol]	NAVY PROPERTY BOUNDARY LINE
[Symbol]	RESERVATION BOUNDARY
[Symbol]	RAILROAD
[Symbol]	STREAM
[Symbol]	SHORE LINE
[Symbol]	INDEX CONTOUR
[Symbol]	INTERMEDIATE CONTOUR
[Symbol]	DEPRESSION CONTOUR
[Symbol]	14. SPOT GRADE ELEVATION OR SPOT
[Symbol]	WOODED AREA
[Symbol]	WASH LAND
[Symbol]	POWER DISTRIBUTION PANEL
[Symbol]	POWER FEEDER
[Symbol]	EXPLOSION PROOF LIGHTS
[Symbol]	MOTOR
[Symbol]	POLE MOUNTED FLOOD LIGHTS



<b>FOSTER WHEELER ENVIRONMENTAL CORPORATION</b> 470 ATLANTIC AVENUE BOSTON, MASSACHUSETTS 02210					
DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
	H. RAMA	FPZ	FPZ	FPZ	5/30/96
SCALE:	DRAWING NUMBER:	CAD FILE NUMBER:	SH	OF	REV
1"=100'	1284.0013.E3	E3.DWG			0

**FOR BID PURPOSES ONLY**

NETC DWG. NO. XXXXXX	DEPARTMENT OF THE NAVY
DR. XXXX	NAVAL FACILITIES ENGINEERING COMMAND
BR.	NAVAL EDUCATION AND TRAINING CENTER
APPROVED	NEWPORT, RHODE ISLAND
DATE	
<b>TANK FARM 4 CLOSURE</b> NAVY REMEDIAL ACTION CONTRACT DELIVERY ORDER NO.13 <b>ON-SITE ELECTRICAL POWER LAYOUT</b>	
SATISFACTORY TO	NAVFAC DRAWING NO.
	F 80091
SCALE: XXXX	CONSTR. CONTR. NO. XXXXX
DATE	SHEET 1 OF 1

