

**RAC DESIGN PACKAGE
(FINAL SUBMITTAL)**

FREE-PHASE PRODUCT RECOVERY SYSTEM MODIFICATIONS

**BUILDING AS-4141
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA**

**NAVY CONTRACT NO. N62470-05-D-6200
DELIVERY ORDER NO. 0029
CATLIN PROJECT NO. 206-074**

JUNE 6, 2008



PREPARED FOR:

**NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
6506 HAMPTON BOULEVARD
NORFOLK, VIRGINIA 23508-1278**

PREPARED BY:

**CATLIN Engineers and Scientists
220 Old Dairy Road
Wilmington, North Carolina 28405
(910) 452-5861**

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1.0 INTRODUCTION

The RAC Design Package (Final Submittal) has been prepared in general accordance with the Remedial Action Optimization & Revised Corrective Action Plan (RAO & RCAP) Addendum Report prepared by CATLIN Engineers and Scientists (CATLIN) dated June 12, 2006 and the guidelines set forth in the Professional Services Guide published by the Atlantic Division, Naval Facilities Engineering Command in July 2002. The purpose of this free-phase product recovery system modification is to enhance the performance of the existing free-phase product recovery system at the Building AS-4141 project site. The design generally consists of the converting the existing pump and treat system into a functional dual phase extraction (DPE) system. The DPE system will generally utilize the existing treatment system equipment with the addition of a vapor-liquid separator and liquid ring vacuum pump. However, due to the condition of the existing transfer pumps and piping, these components are to be replaced in addition to installing three (3) six inch stainless steel extraction wells.

This document is intended to encompass all aspects of the design process as of the Draft Submittal stage. Upon receipt of reviewer comments, the design will be adjusted accordingly to reflect an appropriate level of detail and specificity.

2.0 BASIS OF DESIGN

The Basis of Design is a supplemental document to the RAC Design Package, with the purpose of presenting all the assumptions and design criteria upon which the proposed free-phase product recovery system modifications are based. The document is divided into three basic sub-sections, intended to address all engineering disciplines relevant to this design. The civil design basis includes all general construction and equipment design calculations, and the physical data upon which all assumptions are based. The environmental design basis addresses all relevant environmental considerations, such as environmental permitting and waste streams resulting from implementation of the design. Finally, the geotechnical design basis discusses site geological conditions and any considerations pertaining to groundwater flow and elevation.

Design calculations are presented within the Basis of Design. Recovery well equipment and treatment system design calculations are covered within the Civil Basis of Design, while waste stream calculations are covered within the Environmental Basis of Design. All applicable geotechnical design calculations have been adequately covered in other sections; therefore, calculations were not necessary for the preparation of the Geotechnical Basis of Design.

The Basis of Design for the Building AS-4141 Free-phase Product Recovery System Modifications has been included in Appendix A of this Final Submittal of the RAC Design Package.

3.0 PROJECT SPECIFICATIONS

The Final Submittal Project Specifications for the Building AS-4141 RAC Design Package is comprised of the Introductory, Bidding, and Contract Requirements (Division 00), General Requirements (Division 01), and Site Construction (Division 02). These divisions and their subdivisions are intended to encompass the entire scope of the project.

The Project Specifications, as required for the Final Submittal stage of the RAC Design Package have been included as Appendix B of this document.

4.0 PROJECT COST ESTIMATE

A project cost estimate has been prepared for the proposed modifications to the Building AS-4141 free-phase product recovery system. This cost estimate is intended to reflect the anticipated project costs at the Draft Submittal stage only. The estimate was prepared using the US Cost SUCCESS program recommended in the Professional Services Guide, dated July 2002 and the RS Means Environmental Cost Data-Unit Price Guide and the RS Means Heavy Construction Cost Data Guide. The cost estimate has been assembled using the required Work Breakdown Structure (WBS) format and has been broken down into individual specification sections under the Base Bid

The project cost estimate for the Final Submittal stage of the RAC Design Package has been included as Appendix C.

5.0 CONSTRUCTION DRAWINGS

The construction drawings are intended to display to the extent possible, site conditions with regards to the existing free-phase product recovery system and the proposed system modifications. The drawings consist of a site plan, existing and proposed treatment equipment layout, general construction details and treatment equipment details.

Preliminary construction drawings for the Final Submittal stage of the RAC Design Package have been included as Appendix D.

APPENDIX A
BASIS OF DESIGN

**BASIS OF DESIGN
FREE-PHASE PRODUCT RECOVERY SYSTEM MODIFICATIONS**

**BUILDING AS-4141
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA**

June 6, 2008

**NAVY CONTRACT NO. N62470-05-D-6200
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CATLIN PROJECT NO. 206-074

PREPARED BY:

**CATLIN ENGINEERS AND SCIENTISTS
P. O. BOX 10279
WILMINGTON, NORTH CAROLINA 28404-0279
(910) 452-5861**

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**BASIS OF DESIGN
FREE-PHASE PRODUCT RECOVERY SYSTEM MODIFICATIONS**

**BUILDING AS-4141
MAREINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA**

June 6, 2008

1.0 DESIGN BASIS

For this project, the Basis of Design will focus on the recovery of the remaining free-phase product from the Building AS-4141 project site. Multiple remedial technologies have been used to remove free-phase product from the project site but have not been completely effective. Based on a review of the soil conditions and historical gauging data, the free-phase product is primarily situated within a highly plastic clay layer at the project site. The extremely high capillary forces of the clay layer have prohibited previously implemented technologies from eliminating free-phase product from the project site. Based on the existing project site conditions and the results of a Pilot test, a dual phase extraction (DPE) system was determined to be the most appropriate technology for the removal of the remaining free-phase product.

The Building AS-4141 project site is located on White Street aboard the Marine Corps Air Station (MCAS) in New river, North Carolina. This design is being prepared in general agreement with the recommendations presented in the Remedial Action Optimization & Revised Corrective Action Plan (RAO & RCAP) Addendum Report and the Summary of Aggressive Fluid Vapor Recovery Pilot Test (Pilot Test) Report. The RAO & RCAP Addendum Report and the Pilot Test Report were both prepared by CATLIN Engineers & Scientists (CATLIN) and submitted on June 16, 2006 and March 14, 2007, respectively. The Basis of Design is a detailed presentation of the facts, organized by the disciplines identified by the Professional Services Guide Document, dated July 2002, published by the Atlantic Division, Naval Facilities Engineering Command, and serves as a reference for the free-phase product recovery system modifications. Additionally, the Basis of Design is intended to be a portion of the Remedial Action Contractor Package.

1.1 SYSTEM RECOMMENDATIONS

A pump and treat system was installed and operated at the Building AS-4141 from February 1994 to July 2000. Although the pump and treat system was shut down in July 2000, an evaluation of the existing treatment system equipment indicated several pieces of equipment are suitable to be used as part of the proposed DPE system. The treatment system equipment currently present at the project site includes an oil/water separator, 550-gallon surge tank, 3,000-gallon product storage tank, tower air stripper, 250-gallon sump tank, bag filter and associated transfer pumps.

The proposed DPE system will apply a high vacuum pressure to a total of four (4) recovery wells located within the existing free-phase product plume at the project site. Free-phase product will be extracted from existing recovery well, USTAS4141-RW01, and three (3) proposed recovery wells at the project site and transferred to an existing treatment system that is proposed to be modified. The modified treatment system is to be located approximately 200-feet southwest of Building AS-4141 and will consist of a vapor-liquid separator, liquid ring vacuum pump, oil/water separator, product storage tank, surge tank, air stripper, sump tank, bad filters, carbon absorption drums and associated piping and pumps. The treated water is to be discharged to a nearby lift station and then transferred to the MCAS Waste Water Treatment Plant (WWTP).

Section 2.2 of the Basis of Design provides a detailed description of the proposed components for the DPE system. However, a brief description of the equipment modifications and system installation activities proposed as a part of the Basis of Design, are as follows in no particular order:

- Remove existing oil/water separator and air compressor from the treatment system area and dispose of properly.
- Pressure test the 3-inch PVC discharge line from the treatment system to the nearby lift station.
- Remove all pneumatic tubing, discharge tubing and other debris from the existing 8-inch carrier pipe.
- Install three (3) recovery wells within the existing free-phase product plume at the AS-4141 project site.
- Install proposed carrier pipes from the proposed recovery wells to the proposed treatment system.
- Install junction boxes at each bend in the carrier pipe.
- Install and connect proposed suction lines (to be placed within the existing 8-inch PVC carrier pipe) from all four (4) recovery wells to the proposed treatment system.
- Convert the existing 3,000-gallon product storage tank into an oil/water separator.
- Obtain and install the proposed vapor-liquid separator, liquid ring vacuum pump, 500-gallon product storage tank and four (4) carbon absorption drums.

- Install new high level float switches in the vapor-moisture separator, converted 3,000-gallon oil/water separator, new 500-gallon product storage tank, existing 550-gallon surge tank and existing 250-gallon sump tank and appropriately connect to the existing control panel.
- Replace all existing transfer pumps and associated piping to each component for the proposed DPE system.
- Replace the existing 2-inch Jaeger Tri-packs packing within the existing tower air stripper. Additionally, replace the existing air stripper blower and associated piping.
- All treatment system equipment is to be connected to the existing control panel as necessary.

This Basis of Design is based on the following:

1. A thorough review of historical documents and as-built record drawings.
2. Various field evaluations of the condition of the current remedial system and surrounding area.

1.2 REGULATORY FRAMEWORK EVALUATION

The applicable remedial requirements for the Building AS-4141 project site are the Risk Based Corrective Actions (RBCA) for Petroleum Underground Storage Tanks per 15A NCAC 2L .0106. Additionally, the requirements in the North Carolina Department of Environment and Natural Resources (NCDENR) Underground Storage Tank (UST) Section 2001 Guidelines are also applicable. CATLIN prepared and submitted a Risk Classification and Land Use Form as a part of the RAO & RCAP December 2004. The Building AS-4141 project site was characterized as an Intermediate Risk and Industrial/Commercial Land Use site. The Intermediate Risk is based on the presence of free-phase product at the Building AS-4141 project site.

The primary scope of this document is to address the free-phase product plume at the Building AS-4141 project site under NCDENR UST Section rules and regulations. Once free-phase product removal activities are completed, groundwater sampling will be required to determine if dissolved contaminant concentrations at the project site will require further remediation. Based on soil investigations conducted by CATLIN personnel in December of 2005, no soil contamination is present at the Building AS-4141 project site in excess of the applicable Industrial/Commercial Maximum Soil Contaminant Concentrations (MSCCs).

2.0 CIVIL BASIS OF DESIGN

2.1 BACKGROUND INFORMATION

Several site assessments conducted in the early 1980's identified a leaking JP-5 pipeline in the vicinity of the Building AS-4141 project site. Upon discovery of the leaks, the JP-5 pipeline was reportedly shut down and replaced in the summer of 1984. As a result of the leaking JP-5 pipeline an unknown amount of JP-5 fuel was released at the Building AS-4141 project site.

Several remedial technologies have been used at the project site but have not been completely effective. Initially, an interim recovery system was installed and operated from October 1986 to November 1987. The interim recovery system that was used to remove free-phase product from the project site reportedly recovered a total of 4,034 gallons during operation.

The reports from various site assessments were utilized by O'Brien & Gere Engineers, Inc. (OBG) to develop a Corrective Action Plan (CAP) in June of 1991. OBG identified measurable amount of free-phase product and dissolved phase petroleum hydrocarbons within the groundwater at the project site. Therefore, the CAP recommended a pump and treat system be installed for the remediation of the Building AS-4141 project site. A pump and treat system was installed at the project site and reportedly began operation in February of 1994. The pump and treat system consisted of two (2) recovery wells (USTAS4141-RW01 & USTAS4141-RW02) equipped with pneumatic recovery pumps for the removal of free-phase product and contaminated groundwater from the project site. Recovered fluids were transferred to a treatment system located approximately 200-feet southwest of Building AS-4141. Once within the treatment system, recovered fluids were routed to an oil/water separator, followed by a surge tank, tower air stripper, sump tank, bag filter and carbon absorption drums. The treated water was then discharged to a nearby lift station and subsequently transferred to the MCAS WWTP. The pump and treat system was reportedly shutdown in July of 2000.

Since the shutdown of pump and treat system, free-phase product has been recovered by aggressive fluid vapor recovery (AFVR) technology. In December 2004, CATLIN completed a RAO & RCAP for the project site. The RAO & RCAP recommended that the AFVR remedial approach at the project site be evaluated. Therefore, based on the recommendations provided in the RAO & RCAP and additional comments to the RAO & RCAP by Mr. Bruce Reed of NCDENR UST Section, CATLIN and Shaw Environmental, Inc. (Shaw) were authorized to perform additional investigations at the project site. These additional investigations were documented in an RAO & RCAP Addendum Report, prepared and submitted by CATLIN in June of 2006.

The RAO & RCAP Addendum Report indicated that AFVR was not an effective technology for the elimination of free-phase product at the project site. Based on a review of the soil conditions and historical gauging data, the free-phase product was determined to be primarily situated within a highly plastic clay layer. The extremely high capillary forces of the clay within a highly plastic clay layer. The extremely high capillary forces of the clay layer have prohibited AFVR events and other previously implemented technologies from effectively removing free-phase product from the project site. Therefore, the RAO & RCAP Addendum Report recommended a DPE system be installed for the removal of free-phase product from the project site. DPE technology was determined to be the best approach for the recovery of free-phase product from within this clay layer in comparison to alternative technologies.

Following the submission and approval of the June 2006 RAO & RCAP Addendum Report, CATLIN was authorized to perform an AFVR Pilot Test at the project site. The AFVR Pilot Test was performed to simulate a full scale approach of the DPE Technology and to determine if the DPE was feasible at the project site. The AFVR Pilot Test was performed on recovery well USTAS4141-RW01 and the collected data helped to determine the design parameters for a full scale DPE system at the site. The AFVR Pilot Test monitored extraction flow rates from USTAS4141-RW01 under various applied vacuum pressures. Additionally, the induced vacuums and depth to groundwater/free-phase product was monitored in surrounding observation wells to evaluate the influence of the induced vacuum pressures on USTAS4141-RW01. All activities and results from the AFVR Pilot Test are documented in the Pilot Test Report submitted on March 14, 2007.

In June of 2007, CATLIN personnel completed an evaluation of the existing treatment system equipment. It was determined that the majority of the existing equipment could be used for the proposed DPE system, however, replacement of various components was determined to be necessary for the proposed DPE system to operate effectively. A detailed description of the proposed DPE system design and associated equipment is provided in Section 2.2 of this Basis of Design.

The existing project site conditions to be encountered during the construction of the proposed DPE system are provided in Section 2.1.1 of this Basis of Design. Additionally, the disposal requirements and environmental permits associated with the construction of the proposed DPE system are provided in Sections 2.1.2, and 2.1.3 of this Basis of Design, respectively.

2.1.1 EXISTING SITE CONDITIONS

The topography at the Building AS-4141 project site is relatively flat with the surface area predominantly capped by concrete/asphalt. The project site is divided by White Street and consists of several parking lots, a helicopter hanger and Building AS-4141. Stormwater is conveyed off site by means of drainage ditches and existing storm sewers.

As part of the pre-design phase of the Building AS-4141 project, as-built record was utilized to identify and locate building features and utilities at the project site. Subsequently, a site visit was deemed necessary to identify any aboveground features not shown within the immediate vicinity of the proposed system. Once located, these features were drawn to scale on the construction drawings designated as Sheet C1.

Utilities identified on site include: water mains, storm sewers, sanitary sewers, underground electric/telecommunication lines, fuel distribution lines and carrier pipes of the Building AS-4141 recovery system. Multiple utilities have been identified within areas of proposed construction. Therefore, extreme caution should be used when performing any drilling, excavation or installation activities on the site. Please note that a detailed utility locate was not performed as a part of this design. Therefore, all utilities must be field verified by the installation contractor prior to performing construction activities at the project site. Please refer to drawings designated as Sheet C1 for a detailed representation of the project site layout.

Based on review of soil borings and well construction data, a continuous clay layer with high plasticity is present at the project site. The highly plastic clay layer is located approximately 3 feet BLS and is approximately 7-10 feet thick. A review of historical gauging data indicates the free-phase product is primarily situated within the highly plastic clay layer. Therefore, the DPE system must be designed to overcome the extremely high capillary forces present in the clay layer to effectively remove the free-phase product from the project site.

2.1.2 Demolition

Demolition activities within the scope of this project include concrete/asphalt removal for the installation of recovery well heads, junction boxes and new carrier pipes. Demolished pavement/asphalt will be properly disposed of as construction demolition debris while drill cuttings from the installation of the proposed three (3) recovery wells and carrier pipe will be containerized for proper disposal.

In addition to construction demolition debris, any pneumatic tubing, discharge tubing and other debris currently within the existing 8-inch carrier pipe is to be removed and properly disposed as municipal solid waste (assuming no free-phase product is present within each item). Furthermore, the existing oil/water separator and existing air compressor at the existing treatment system is to be removed and will be properly disposed as municipal solid waste (assuming no free-phase product is present within each item) or recycled and used on another project site.

2.1.3 Environmental Permits

A Sedimentation & Erosion Control Permit is not required for this project since the disturbed area is estimated to be less than one acre. However, Best Management Practices (BMP) is required to be incorporated throughout the duration of the construction process as referenced in the North Carolina Sedimentation & Erosion Control Planning Design Manual. In general, the purpose of incorporating BMP is to prevent any sediment from leaving the site during construction activities. Therefore, a Sedimentation & Erosion Control Plan should be prepared to address protection of storm drains and watercourse access from sediment and debris contamination. The construction contractor will be responsible for providing ground cover of denuded areas in accordance with Chapter 4 of Title 15A NCAC (T15A.04). Additionally, the construction contractor will be responsible for the removal of any temporary erosion/sedimentation control devices once stabilization has been accomplished.

Treated water from the proposed DPE system is to be discharged to a nearby lift station and subsequently transferred to the MCAS WWTP. As per conversations with Camp Lejeune personnel, no modifications to the existing National Pollution Discharge Elimination System (NPDES) permit are required based on the anticipated discharge from the proposed DPE system must be treated to meet drinking water standards per 15A NCAC 2B prior to discharge.

2.2 SYSTEM DESIGN

The components of the proposed Building AS-4141 DPE system are as follows:

- Recovery Wells
- Vapor-Liquid Separator & Associated Components
- Liquid Ring Vacuum Pump
- Oil/Water Separator
- Product Storage Tank
- Surge Tank
- Air Stripper & Associated Components
- Sump Tank
- Bag Filters
- Carbon Adsorption Drums

The components of the proposed Building AS-4141 DPE system were designed based on data collected during the AFVR Pilot Test. As previously mentioned, the AFVR Pilot Test monitored extraction flow rates from existing recovery well USTAS4141-RW01 under various applied vacuum pressures. The maximum extraction flow rate observed was approximately 5 gallons per minute (gpm). With a total of four (4) recovery wells and flow rate of 5 gpm per recovery well, a maximum design flow rate of 20 gpm was used for designing the proposed DPE treatment equipment. The maximum design flow rate of 20 gpm is considered to be on high side since the recovery flow rate is anticipated to stabilize to 10-15 gpm.

The following sections describe the Building AS-4141 DPE system layout and the design of individual system components.

2.2.1 System Layout

The proposed DPE system will apply a high vacuum pressure to a total of four (4) recovery wells at the project site. As a result of the applied vacuum pressure, free-phase product and contaminated groundwater will be recovered from the high plasticity clay layer at the project site. Recovered fluids from the project site will be transported to the treatment system approximately 200-feet southwest of Building AS-4141. Once within the treatment system, recovered fluids will enter a vapor-liquid separator for initial treatment. Any vapors collected in the vapor-liquid separator are to be discharged to the atmosphere while recovered liquids are to be transferred to a 3,000-gallon oil/water separator. Recovered free-phase product from the oil/water separator is to be transferred to a 500-gallon product storage tank for temporary storage while potentially contaminated groundwater will be transferred to a 550-gallon surge tank. Recovered fluids within the surge tank will be pumped to a tower air

stripper for further treatment. Any vapors produced by air stripper treatment are to be discharged to a 250-gallon sump tank for temporary storage. Water within the sump tank is to be pumped through a bag filter and subsequently through a series of carbon adsorption drums. The treated water is then discharged to a nearby lift station and subsequently routed to the MCAS WWTP.

It is important to note that the vapor-liquid separator, liquid ring vacuum pump, oil/water separator, product storage tank and surge tank are proposed to be located within an existing 24-foot by 19-foot by 1-foot deep containment pad. Please refer to Sheets C1 and C2 of the Construction Plans for an illustration of the proposed system layout.

2.2.2 Recovery Wells Design

One (1) existing recovery well, USTAS4141-RW01 and three (3) new recovery wells (USTAS4141-RW02 through USTAS4141-RW04) are proposed to be used for the recovery of free-phase product and groundwater at the Building AS-4141 project site. The locations of these recovery wells are illustrated on Sheet C1 of the Construction Plans. The three (3) new recovery wells are to be in 6-inch stainless steel wells and to be set within the previously referenced high plasticity clay layer. Based on a review of historical boring logs and well construction records, the high plasticity clay layer is located approximately 3 feet BLS and is approximately 7-10 feet thick. Therefore, continuous sampling techniques should be implemented to ensure the proposed recovery wells are within the high plasticity clay layer but not below this layer. Please refer to the Dual Phase Extraction Well Detail provided on Sheet C5 of the Construction Plans.

2.2.3 Vapor-Liquid Separator & Associated Components

As previously mentioned, recovered fluids from the Building AS-4141 project site will be transferred to a vapor-liquid separator for initial treatment. Any vapors collected in the vapor-liquid separator will be discharged to the atmosphere. However, recovered fluids will collect in the bottom of the vapor-liquid separator and will be pumped to the oil/water separator for additional treatment.

A PRM Model MS200 vapor-moisture separator, or approved equal, has been selected for the proposed DPE treatment system. The vapor-moisture separator shall contain intrinsically safe float switches to start and stop recovered fluids from being pumped from the vapor-liquid separator to the oil/water separator. The proposed PRM Model MS200 vapor-moisture separator is 32.5-inch in diameter and 60-inches tall and is to be assembled on a 6-foot by 8-foot skid with a

liquid ring vacuum pump, transfer pump and associated piping, valves, switches, controls and wiring. The vapor-liquid separator shall be equal to similar units constructed by Product Recovery Management of Durham, North Carolina.

2.2.3.1 Transfer Pump to the Oil/Water Separator

As previously mentioned, water recovered from the vapor-liquid separator is to be pumped to the oil/water separator for further treatment. The transfer pump is designed to pump recovered fluids at 20 gpm with a minimum total dynamic head of 30 feet or 13 pounds per square inch (psi). Due to the location of the transfer pump to the oil/water separator and location within the containment area, the selected transfer pump must be NEMA-4 (explosion proof) rated.

Based on the requirements of the transfer pump from the vapor-liquid separator to the oil/water separator, a 1.5 horsepower (HP), Moyno Model 35651 motorized pump, or approved equal, is to be used.

2.2.4 Liquid Ring Vacuum Pump

An Atlantic Fluidics Model A-300, oil sealed liquid ring vacuum pump capable of 320 acfm at 20-inches of Mercury (hg) was selected for the proposed DPE treatment system. The proposed liquid ring vacuum pump is a 30HP, 230 volt, 3-phase TEXP motor or approved equal. As previously mentioned, the proposed liquid ring vacuum pump is to be assembled on a 6-foot by 8-foot skid with a vapor-liquid separator, transfer pump and associated piping, valves, switches, controls and wiring. The liquid ring vacuum pump shall be equal to similar units constructed by Product Recovery Management of Durham, North Carolina.

2.2.5 Oil/Water Separator

Assumptions

- Based on results from the March 2007 AFVR Pilot Test, the maximum design flow rate of 5 gallons per minute (gpm) per recovery well is to be used. Therefore, with a total of four (4) recovery wells, a maximum design flow rate of 20 gpm will be used for the purpose of designing the oil/water separator.

- Based on a site visit to evaluate the existing AS-4141 remediation equipment, the existing oil/water separator was determined to be inappropriate for the proposed DPE system. Therefore, the existing 3,000-gallon product storage tank is proposed to be converted into an oil/water separator for the proposed DPE system.
- Free-phase product is predominately JP-5 jet fuel.

Selection

As previously mentioned, the existing 3,000-gallon product storage tank is to be converted into the oil/water separator for the proposed DPE system. Although the existing oil/water separator is able to handle the maximum design flow rate of 20 gpm, the detention time of the existing oil/water separator is anticipated to be too short for adequate treatment of recovered fluids. Turbulent mixing of recovered fluids is expected as a result of the recovery mechanisms of the proposed DPE system and the initial treatment within the vapor-liquid separator. Therefore, a larger oil/water separator is recommended to increase the detention time of recovered fluids to allow for the emulsified free-phase product and groundwater to adequately separate. Based on the calculations provided within, the approximate detention time of recovered fluids in the existing oil/water separator and the proposed 3,000 gallon oil/water separator is 25.4 minutes and 127.5 minutes, respectively. Therefore, by converting the existing 3,000-gallon product storage tank into the oil/water separator for the proposed DPE system, recovered fluids will experience approximately 400% increased detention time.

The proposed modifications to the existing 3,000-gallon product storage tank include installing an inlet port, an outlet port and a free-phase product drain. The outlet port will consist of an inverted outlet pipe to ensure water from the bottom of the tank is recovered. This design is anticipated to minimize the possibility of free-phase product discharging from the oil/water separator to the surge tank. The proposed modifications to the existing 3,000-gallon product storage tank are provided on Sheet C3 of the Construction Plans.

2.2.6 Free-Phase Product Storage Tank Design

Assumptions

- As previously stated, the maximum design flow rate for the treatment system is 20 gpm.
- Based on the March 2007 AFVR Pilot Test, the design recovery flow rate for free-phase product is 1 gallon per hour (gph) per well. Therefore, a maximum design flow rate of recovered free-phase product from the four (4) recovery wells is expected to be approximately 4 gph or 0.07 gpm.
- As previously mentioned, the existing 3,000-gallon product storage tank is to be converted to the oil/water separator.
- The waste stream consists of free-phase JP-5 fuel.
- Higher volumes of free-phase product are anticipated to be recovered during the initial start-up period compared to the average volume recovered over time.

Selection

Based on recovery system design, geology of the site, and amount of free-phase product present, a new single walled 500-gallon product storage tank is to be utilized for temporary storage of recovered free-phase product.

Higher recovered volumes of free-phase product are anticipated during the initial startup period compared to the average volume over time. Therefore, the fluid level of the product storage tank should be inspected daily during the initial start-up period and less frequently as the free-phase product recovery rates decrease. Control logic should also be in place to prevent over-filling of the product storage tank. A high level float switch is recommended to be set at 90% capacity to notify the operator of the potential for overflow. A high-high level float switch that will shut down the entire DPE system is recommended to be set at 95% capacity.

2.2.7 Surge Tank

As previously mentioned, potentially contaminated groundwater from the oil/water separator will be transferred to the existing 550-gallon surge tank by gravity feed. The existing 550-gallon surge tank is a single walled cylindrical tank, approximately 6.33 feet long by 4.0 feet in diameter. This tank will serve as a reservoir for potentially contaminated groundwater to be pumped to the existing air stripper

for further treatment. In order to start pumping water from the sump tank, control logic should be set at approximately 70% sump tank capacity. Additionally, control logic should be set approximately 10% sump tank capacity to stop water from pumping from the sump tank.

Additional control logic should be implemented to prevent over-filling of the sump tank during the treatment system operation. A high level float switch is recommended to be placed at approximately 90% tank capacity to alarm the treatment system operator of potential over-fill. Additionally, control logic is recommended to be placed at approximately 95% sump tank capacity that will shut down the entire DPE system.

Please note that the electrical portion of the control logic is to be designed as a part of the construction contractor's scope and all devices must be compatible with JP-5 fuel.

2.2.8 Air Stripper & Associated Components

2.2.8.1 Air Stripper

The existing air stripper will treat potentially contaminated water from the existing 550-gallon surge tank. The existing air stripper is approximately 15 feet high with an approximate internal cross section of 0.83 square feet. The flow capacity of the existing air stripper is documented to be 20 gpm with the flow capacity of the distributor tray ranging between 10 to 20 gpm. The packing depth within the air stripper is approximately 10 feet deep.

Calculations provided within determined the approximate removal efficiency of the existing air stripper based on known and unknown parameters. Unknown parameters were conservatively estimated based on historical groundwater analytical data, Jaeger Tri-Packs manual (air stripper packing material) and additional literature on air stripping. The removal efficiency was calculated to be approximately 97% with an influent flow rate of 20 gpm, the design flow rate of the proposed DPE system.

Based on an evaluation of the existing air stripper, it has been determined that the existing 2-inch Jaeger Product Tri-Packs (air stripper packing material) are to be replaced. Additionally, the blower, transfer pump and associated piping are to be replaced as a part of this design.

Groundwater samples collected in June 2007 revealed high levels of dissolved iron at the project site. This may become problematic as oxygen is introduced to recovered fluids within the air stripper causing the dissolved iron to oxidize and precipitate out of the water column. Therefore, the anticipated maintenance on the air stripper equipment will be relatively frequent.

2.2.8.2 Air Stripper Blower

As previously mentioned, the existing air stripper blower is to be replaced. Based on the air stripper calculations provided within, the optimal air flow rate is approximately 270 cubic feet per minute (cfm). The optimal air flow rate is based on the 20 gpm design flow rate for the proposed DPE system. Additionally, the anticipated pressure loss associated with the 2-inch Jaeger Product Tri-Packs was determined to be approximately 0.2 inches of water per foot of packing material. Therefore, with a 10 foot packing bed depth, the anticipated pressure loss is anticipated to be approximately 2 inches of water.

Based on the requirements of the air stripper blower, a ROTRON Model DR808AY72MX regenerative blower, or approved equal, was selected. The selected regenerative blower has a maximum air flow rate of 350 scfm with a maximum pressure of 116 inches of water and is rated with a 7.5 HP motor, 230/460 volt, 3-phase and should be intrinsically safe.

2.2.8.3 Air Stripper Transfer Pump

As previously mentioned, recovered water is to be pumped from the 550-gallon surge tank to the air stripper. The transfer pump must be able to supply 20 gpm at a minimum of 16 feet or 6.9 psi of head.

Based on the requirements of the air stripper transfer pump, a closed-coupled centrifugal Goulds Model 3642 pump, or approved equal, has been selected. The Goulds Model 3642 pump is rated at ½ HP, 230 volt, 3-phase explosion proof.

2.2.9 Sump Tank

As previously mentioned, treated fluids from the air stripper are to be transferred to the existing 250-gallon sump tank by gravity feed. The existing 250-gallon sump tank is a single walled cylindrical tank, approximately 4.33 feet long by 2.5 feet in diameter. This tank will serve as a reservoir for treated fluids from the air stripper to be pumped to through a bag filter and subsequently through a series of carbon adsorption drums. In order to start pumping water from the sump tank capacity. Additionally, control logic should be set at approximately 10% sump tank capacity to stop water from pumping from the sump tank.

Additional control logic should be implemented to prevent over-filling of the sump tank during the treatment system operation. A high level float switch is recommended to be placed at approximately 90% tank capacity to alarm the treatment system operator of potential over-fill. Additionally, control logic is recommended to be placed at approximately 95% sump tank capacity that will shut down the entire DPE system.

Please note that the control logic is to be designed as a part of the construction contractor's scope and all devices must be compatible with JP-5 fuel.

2.2.9.1 Sump Tank Transfer Pump

As previously mentioned, water from the existing 250-gallon sump tank is to be pumped through the proposed bag filters and carbon adsorption drums prior to discharge to the MCAS WWTP. Based on the calculations provided within, the transfer pump from the sump tank must be able to supply 20 gpm at a minimum of 5 feet or 2.16 psi of head.

Based on the requirements of the sump tank transfer pump, a closed-coupled centrifugal Goulds Model 3642 pump, or approved equal, has been selected. The Goulds Model 3642 pump is rated at ½ HP, 230 volt, 3-phase explosion proof. The selected pump manufacturer information is provided in the attached appendices.

2.2.10 Bag Filter

Groundwater analytical results collected in June of 2007 revealed high levels of dissolved iron at the project site. This may become problematic when oxygen is introduced to recovered fluids causing the dissolved iron to oxidize and precipitate out of the water column. It is anticipated that the greatest introduction of oxygen to recovered fluids will occur in the vapor-liquid separator and in the air stripper. Any iron particles that form within the vapor-liquid separator will most likely settle out in the oil/water separator and/or surge tank. However, iron particles that form within the air stripper will require removal by a bag filter prior to the carbon adsorption treatment. The efficiency of the carbon drums will be drastically reduced if clogged by iron particles.

Based on the design flow rate of 20 gpm, the Rosedale Duplex Model-4 bag filter with 12-inch basket depth and 2-inch flanged connections or approved equal is to be used prior to pumping recovered fluids through the carbon adsorption drums. Standard oil adsorbent filter bags are recommended and the bag filter housing construction material is to be stainless steel to prevent oxidation of construction material. The Rosedale Model-4 bag filter is approximately 19-inches wide by 22.25-inches long by approximately 24-inches tall. An 18-inch to 12-inch clearance is required for removal and replacement of bag filter media.

2.2.11 Carbon Adsorption Drums

As previously mentioned, water from the 250-gallon sump tank is to be pumped through a bag filter and subsequently through a series of carbon adsorption drums. Four (4) CarbonAir LPC-3 Series, or approved equal, activated carbon adsorption drums have been selected to be used for the final treatment of recovered fluids prior to discharge to the MCAS WWTP. Each carbon drum is rated up to 10 gpm. The first carbon drum is designed for the primary treatment with the second as back-up. Samples are recommended to be collected between the canisters. When contaminant break through is detected, the primary canister is to be removed and replaced with the back-up and a new canister will replace the back-up. Please refer to Sheets C2 and C3 for illustrations of the carbon adsorption drums layout.

Please refer to the attached manufacturer information for details on the LPC3 Series activated carbon filter.

3.0 ENVIRONMENTAL BASIS OF DESIGN

The Environmental Basis of Design Section is intended to address environmental issues that will affect the project. Due to the nature of the project and previous assessments at the project site, the primary environmental issues to be encountered are in the realm of petroleum contaminated soils, potentially contaminated groundwater and the presence of free-phase product. The majority of petroleum contamination at the project site is residual JP-5 fuel believed to be a result of a leaking JP-5 pipeline.

Waste generated during construction activities will include well drill cuttings, well development fluids, soil from carrier pipe installations and demolition debris. Drill cuttings, well developmental fluids and soil from carrier piping are to be containerized for proper disposal. Concrete and asphalt debris are to be disposed as construction demolition debris. Required testing of these contaminated materials will be at the discretion of the disposal facility. The installation contractor will be required to submit a Site Specific Health and Safety Plan that addresses the potential risks for encountering unknown site conditions.

Based on the AFVR Pilot Test, the maximum design flow rate of the proposed DPE system was calculated to be approximately 20 gpm at startup. As previously mentioned, it is anticipated that the flow rate will stabilize at 10 to 15 gpm. Based on the 20 gpm maximum design flow rate, it is anticipated that the treatment system will initially discharge approximately 28,000 gallons per day (gpd) to the MCAS WWTP. Additionally, the AFVR Pilot Test determined that the recovered fluids consist of 0.332% free-phase product. Therefore, based on a 20 gpm maximum design flow rate, the treatment system is anticipated to recover approximately 96 gallons of free-phase product per day. However, the recovery of free-phase product is expected to be greater during startup of the treatment system compared to the average long recovery rates. Since the AFVR Pilot Test was performed for approximately 8 hours, the data collected during the AFVR Pilot Test is representative of startup conditions. Therefore, the free-phase product recovery rate of 96 gpd is anticipated to be in the upper range of recovery flow rates experienced during the treatment system operation.

4.0 GEOTECHNICAL BASIS OF DESIGN

This section of the Basis of Design is intended to provide the current subsurface conditions at the project site. These assumed current conditions are based on a review of the available historical reports.

4.1 SITE GEOLOGY

The topography of the Building AS-4141 project site is relatively flat. The surface area at the project site is predominantly capped by concrete/asphalt with small grass covered areas. Based on the existing soil borings and well construction records, soils in the upper two to three feet below land surface (BLS) are predominantly very fine to fine sand with medium plasticity. A continuous fat clay layer with high plasticity is present approximately 3 feet BLS and is approximately 7-10 feet thick. Soils 10 feet BLS were observed to be predominantly very fine grained sands with trace of silts and extending to an unknown depth.

4.2 GROUNDWATER ELEVATION AND FLOW DIRECTION

Groundwater flow direction has been observed to be predominantly toward the northeast. Depth to groundwater has historically ranged from approximately 3 to 8 feet BLS. Groundwater flow velocity at the project site has been calculated by OBG to be approximately 18 ft/year. The groundwater flow velocity calculations were based on an effective porosity of 0.40, an average hydraulic conductivity of 7.4 gallons per day per square feet, and a hydraulic gradient of 0.02 ft. /ft. The average hydraulic conductivity was based on in-situ permeability tests performed by OBG.

CATLIN has assumed that the groundwater velocity and the hydraulic conductivity calculated by OBG remain applicable to this project site.

5.0 REFERENCES

CATLIN, *Remedial Action Optimization & Revised Corrective Action Plan, JP-5 Line Area, Marine Corps Air Station, New River, North Carolina*. December 2004.

CATLIN, *Building AS-4141 Remedial Action Optimization & Revised Corrective Action Plan Addendum Report, Marine Corps Air Station, New River, North Carolina*. June 12, 2006

CATLIN, *Summary of Aggressive Fluid Vapor Recovery Pilot Test, Building AS-4141, Marine Corps Air Station, New River, North Carolina*. March 14, 2007.

North Carolina Department of Environment and Natural Resources, Division of Waste Management, UST Section, 2001, *Guidelines for Assessment and Corrective Action*. Effective July 1, 2001.

North Carolina Department of Environment and Natural Resources, Division of Water Quality, 2002, *Title 15A Subchapter 2L-Classifications and Water Quality Standards Applicable To The Groundwaters of North Carolina*. Effective December 2002.

Nyer, Evan K., *Groundwater Treatment Technology*. New York, New York, 1985.

O'Brien & Gere Engineers, Inc., *Ground Water Remediation Systems at Various Locations Marine Corps Air Station, New River, North Carolina & Marine Corps Base, Camp Lejeune, North Carolina*. June 26, 1191.

Radian International, *Remedial Action Optimization Case Study, JP-5 Line Area, Marine Corps Air Station, New River, North Carolina*. May 2000.

US Army Corps of Engineers, *Engineering Design Manual – Multi-Phase Extraction*. June 1, 1999.

WASTE STREAM CALCULATIONS

JOB: BDU 954141 R00

COMPUTED BY: J. Cook

DATE: 7-17-07

DESCRIPTION: WASTE STREAM CALLS.

CHECKED BY: MEM

DATE: 7-23-07

SHEET 1 OF 1

WASTE STREAM CALCULATIONS

ASSUMPTIONS:

- ACCORDING TO THE AFVR PILOT TEST, THE FLOW RATE PER WELL IS APPROXIMATELY 5 GPM PER WELL.
- TOTAL FLUIDS CONSIST OF APPROXIMATELY 0.332 % FREE-PHASE PRODUCT
- TOTAL OF FOUR (4) RECOVERY WELLS WILL BE USED FOR THE RECOVERY OF FREE-PHASE PRODUCT & POTENTIALLY CONTAMINATED GROUNDWATER FROM THE AS-4141 PROJECT SITE

VOLUMETRIC FLOW RATE TO MLAS WWTP

$$\begin{aligned} 5 \text{ GPM PER WELL} \times 4 \text{ RECOVERY WELLS} &= 20 \text{ GPM} \\ &= \underline{28800 \text{ GPD}} \quad \text{AT START UP} \end{aligned}$$

VOLUMETRIC FLOW RATE OF RECOVERED FREE-PHASE PRODUCT

$$28,800 \text{ GPD} \times 0.00332 = 95.6 \text{ GPD} \text{ SAH } \underline{96 \text{ GPD}}$$

NOTE: THIS DATA IS BASED UPON A ONE DAY AFVR PILOT TEST AT THE PROJECT SITE. THE RECOVERY OF FREE-PHASE PRODUCT IS ANTICIPATED TO INCREASE DURING THE STARTUP OF THE TREATMENT SYSTEM. SINCE THE AFVR PILOT TEST WAS INTERRUPTED FOR APPROXIMATELY 6 HRS, THIS IS REPRESENTATIVE OF STARTUP CONDITIONS. THEREFORE 96 GPD IS ANTICIPATED TO BE IN THE UPPER RANGE OF ANTICIPATED RECOVERY OF FREE-PHASE PRODUCT OVER THE COURSE OF SYSTEM OPERATION.

**VAPOR-LIQUID SEPARATOR
MANUFACTURER INFORMATION**

Moisture Separators

Moisture Separators:

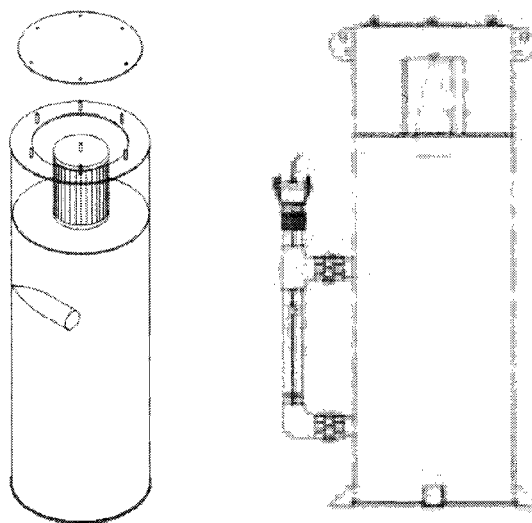
PRM manufactures high quality moisture separators (MS tanks) primarily for Soil Vapor Extraction and Dual Phase Extraction Applications. PRM manufactures MS tanks that are superior to any on the market

Standard Specifications:

- Heavy gauge carbon steel construction, designed for deep vacuum to 28"Hg
- Tangential inlet port for maximum water removal
- UV resistant exterior powder coat finish
- Chemical resistant full interior epoxy coating means no rust
- 4 isolation feet to elevate MS tank from surface, preventing potential corrosion
- Interior centrifugal moisture isolation ring (doughnut ring) to assist in dropping out moisture in the tank, not the effluent
- Interior Inline filter assembly with reusable poly filter
- Removable gasketed filter replacement port at the top of the tank with handle
- Full 6" inspection port at the bottom of each tank with easily removable clean out access
- 1" drain port with 1" brass ball valve
- (2) 2" threaded bungs for standard PRM site tube assembly

Options:

- 2" site tube assembly
- Single high level or 3 float stem designed to fit directly into the site tube assembly with cam lock connection
- Vacuum relief valves for a variety of flows and vacuum levels
- T304 or T316 Stainless Steel assembly if so requested
- Centrifugal or Progressive cavity pumps for condensate removal.



Moisture Separators:

For most SVE applications, PRM recommends the use of the standard MS tank. Please always consider oversizing the MS tank to minimize friction losses and to improve condensate collection.

Dual Phase Extraction:

When using an MS tank for Dual phase extraction purposes where water is removed in a capacity of GPM, PRM recommends oversizing the MS tank and integration of the internal mist eliminator assembly. Please consult with PRM on the blower of choice for these applications as high levels of condensate should be considered carefully when selecting the blower.

Please consult with PRM on larger applications. PRM can offer MS tanks with design flows in excess of 5000SCFM. Special considerations are given to larger vessels due to operational conditions.

Model #	Inlet/Outlet	Max Flow (scfm)	Dimensions	Liquid Capacity	PD @ Max Flow
MS30	2"/2" NPT	250	14D"x48"H	15	5"WC
MS60	3"/4" NPT	400	18"Dx60"H	30	5"WC
MS80	4"/4" NPT	500	20"Dx60"H	40	5"WC
MS120	4"/6" NPT	750	24"Dx60"H	60	5"WC
MS200	6"/6" NPT	1100	32"Dx60"H	100	5"WC
MS800	8"/10" FLANGE	2500	42"Dx114H	400	2.5"WC

Connection sizes listed are standard connections. Actual sizes will vary from project to project to accommodate actual system piping.

**LIQUID RING VACUUM PUMP
MANUFACTURER INFORMATION**

atlantic fluidics® A-Series™

Single Stage, Liquid Ring Pump

Models:

A5 A10 A15 A20 A75 A100 A130 A200 **A300**

Features

- No contact between operating components in the casing
- Flat power curve over entire vacuum range prevents motor overload
- Reduced stress on motor shaft and bearings
- Increased water handling capability prevents heat build-up, extends life of mechanical seals
- Compact, close-coupled design eliminates need for interstage manifold or motor alignment
- Shrouded rotor increases pumping efficiency for high vacuum and low water consumption

Materials of Construction

Casing, Cover, Rotor, Port Cylinder:

All Bronze (A5 – A130)
Cast Iron, Bronze Fitted (A10 – A130)
All Stainless Steel (A10 – A300)
All Ni-Resist (A20 – A300)
All Cast Iron (A200 – A300)

Optional Material:

Alloy 20 (A10 – A300)
Hastelloy™ (A10 – A300)

Mechanical Seals:

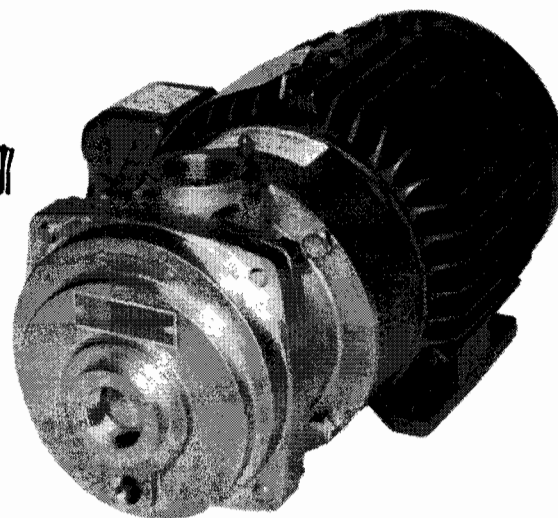
BUNA – Cast Iron Bronze Fitted, All Bronze
Viton™ - Ni Resist, Stainless Steel
EPR
Kalrez™

Drive Options:

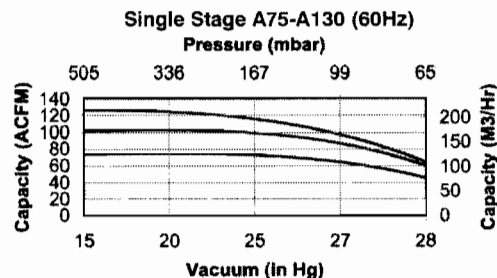
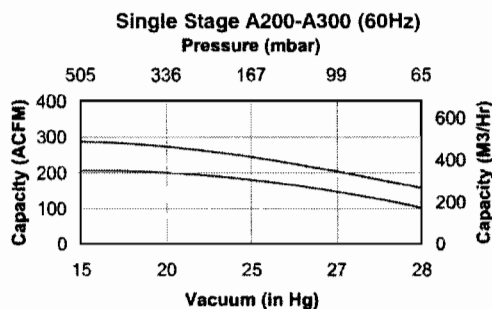
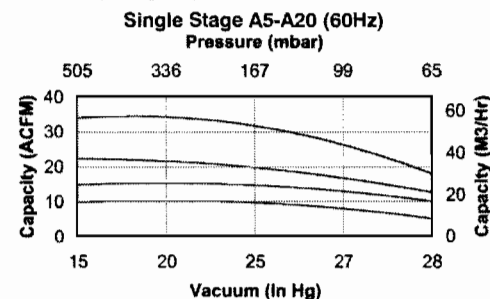
Pedestal Frame
Close-coupled motor

Stocked Motors:

TEFC – 3Ø (A5 – A300)
TEFC – 1Ø (A5 – A130)
XP Class I, GpD – 3Ø (A5 – A300)
XP Class I, GpD – 1Ø (A5 – A75)



Typical Pumping Speed Curves



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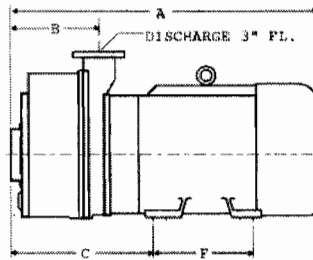
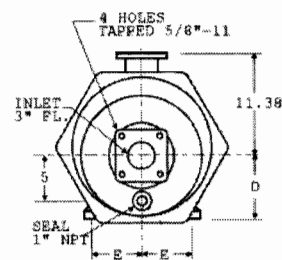
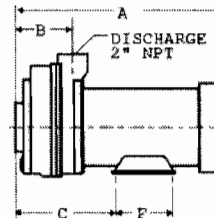
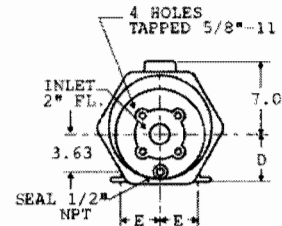
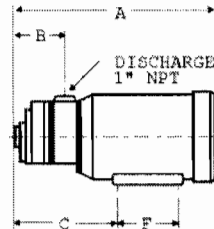
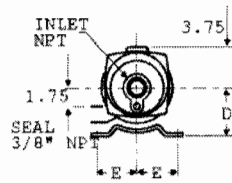


Dimensions:

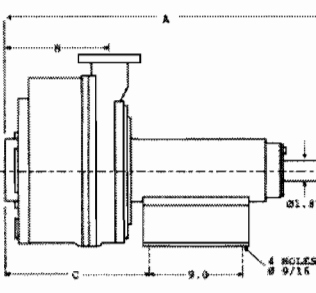
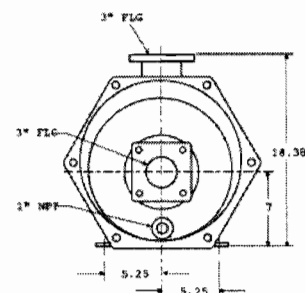
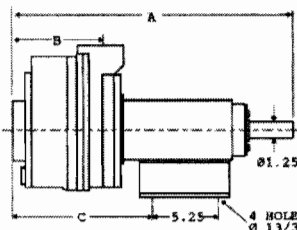
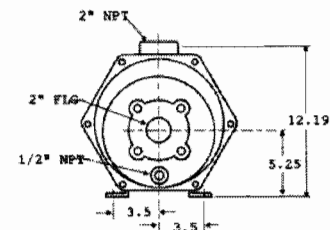
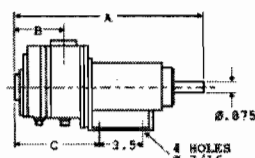
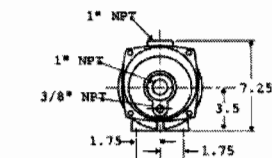
Values shown are approximate and should not be used for construction.

Certified drawings are available through your local Tuthill Vacuum & Blower Systems Sales Professional

Close-coupled Design



Pedestal Mount



MODEL	FRAME	INLET	inches/mm						MOTOR HP	Weight (lbs./kg)
			A	B	C	D	E	F		
A5	56CZ	3/4	14.0 356	2.9 74	6.7 170	3.5 89	2.44 62	3.0 76	1	45 20
A10	145TCZ	1	16.6 422	3.6 92	8.0 203	3.5 89	2.75 70	5.0 127	1 1/2	55 25
A15	145TCZ	1	17.0 432	3.8 97	8.3 211	3.5 89	2.75 70	5.0 127	2	60 27
A20	182CZ	1	18.5 470	4.6 117	9.6 244	4.5 114	3.75 95	5.5 140	3	80 36

MODEL	FRAME	INLET	inches/mm						MOTOR HP	Weight (lbs./kg)
			A	B	C	D	E	F		
A75	184TCZ	2	20.2 513	5.8 147	9.8 249	4.50 114	3.75 95	5.5 140	5	180 82
A100	213TCZ	2	23.1 587	7.1 180	12.1 307	5.25 133	4.25 108	7.0 178	7 1/2	195 89
A130	215TCZ	2	25.3 642	8.1 206	13.1 333	5.25 133	4.25 108	7.0 178	10	250 114

MODEL	FRAME	INLET	inches/mm						MOTOR HP	Weight (lbs./kg)
			A	B	C	D	E	F		
A200	284TYZ	3	32.4 823	8.3 211	14.2 361	7.0 178	5.50 140	11.0 279	15	560 254
A300	284TYZ	3	33.7 856	9.7 246	15.6 396	7.0 178	5.50 140	11.0 179	20	600 272

MODEL	inches/mm			Weight (lbs./kg)
	A	B	C	
A10	14.52 369	3.52 89	6.20 157	42 19
A15	14.83 377	3.83 97	6.51 165	44 20
A20	15.60 396	4.60 117	7.28 185	48 22

MODEL	inches/mm			Weight (lbs./kg)
	A	B	C	
A75	20.57 369	5.75 89	9.44 157	125 57
A100	21.88 377	7.07 97	10.75 165	130 59
A130	22.88 396	8.07 117	11.75 185	145 66

MODEL	inches/mm			Weight (lbs./kg)
	A	B	C	
A200	28.81 732	8.31 211	11.88 302	250 114
A300	30.19 767	9.69 246	13.25 337	325 148

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**TRANSFER PUMP FROM VAPOR-LIQUID SEPARATOR
TO THE OIL/WATER SEPARATOR DESIGN CALCULATIONS**

JOB: BLDG 454141 BOD

COMPUTED BY: J. COOK

DATE: 7-17-07

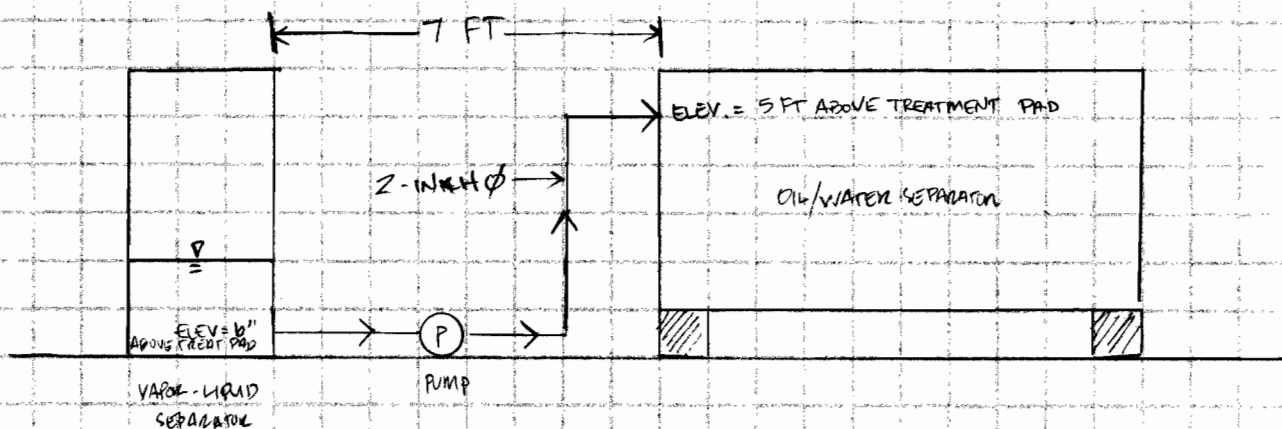
DESCRIPTION: TRANSFER PUMP CALL

CHECKED BY: MEM

DATE: 7-23-07

SHEET 1 OF 2

TRANSFER PUMP FROM VAPOR-LIQUID SEPARATOR TO OIL/WATER SEPARATOR



- STATIC LIFT = APPROXIMATELY 4.5 FT.
- LENGTH OF 2" PVC PIPE = APPROXIMATELY 11.5 FT
- ASSUME EQUIVALENT LENGTH OF PIPE FOR MINOR LOSS = 20% TOTAL LENGTH
 $= 0.2(11.5) = 2.3 \text{ ft}$
- TOTAL LENGTH OF PIPE = 13.8' SAY 14'
- FLOW RATE = 20 gpm
- VACUUM PRESSURE WITHIN VAPOR-LIQUID SEPARATOR = -22" Hg
 $= 10.8 \text{ psi or } 25 \text{ FT}$

* TOTAL HEAD LOSS @ 20 gpm = $9.8' / 1000'$ OF PIPE (C value = 140)
 $= 0.0098 (14')$
 $= 0.1372'$

* ELEVATION HEAD = 4.5 FT

* TOTAL DYNAMIC HEAD = $4.5' + 0.1372' + 25' = 29.6$ say 30'
 (TDH)
 or
 13 psi

* WILLIAMS & HAZEN, HYDRAULIC TABLES AS DETERMINED BY THE HAZEN & WILLIAMS FORMULA, 1983

JOB: BLDG ASH141 BOD

COMPUTED BY:

DATE:

DESCRIPTION: TRANSFER PUMP CALCS

CHECKED BY: MEM

DATE: 7-23-07

CONCLUSION

AT 20 GPM, THE SELECTED TRANSFER PUMP MUST OPERATE AT A MINIMUM OF 30 feet or 13 PSI of head.

SELECTION

A MOYNO MODEL 35651 MOTORIZED PUMP OR APPROVED EQUAL AS BEEN SELECTED AS A SUITABLE TRANSFER PUMP FROM VAPOR-LIQUID SEPARATOR TO THE OIL/WATER SEPARATOR. ADDITIONALLY, THE SELECTED PUMP IS A 1.5 HP 230 VOLT, 3-PHASE EXPLOSION PROOF. SEE ATTACHED MANUFACTURE INFORMATION.



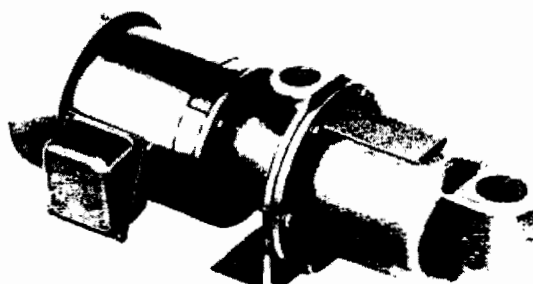
SERVICE MANUAL MOYNO® 500 PUMPS

300 Series Motorized 35650, 35651, 35652, 36750, 36751, and 36752 Model

DESIGN FEATURES

Housing: Cast iron/316 SS
Pump Rotor: AISI 416 stainless steel/ANSI 316 SS
Pump Stator: NBR
Seal: NBR (Nitrile)
Motor Shaft: Mechanical (carbon/ceramic)
Motor: 3 phase; 1-1/2 HP, 208/230/460V for Models 35650 and 35651; 2 HP, 230/460V for Models 36751 and 36750; 1 phase; 1-1/2 HP, 115/230V for Model 35652; 1 phase; 2 HP, 115/230V for Model 36752.60 Hertz, 1725 rpm, totally enclosed

Note: Alternate elastomers available. Refer to Repair/ Conversion Kit Numbers, page 4.



INSTALLATION

Mounting Position. Pump may be mounted in any position. When mounting vertically, it is necessary to keep bearings above seals to prevent possible seal leakage into bearings.

Pre-Wetting. Prior to connecting pump, wet pump elements and mechanical seal by adding fluid to be pumped into suction and discharge ports. Turn pump over several times in a clockwise direction to work fluid into pump elements.

Piping. Piping to pump should be self-supporting to avoid excessive strain on pump housings. See Table 1 for suction and discharge port sizes of each pump model.

Use pipe "dope" or tape to facilitate disassembly and to provide seal on pipe connections.

Electrical. Follow the wiring diagram on the motor nameplate or inside the terminal box for the proper connections. The wiring should be direct and conform to local electrical codes. Check power connections for proper voltage. Voltage variations must not exceed + 10% of nameplate voltage. Motors do not have overload protection.

To prevent damage to pump, pump rotation must be clockwise when facing pump from motor end.

OPERATION

Self-Priming. With wetted pumping elements, the pump is capable of 25 ft. suction lift with pipe size equal to port size. Be sure suction lines are air tight or pump will not self-prime.

DO NOT RUN DRY. Unit depends on liquid pumped for lubrication. For proper lubrication, flow rate should be at least 10% of rated capacity.

Pressure and Temperature Limits. See Table 1 for maximum discharge pressure of each model. Unit is suitable for service at temperatures shown in Table 2.

Storage. Always drain pump for extended storage periods by removing bottom drain plug. To drain Model 36750, 36751 and 36752 remove suction housing bolts and loosen suction housing.

Caution: Suction pressure should never be greater than discharge pressure.

Table 1. Pump Data

Pump Model	356	367
Suction Port (NPT)	1-1/2	2
Discharge Port (NPT)	1-1/4	1-1/4
Voltage Rating (VAC)	See Motor Name Plate For Voltage Ratings	See Motor Name Plate For Voltage Ratings
Discharge Pressure (psig) (maximum)	50	50

NOTE: SSU = $\frac{5 \times \text{CP}}{\text{specific gravity}}$ (approximate)

Table 2. Temperature Limits

Elastomer	Temperature Limits
*NBR	10°-160°F
*EPDM	10°-210°F
*FPM	10°-240°F

*NBR = Nitrile

EPDM = Ethylene-Propylene-Diene Terpolymer

FPM = Fluoroelastomer

TROUBLE SHOOTING

WARNING: Before making adjustments, disconnect power source and thoroughly bleed pressure from system. Failure to do so could result in electric shock or serious bodily harm.

Failure To Pump.

1. Motor will not start: Check power supply. Voltage must be $\pm 10\%$ of nameplate rating when motor is in locked rotor condition.
2. Motor runs and thermally kicks out: Check for excessive pressure. Increase ventilation to motor. Do not use less than #14 wire size.
3. Stator torn; possible excessive pressure: Replace stator, check pressure at discharge port.
4. Flexible joint broken; possible excessive pressure: Replace joint, check pressure at discharge port.
5. Wrong rotation: Rotation must be clockwise when facing pump from motor end. Reverse the connections of any two line leads to the motor.
6. Excessive suction lift or vacuum.

Pump Overloads.

1. Excessive discharge pressure: Check pressure at discharge port for maximum ratings given in Table
2. Fluid viscosity too high: Limit fluid viscosity to 100 CP or 500 SSU.

Noisy Operation.

1. Excessive suction lift or vacuum: Maximum suction lift is 25 feet for water.
2. Suction line too small: Check pipe size. Be sure lines are free from obstructions.
3. Pump cavitates: Pump speed is 1725 rpm. Viscosity of fluid should not exceed 100 CP or 500 SSU.
4. Flexible joint worn: Replace joint. Check pressure at discharge port.
5. Insufficient mounting: Mount to be secure to a firm base. Vibration induced noise can be reduced by using mount pads and short sections of hose on suction and discharge ports.

Seal Leakage.

1. Leakage at startup: If leakage is slight, allow pump to run several hours to let faces run in.
2. Persistent seal leakage: Faces may be cracked from freezing or thermal shock. Replace seal.

Pump Will Not Prime.

1. Air leak on suction side: Check pipe connections.

PUMP DISASSEMBLY

WARNING: Before disassembling pump, disconnect power source and thoroughly bleed pressure from system. Failure to do so could result in electric shock or serious bodily harm.

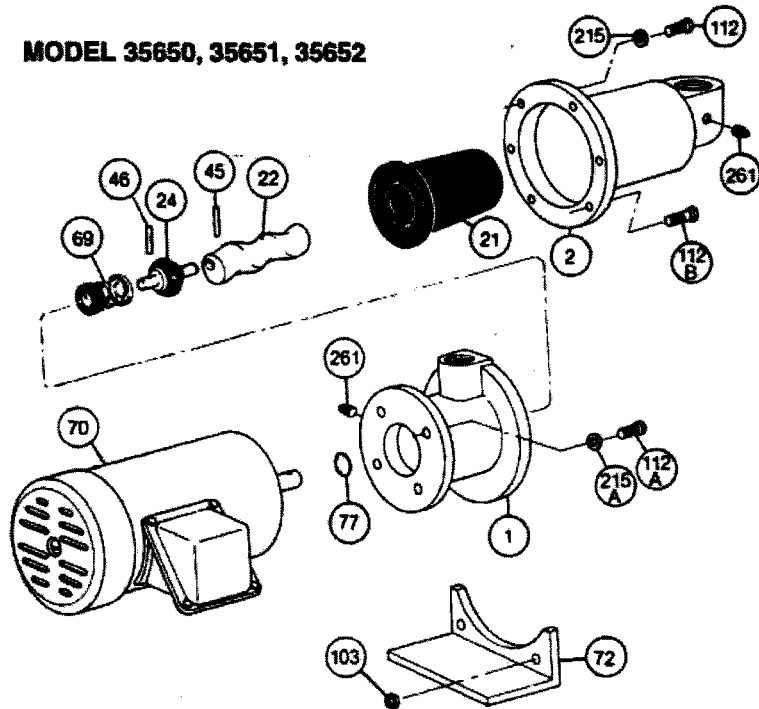
1. Disconnect power source.
2. Remove suction and discharge piping.
3. Remove screws (112) holding suction housing (2) to discharge housing (1). Remove suction housing (2) and stator (21).
4. Rotor (22) can be detached from flexible joint (24) by using a punch to remove rotor pin (45). Support joint when removing pin.
5. Flexible joint (24) can be removed from motor shaft by using a punch through the discharge port to remove shaft pin (46).
6. Carefully slide mechanical seal (69) off motor shaft.
7. Remove discharge housing (1) from motor (70) by removing screws (112A and 112C) and washers (215).
8. Carefully pry seal seat out of discharge housing (1). If any part of mechanical seal (69) is worn or broken, the complete assembly should be replaced. Seal components are matched parts and not interchangeable.
9. Remove slinger ring (77).

PUMP ASSEMBLY

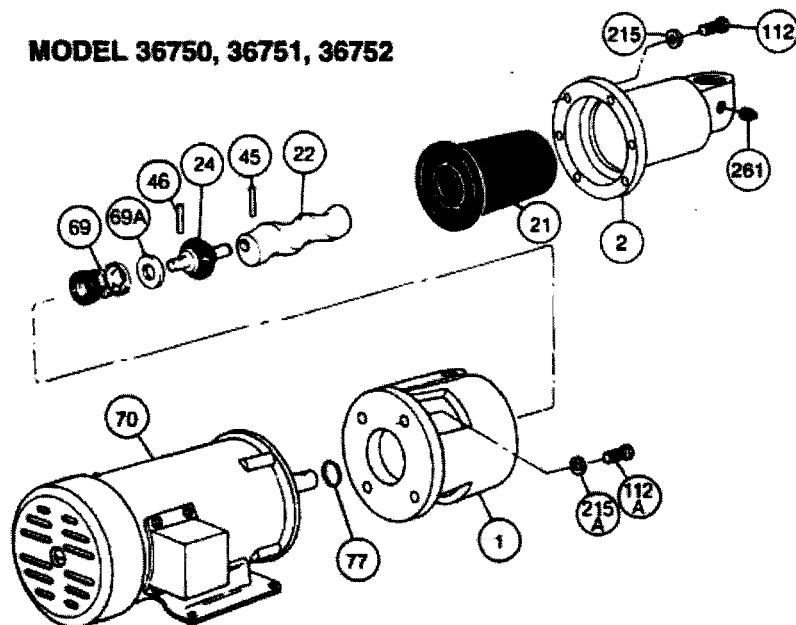
1. Replace slinger ring (77).
 2. Attach discharge housing (1) to motor (70) using lock washers (215) and body screws (112A).
 3. Install mechanical seal (69) using the following procedures:
 - a. Clean and oil sealing faces using light oil (not grease).
- Caution: Do not use oil on EPDM parts. Substitute glycerin or soap and water.**
- b. Oil the outer surface of seal seat, and push assembly over motor shaft into the bore of the discharge housing (1) seating it firmly and squarely.
 - c. After cleaning and oiling the shaft, slide the seal body along the shaft until it meets the seal seat.
 - d. Install seal spring and spring retainer on shaft.
4. On Model 367, position seal spacer (69A) on motor shaft with slots away from seal (69).
 5. Pin flexible joint (24) to motor shaft with shaft pin (46) using a punch through the discharge port.
 6. Pin rotor (22) to flexible joint using rotor pin (45). Support joint while installing pin.
 7. Slide stator (21) on rotor (22) carefully locating stator flange in housing groove.
 8. Secure stator (21) and suction housing (2) to discharge housing (1) using screws (112).
 9. Proceed as in installation instructions.

When ordering parts, please specify
pump model number, pump serial number,
part number, part description and quantity.

MODEL 35650, 35651, 35652



MODEL 36750, 36751, 36752



PARTS LIST

Item No.	Description	Pump Model Numbers					
		35650	35651	35652	36750	36751	36752
1	Discharge Housing	350-0632-007	350-0632-000	350-0632-007	340-0951-007	340-0951-000	340-0951-007
2	Suction Housing	350-0489-000	350-0280-000	350-0489-000	350-0302-007	350-0302-000	350-0302-007
*21	Stator		340-3505-120		340-3506-120		
*22	Rotor	320-6392-015	320-6392-000	320-4431-000	330-3077-000	330-2042-000	330-3077-000
24	Flexible Joint		320-1618-000		320-1749-000		
*45	Rotor Pin		320-4069-003		320-4439-002		
*46	Motor Pin		320-4069-005		320-4439-001		
*69	Mechanical Seal		320-3945-000		320-1750-000		
69A	Seal Spacer				320-1737-000		
70	Motor	330-7845-003	330-7845-000	330-8054-002	330-2802-004	300-2802-001	330-8053-004
72	Motor Support		320-4446-000				
77	Slinger Ring			320-6385-000			
103	Nuts (2 req.)		614-0010-111 (3/8-16)				
112	Screw, Hex Hd		619-1530-161 (3/8-16 x 1) (4 req.)		619-1530-161 (3/8-16 x 1) (6 req.)		
112A	Screw, Hex Hd (4 req.)		619-1530-161 (3/8-16 x 1)		619-1550-161 (1/2-13 x 1)		
112B	Screw, Hex Hd (2 req.)		320-6918-000 (3/8-16 x 1-3/4)				
215	Lock Washer		623-0010-411 (3/8) (4 req.)		623-0010-411 (3/8) (6 req.)		
215A	Lock Washer (4 req.)		623-0010-411 (3/8)		623-0010-431 (1/2)		
261	Pipe Plug		610-0120-011 (1/8 NPT)				

* Recommended spare parts

REPAIR/CONVERSION KIT NUMBERS (For cast iron pumps only)

Item No.	Description	Model 35651			Model 36751		
		NBR	EPDM	FPM	NBR	EPDM	FPM
—	Kit No.	311-9123-000	311-9125-000	311-9126-000	311-9060-000	311-9036-000	311-9124-000
21	• Stator	340-3505-120	340-3505-320	340-3505-520	340-3506-120	340-3506-320	340-3506-520
24	• Joint	320-1618-000	320-6508-000	320-6509-000	320-1749-000	320-6378-000	320-6515-000
69	• Seal	320-3945-000	320-6380-000	320-6510-000	320-1750-000	320-6390-000	320-6517-000
46	• Pin (Motor)		320-4069-005			320-4439-001	
45	• Pin (Rotor)		320-4069-003			320-4439-002	

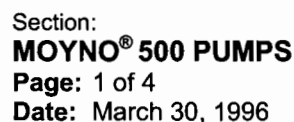
*NBR = Nitrile

EPDM = Ethylene-Propylene-Diene Terpolymer

FPM = Fluoroelastomer

ABRASION RESISTANT SEALS

Elastomer	Models	
	356	367
NBR	320-6505-000	320-6511-000
EPDM	320-6506-000	320-6512-000
FPM	320-6507-000	320-6513-000



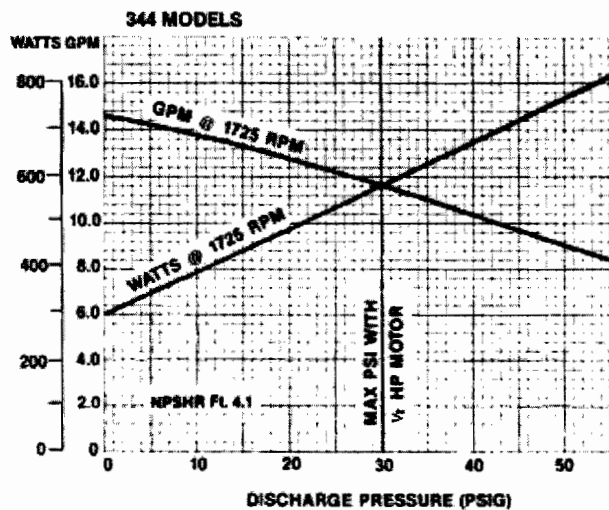
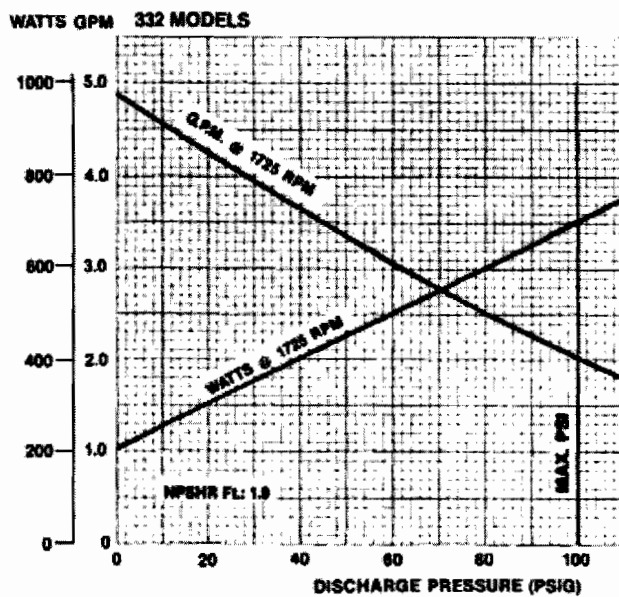
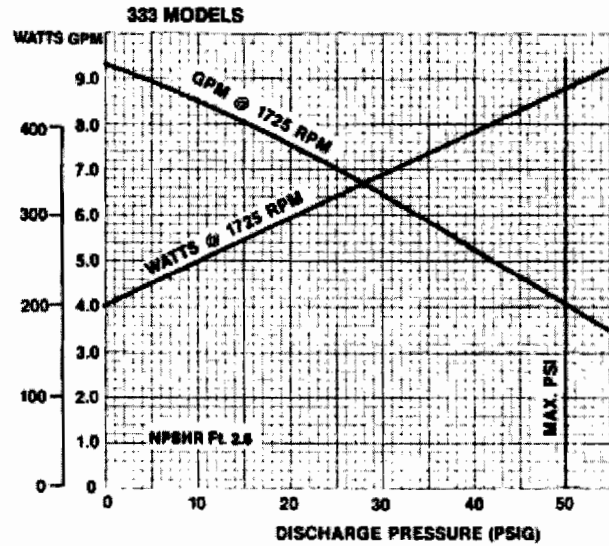
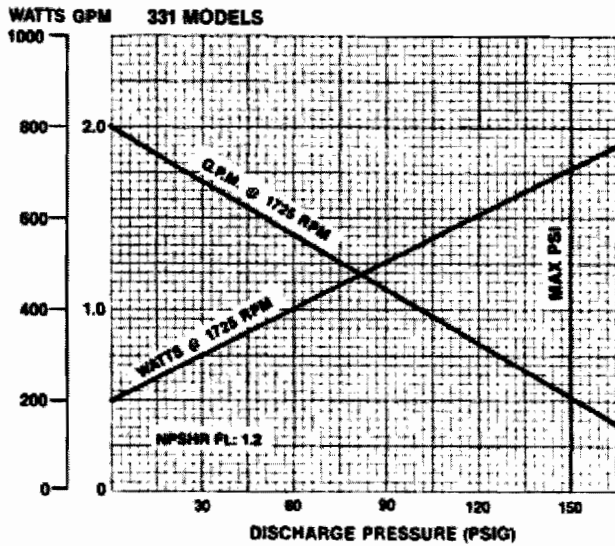
331, 332, 333, 344 MODELS

[illegible]

COMPONENT	MODELS			
	33159, 33259 33359, 34459	33160, 33260 33360, 34460	33152, 33252 33352, 34452	33150, 33250 33350, 34450
Housing	Cast iron	Cast iron	316SS	316SS
Rotor	416 SS/CP	416 SS/CP	316 SS/CP	316 SS/CP
Stator	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)
Motor Data	1/2 HP, 1 PH	1/2 HP, 3 PH	1/2 HP, 1 PH	1/2 HP, 3 PH
	115/230 VAC	230/440 VAC	115/230 VAC	230/440 VAC
	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC
Weight (lbs)	41	41	41	41

CP = Chrome plated

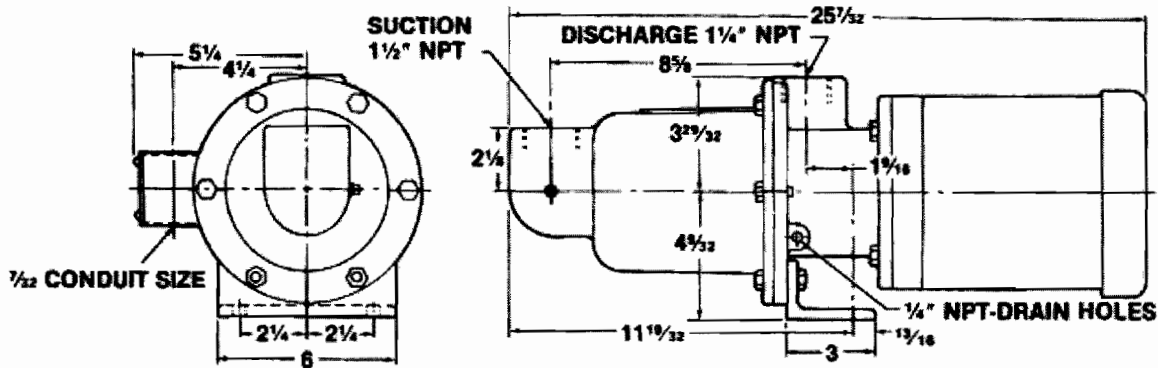
PERFORMANCE (Water at 70°F)



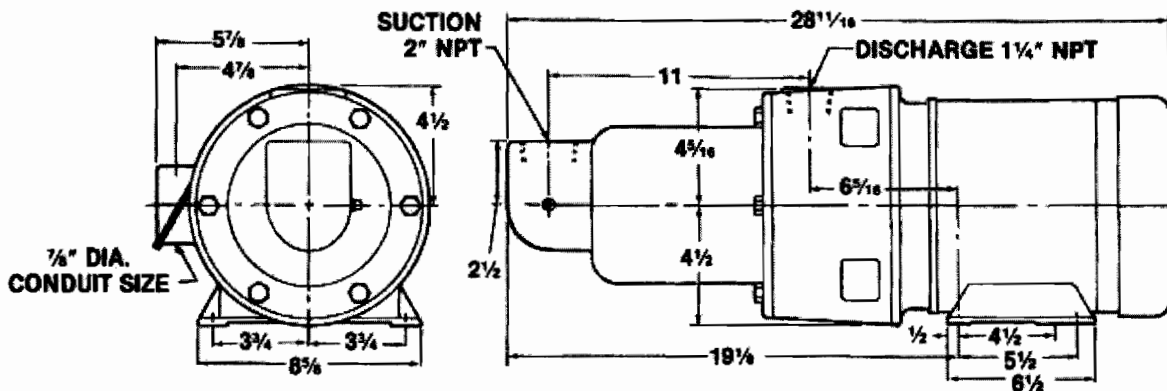
NOTE: With the standard 1/2 HP motor, maximum fluid viscosity is 100 CP (500 SSU).

356 AND 367 MODELS DIMENSIONS

Model 35651



Model 36751



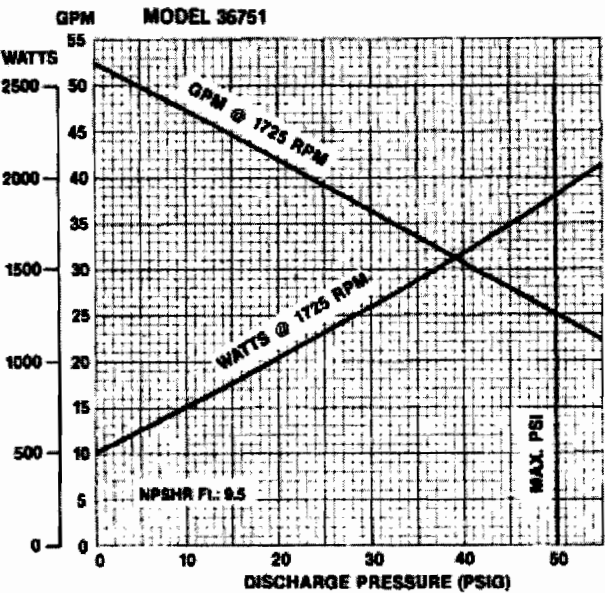
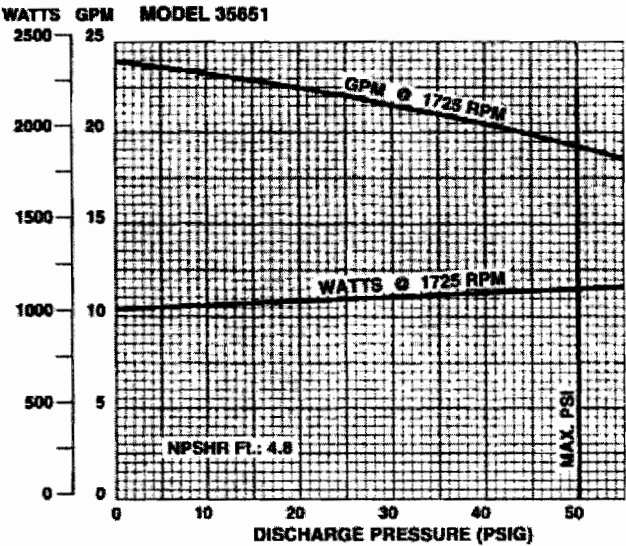
All dimensions are in inches.
Specifications subject to change without notice.

MATERIALS OF CONSTRUCTION

COMPONENT	MODELS					
	35651	36751	35650	35652	36750	36752
Housing	Cast iron	Cast iron	316 SS	316 SS	316 SS	316 SS
Rotor	416 SS/CP	416 SS/CP	316 SS/CP	316 SS/CP	316 SS/CP	316 SS/CP
Stator	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)	NBR (Nitrile)
Motor Data	1-1/2 HP, 3 PH	2 HP, 3 PH	1-1/2 HP, 3 PH	1-1/2 HP, 1 PH	2HP, 3 PH	2 HP, 1 PH
	208/230/440 VAC	230/440 VAC	230/460 VAC	115/230 VAC	230/460 VAC	115/230 VAC
	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC	60 HZ TEFC
Weight (lbs)	68	115	68	68	115	115

CP = Chrome plated

PERFORMANCE (Water at 70°F)



NOTE: With the standard
1 ½ HP (Model 35651)
2 HP (Model 36751)
motor, maximum fluid
viscosity is 100 CP
(500 SSU).

OIL/WATER SEPARATOR DESIGN CALCULATIONS

JOB: BLDG AS4141 BOD

COMPUTED BY: J. Cook

DATE: 7-17-07

DESCRIPTION: OIL/WATER SEP.

CHECKED BY: MEM

DATE: 7-24-07

OIL/WATER SEPARATOR

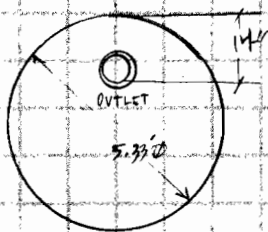
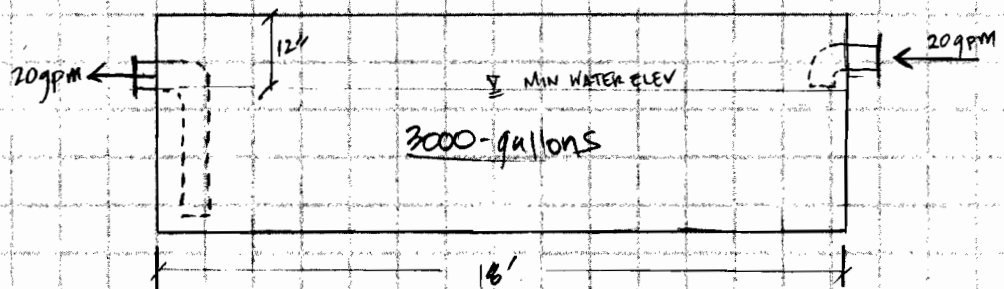
PAGE 1 of 4

ASSUMPTIONS

- Total of four (4) recovery wells will be utilized for the recovery of free-phase product and groundwater from the Building AS4141 Project Site.
- Based on results from the AFVR Pilot Test conducted on existing recovery well US-AS4141-RW01 the treatment system will be designed for a groundwater flow rate of 5gpm per recovery well.

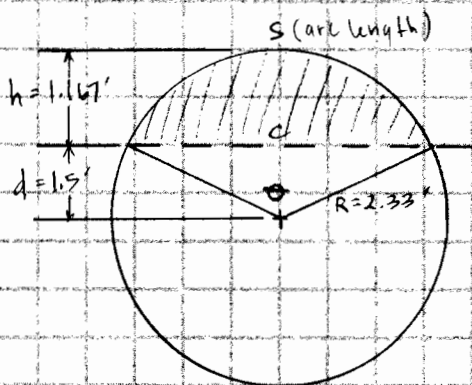
$$(4 \text{ recovery wells}) \times \left(\frac{5 \text{ gpm}}{\text{recovery well}} \right) = 20 \text{ gpm} \quad \hat{=} \text{ Design flow rate for oil/water separator}$$

- Determine approximate detention time recovered fluids will experience based on a 20gpm design flow rate and converting existing 3000-gallon product storage tank into an oil water separator with the following design parameters.

END VIEWSIDE VIEW

PAGE 2 of 4

First, determine the minimum volume of fluids within the converted oil/water separator with the out let invert pipe set at 14" (1.167') below the top of the tank



WHOLE : AREA OF SHADED REGION = $\frac{1}{2} R^2 (\theta - \sin \theta)$
 $= \frac{1}{2} (RS - cd)$
 $= R^2 \cos^{-1} (d/R) - d \sqrt{R^2 - d^2}$
 $= R^2 \cos^{-1} \left(\frac{R-h}{R} \right) - (R-h) \sqrt{2Rh - h^2}$

SO,
AREA OF SHADED REGION = $2.33^2 \omega s^{-1} \left(\frac{2.33 - 1.167}{2.33} \right) - (2.33 - 1.167) \sqrt{2(2.33)(1.167 - 1.167)}$
= 3.34 ft^2

Second, determine approximate volume of fluid in the 18ft long oil/water separator:

$$\begin{aligned} &= 3.34 \text{ ft}^2 \times 18 \text{ ft} \\ &= 60.15 \text{ ft}^3 \\ &= 450 \text{ gallons} \end{aligned}$$

Therefore, the approximate minimum volume in the converted oil/water separator is anticipated to be

$$= 3,000 \text{ gallon} - 450 \text{ gallon}$$
$$= 2,550 \text{ gallons} \quad \text{OK } 2620 \text{ gal from chart}$$

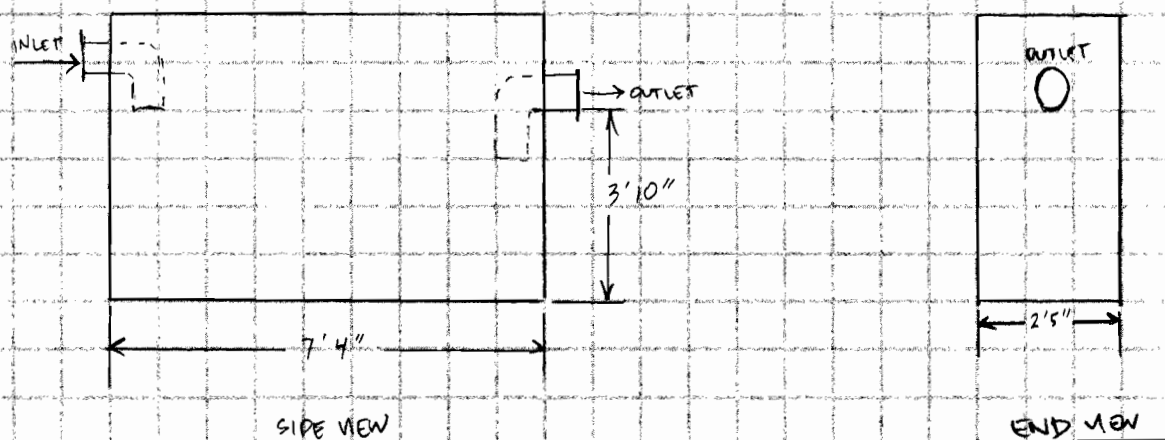
JOB: BUDH ASYIHI BOXCOMPUTED BY: J. WokDATE: 7-17-07DESCRIPTION: OIL/WATER SEPCHECKED BY: MEMDATE: 7-24-07

PAGE 3 of 4

Now that the approximate design flow rate of 20 gpm and approximate minimum volume of fluids of 2,550 gallons have been calculated, the approximate detention time is as follows:

$$\frac{2550 \text{ gallons}}{20 \text{ gallon/min.}} = \underline{\underline{127.5 \text{ minutes}}} \quad \text{OK} \checkmark$$

In order to compare this with the approximate detention time required fluid would experience in the existing oil water separator the following calculations are necessary:



EXISTING OWS

$$\begin{aligned} \text{APPROXIMATE VOL OF RETAINED FLUIDS} &= 3.83' \times 7.33' \times 2.42 \\ \text{IN EXISTING OWS} &= 68 \text{ ft}^3 \\ &= 508 \text{ gallons } \checkmark \end{aligned}$$

JOB: BUDY AS4141 RODCOMPUTED BY: J. CookDATE: 7-17-07DESCRIPTION: OIL/WATER SEP.CHECKED BY: MEMDATE: 7-24-07

PAGE 4 of 4

With a design flow rate of 20 gpm and an approximate detention volume of 500 gallons, the approximate detention time of the existing oil/water separator is:

$$\frac{500 \text{ gallons}}{20 \text{ gallon/min}} = \underline{25.4 \text{ minutes}}$$

CONCLUSION

By converting the existing 3000 gallon product storage tank into the oil/water separator for the proposed Dual Phase Extraction system, the detention time will be increased by 402%. Due to the anticipated mixing of recovered free-phase product and ground water from the recovery process and initial treatment within the vapor-moisture separator, the increased detention time will be required for acceptable treatment of recovered fluids.

**PRODUCT STORAGE TANK
DESIGN CALCULATIONS**

JOB: _____ COMPUTED BY: J. Look DATE: 1-17-07
DESCRIPTION: PRODUCT STORAGE TANK CHECKED BY: MEM DATE: 7-24-07

PAGE 1 of 2

DESIGN OF PRODUCT STORAGE TANK

ASSUMPTIONS

- Maximum design flow rate into the oil/water separator is 20 gpm, based on AFVR Pilot Test.
- Total fluids consist of approximately 0.332% free-phase product, based on the AFVR Pilot Test.

Flow rate of free-phase product into product storage tank =

$$\begin{aligned} 20 \text{ gpm} (0.00332) &= 0.0664 \text{ gpm} \\ &= 3.984 \text{ gph} \\ &= 95.616 \text{ gpd} \quad \text{say } 100 \text{ gpd} \end{aligned}$$

CONCLUSIONS & RECOMMENDATION

Based on the data collected during the AFVR Pilot Test at the project site, the free-phase product recovery rate was calculated to be approximately 100 gpd. However, since the AFVR pilot test was conducted for one day, the calculated free-phase product recovery flow rate is anticipated to represent the initial recovery rates of the DPE system. It is anticipated that recovery flow rates during initial startup of the DPE system are to be significantly higher than the average recovery flow rate through out the extent of the DPE system operation. Therefore, a 500-gallon product storage tank has been determined to be appropriate for the long term operation of the proposed DPE system. The product storage tank should be inspected daily during initial start up of the DPE system and weekly once recovery rates are reduced. A high level float switch is recommended to be set at 90% product storage tank capacity to notify the operator of the potential for over-fill. A high-high level float switch that will shut down the DPE system is recommended to be set at 95% capacity.

JOB: BCD4 AS4141 ROD

COMPUTED BY: J. Wook

DATE: 7.17.07

DESCRIPTION: PRODUCT STORAGE TANK

CHECKED BY: MEM

DATE: 7-24-07

PAGE 2 of 2

- ◆ 90% capacity of the 500 gallon (4' dia x 5.5' long) product storage tank is 2 inches below the top of the tank.
- ◆ 95% capacity of the 500 gallon (4' dia. x 5.5' long) product storage tank is 6 inches below the top of the tank.

**AIR STRIPPER & ASSOCIATED COMPONENTS DESIGN CALCULATIONS
&
MANUFACTURER INFORMATION**

JOB: BOD4 AS4141 BOD

COMPUTED BY: J. WOLK

DATE: 7-17-07

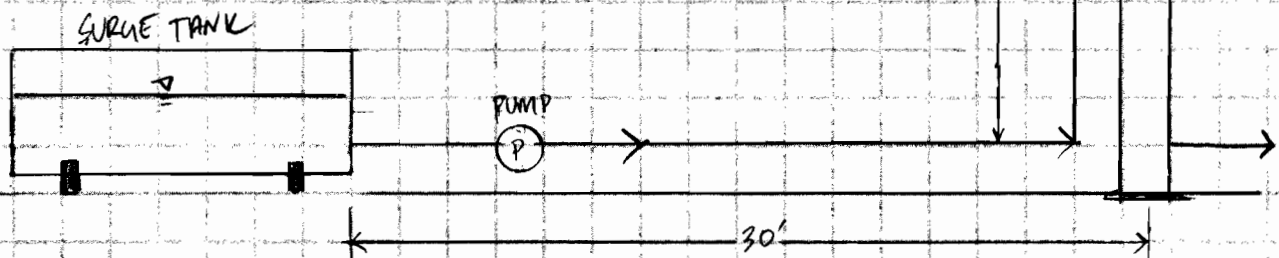
DESCRIPTION: TRANSFER PUMP

CHECKED BY: MEM

DATE: 7-24-07

SHEET 1 OF 2

TRANSFER PUMP FROM SURGE TANK TO AIR STRIPPER



• STATIC LIFT = APPROXIMATELY 15'

• LENGTH OF PIPE = APPROXIMATELY 30' + 15' = 45'

2" PVC PIPE

• ASSUME EQUIV. = 20' / TOTAL LENGTH PIPE = $(0.2) 45' = 9'$

LENGTH OF PIPE

FOR MINOR LOSS

• TOTAL LENGTH OF PIPE = $45' + 9' = 54'$

PIPE

• ASSUME $C = 140$

* TOTAL HEAD LOSS @ 20 GPM = $9.8' / 1000'$ length of pipe
 = $0.0098 (54')$
 = $0.53'$

* ELEVATION HEAD = 15 FT (APPROXIMATE)

* TOTAL DYNAMIC HEAD = $15' + 0.53' = 15.53'$ say 16' or 6.9 psi.
 (TDH)

* WILLIAMS & HAZEN, HYDRAULIC TABLES AS DETERMINED BY HAZEN & WILLIAMS FORMULA, 1933

JOB: BUDY AS4141 POD

COMPUTED BY: J. Look

DATE: 7-17-07

DESCRIPTION: TRANSFER PUMP

CHECKED BY: MEM

DATE: 7-24-07

SHEET 2 OF 2

CONCLUSION

AT 20 GPM, THE SELECTED TRANSFER PUMP MUST OPERATE AT A MINIMUM OF 6.9 PSI or 10 FT OF HEAD.

SELECTION

A GOULD'S CLOSED-COUPLED CENTRIFUGAL PUMP MODEL 3642, OR APPROVED EQUAL, HAS BEEN DETERMINED TO BE SUITABLE FOR TRANSFERRING RECOVERED FLUIDS FROM THE 550-GALON SOURCE TANK TO THE AIR STRIPPER. ADDITIONALLY, THE GOULD'S MODEL 3642 PUMP, OR APPROVED EQUAL, SHALL BE 1/2 HP, 220 VOLT, 3-PHASE EXPLOSION PROOF, SEE ATTACHED MANUFACTURE INFO.

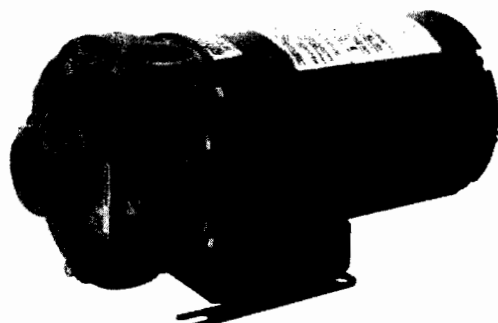


ITT

Commercial Water

Goulds Pumps

3642 Close-Coupled
Centrifugal Pumps



FEATURES

- **Compact Design:** Close coupled, space saving design provides easy installation. Flexible couplings and bedplates not required.
- **Mounting:** Can be mounted in vertical or horizontal position.
- **Construction:** Available in bronze fitted (BF), all iron (AI), or all bronze (AB). Bronze fitted means bronze impeller.
- **Impeller:** Enclosed design for high efficiencies. Threaded directly on motor shaft. Stainless steel locknut on three phase models requires no clearance adjustments. Balanced for smooth operation.
- **Casing:** Volute type, cast iron or brass construction. Back pullout design. Discharge can be rotated in eight positions. Vertical discharge standard. Tapped openings provided for priming, venting and draining.
- **Mechanical Seal:** Standard carbon/ceramic faces, BUNA elastomers, 300 series stainless steel components. Option seals available.
- **Motor:** Close-coupled design. Ball bearings carry all radial/axial thrust loads. Designed for continuous operation. All ratings are within working limits of the motor.



Goulds Pumps is a brand of ITT Residential and Commercial Water.

www.goulds.com

Engineered for life



ITT

GOULDS PUMPS Commercial Water

APPLICATIONS

Specifically designed for the following uses:

- Water circulation
- Booster service
- Liquid transfer
- Spraying systems
- Jockey pump service
- General purpose pumping

SPECIFICATIONS

Pump

- Capacities: to 110 GPM
- Heads: to 118 feet
- Pipe connections:

Model	Suction	Discharge
1 x 1¼ - 5	1¼" NPT	1" NPT
1¼ x 1½ - 5	1½" NPT	1¼" NPT

- Maximum working pressure: 125 PSI
- Temperature: standard seal, 212°F (100°C) maximum or 250°F (121°C) with optional high temperature seal.
- Rotation: right hand i.e.; clockwise when viewed from motor end.

Motor

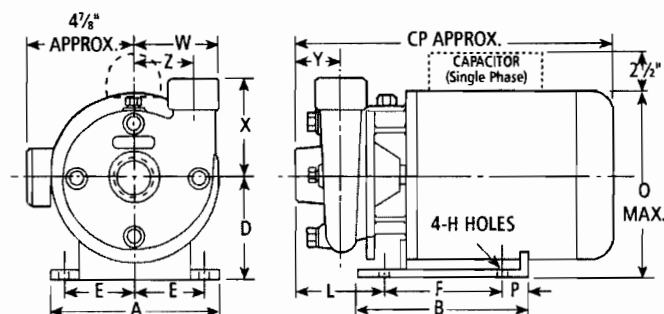
- NEMA standard
- Open drip proof, TEFC, or (explosion proof three phase only) enclosures.
- 60 Hz, 3500 RPM
- Stainless steel shaft
- Single phase: ½-2 HP ODP or TEFC. Built-in overload with automatic reset.
- Three phase: ⅓-2 HP: ODP, 208-230/460 V
- ½-2 HP: TEFC, 208-230/460 V
- ½-2 HP: expl. proof, 230/460 V
- Overload protection must be provided in starter unit. Starter and heaters (3) must be ordered separately.

Goulds Pumps is ISO 9001 Registered.

DIMENSIONS AND WEIGHTS

Pump	A	B	D	E	F	H	L	O	P	W	X	Y	Z	CP	Motor Frame	Wt. (lbs.)
1x1¼-5	6¾	5⅞	4⅞	2⅞	5	13/32	3⅞	7	7/16	4	4⅞	2⅞	3⅞	13½	48	55
1¼x1½-5							3⅞	7⅞			4	2⅞	2⅞	15½	56	67
														15¾	56	68

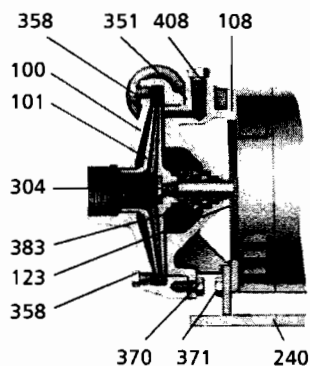
(All dimensions are in inches and weights in lbs. Do not use for construction purposes.)





ITT

GOULDS PUMPS Commercial Water



MOTOR FRAME

Motor Frame	Single Phase		Three Phase	
	ODP	TEFC	ODP	TEFC/EXPL
48	1/3	—	—	—
56	1/2 - 2	1/2 - 2	1/3 - 2	1/2 - 2

COMPONENTS

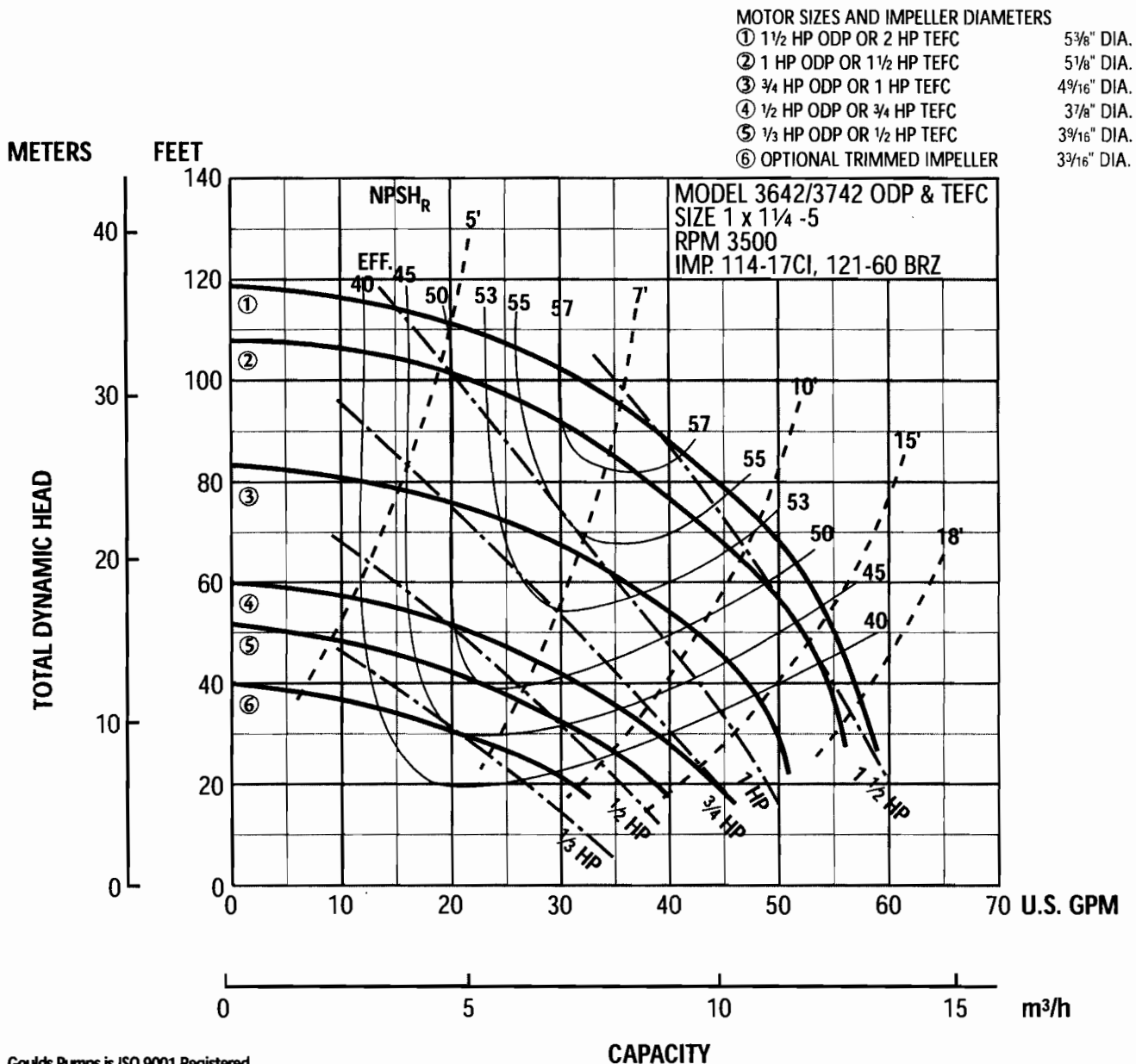
Item No.	Description	Material Code					
		Bronze Fitted	All Iron	All Bronze			
100	Casing	1001	1001	1101			
101	Impeller	1101	1001	1101			
108	Adapter	1001	1001	1101			
123	Water deflector	Rubber or Micarta®					
240	Motor Support	Steel					
	Rubber Channel	Rubber					
304	Impeller nut*	Stainless steel					
351	Gasket-casing	Composite					
358	Pipe plug ¼" vent and drain	Brass	Steel	Brass			
370	Hex head cap screw adapter to case	Zinc-Plated Steel					
371	Hex head cap screw adapter to motor	Zinc-Plated Steel					
408	Prime plug – priming ¼" NPT	Brass	Steel	Brass			
383	Mechanical Seal						
Order Suffix	10K10	Std.	Service General	Rotary	Stationary	Elastomers	Metal Parts
N	10K6	Opt.	Heavy Duty	Carbon	Ceramic	BUNA	300 Series SS
O	10K18		Hi Temp.		Sil-Carbide		
V	10K55		Chem. Duty		Ceramic	Viton	

* Impeller nut furnished on three phase units only.

MATERIALS OF CONSTRUCTION

Material Code	Engineering Standard
1001	Cast iron ASTM A48 CL 20
1101	Bronze ASTM B584, C87500 Lead-Free

PERFORMANCE CURVE 1AI, 1BF, 1AB . . .



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 C36/3742

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Goulds Pumps



ITT Industries

JOB: BUDGET ASSESSMENT - JOB-074COMPUTED BY: J. LookDATE: 7-17-07DESCRIPTION: AIR STRIPPER CALCSCHECKED BY: MEWDATE: 7-29-07

PAGE 1 OF 4

DETERMINE EXPECTED REMOVAL EFFICIENCY OF THE EXISTING AIR STRIPPER

$$* Z = HTU \times NTU$$

WHERE : $HTU = \text{HEIGHT OF TRANSFER UNITS} = \frac{L}{K_L a}$

$$NTU = \text{NUMBER OF TRANSFER UNITS} = \frac{R}{R-1} \ln \left[\frac{(C_{in}/C_{out})(R-1)+1}{R} \right] \checkmark$$

AND

 $Z = \text{PACKING HEIGHT (ft)}$ $L = \text{LIQUID LOADING RATE (ft}^3 \text{H}_2\text{O/sec} \cdot \text{ft}^2)$ $K_L a = \text{MASS TRANSFER COEFFICIENT (1/sec)}$ $C_{in} = \text{INFLENT CONCENTRATION (ppb)}$ $C_{out} = \text{EFFLUENT CONCENTRATION (ppb)}$ $R = \text{STRIPPING FACTOR OR UNIVERSAL GAS CONSTANT}$ $R = H \cdot G / L \cdot P_t \checkmark$

WHERE

 $H = \text{HENRY'S LAW CONSTANT (atm} \cdot \text{ft}^3 \text{H}_2\text{O/ft}^3 \text{air)}$ $G = \text{GAS LOADING RATE (ft}^3 \text{air/sec} \cdot \text{ft}^2)$ $P_t = \text{OPERATING PRESSURE (= 1 atm)}$ * FROM: GROUNDWATER TREATMENT TECHNOLOGY

BY EVAN K. NYER, 1985

JOB: PLD4-459141 P20 - 206-074COMPUTED BY: J. COOKDATE: 7-17-07DESCRIPTION: AIR STRIPPER CELLSCHECKED BY: MEMDATE: 7-29-07

PAGE 2 OF 4

AIR STRIPPER DESIGN CRITERIA

1. OPTIMAL AIR/WATER RATIO = $100 \text{ ft}^3/\text{ft}^3$
2. FOR CONSERVATIVE DESIGN, USE LOWEST HENRY'S LAW CONSTANT (H) OF COMPOUNDS TO BE STRIPPED

NOTE: NAPHTHALENE HENRY'S LAW CONSTANT

$$H = 22 \frac{\text{atm} \cdot \text{ft}^3/\text{lb}}{\text{ft}^3 \text{air}}$$

COMPOUND WITH A HIGHER H VALUE WILL BE STRIPPED MORE EFFECTIVELY.

AIR STRIPPER DESIGN PARAMETERS

• LIQUID FLOW RATE INTO SYSTEM, $Q_{IN} = \sum Q_{\text{RECOVERY WELLS}}$
 $= 20 \text{ gpm}$

• LIQUID LOADING RATE, $L = Q_{IN} / \text{GROSS SECTIONAL AREA OF AIR STRIPPER}$

$$= \frac{20 \text{ gal}}{\text{min}} \cdot \frac{\text{min}}{60 \text{ sec}} \cdot \frac{\text{ft}^3}{7.48 \text{ gal}} \cdot \frac{1}{0.83 \text{ ft}^2}$$

$$= 0.054 \text{ ft}^3/\text{sec} \cdot \text{ft}^2$$

↑
INTERNAL GROSS SECTIONAL AREA OF EXISTING AIR STRIPPER

JOB: BDU AS4141 RQ7 - 206-074

COMPUTED BY: J. Wolk

DATE: 7-17-07

DESCRIPTION: AIR STRIPPER CALCS

CHECKED BY: MEM

DATE: 7-24-07

PAGE 30 F#

• AIR FLOW RATE INTO AIR STRIPPER, $Q_{\text{AIR}} = 100 Q_{\text{WATER}}$
 $= 267.36 \text{ cfm}$ say 270 cfm ✓

• GAS LOADING RATE, $G = Q_{\text{AIR}} / \text{CROSS SECTION AREA OF EXISTING AIRSTRIPPER}$

$$= \frac{270 \text{ ft}^3}{\text{min}} \times \frac{\text{min}}{60 \text{ sec}} \div 0.83 \text{ ft}^2$$

$$= 5.42 \text{ ft}^3 / \text{sec} \cdot \text{ft}^2 \checkmark$$

CROSS SECTIONAL AREA OF EXISTING AIRSTRIPPER

• STRIPPING FACTOR, $R = H \cdot G / L \cdot P_t$

$$= \frac{\left[\frac{22 \text{ atm} \cdot \text{ft}^3 \text{H}_2\text{O}}{\text{ft}^3 \text{air}} \right] \left(\frac{5.42 \text{ ft}^3}{\text{sec} \cdot \text{ft}^2} \right)}{\left[\left(\frac{0.054 \text{ ft}^3}{\text{sec} \cdot \text{ft}^2} \right) \cdot (1 \text{ atm}) \right]}$$

$$= 2208 \left(\frac{\text{ft}^3 \text{H}_2\text{O}}{\text{ft}^3 \text{air}} \right) \checkmark$$

• INFLUENT CONCENTRATION, $C_{\text{IN}} = 500 \text{ PAB}^*$

* ASSUMED VALUE FOR NAPHTHALENE CONCENTRATION IN GROUNDWATER WITH JP-5, FREE-PHASE PRODUCT, BASED ON A REVIEW OF MULTIPLE SITES WITH JP-5 FREE PHASE PRODUCT CONTAMINATION.

• PACKING HEIGHT OF EXISTING AIR STRIPPER, $Z = 10 \text{ ft}$.

JOB: BLDG ASH141 PDD - 206-074

COMPUTED BY: J. Wolk

DATE: 7-17-07

DESCRIPTION: AIR STRIPPER CALCS

CHECKED BY: MEM

DATE: 7-29-07

SHEET 4 OF 4

- MASS TRANSFER COEFFICIENT, $K_LA = 0.02 (1/sec)^*$ ✓

THE K_LA VALUE WAS APPROXIMATED BASED ON THE ANTICIPATED LOADING RATE AND SIZE OF PACKING. NOTE THAT AT THE SMALLER SIZE AIR STRIPPER PACKING, THE HIGHER THE REMOVAL EFFICIENCY

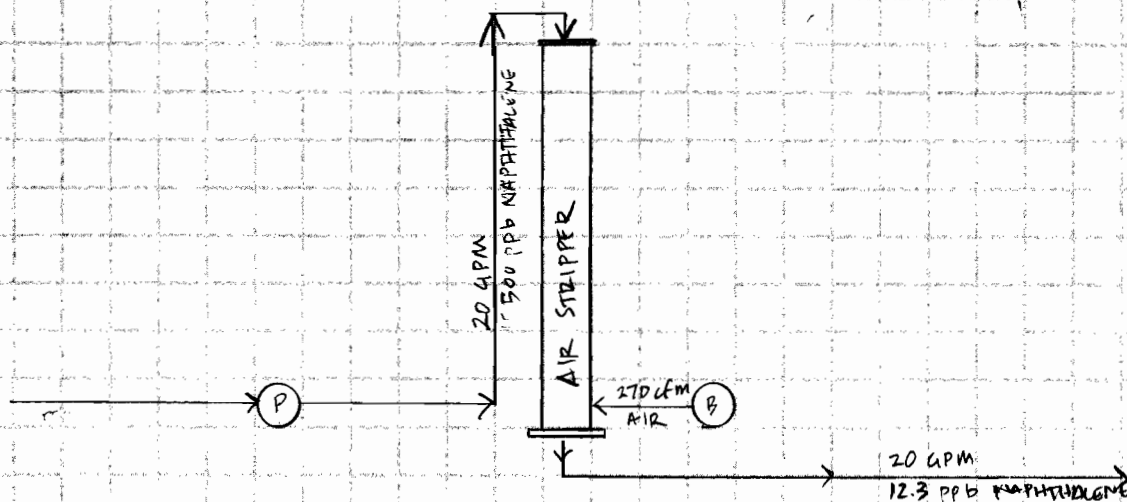
- FROM $Z = HTU \times NTU$, $C_{eff} = 12.33 \text{ PPB NAPHTHALENE}$

$$\text{REMOVAL EFFICIENCY} = \left(1 - \frac{C_{eff}}{C_{in}} \right) \times 100$$

$$= 97.5\% \text{ REMOVAL EFFICIENCY}$$

CONCLUSION

BASED ON THE EXISTING AIR STRIPPER COMPONENTS & INPUT PARAMETERS, A 97.5% REMOVAL EFFICIENCY WAS CALCULATED.



JOB: BLDG AS4141 BOD

COMPUTED BY: J. Wook

DATE: 7-17-07

DESCRIPTION: AIR STRIPPER BLOWER DESIGN

CHECKED BY: MEW

DATE: 7-24-07

SHEET 1 OF 1

AIR STRIPPER BLOWER DESIGN

- ◆ INFLOW WATER TO THE AIR STRIPPER IS 20 gpm FOR DESIGN PURPOSES
- ◆ AIR/WATER RATIO = 100 FT³/FT³
- ◆ ACCORDING TO JAEGER PRODUCTS CATALOGUE, THE 2-INCH JAEGER TR-1 PACKS PACKING MATERIAL PRESSURE CHANGE (ΔP) = 0.2 inches H₂O column / ft of bed.
- ◆ THE EXISTING AIR STRIPPER HAS AN APPROXIMATE BED DEPTH OF 10 FT.

$$\Delta P = [0.2 \text{ INCHES H}_2\text{O COLUMN / FT PACKING}] \times 10 \text{ FT OF PACKING}$$

$$\rightarrow \boxed{\Delta P = 2 \text{ INCHES OF H}_2\text{O COLUMN}}$$

$$\begin{aligned} \text{AIR FLOW RATE} &= 100' Q_{IN} \\ &= 100 (20 \text{ gpm}) \\ &= 2000 \text{ gpm OR } 267.36 \text{ cfm} \end{aligned}$$

$$\boxed{= \text{SAY } 270 \text{ cfm}}$$

CONCLUSION

AT 20 gpm, THE AIR STRIPPER BLOWER MUST SUPPLY 270 cfm OF AIR AT MINIMUM 2" H₂O.

SELECTION

A ROTOR REGENERATIVE BLOWER MODEL NO DR808-A4 12MX, OR APPROVED EQUIV, HAS BEEN SELECTED FOR THE AIR STRIPPER. THE SELECTED BLOWER IS A 7.5 HP, 230/460V, 3-PHASE, and should be intrinsically safe. Refer to the attached manufacture information.

ROTRON® Regenerative Blowers

DR 808 & CP 808

Regenerative Blower

FEATURES

- Manufactured in the USA – ISO 9001 compliant
- CE compliant – Declaration of Conformity on file
- Maximum flow: 350 SCFM
- Maximum pressure: 116 IWG
- Maximum vacuum: 6.9" Hg (93.9 IWG)
- Standard motor: 7.5 HP, TEFC
- Cast aluminum blower housing, impeller & cover; cast iron flanges (threaded)
- UL & CSA approved motor with permanently sealed ball bearings
- Inlet & outlet internal muffling
- Quiet operation within OSHA standards

MOTOR OPTIONS

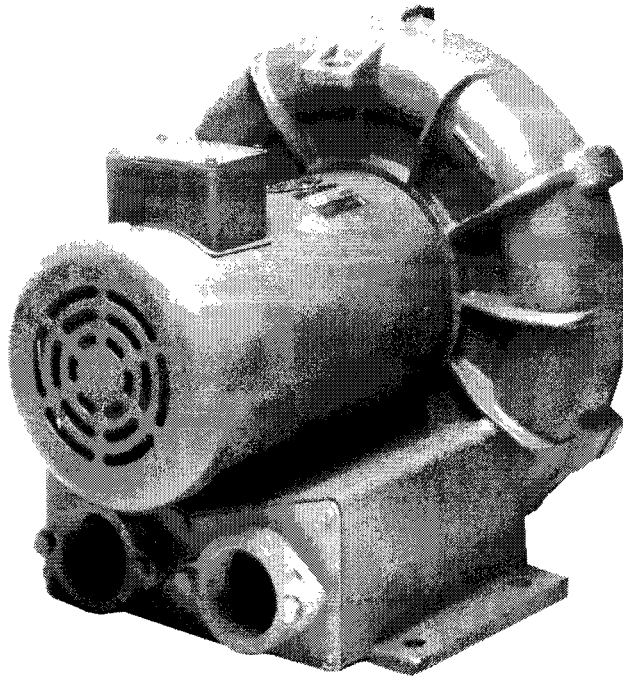
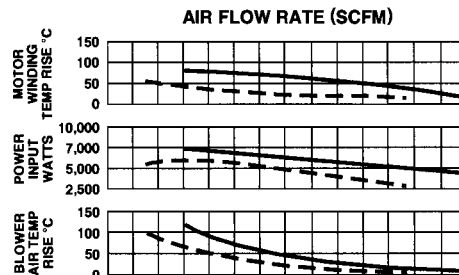
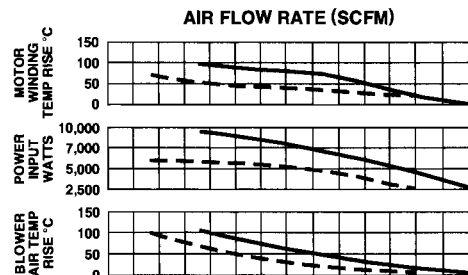
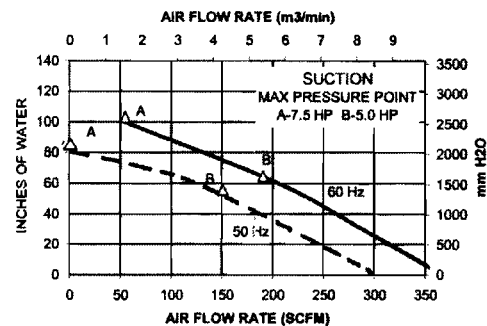
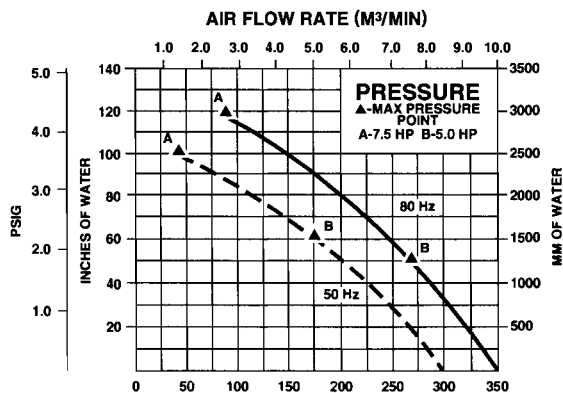
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepower for application-specific needs

BLOWER OPTIONS

- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)

- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

**BLOWER PERFORMANCE AT STANDARD CONDITIONS**

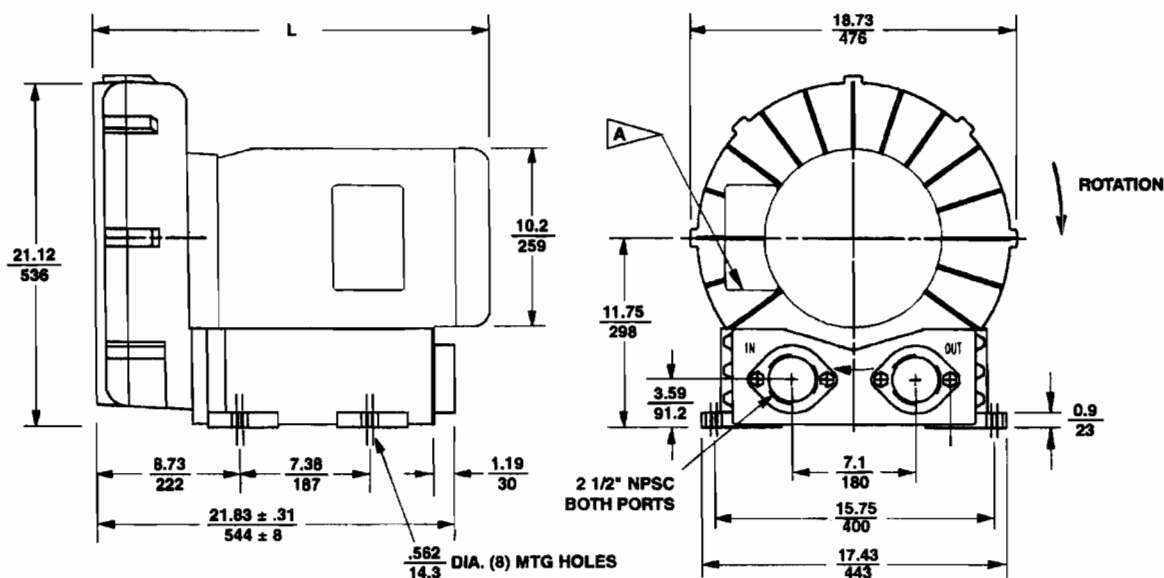
Rev. 2/04

B-31

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ROTRON® Regenerative Blowers

DR 808 & CP 808 Regenerative Blower



DIMENSIONS: IN
MM
TOLERANCES: .XX ± 1/2.5
(UNLESS OTHERWISE NOTED)

MODEL	L (IN)	L (MM)
DR808AY72MX	23.23	590
DR808AY86MX	22.73	577
DR808D89MX	21.08	535
CP808FG72MXLR	22.74	578

Scale CAD drawing available upon request.

TERMINAL BOX CONNECTION 1.06 INCH DIAMETER ON TEFC MOTORS
.75 NPT ON XP MOTORS

SPECIFICATIONS

MODEL	DR808AY72MX	DR808AY86MX	DR808D89MX	CP808FG72MXLR	HiE808AY72MX
Part No.	038722	038724	038725	038734	038728
Motor Enclosure - Shaft Material	TEFC - CS	TEFC - CS	TEFC - CS	ChemTEFC - SS	TEFC - CS
Horsepower	7.5	7.5	5.0	Same as DR808AY72MX - 038722 except add Chemical Processing (CP) features from catalog inside front cover	Same as DR808AY72MX - 038722 except add High Efficiency motor
Voltage ¹	230/460	575	230/460		
Phase - Frequency ¹	Three - 60 Hz	Three - 60 Hz	Three - 60 Hz		
Insulation Class ²	F	F	F		
NEMA Rated Motor Amps	22.2/11.1	7.2	17.3-15.6/7.8		
Service Factor	1.15	1.15	1.15		
Locked Rotor Amps	120/60	60	152/76		
Max. Blower Amps ³	27.0/13.5	10.8	17.0/8.5		
Recommended NEMA Starter Size	1/1	1	1/0		
Shipping Weight	294 lb (134 kg)	262 lb (119 kg)	294 lb (134 kg)		

¹ Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

² Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

³ Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please consult your Local Field Sales Engineer for specification updates.

Rev. 2/04

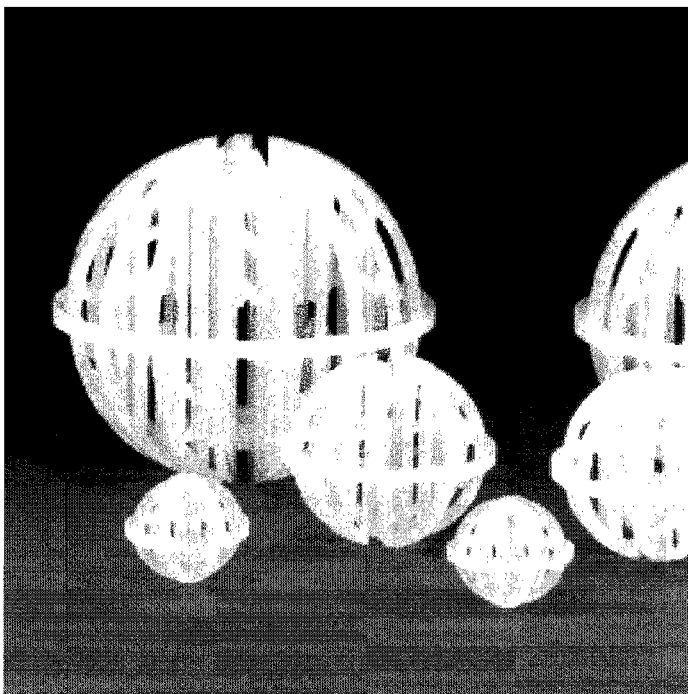
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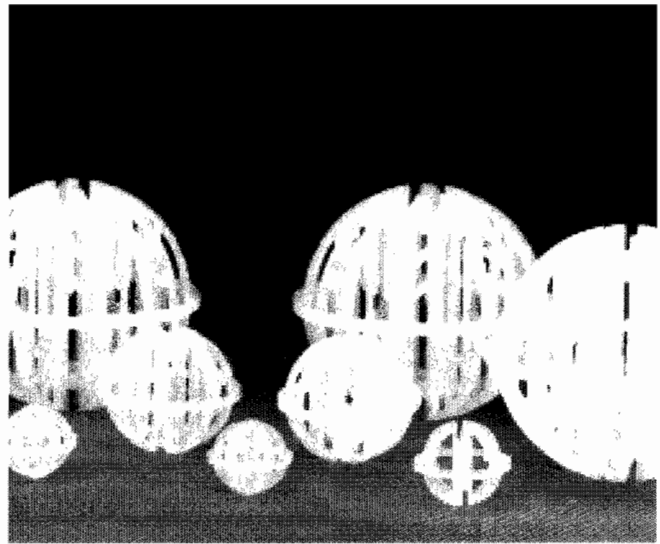
JAEGER

TOWER PACKINGS • TRAYS • COLUMN INTERNALS

Jaeger Tri-Packs®
Product Bulletin 600



Superior performance by design™
JAEGER PRODUCTS, INC.®



Jaeger Tri-Packs®

Features

- Jaeger Tri-Packs® are hollow, spherical packings made of injection molded plastic, available in four diameters: 1", 1 ¼", 2", and 3 ½".
- Symmetrical geometry made from a unique network of ribs, struts, and drip rods.
- High active surface areas.
- Extremely low pressure drops.
- Extremely high operating capacities.

Benefits

- High mass and heat transfer rates.
- Excellent gas and liquid dispersion characteristics.
- Resist nesting, making removal easy.
- Installs to packed position - no settling.
- Available in a wide variety of plastics.
- Predictable performance.

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Jaeger Tri-Packs®-PP are NSF Certified to ANSI/NSF Standard 61 when made in polypropylene.

Specifications & Physical Properties

Materials

Twelve standard, injection moldable plastics are available:

Polypropylene (PP)	TopEx® (LCP)
Polyethylene (PE)	Kynar® (PVDF)
Polypropylene	Halar® (ECTFE)
Glass-Filled (PPG)	Teflon® (PFA)
Noryl® (PPO)	Tefzel® (ETFE)
Polyvinylchloride (PVC)	Tefzel® Glass-
Corzan™ (CPVC)	Filled (ETFE-G)

Other plastics are available on request.

IMPORTANT NOTE:

Design data presented in this bulletin are for preliminary calculations only. Contact Jaeger before finalizing calculations.

JAEGER TRI-PACKS® is a Registered Trademark of
JAEGER PRODUCTS, INC.

Properties Table

Size (in.)	1	1 1/4	2	3 1/2
Geometric Surface Area (ft²/ft³)	85	70	48	38
Packing Factor (1/ft)	28	25	16	12
Void Space (%)	90	92	93.5	95
Bulk Density (lb/ft³) (PP)	6.2	5.6	4.2	3.3

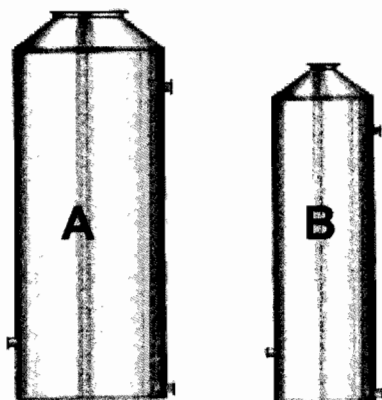
Maximum Operating Temperatures for Plastic Jaeger Tri-Packs

Jaeger Tri-Packs® are available in a variety of injection-molded plastics for different applications. The maximum operating temperatures for these different resins vary from material to material and are also affected by specific process variables. The data presented below correspond to maximum continuous operating temperatures at atmospheric pressure and systems that are essentially air and water. The presence of solvents, acids, free radicals, and oxidants needs to be considered. Furthermore, these temperatures correspond to the maximum recommended bed depth for each packing size and material. These maximum bed depths are different depending on the application. Consult with Jaeger in respect to the maximum bed depth for your particular application.

Material	Maximum Temperature (Deg. F) (1 atm, air/water, at max. recommended depth)	Bulk Density Factor
Polyvinyl Chloride (PVC)	140	1.50
Polyethylene (PE)	160	1.02
Polypropylene (PP)	180	1.00
Corzan™ (CPVC)	230	1.74
Chlorinated Polyvinyl Chloride (CPVC)	210	1.74
Polypropylene - Glass-Filled (10-30%) (PP-G)	210-230*	1.17-1.38*
Noryl® (PPO)	230	1.24
Kynar® (PVDF)	280	1.98
Halar® (ECTFE)	290	1.86
Tefzel® (ETFE)	350	1.93
Teflon® (PFA)	400	2.45
Tefzel® - Glass Filled (25% Glass) (ETFE-G)	410	2.2

*Depending on glass content.

Superior Performance by Design



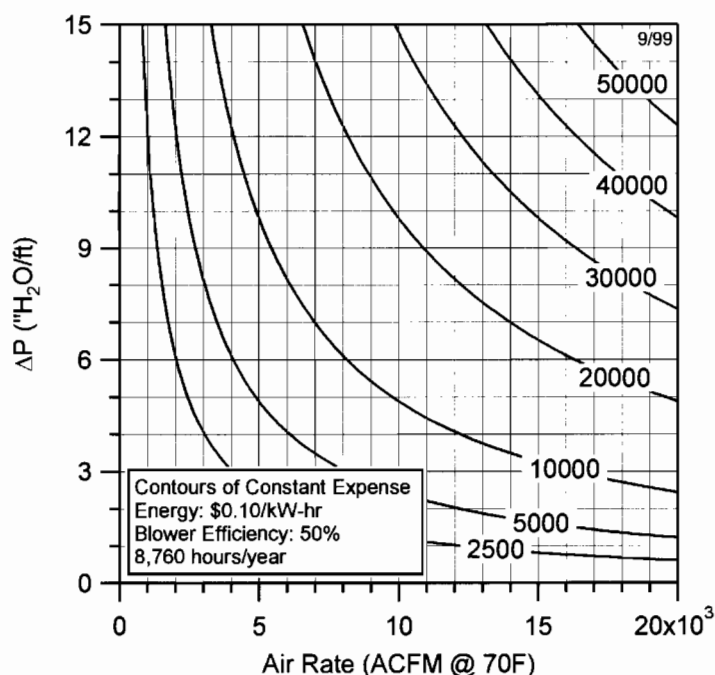
Question: Which column design is less expensive?

Answer: Column A

Which design is less expensive? If you chose column B, then you might be in for a surprise.

The price you pay for pollution abatement is composed of two parts. First, there's the direct capital cost for the scrubber or stripper. This includes the up-front money you are charged for the column, the packing and the internals. But there's also an ongoing energy expense that you must pay for gas compression and for liquid pumping. The capital cost is usually carefully monitored and controlled because it is oftentimes a large lump sum payment charged before abatement even begins.

By contrast, energy is paid for on an ongoing basis. It is a cost not often considered in the evaluation of designs submitted by different vendors because it is presumed that this cost should be about the same for all designs. It then follows that the cost for abatement is minimized by minimizing the capital expense. But this reasoning can be seriously flawed. Energy costs are extremely sensitive to design choices like column diameter, packed depth, gas loading per square foot of column cross section, and materials of construction. The only proper way to choose a design is to balance capital expenses against operating expenses. The annual abatement cost is the sum of the depreciated capital cost and the annual energy cost. The proper choices of column diameter, packed depth, and gas loading per unit cross section are those that minimize this annual abatement cost. When the capital depreciation time is relatively long, the column diameter increases in order to bring the pressure drop down and thus lower energy costs. Conversely, when capital is depreciated more quickly, the column size shrinks (at the expense of higher pressure drop) in order to lower the up front expense. In short, then, a smaller column can be more expensive to operate than a larger one when all cost factors are taken into account.



Jaeger Products can work closely with your organization to develop cost models for your project and we can optimize a design based on these models to meet your financial objectives. Contact us about your design needs.

JAEGER

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Phone: 281-449-9500

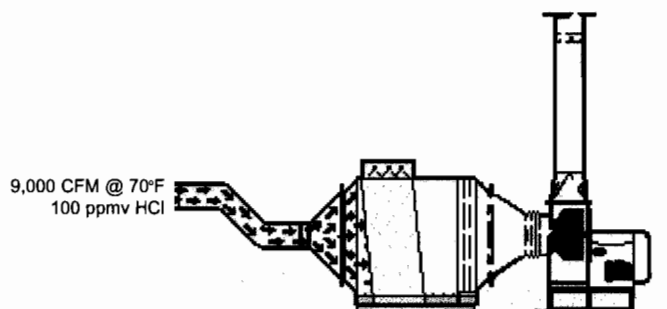
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Performance Comparison

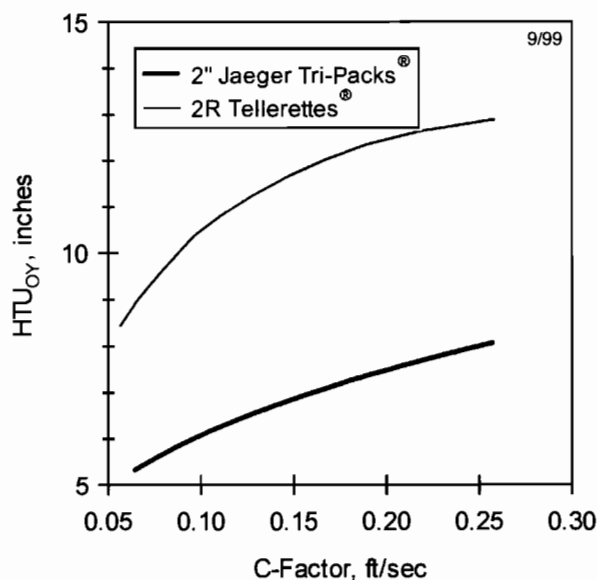
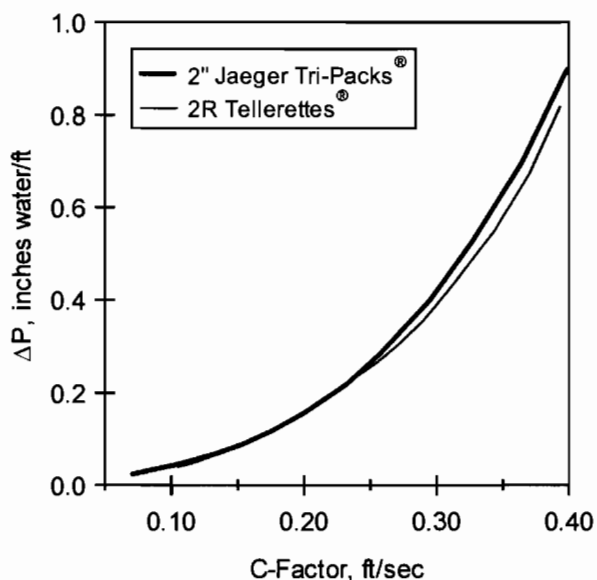
2R Tellerettes® vs 2" Tri-Packs®

HCl/Caustic Scrubbing @ 70°F, 1 atm, 100 ppm_v Inlet



ppm _v Out	Removal Effcy. %	Δp/H H ₂ O/ft	
17.5	82.5	0.11	2" Pall Rings
3.8	96.2	0.065	2R Tellerettes®
3.8	96.2	0.042	3 1/2" Tri-Packs®
0.5	99.5	0.086	2" Tri-Packs®

- 2" Tri-Packs® give a 97% improvement in outlet HCl concentration compared to 2" Pall Rings
- 2" Tri-Packs® outperform 2R Tellerettes® by 87%
- 3 1/2" Tri-Packs® give a 78% improvement when compared to 2" Pall Rings
- 3 1/2" Tri-Packs® equal 2R Tellerettes® performance with 35% lower pressure drop.



Tellerettes® HTU data from Ceilcote catalog 12-10.60; Δp data from 12-10.11
Tri-Packs® HTU curves are simulations based on available HTU data from other systems.

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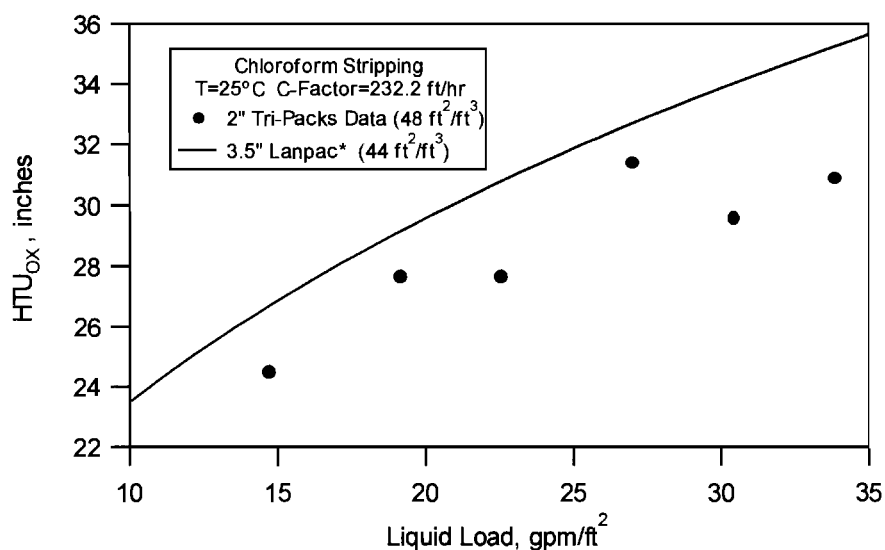
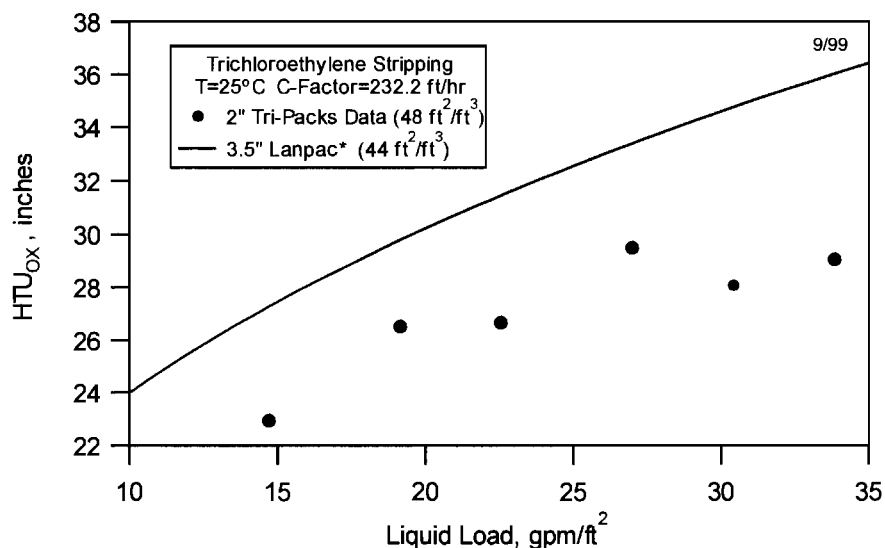
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Jaeger Tri-Packs® Outperform Lanpac®

Verified by Independent Tests



*HTU values for 3.5" Lanpac® calculated from Lanpac HTU correlation reported in Lantec Technical Bulletin TL-901.
2" Jaeger Tri-Packs® performance data taken from U.S. Department of Commerce document AD-A158 811 June 1985.

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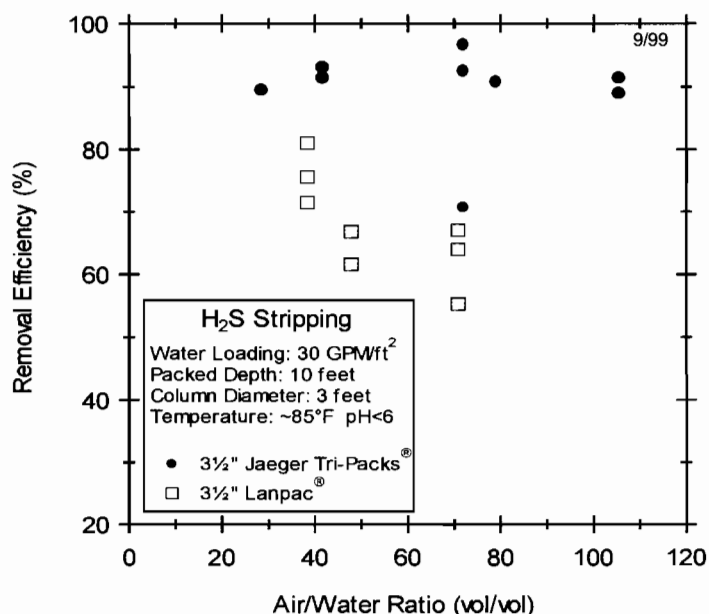
Phone: 281-449-9500

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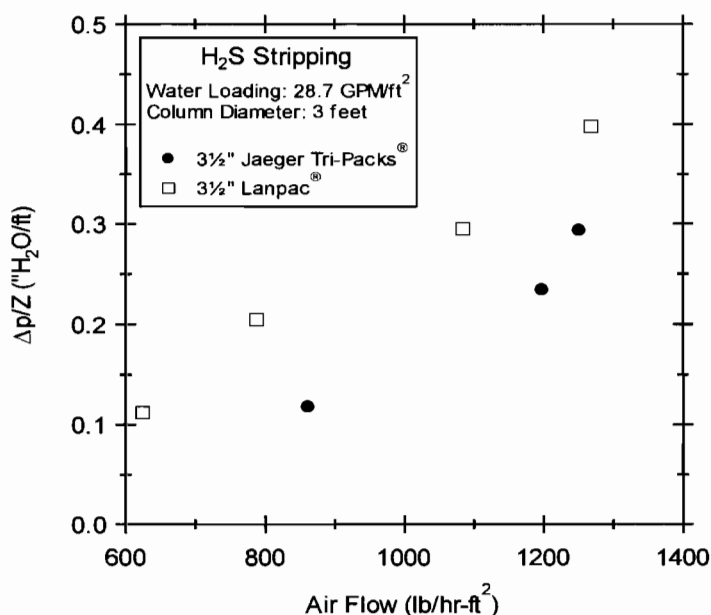
Again & Again!!

Jaeger Tri-Packs® Out Distance Lanpac® in Stripping and Pressure Drop Tests



When Manatee County, Florida required H₂S stripping towers for water treatment in 1992, they were concerned about long-term energy cost. The OEM Manufacturer retained by the county conducted tests on different packings to assure that their client received the most efficient packing and system. The partial results shown in the two graphs at the left show why they picked 3 1/2" Jaeger Tri-Packs® over 3 1/2" Lanpac® as the most efficient and affordable packing available.

When these two products - of comparable size - are used for identical purposes with identical conditions, the 3 1/2" Jaeger Tri-Packs® overwhelmingly outperform the 3 1/2" Lanpac®. Stripping efficiencies for 3 1/2" Jaeger Tri-Packs® averaged 36.5% better than those for 3 1/2" Lanpac®. These results are illustrated by the graph at the top left.



The same trend is evident in the pressure drop, as illustrated by the graph on the lower left. The data shows the advantage in energy savings that 3 1/2" Jaeger Tri-Packs® offers over the 3 1/2" Lanpac®.

3 1/2" Jaeger Tri-Packs® were recommended and installed because they outperformed 3 1/2" Lanpac® in both mass transfer efficiency and pressure drop. The 3 1/2" Jaeger Tri-Packs® are still in service and will continue to provide the energy savings and value originally desired by Manatee County.

Give us a call. Jaeger can provide the products and services to get you the most out of your packing or mass transfer device.

Data from test performed in 1992 by Duall Division, Metpro Corporation, Owosso, Michigan.

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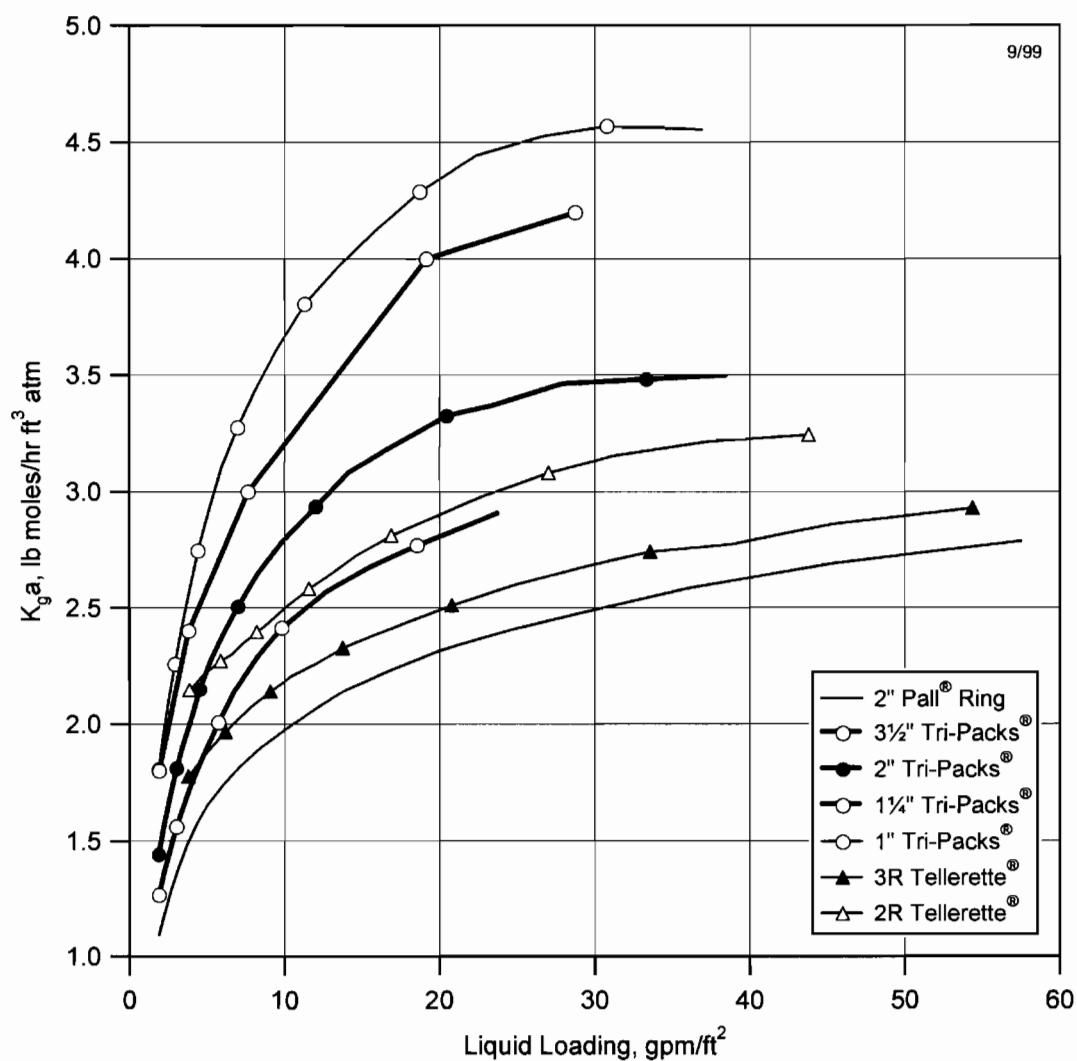
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Packing Comparison

K_{ca} vs. Liquid Loading

CO₂ Air/Caustic Countercurrent Flow



Tellerettes® data from Ceilcote Technical Bulletin 12-10.60.
Column diameters and packed depths varied among the tests reported here.

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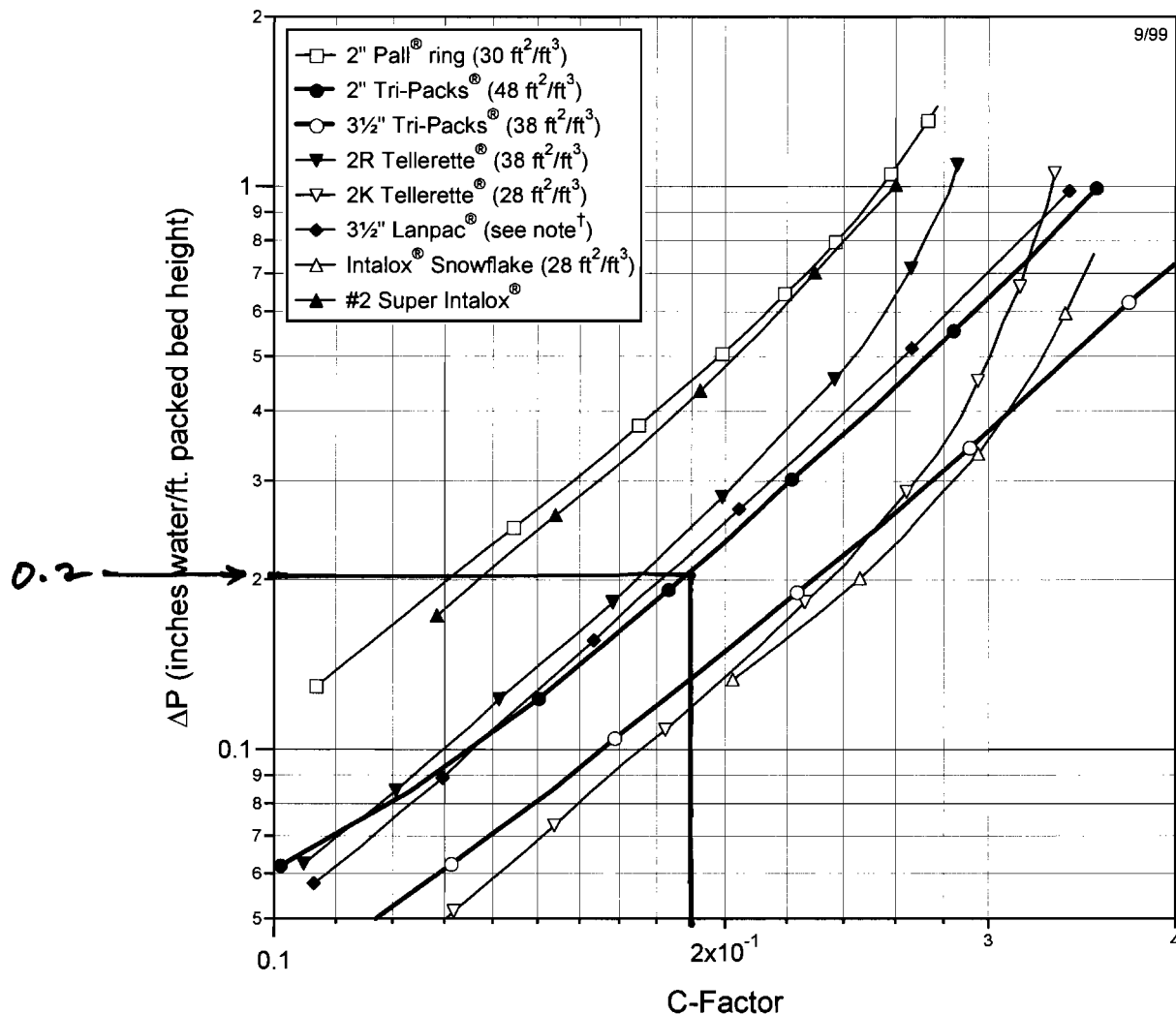
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Pressure Drop Comparison

Plastic Packing

Ambient Air/Water (70°F, 1 atm) at 20 gpm/ft²



$$C\text{-Factor} = V_s [(\rho_V)/(\rho_L - \rho_V)]^{1/2} \text{ where}$$

V_s = Superficial Vapor Velocity in ft/sec

ρ_L and ρ_V = Density of Liquid and Vapor in lb/ft³

+44, 45, 48, 68 ft²/ft³ reported in Lantec Literature.

Lanpac data from Lantec Technical Bulletin TL-905.

2K & 2R Tellerettes data from Ceilcote Catalog 12-10.11 and 12-10.13.

Pall ring data from Jaeger Catalog 700-pd705.

Snowflake data from Norton Bulletin ISPP-1.

Super Intalox saddle data from Norton Bulletin DC-11.

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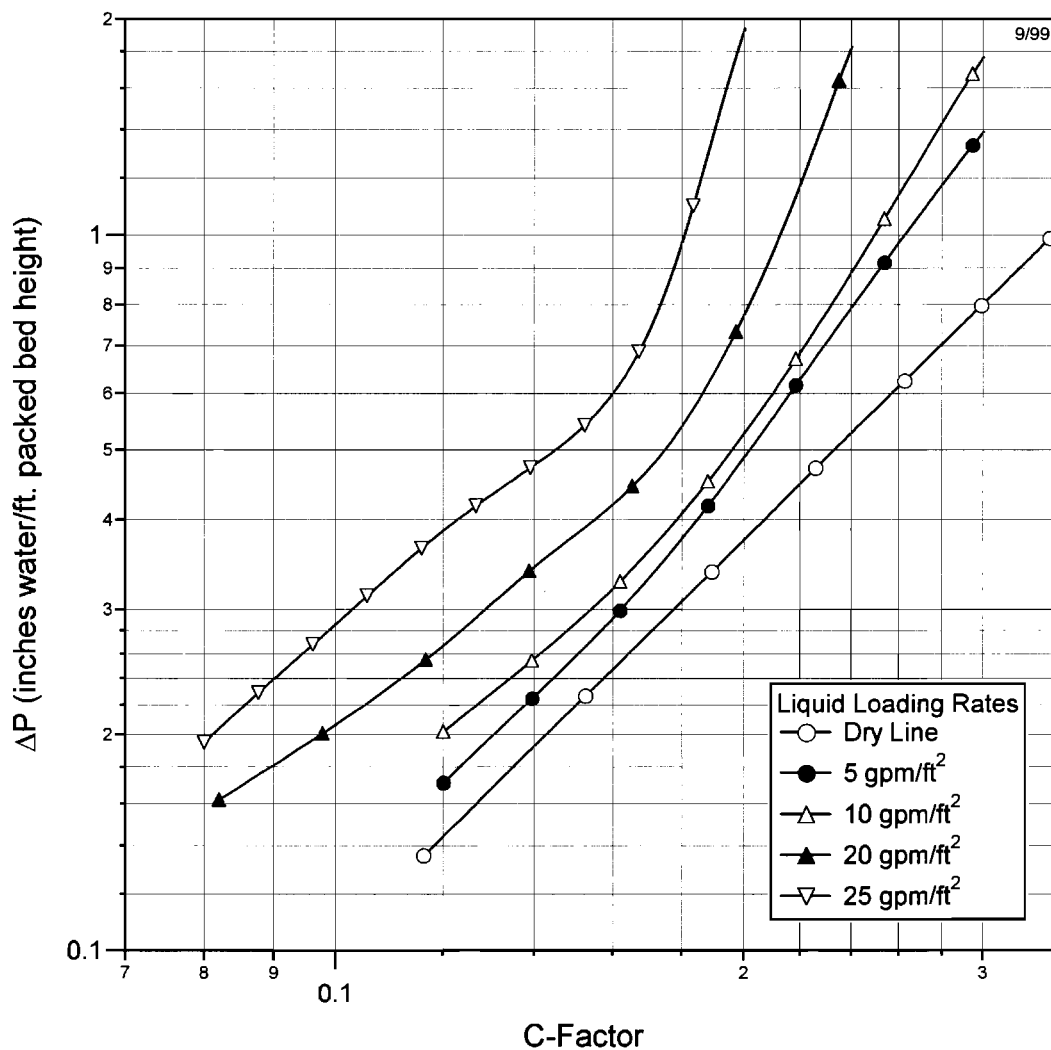
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Pressure Drop vs. C-Factor

1" Plastic Jaeger Tri-Packs[®]

Ambient Air-Water Systems for Various Liquid Loadings



$$C\text{-Factor} = V_s [(\rho_v)/(\rho_L - \rho_v)]^{1/2}$$
 where
 V_s = Superficial Vapor Velocity in ft/sec
 ρ_L and ρ_v = Density of Liquid and Vapor in lb/ft³

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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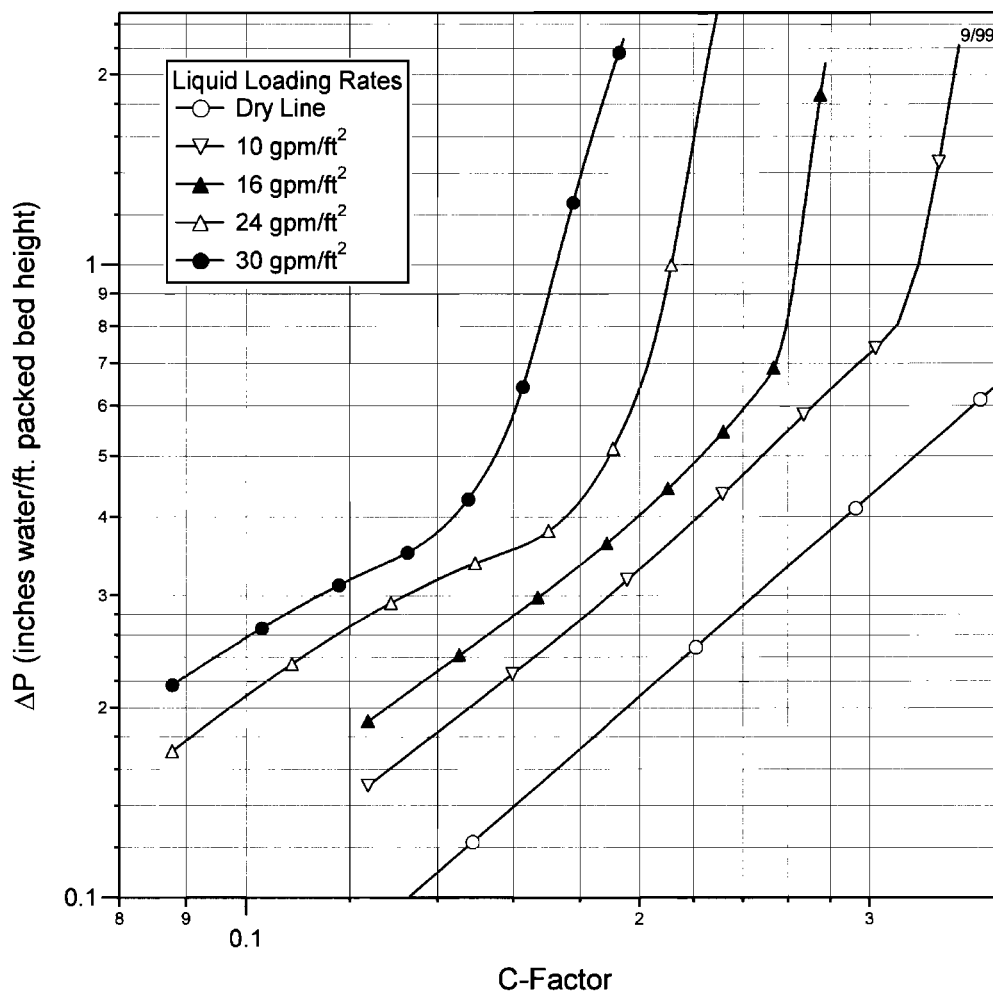
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Pressure Drop vs. C-Factor

1.25' Plastic Jaeger Tri-Packs®

Ambient Air-Water Systems for Various Liquid Loadings



$$\text{C-Factor} = V_s [(\rho_v)/(\rho_L - \rho_v)]^{1/2} \text{ where}$$

$$V_s = \text{Superficial Vapor Velocity in ft/sec}$$

$$\rho_L \text{ and } \rho_v = \text{Density of Liquid and Vapor in lb/ft}^3$$

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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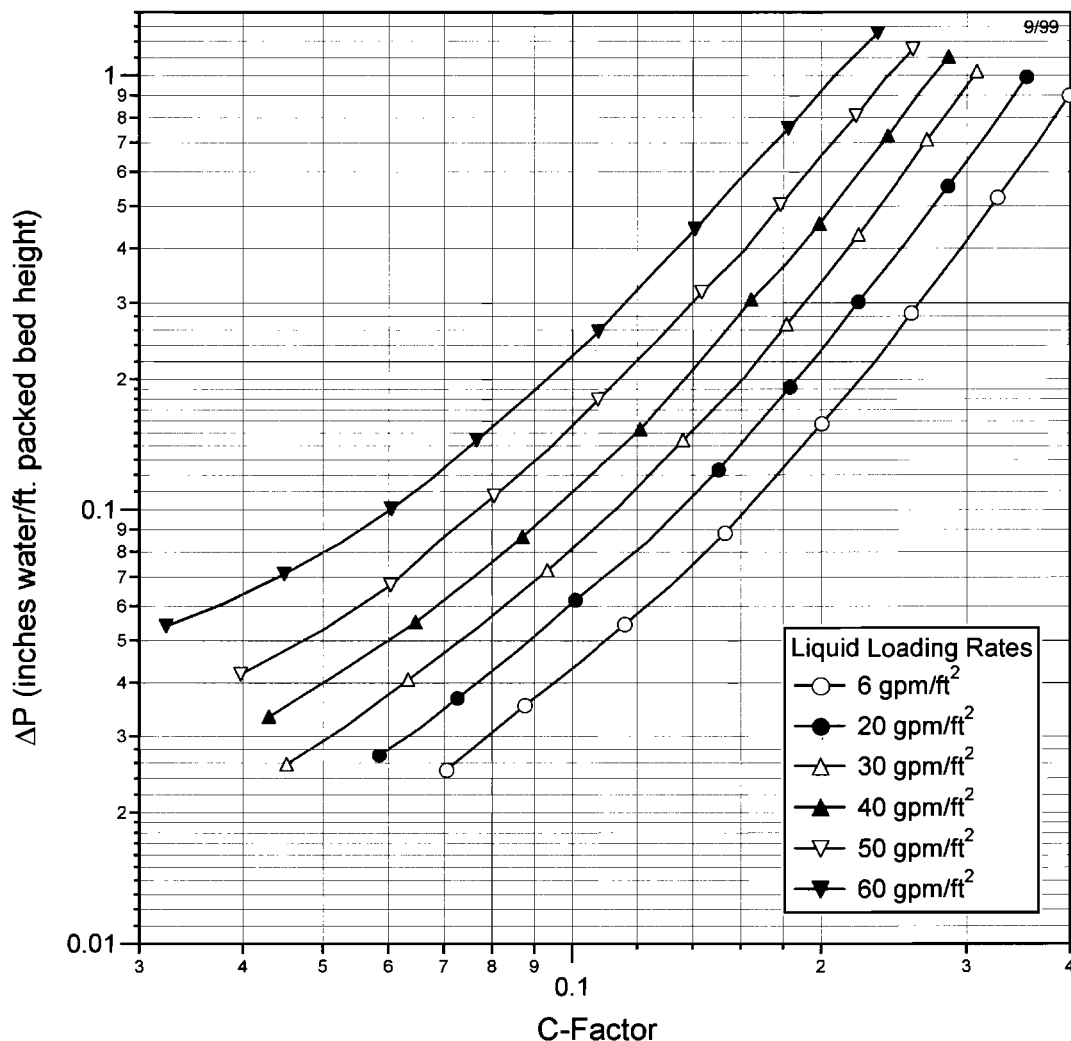
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Pressure Drop vs. C-Factor

2" Plastic Jaeger Tri-Packs®

Ambient Air-Water Systems for Various Liquid Loadings



C-Factor = $V_s [(\rho_v)/(\rho_L - \rho_v)]^{1/2}$ where
 V_s = Superficial Vapor Velocity in ft/sec
 ρ_L and ρ_v = Density of Liquid and Vapor in lb/ft³

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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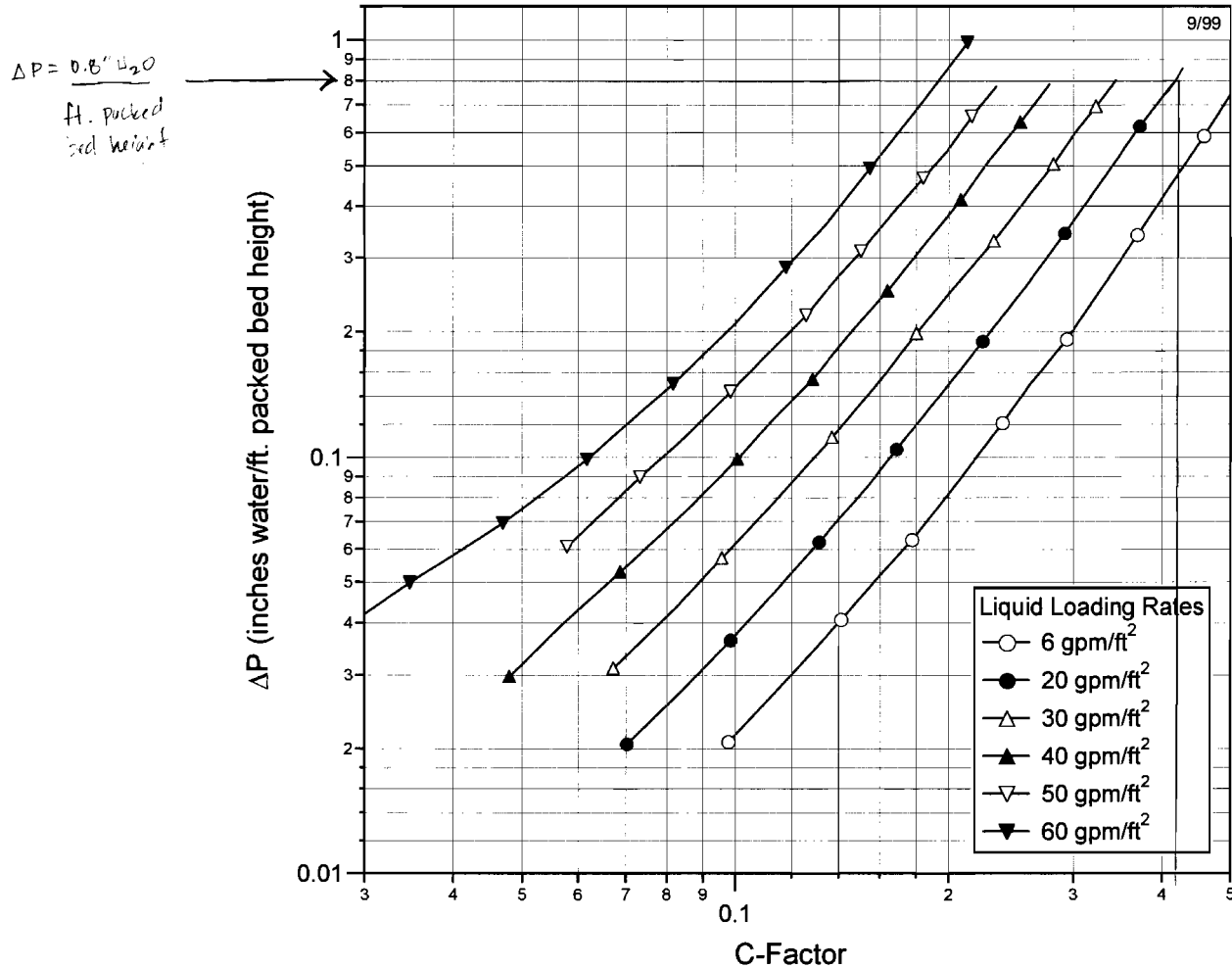
Fax: 281-449-9400

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Pressure Drop vs. C-Factor

3.5" Plastic Jaeger Tri-Packs™

Ambient Air-Water Systems for Various Liquid Loadings



$$C\text{-Factor} = V_s [(\rho_L)/(\rho_L - \rho_V)]^{1/2} \text{ where}$$

V_s = Superficial Vapor Velocity in ft/sec
 ρ_L and ρ_V = Density of Liquid and Vapor in lb/ft³

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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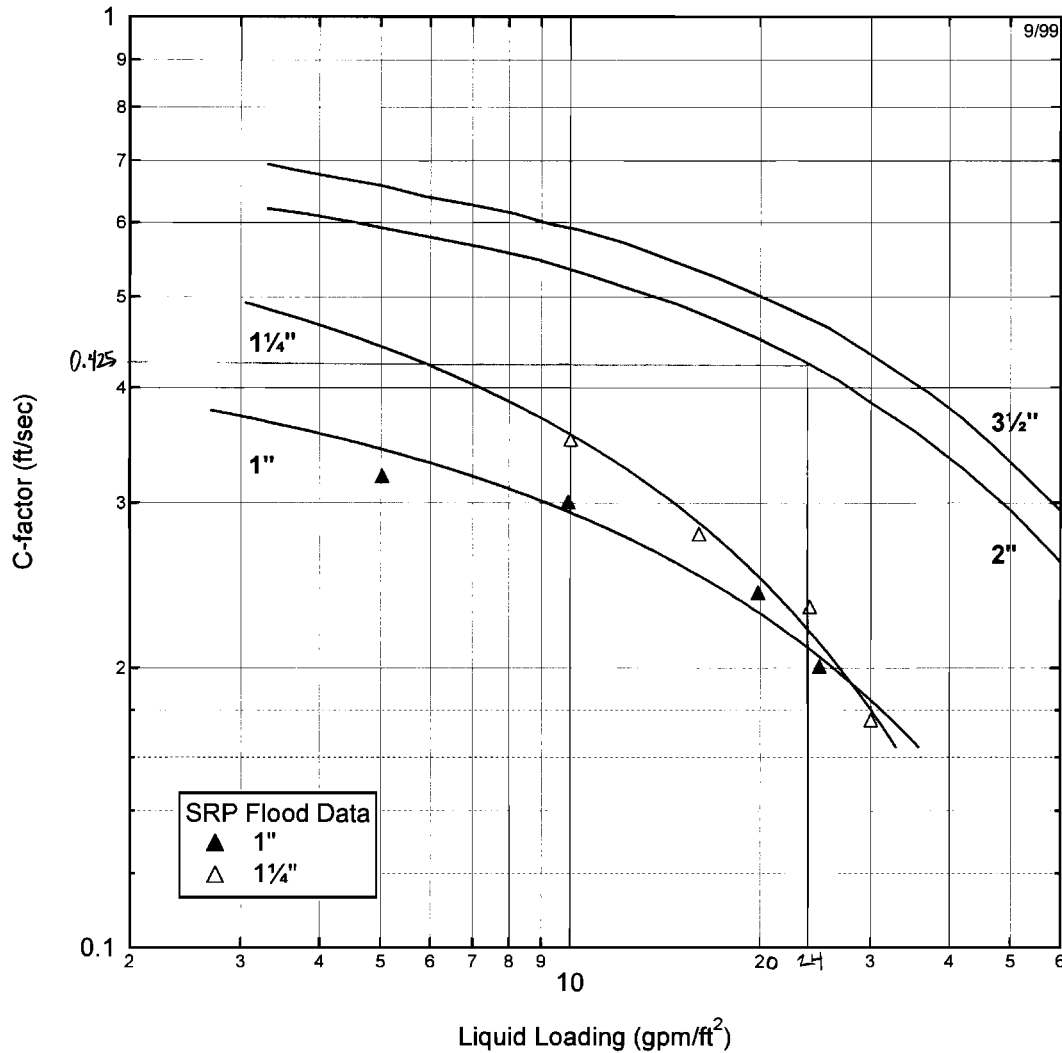
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Generalized Flooding Curves

Plastic Jaeger Tri-Packs[®]

Ambient Air-Water Systems at 1 atm, 70°F



SRP Flood Data
 ▲ 1"
 △ 1 1/4"

$C\text{-Factor} = V_s [(\rho_v)/(\rho_L - \rho_v)]^{1/2}$ where
 V_s = Superficial Vapor Velocity in ft/sec
 ρ_L and ρ_v = Density of Liquid and Vapor in lb/ft³

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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SRP - Separations Research Program, University of Texas at Austin.

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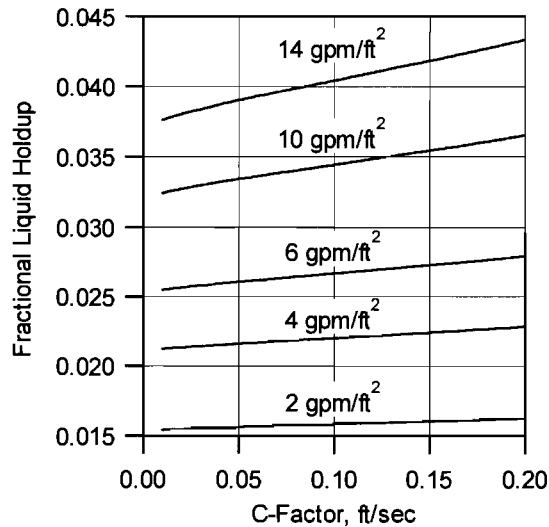
Fax: 281-449-9400

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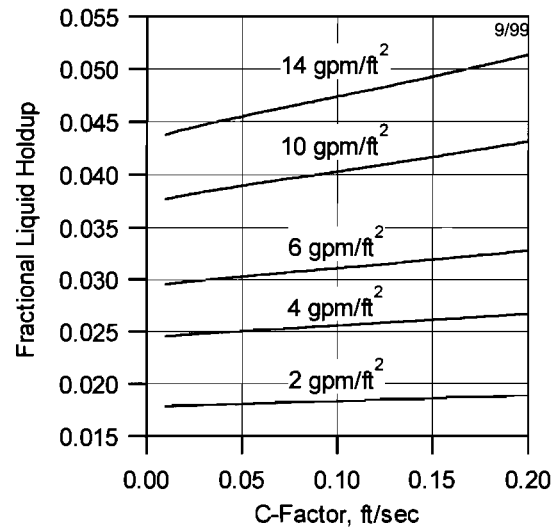
Liquid Holdups

Jaeger Tri-Packs®

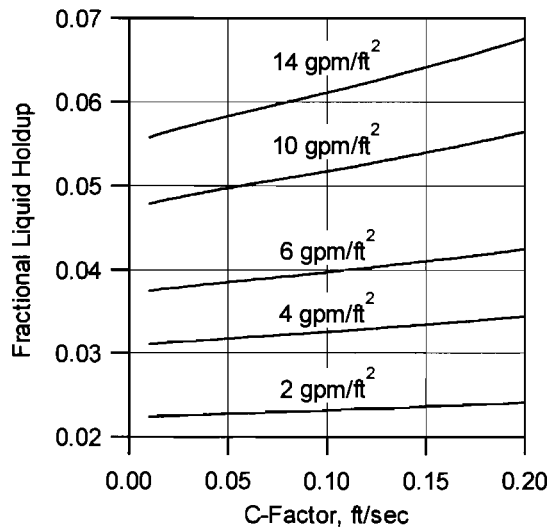
3 1/2" Jaeger Tri-Packs®



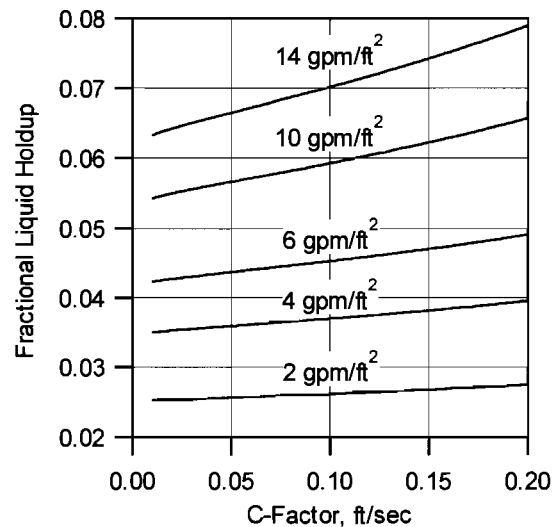
2" Jaeger Tri-Packs®



1 1/4" Jaeger Tri-Packs®



1" Jaeger Tri-Packs®



Fractional holdups estimated from formula presented in I&EC Research, 5(33), 1222 (1994).

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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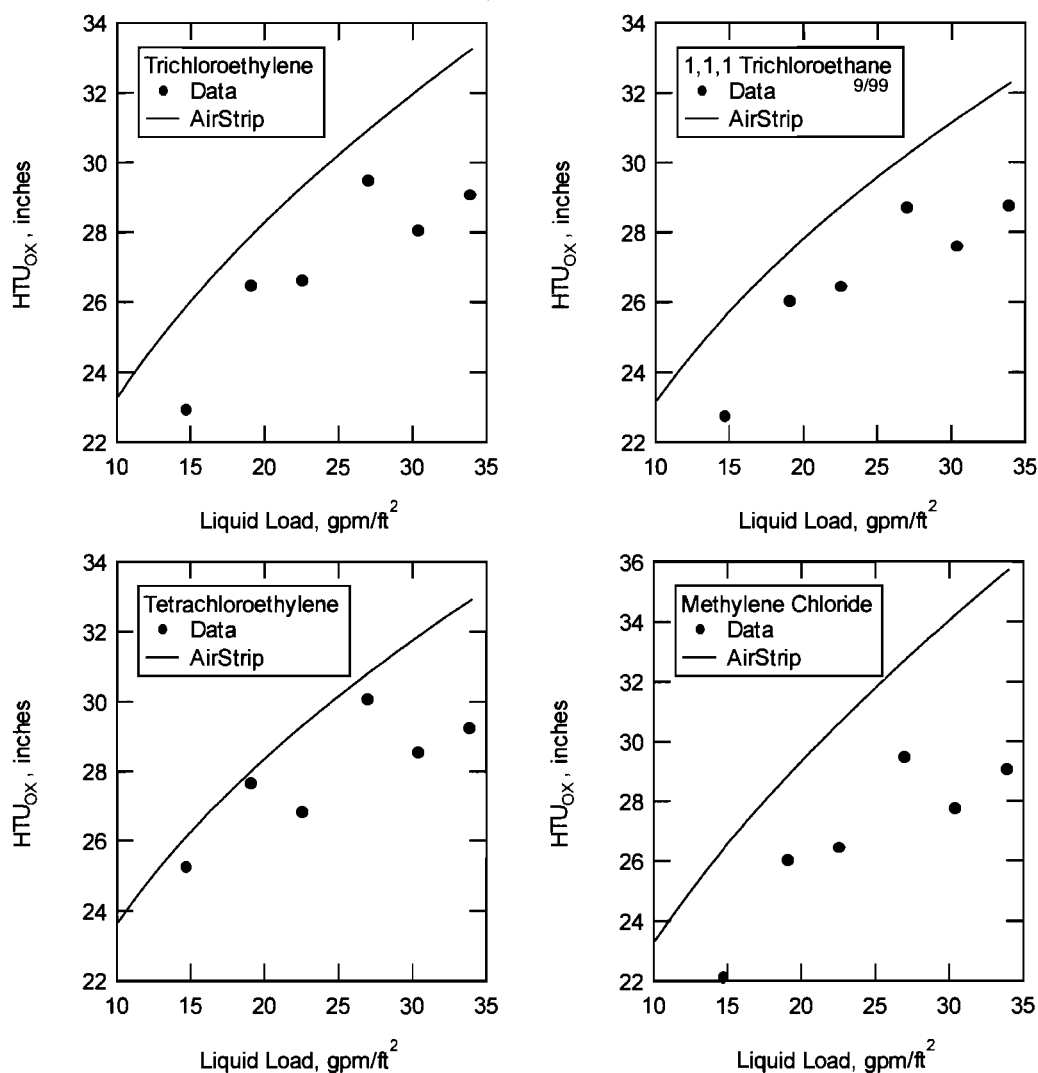
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...Jaeger Tri-Packs® Exceed Expectations

AirStrip® Predictions

T=25C, C-factor=232.2 ft/hr



2" Jaeger Tri-Packs® performance data taken from U.S. Department of Commerce document AD-A 158 811, June 1985.
AirStrip v.1.2 is a computer program which uses the mass transfer correlations of Onda et al., to design and rate air strippers.

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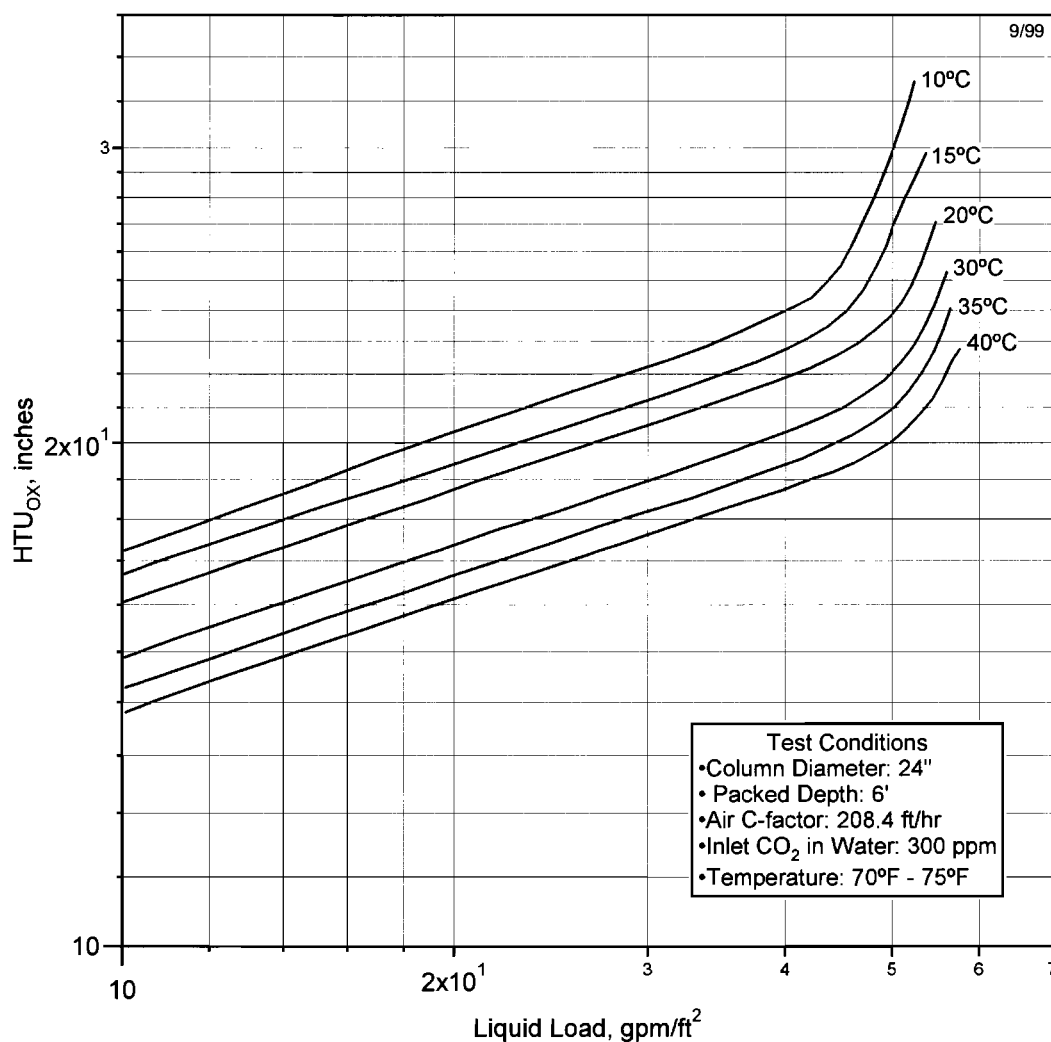
Phone: 281-449-9500

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HTU_{ox} for CO₂ Desorption from Water

2" Plastic Jaeger Tri-Packs



For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

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Absorption/Scrubbing

MASS TRANSFER DATA

Absorption System	G (lb/hr-ft ²)	L (lb/hr-ft ²)	Temp. (°F)	HTU-Inches		
				1	2	32
HCl-H ₂ O	1792	2048	77	7.0	10.6	12.0
HCl-NaOH	1567	2048	68	6.1	8.8	10.0
Cl ₂ -NaOH	1229	2202	122	9.9	14.5	16.0
NO ₂ -Na ₂ S+NaOH	717	1127	68	32.0	49.2	54.0
NH ₃ -H ₂ SO ₄	492	1024	68	4.1	6.0	7.0
NH ₃ -H ₂ O	512	1024	68	5.6	8.4	10.0
NH ₃ -H ₂ O	512	4096	68	3.6	5.4	6.2
SO ₂ -NaOH	1946	4096	140	8.1	12.0	14.0
HF-H ₂ O	1844	3072	77	4.6	6.9	8.1
H ₂ S-NaOH	1229	1331	68	13.0	19.4	22.0

Typical Design Parameters

- Gas Velocity** 100-500 ft/min.
These loadings are based on the cross-sectional area of the scrubber as seen by the gas. In counter-current scrubbers this area corresponds to the cross-section of the tower. In cross-flow scrubbers, it corresponds to the cross-section on a vertical plane of the packed bed.
- Liquid Loading** 2-10 gpm/ft²
These loadings are based on the cross-sectional area of the scrubber as seen by the liquid. In counter-current scrubbers, this area corresponds to the cross-section of the tower. In cross-flow scrubbers, it corresponds to the cross-section on a vertical plane of the packed bed.
- Packing Size** For random packings, optimum size scrubber diameter/packing size ratio is 12:1.
- pH** pH needs to be specified and controlled for any absorption involving contaminants which can dissociate in aqueous solution. Contact Jaeger for your specific application.
- Pressure Drop** Packed bed pressure drop in new scrubbers should be between 0.02" and 0.2" water/ft. of packed bed depth for optimum design.
- Blowdown and Makeup Rates** These two variables need to be determined by process design and material balance considerations within the constraints shown above. Consult Jaeger for the proper values for your application.

JAEGER

Jaeger Understands Your Water Treatment Needs

Among the biggest long term maintenance problems facing personnel charged with operating scrubbers and strippers are *scaling*, *fouling*, and *disinfection*. *Scaling* is the precipitation and deposition of water-insoluble salts onto column internals and packing. Scaling is distinct from *fouling*, which involves the formation of deposits other than salts and which may be due to corrosion or biological growth. Finally, operators must consider *disinfection* if the water being treated is ultimately destined for human or animal consumption.

Scaling is especially troublesome when the contaminant being dealt with can dissociate or needs to dissociate in water to effect its efficient removal. For these contaminants, water pH is adjusted by adding strong acids or bases to prevent or enhance dissociation. Generally speaking, dissociation needs to be prevented when the contaminant is to be stripped from water; it needs to be enhanced when the contaminant is to be scrubbed from air. Unfortunately, when these pH adjustments are performed on "hard" water, one is often forced to cross the solubility envelopes for sparingly soluble salts of calcium, iron, or magnesium (among others). If these solubility phase boundaries are crossed, precipitation is a thermodynamic inevitability. Contrary to popular belief, **packing geometry plays little or no role in the scaling process**. The rate at which a packing scales, therefore, depends primarily upon the initial water "hardness" and the "pH driving force", i.e. the difference between the operating pH and the pH at the solubility limit for the salt in question, with secondary effects caused by liquid and gas loading.

The pictures shown are of actual packings and internals taken from different air stripping towers in the field. The picture on the top right is of 3 1/2" Lanpac®, claimed by its manufacturer to be "scaling and fouling resistant". It came from an air stripper located in an area where the groundwater is high in iron. The middle picture is of a conventional Pall® ring that also fouled severely in an air stripping application. Finally, the bottom right picture is of the distributor removed from the same tower which held the Pall® rings of the center photo.

Two very common contaminants - ammonia and hydrogen sulfide - require that water pH be adjusted for effective stripping or scrubbing to take place. Ammonia is a weak base while hydrogen sulfide is a weak acid. Vapor/liquid equilibrium considerations make ammonia normally amenable only to scrubbing while hydrogen sulfide can be scrubbed or stripped. The top graph on the opposite page illustrates the effect of pH on the dissociation of these two compounds. The bottom graph is a solubility phase diagram for three of the more common cations found in "hard" water. Comparison of these two graphs illustrates that there can be significant overlap of the regions of best "operational" pH into regions of high scaling potential for these two example compounds. Similar analyses could be done for other compounds and/or other cations.

Clearly, the best way to avoid costly shutdowns from scaling is to prevent them. Addition of sequestering agents or other appropriate chemicals can drastically minimize column down time. In situations where chemical addition is inappropriate, or perhaps even prohibited, a proper maintenance and cleaning program should be implemented, which might include *in situ* acid or caustic washing of the packing and internals. These measures will also help to reduce fouling.



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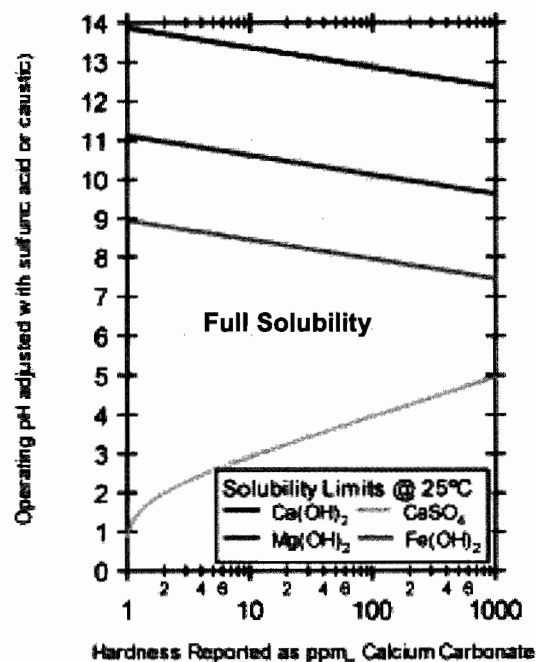
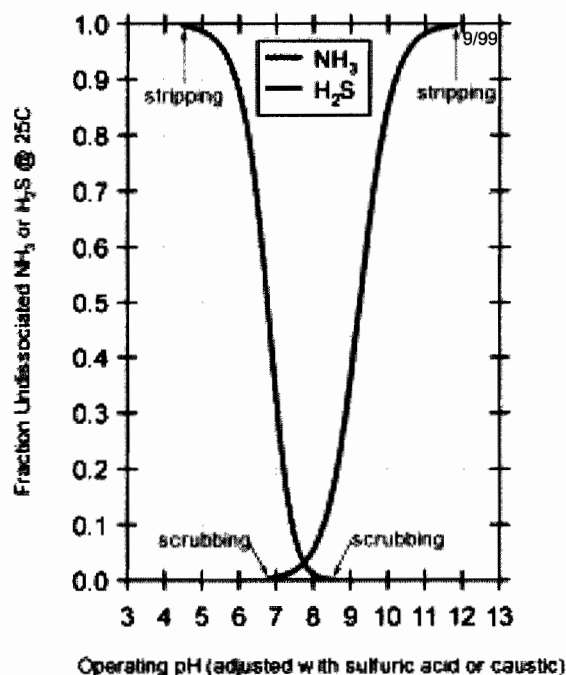
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Disinfection refers to the killing of microorganisms. Most forms of disinfection, including chlorination and ozonation, kill organisms by oxidation. The exception is UV disinfection, which kills organisms with ultraviolet radiation. Chlorination is by far the most common disinfectant in use in the United States. One concern associated with chlorine use is its potential to react with suspended or soluble organic matter to produce *trihalomethanes* (THMs). These compounds appear to be potent carcinogens. The *trihalomethane formation potential* (THMFP) is a measure of the tendency of a water source to produce THMs. Unfortunately, the effectiveness of chlorine is decreased by high pH and low temperature. For these reasons, ozone is becoming a more common disinfectant. Ozone is a much more powerful oxidant than chlorine. It is also naturally unstable, with half-life of approximately 20 minutes. It, therefore, must be generated at its point of use. Ozonation is very common in Europe. It has received increased attention recently because it is the only disinfectant that appears to be effective against *cryptosporidium*.

Today, Jaeger is the only packing supplier offering you more than just rhetoric on the subjects of scaling, fouling, and disinfection. For example, our non-toxic pretreatment product, JP-7, is a proven technology based on polyphosphate chemistry. Polyphosphates sequester "hard" cations in solution by complexing with them to form large, soluble clusters. In addition, JP-7 has been approved by the EPA, the Department of Agriculture, and several state health agencies for use in potable water systems. Where water comes in contact with metals JP-7 has the added benefit of acting as a corrosion inhibitor. Contact Jaeger for additional information about scaling, fouling, and disinfection and how we might help you to overcome these difficulties.



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Conversion Factors

FROM	TO	MULTIPLY BY	ADD OFFSET
mg/ml	ppm _w	1.0	
1/ft	1/m	3.2808	
atm	psia	14.696	
atm	psig	14.696	-14.696
atm	torr	760	
C	F	1.8	32
C	K	1	273.15
C-factor (air/water @70°F) ft/se	lb/hr ft ²	7776.2	
F	K	.5556	255.3722
ft	cm	30.48	
ft	m	.3048	
ft ² /ft ³	m ² /m ³	3.2808	
ft ³	gal (US)	7.4805	
ft ³	m ³	.0283	
g/cm ³	lb/ft ³	62.428	
gm/cm ³	kg/m ³	1000	
gpm/ft ²	lb/hr ft ² (water @ 70°F)	499.7	
hr	sec	3600	
in	m	.0254	
in wc/ft	dyne/cm ³	81.5617	
in wc/ft	Pa/m	815.6168	
kg	gm	1000	
kg	lb	2.2046	
kg/m ² *sec	lb/ft ² *hr	737.3402	
kg/sec	lb/hr	7936.6829	
kg mole/m ² *sec	lbmole/ft ² *hr	737.3402	
kW	hp	1.341	
lb	gm	453.59	
m ²	cm ²	10000	
m ²	ft ²	10.7639	
m ² /m ³	cm ² /cm ³	.01	
m ³	liters	1000	
mg/l	ppm _w	1.0	
Millions of Gallons/Day	gpm	694.46	
min	sec	60	
ppm _w	ppb _w	1000	

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		Packing Factor (lb)	Weight (lb)	Surface Area (ft ²)	Unit Volume (ft ³)
Plastic Packing					
Jaeger Tri-Packs®	1"	28	6.2	85	90
	1 1/4"	25	5.6	70	92
	2"	16	4.2	48	93.5
	3 1/2"	12	3.3	38	95
Cascade Mini-Rings®	1"	26	4.0	85	92
	2"	16	3.5	50	93
	3 1/2"	12	3.2	40	94
Jaeger Rings	5/8"	97	7.8	108	86
	1"	52	5.9	64	90
	1 1/2 "	32	4.8	44	91
	2"	25	4.3	33	92
	3 1/2"	16	3.8	26	93
Jaeger Saddles	1"	33	4.7	60	91
	2"	21	3.3	30	94
	3"	16	2.8	20	95
Bio-Ring™	3 1/2"	NA	2.8	32	95
Cascade Bio-Ring™	7"	NA	2.2	30	95

Metal Random Packing

VSP®	25 mm	32	11.9	62.5	97.5
	40 mm	21	10.6	40.2	98
	50 mm	20	10.0	33.5	98
Top-Pak®	75 mm	16	10.0	24.4	98
Interpack®	10 mm	246	40.5	189	90
	15 mm	122	21.5	110	94
	20 mm	73	21.8	79.5	96

Metal Structured Packing

Max-Pak™	1/2"	19-22	12.8	77	97
----------	------	-------	------	----	----

Ceramic Packing

Novalox® Saddles	1/2"	201	43.0	190	73
	3/4 "	131	41.0	102	74
	1"	97	40.3	78	74
	1 1/2 "	52	40.3	61	75
	2"	40	36.8	37	77
	3"	22	35.9	28	77

For More Information:

General Brochure

Series 100

Metal VSP & Metal Top-Pak

Series 200

Metal Random Packing

Series 400 - Future Publication

CoFlo™ Trays

Series 300

Fractionation Trays

Series 450 - Future Publication

Metal Max-Pak™

Series 500

Plastic Jaeger Tri-Packs™

Series 600

Plastic Rings & Saddles

Series 700

Plastic Cascade Mini-Rings

Series 800

Biological Products & Chemicals

Series 900 - Future Publication

Ceramic Packing

Series 1000

Column Internals

Series 1100

Manufactured and Marketed by:

Jaeger Products, Inc.

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Houston, TX 77039

Phone: 281.449.9500 • Fax: 281.449.9400

800.678.0345

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— Complete Technical Catalog includes all of the above along with other technical and performance information.

NOTE: The information presented in this brochure is believed to be accurate and reliable. However, it is based on test results which may not apply to your application. Therefore, the data is presented without guarantee or warranty. We recommend that you contact Jaeger's engineering department or your local representative to discuss the details of your specific application.

JAEGER TRI-PACKS® is a Trademark of JAEGER PRODUCTS, INC., U.S. Patent No. 4,203,935. Canadian Patent No. 1,150,621. Tri-Packs have the Trademark "HACKETTEN" in Germany. Further Patents Pending.

JAEGER PRODUCTS, INC. is a member of Fractionation Research, Inc. and Water Environment Federation.

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Noryl®

Kynar®

Halar®

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Intalox®

Pall®

Raschig®

Tellerette®

Hiflow Rings®

Lanpac®

NSF®

B.F. Goodrich

General Electric Company

Elf Atochem North America, Inc.

Ausimont USA, Inc.

E.I. DuPont de Nemours & Co., Inc.

E.I. DuPont de Nemours & Co., Inc.

Norton Chemical Process Products

Norton Chemical Process Products

Raschig AG

Ceilcote-Air Pollution Control

Rauschert Industries, Inc.

Lantec Products, Inc.

NSF International

Represented by:



Superior performance by design™
JAEGER PRODUCTS, INC.®

600-1099-10000

**TRANSFER PUMP FROM SUMP TANK TO
BAG FILTER/CARBON FILTER/LIFT STATION
&
MANUFACTURER INFORMATION**

JOB: BUDG AS4141 BOD

COMPUTED BY: J. COOK

DATE: 7-17-07

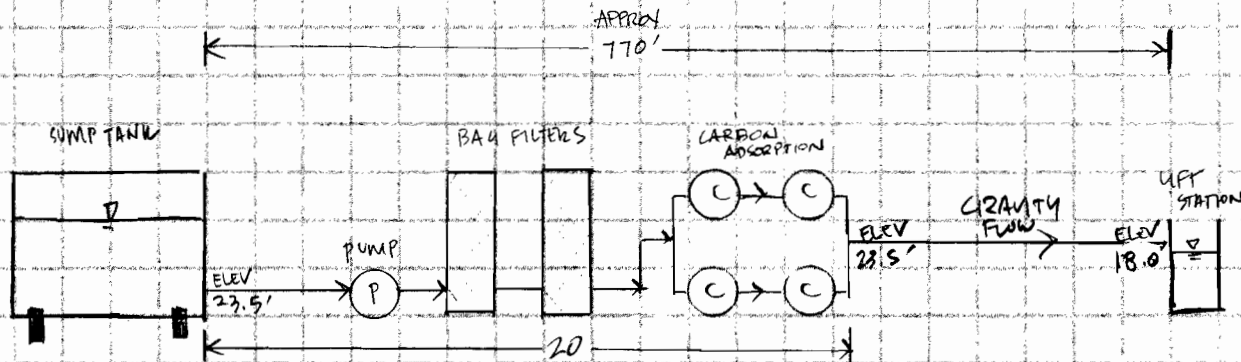
DESCRIPTION: TRANSFER PUMP

CHECKED BY: MZM

DATE: 7-24-07

SHEET 1 OF 2

TRANSFER PUMP FROM SUMP TANK TO BAG FILTERS, CARBON DRUMS & LIFT STATION



- STATIC LIFT = $18' - 23.5' = -5.5'$

- LENGTH OF 2" PVC PIPE = 770'

- HEAD LOSS THROUGH BAG FILTERS = APPROX. 0.5 PSI OR 1' SAY 2'

- HEAD LOSS THROUGH CARBON = 1 PSI OR APPROX 16' SAY 20'

- ASSUME EQUIV. LENGTH OF PIPE FOR MINOR LOSS = 20% TOTAL LENGTH OF PIPE = $0.2(770') + 154'$

- TOTAL LENGTH OF PIPE = $770' + 2' + 20' + 154' = 946$ SAY 930'

- TOTAL HEAD LOSS @ 20 GPM = $9.8' / 1000' \text{ LENGTH OF PIPE} = 0.0098' \times 930' = 9.114'$ SAY 10'

- ELEVATION HEAD = $-5.5'$ (APPROX.)

- TOTAL DYNAMIC HEAD = $-5.5' + 10' = 4.5'$ SAY 5' OR 2.16 PSI (TDH)

JOB: BLDG AS4141 BOD

COMPUTED BY: J. COOK

DATE: 7-9-07

DESCRIPTION: TRASH PUMP

CHECKED BY: MEM

DATE: 7/24/07

SHEET 2 OF 2

CONCLUSION

AT 20 GPM, THE SELECTED PUMP FROM THE SUMP TANK THROUGH THE BAA FILTERS AND CARBON ADSORPTION DRUMS MUST OPERATE @ 5' OR 2.16 PSI OF HEAD

SELECTION

A GOWDS CLOSED-COUPLED CENTRIFUGAL PUMP MODEL 3642, OR APPROVED EQUAL, HAS BEEN DETERMINED TO BE SUITABLE FOR TRANSFERING RECOVERED FLUIDS FROM THE SUMP TANK TO THE BAA FILTER, CARBON FILTERS & DISCHARGED TO THE MCAS WWTP. ADDITIONALLY, THE GOWDS MODEL 3642 PUMP, OR APPROVED EQUAL, SHALL BE 1/2 HP, 230 VOLT, 3-PHASE EXPLOSION PROOF. SEE ATTACHED MANUFACTURE INFORMATION.

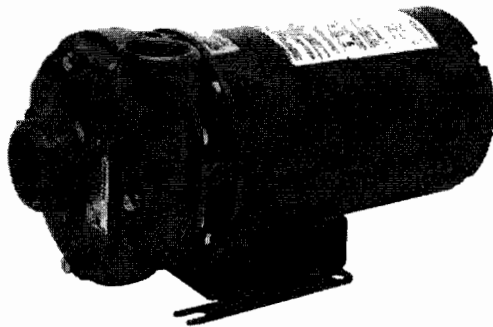


ITT

Commercial Water

Goulds Pumps

3642 Close-Coupled
Centrifugal Pumps



FEATURES

■ **Compact Design:** Close coupled, space saving design provides easy installation. Flexible couplings and bedplates not required.

■ **Mounting:** Can be mounted in vertical or horizontal position.

■ **Construction:** Available in bronze fitted (BF), all iron (AI), or all bronze (AB). Bronze fitted means bronze impeller.

■ **Impeller:** Enclosed design for high efficiencies. Threaded directly on motor shaft. Stainless steel locknut on three phase models requires no clearance adjustments. Balanced for smooth operation.

■ **Casing:** Volute type, cast iron or brass construction. Back pullout design. Discharge can be rotated in eight positions. Vertical discharge standard. Tapped openings provided for priming, venting and draining.

■ **Mechanical Seal:** Standard carbon/ceramic faces, BUNA elastomers, 300 series stainless steel components. Option seals available.

■ **Motor:** Close-coupled design. Ball bearings carry all radial/axial thrust loads. Designed for continuous operation. All ratings are within working limits of the motor.



Goulds Pumps is a brand of ITT Residential and Commercial Water.

www.goulds.com

Engineered for life



ITT

GOULDS PUMPS Commercial Water

APPLICATIONS

Specifically designed for the following uses:

- Water circulation
- Booster service
- Liquid transfer
- Spraying systems
- Jockey pump service
- General purpose pumping

SPECIFICATIONS

Pump

- Capacities: to 110 GPM
- Heads: to 118 feet
- Pipe connections:

Model	Suction	Discharge
1 x 1 1/4 - 5	1 1/4" NPT	1" NPT
1 1/4 x 1 1/2 - 5	1 1/2" NPT	1 1/4" NPT

- Maximum working pressure: 125 PSI
- Temperature: standard seal, 212°F (100°C) maximum or 250°F (121°C) with optional high temperature seal.
- Rotation: right hand i.e.; clockwise when viewed from motor end.

Motor

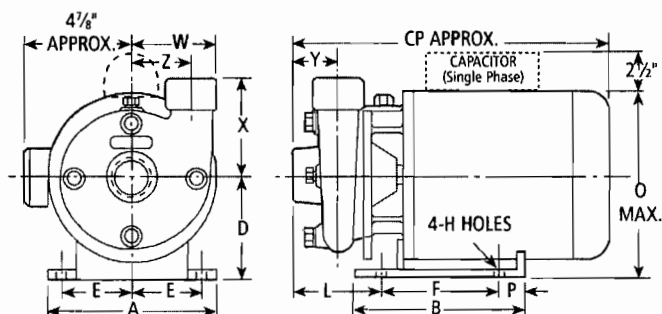
- NEMA standard
- Open drip proof, TEFC, or (explosion proof three phase only) enclosures.
- 60 Hz, 3500 RPM
- Stainless steel shaft
- Single phase: 1/2-2 HP ODP or TEFC. Built-in overload with automatic reset.
- Three phase: 1/3-2 HP: ODP, 208-230/460 V
1/2-2 HP: TEFC, 208-230/460 V
1/2-2 HP: expl. proof, 230/460 V
- Overload protection must be provided in starter unit. Starter and heaters (3) must be ordered separately.

Goulds Pumps is ISO 9001 Registered.

DIMENSIONS AND WEIGHTS

Pump	A	B	D	E	F	H	L	O	P	W	X	Y	Z	CP	Motor Frame	Wt. (lbs.)
1x1 1/4-5	6 3/4	5 7/8	4 1/8	2 15/16	5	1 3/32	3 3/8	7	7/16	4	4 1/8	2 3/16	3 1/16	13 1/2	48	55
1 1/4x1 1/2-5							3 3/8	7 3/8			4	2 1/4	2 15/16	15 1/2	56	67
														15 3/4	56	68

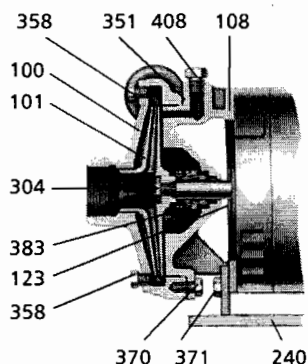
(All dimensions are in inches and weights in lbs. Do not use for construction purposes.)





ITT

GOULDS PUMPS Commercial Water



MOTOR FRAME

Motor Frame	Single Phase		Three Phase	
	ODP	TEFC	ODP	TEFC/EXPL
48	1/3	—	—	—
56	1/2 - 2	1/2 - 2	1/3 - 2	1/2 - 2

COMPONENTS

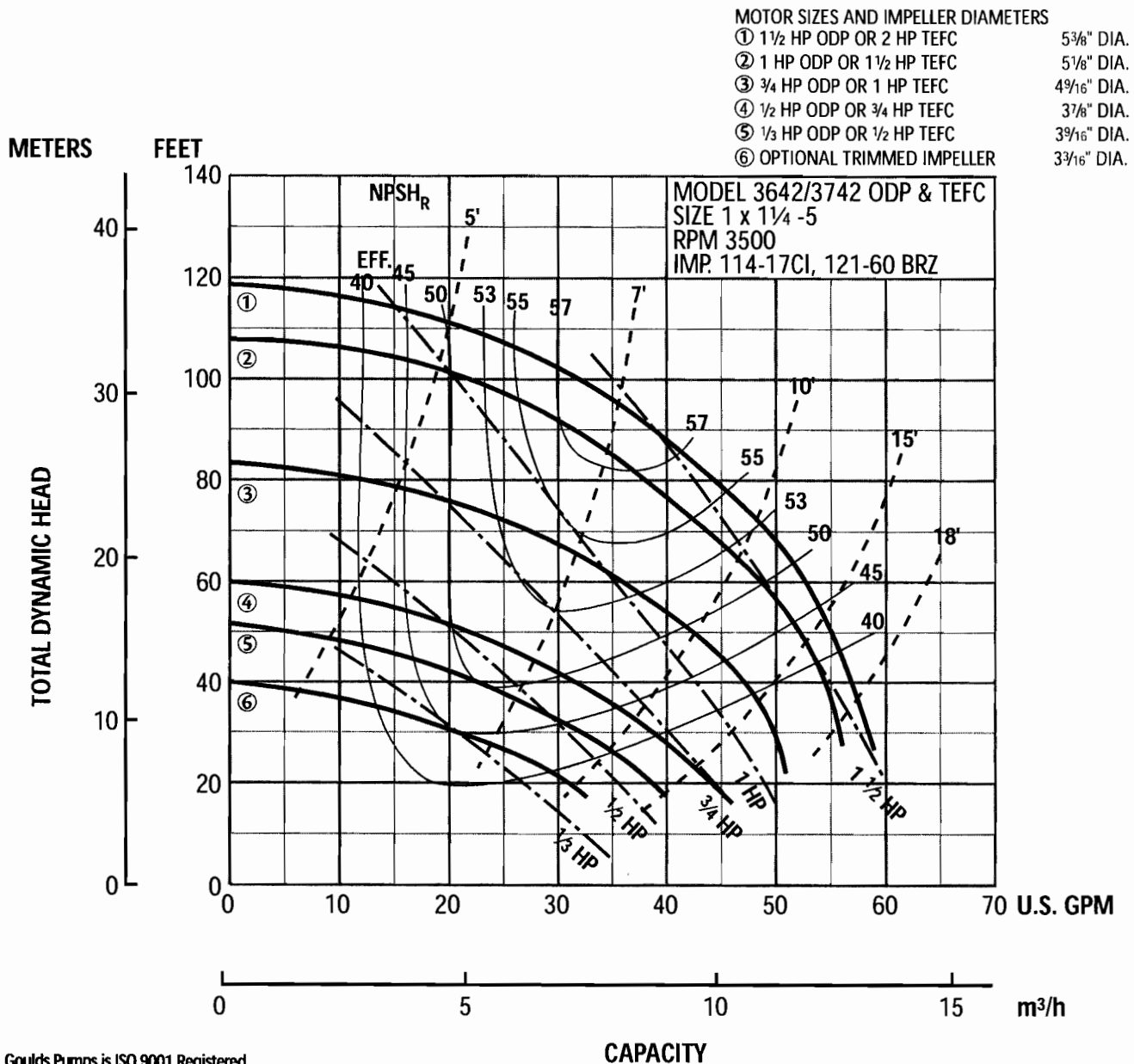
Item No.	Description	Material Code					
		Bronze Fitted	All Iron	All Bronze			
100	Casing	1001	1001	1101			
101	Impeller	1101	1001	1101			
108	Adapter	1001	1001	1101			
123	Water deflector	Rubber or Micarta®					
240	Motor Support	Steel					
	Rubber Channel	Rubber					
304	Impeller nut*	Stainless steel					
351	Gasket-casing	Composite					
358	Pipe plug ¼" vent and drain	Brass	Steel	Brass			
370	Hex head cap screw adapter to case	Zinc-Plated Steel					
371	Hex head cap screw adapter to motor	Zinc-Plated Steel					
408	Prime plug – priming ¼" NPT	Brass	Steel	Brass			
383	Mechanical Seal						
Order Suffix	10K10	Std.	Service	Rotary	Stationary	Elastomers	Metal Parts
			General	Carbon	Ceramic	BUNA	300 Series SS
N	10K6		Heavy Duty		Ni-Resist		
O	10K18	Opt.	Hi Temp.		Sil-Carbide	EPR	
V	10K55		Chem. Duty		Ceramic	Viton	

* Impeller nut furnished on three phase units only.

MATERIALS OF CONSTRUCTION

Material Code	Engineering Standard
1001	Cast iron ASTM A48 CL 20
1101	Bronze ASTM B584, C87500 Lead-Free

PERFORMANCE CURVE 1AI, 1BF, 1AB . . .



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 C36/3742

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Goulds Pumps



ITT Industries

**BAG FILTER
MANUFACTURER INFORMATION**

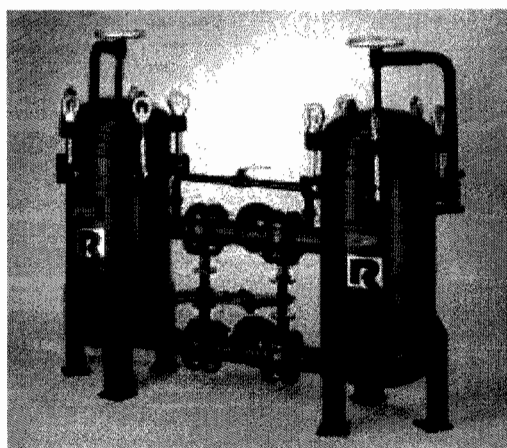
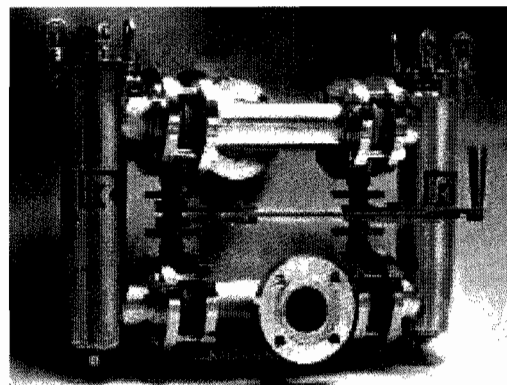
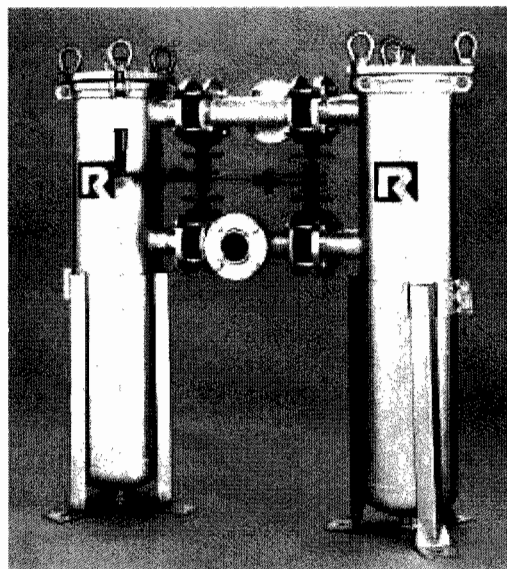
R Duplex Bag Filters And Basket Strainers

Trouble free, continuous operation

Duplex filters permit continuous operation, reducing overall operating costs. Flow can be switched back and forth between two filter vessels or housings, allowing one side to be serviced while the other is in use.

The Rosedale duplex, using a single multi-ported valve operating system (patent applied for), is a better solution, and offers many benefits:

- Four separate valves are used all operated simultaneously by a single lever.
- Valves use the standard butterfly design, known for their effective seal, low pressure drop, and low cost.
- Any of the valves can be serviced individually, without need to disturb the other valves or piping. Replacements are readily available.
- Valves are soft-seated to provide bubble-tight closure.
- A variety of valve seal materials is available for use with a number of hard-to-handle fluids.
- Pressure drop is minimized because the flow path has the equivalent of only four elbows instead of the usual six.
- Mechanical stops assure that the valves are completely open or closed.
- A single-valve pressure balancing vent system is furnished to ease movement of the lever and to fill the just serviced vessel before use.
- Vents in filter covers and drain ports in filter housing speed evacuation and filling.
- Remotely operated power actuators and automatic power actuation (triggered by pressure differential sensing) are offered. Air or electric actuation is best if such power is available.



Construction Materials

Available in carbon steel, 304 stainless steel, or 316 stainless steel.

Internal valve parts other than seals are 316 stainless steel.

Four different materials can be ordered for all seals involved.

All baskets and mesh linings are made of stainless steel. 304 stainless will be supplied with carbon and 304 housings, 316 stainless with 316 housings.

Choosing a Basket Strainer or Bag Filter

Choose between straining a fluid (removing particles down to 74 micron size) and filtering it (removing particles down to 1 micron).

Pressure Drop Data

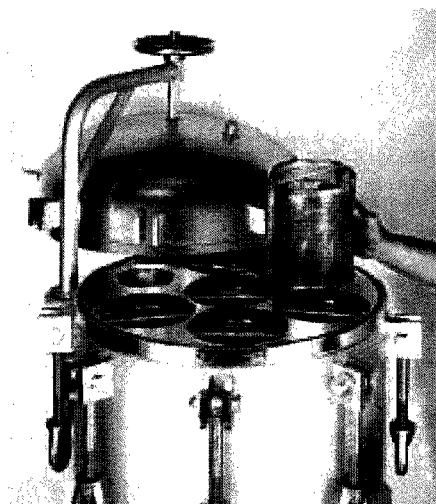
Basket strainers and bag filters are usually selected so that the pressure drop does not exceed 2 psi, when they are clean. Higher pressure drops may be tolerated, when contaminant loading is low.

The pressure drop data are accurate for all housings with strainer or filter bag baskets. When filter bags are added, total pressure drop becomes the sum of the pressure drop as determined by the steps below plus the pressure drop through the bag as defined on pages 61 and 62.

Follow these easy steps:

1. Using the desired pipe size and approximate flow rate, determine the basic pressure drop from the appropriate graph.
2. Multiply the pressure drop obtained in step 1 by the viscosity correction factor found in the accompanying table. This is the adjusted (clean) pressure drop for all baskets without filter bags.

Note: Filter bags are specified separately. See page 120-130.



	Viscosity, cps								
	1 (H ₂ O)	50	100	200	400	600	800	1000	2000
All unlined baskets	.65	.85	1.00	1.10	1.20	1.40	1.50	1.60	1.80
40-mesh lined	.73	.95	1.20	1.40	1.50	1.80	1.90	2.00	2.30
60-mesh lined	.77	1.00	1.30	1.60	1.70	2.10	2.20	2.30	2.80
80-mesh lined	.93	1.20	1.50	1.90	2.10	2.40	2.60	2.80	3.50
100-mesh lined	1.00	1.30	1.60	2.20	2.40	2.70	3.00	3.30	4.40
200-mesh lined	1.30	1.70	2.10	3.00	3.40	3.80	4.40	5.00	6.80

Selecting A Size

These descriptions and flow charts can aid in size selection. Capacities given are for each of the two vessels in any duplex system.

Model 4-For flow rates to 50 gpm*

- Pipe sizes 1, 2, or 3 inch, flanged
- Basket depth: 12 inches (nominal)

Basket Data

Depth (nominal, inches)	Diameter (inches)	Surface Area	Volume (cu. in.)
12	3.9	1.0	130

Model 6-For flow rates to 100 gpm*

- Delivers 3.4 square feet of basket or bag surface without need for ASME code construction.
- Can be fitted to hold cartridge filter elements
- Pipe sizes 1, 2, 3, or 4 inches (flanged).
- Two basket depths: 18, or 30 inches (nominal)

Basket Data

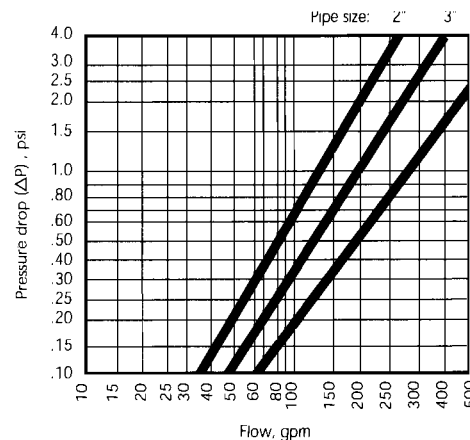
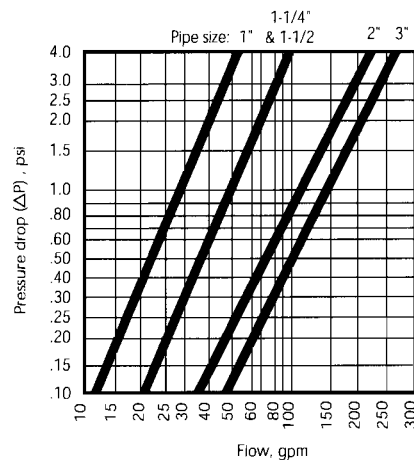
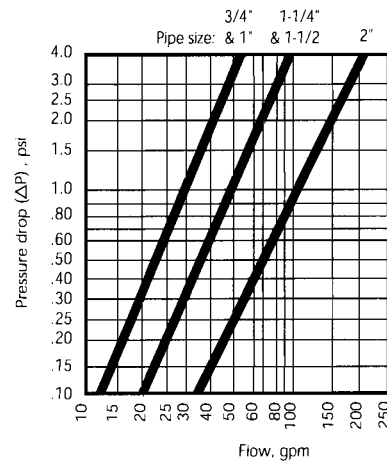
Depth (nominal, inches)	Diameter (inches)	Surface Area	Volume (cu. in.)
18	5	2.0	350
30	5	3.4	630

Model 8-For flow rates to 220 gpm*

- Can be fitted to hold cartridge filter elements
- Pipe sizes 2, 3, or 4 inch, flanged.
- Two basket depths: 15 or 30 inches (nominal)

Basket Data

Depth (nominal, inches)	Diameter (inches)	Surface Area	Volume (cu. in.)
15	6.7	2.3	500
30	6.7	4.4	1000

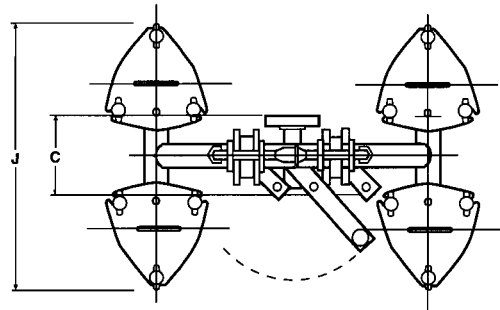
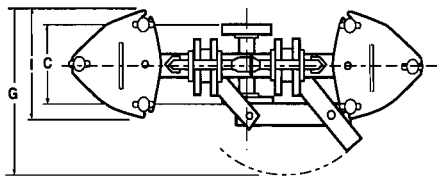


*Based on housing only. Fluid viscosity, filter cartridge used, and expected dirt loading should be considered when sizing a filter.

Single-Basket Models (IN)

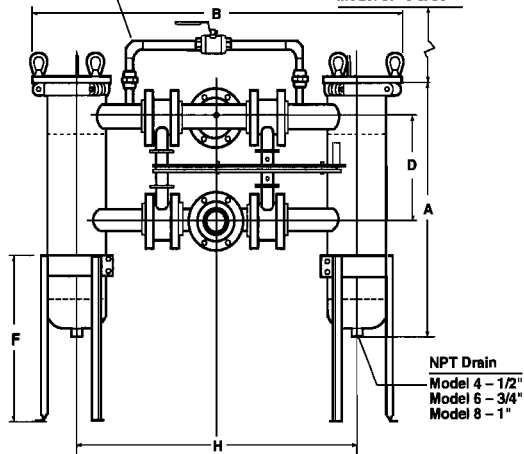
Model	Flange Size	A For basket depths				B	B1 (Model 82 only)	C	D	F	G	H	I	J (Model 82 only)
		12	15	18	30									
4	1	18				29.5		9	15	14	19	22.25	7.0	
	2	18				29.5		9	15	14	19	22.25	7.0	
	3	22.125				31.75		11	17	14	19	24.25	7.0	
6	1			25.75	37.75	34.75		9	15	18	20.5	24.25	10.0	
	2			25.75	37.75	34.75		9	15	18	20.5	24.25	10.0	
	3			27.75	39.625	37		11	17	18	20.5	26.25	10.0	
	4			27.625	39.625	41.5		13	18	18	20.5	31	10.0	
8	1		23.75		38.75	44.75	45.75	9	15	22	21.3	32.25	11.6	28.6
	2		23.75		38.75	44.75	45.75	9	15	22	21.3	32.25	11.6	28.6
	3		25.625		40.625	47	48	11	17	22	21.3	34.5	11.6	30.6
	4		25.625		40.625	49.5	50.5	13	18	22	21.3	37	11.6	30.6

The inlets and outlets on all duplex systems come standard in a horizontal configuration (facing opposite directions). The option of arranging the inlet and outlet is available in three positions, 90° apart. The system is designed with flanged tees, allowing the orientation to be changed in the field.



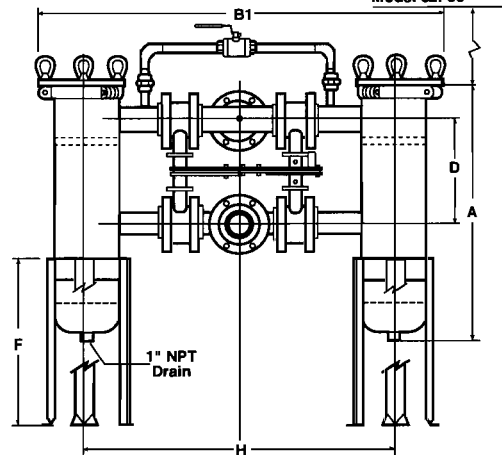
No pressure balance valve on Model 4

Basket Removal Clearances:
Model 4: 12"
Model 6: 18 & 30"
Model 8: 15 & 30"



NPT Drain
Model 4 - 1/2"
Model 6 - 3/4"
Model 8 - 1"

Basket Removal Clearance:
Model 82: 30"



Duplex Model 82

Duplex Models 4, 6, and 8

CARBON ADSORPTION DRUMS MANUFACTURER INFORMATION



Virgin Granular Coal Based Carbon (Liquid Phase)

Carbonair's virgin granular coal based carbon is manufactured from selected grades of bituminous coal which give high adsorption surface area with a broad pore size distribution (micropore, mesopore, and macropore). This carbon is recommended for a variety of organic hydrocarbons.

Typical Applications

Groundwater, wastewater, potable water, liquid process purification, decolorization, and dechlorination.

Typical Contaminants

Petroleum hydrocarbons such as MTBE, BTEX (benzene, toluene, ethylbenzene, xylenes), butylbenzene, isopropylbenzene, isopropylether, propylbenzene, styrene, trimethylbenzene, tetraethyl lead (TEL), low molecular weight PAHs (polyaromatic hydrocarbons such as naphthalene, methyl naphthalene) and high molecular weight PAHs (fluoranthene, phenanthrene, and pyrene).

Chlorinated and brominated hydrocarbons such as bromoform, bromodichloromethane, carbontetrachloride, chlorodibromomethane, chloroform, dibromochloropropane, dichloroethene (DCE), dichloroethane (DCA), ethylenedibromide, trichloroethane (TCA), trichloroethene (TCE), tetrachloroethane, and tetrachloroethene (PCE), and polychlorinated biphenyls (PCBs).

Other organic compounds such as dyes, pesticides, herbicides, insecticides, explosives, phenols, pentachlorophenols, and PCBs.

Inorganic compounds such as chlorine and chloramines.

Typical Physical Properties*

Iodine Number	900 (minimum)
Molasses Number	200 (minimum)
Apparent density (dense packing)	27-31 lbs/ft ³
Abrasion Number (Ro-Tap)	75 (minimum)
Moisture Content (as packed)	2% (maximum)
Mesh Size	8x30, 12x40

* Please consult with Carbonair for your specific application.

Florida

4710 Dignan St.
Jacksonville, FL 32254
904.387.4465 General
904.387.5058 Fax
800.241.7833 Toll-free
sales@carbonair.com

Minnesota

2731 Nevada Ave. N.
New Hope, MN 55427
763.544.2154 General
763.544.2151 Fax
800.526.4999 Toll-free
sales@carbonair.com

Texas

4889 Hunter Rd. Bldg 1-C
San Marcos, TX 78666
512.392.0085 General
512.392.0066 Fax
800.893.5937 Toll-free
sales@carbonair.com

Virginia

4328 West Main St.
Salem, VA 24153
540.380.5913 General
540.380.5920 Fax
800.204.0324 Toll-free
sales@carbonair.com

LPC Series Activated Carbon Filters

Carbonair's LPC Series activated carbon filters are typically used in gravity discharge or low pressure water treatment applications. The materials used in construction are in accordance with standards established by AWWA, FDA and EPA.

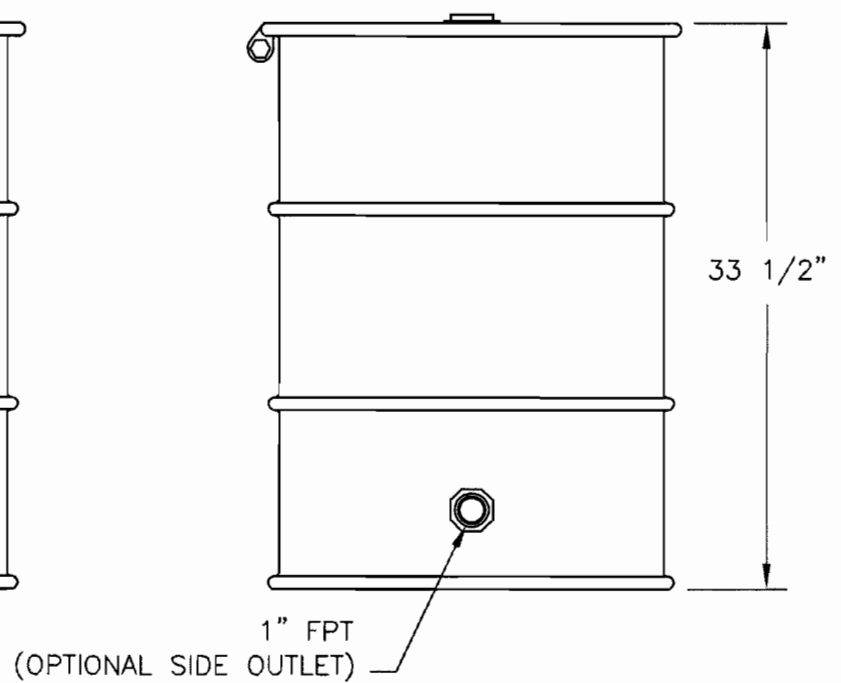
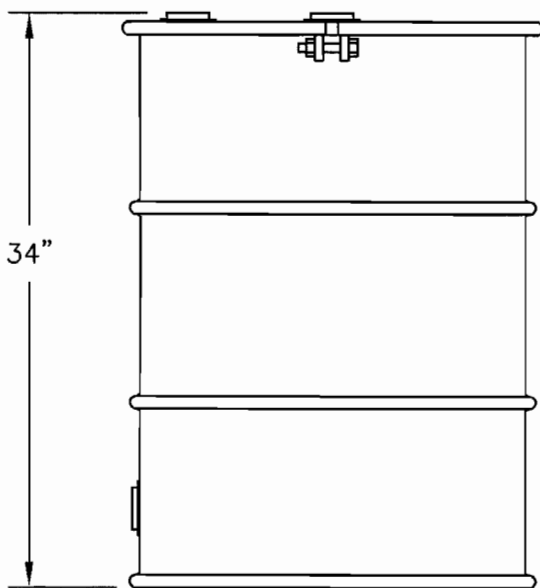
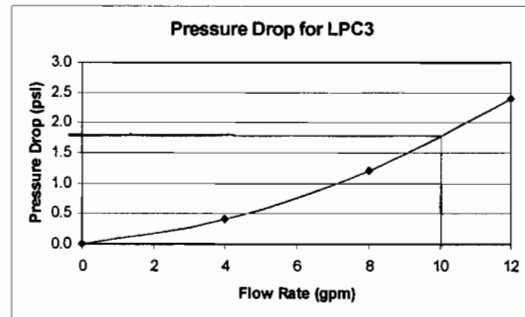
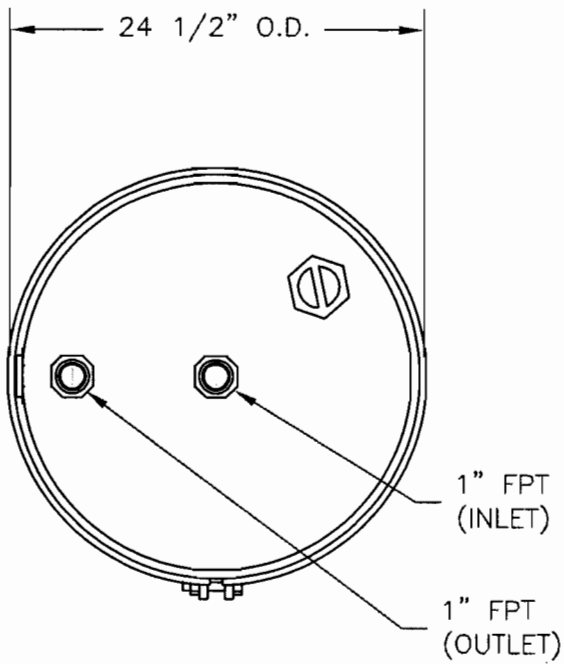
LPC Series Activated Carbon Filter Specifications

Model >	LPC3	LPC3.85
Diameter	24.5"	30"
Height	2.8'	3'-6"
Bed Area (sq feet)	2.6	3.68
Flow Range (gpm)	1-10	1-13
Carbon Capacity (pounds)	200	250
Fittings	1" NPT	1.5" NPT
Design Pressure (psi)	10	5
Empty Weight (pounds)	50	100
Loaded Weight (pounds)	250	350
Operating Weight (pounds)	423	725
Drained Weight (pounds)	355	600

Standard Features

- Low-pressure vessel
- 55-gallon steel drum (LPC3 and LPC3.85)
- Quick installation
- Welded steel construction
- 15 psi maximum design pressure

Carbon Adsorber—Liquid Phase
LPC 3



APPENDIX B

PROJECT SPECIFICATIONS

DEPARTMENT OF THE NAVY
SPECIFICATION NO:

NAVAL FACILITIES ENGINEERING COMMAND

CONTRACT NO:
N62470-05-D-6200
Delivery Order No. 0029

CONSTRUCT FREE-PHASE PRODUCT RECOVERY SYSTEM FOR BUILDING AS-4141
at the

MARINE CORPS AIR STATION

NEW RIVER, NORTH CAROLINA

DESIGN BY:

CATLIN ENGINEERS AND SCIENTISTS

P.O. BOX 10279
WILMINGTON, NORTH CAROLINA 28404-0279

SPECIFICATION PREPARED BY:

Architectural:	Civil:	Structural:
	Michael E. Mason, P.E.	

Electrical:	Mechanical:	Other:
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SPECIFICATION SUBMITTED BY: _____ DATE: _____

SPECIFICATION APPROVED BY: _____ DATE: _____

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01330	SUBMITTAL PROCEDURES
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-- End of Project Table of Contents --

SECTION 01006N

POST AWARD MEETINGS

09/03

PART 1 GENERAL

1.1 SUMMARY

This document includes post-award requirements for project kickoff and subsequent design and preconstruction meetings.

1.2 POST AWARD KICKOFF MEETING

The Post Award Kickoff (PAK) meeting is made up of three elements, Contract Administration, Design Presentation and Partnering. These three elements share common goals, participants and information. If mutually beneficial to the Contractor and the Government, these three elements may be addressed in a single meeting or multiple meetings.

1.2.1 PAK Meeting Location

Within 14 calendar days after contract award, and prior to commencing work, meet with the Contracting Officer for the one-day PAK meeting(s). The meeting shall be located at Marine Corps Base, Camp Lejeune, Environmental Quality Branch (EQD). The Contractor shall coordinate the meeting times and dates with his design and construction teams.

1.2.2 PAK Meeting Goals

The meeting(s) goals are:

- a. Integrate the Contractor and all client representatives into the project team.
- b. Achieve consensus from the project team on any issues and concerns with the Contractor's technical proposal.
- c. Establish and explain policies and procedures for completion of a successful project.
- d. Establish clear lines of communication and points of contact for Government and Contractor team members.

1.2.3 PAK Meeting Attendees

The following Contractor key personnel shall attend the PAK: Project Manager, Project Scheduler, Design Staff, Contractor's Professional Consultant, Superintendent, QC Manager, and DQC Manager. Optional attendees include: Principal, Assistant Project Manager, major subcontractors and specialized supplemental QC personnel.

1.2.4 Contract Administration

Contract and design build overview issues will be addressed.

1.2.5 Design Presentation

The Contractor shall present and submit for acceptance a Preliminary Network Analysis Schedule (PNAS) as described in Section 01321N NETWORK ANALYSIS SCHEDULE(NAS) to allow attendees to prepare for key milestone events and to anticipate any Critical Path Design Submittals. The PNAS shall indicate all design submittals the Contractor intends to submit for acceptance by the Government. The Contractor shall lead discussions to develop an understanding of the accepted technical proposal and conduct a working session to develop the approved conceptual site and floor plans.

1.3 PRECONSTRUCTION MEETING

Meet with the Contracting Officer to discuss construction items of concern to the Government and the Contractor such as outages, storage, trailer location, disposal of construction debris, etc. at a location to be determined by the Contracting Officer. The Preconstruction meeting may take place with the PAK meeting or at any time prior to mobilization and before any construction work begins.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION 01110N

SUMMARY OF WORK
02/03

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

The work includes providing, installing, and operating a free-phase product recovery system at the Building AS-4141 project site and incidental related work.

1.1.2 Location

The work shall be located at the MCAS New River, NC, Building AS-4141, approximately as indicated. The exact location will be shown on the plan sheets.

1.2 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.3 LOCATION OF UNDERGROUND FACILITIES

Obtain digging permits prior to start of excavation. The Contractor is to scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground, or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated to be specified or removed but indicated or discovered during scanning in locations to be traversed by piping, ducts, and other work to be conducted or installed.

1.3.1 Notification Prior to Excavation

Notify the Contracting Officer prior to starting excavation work. The Contractor is responsible for marking all utilities.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

SECTION 01140N

WORK RESTRICTIONS

02/03

PART 1 GENERAL

1.1 SPECIAL SCHEDULING REQUIREMENTS

- a. The Air Station will remain in operation during the entire construction period. The Contractor shall conduct his operations so as to cause the least possible interference with normal operations of the activity.
- b. Permission to interrupt any Activity airfields, roads, railroads, and/or utility service shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.

1.2 CONTRACTOR ACCESS AND USE OF PREMISES

1.2.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. To minimize traffic congestion, delivery of materials shall be outside of peak traffic hours unless otherwise approved by the Contracting Officer. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.2.1.1 Employee List

The Contractor shall provide to the Contracting officer, in writing, the names of two designated representatives authorized to request personnel and vehicle passes for employees and subcontractor's employees prior to commencement of work under this contract. The Contractor shall adhere to the most current requirements of "Important Clarifications - Contractors - How to Gain Access," in obtaining access to the Naval Air Station complex for the life of the contract. A copy of these requirements will be provided at the preconstruction meeting.

1.2.2 Emergency Response Requirement

The most appropriate protective action for certain emergencies is to take shelter. Personnel shall immediately seek shelter while an assessment is made of the threat and determinations are being made regarding subsequent actions such as "all clear" or selected building evacuations. The following procedures have been put in place in the event of an emergent condition.

1. NOTIFICATION: The primary means of alerting personnel shall be emergency alert signals. The alerting signal to seek shelter shall be three steady tones that last for thirty seconds separated by ten seconds of silence. The notification for "all clear" shall be three short tones repeated three times.

2. SHELTERING: When personnel hear the alert signal, the area of work must be secured in a manner that will leave the site in safe condition. Personnel shall seek shelter in the nearest occupied building in calm and orderly manner. If possible, secure all windows and doors and shut off ventilation. If in a vehicle, park the vehicle so that it does not block the normally traveled portion of the road and proceed into the nearest occupied building.

3. EVACUATION: In the event of an evacuation, personnel shall receive directions from team members of the Crowd Control Center (CCC) or the building custodian acting on the directions from the CCC. Contract personnel shall comply with instructions given at all times.

1.2.3 Working Hours

Regular working hours shall consist of times established by the Contracting Officer based on area of work to be performed for a particular activity, Monday through Friday, 7 a.m. to 4 p.m., excluding Government holidays.

1.2.4 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

1.2.5 Occupied and Existing Buildings

The Contractor shall be working around existing buildings which are occupied.

The existing buildings and their contents shall be kept secure at all times. Provide temporary closures as required to maintain security as directed by the Contracting Officer.

Provide dust covers or protective enclosures to protect existing work that remains and Government material located within the Building AS-4141 area during the construction period.

1.2.6 Utility Cutovers and Interruptions

- a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."
- b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
- c. Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.3 SECURITY REQUIREMENTS

The Contractor shall be working around active airfield operations. The Contractor shall observe Air Station security regulations covering access to the Flightline and working on the Flightline. Specific requirements should be coordinated through the Contracting Officer.

All Contractor employees will be required to obtain identification badges. Specific requirements should be coordinated through the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01310N

ADMINISTRATIVE REQUIREMENTS

09/03

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of contact personnel; G

Personnel list; G

Vehicle list; G

1.2 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

- a. Comprehensive general liability: \$500,000 per occurrence
- b. Automobile liability: \$200,000 per person, \$500,000 per occurrence for bodily injury, \$20,000 per occurrence for property damage
- c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.
- d. Employer's liability coverage of \$100,000, except in States where workers compensation may not be written by private carriers,
- e. Others as required by North Carolina.

1.3 CONTRACTOR PERSONNEL REQUIREMENTS

1.3.1 Subcontractors and Personnel

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.2 Identification Badges

Identification badges, if required, will be furnished without charge. Application for and use of badges will be as directed and will be discussed at the Preconstruction Meeting. Immediately report instances of lost or

stolen badges to the Contracting Officer.

Identification badges will be issued to the Contractor and his employees in accordance with the Naval Air Station Security Regulations. A copy of the security regulations may be obtained from the security Office. All badges must be returned or accounted for to the department of Public Safety's Pass and Identification Office upon expiration of the badge or contract, or termination of the employee. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.3.3 Vehicles

Provide a vehicle list of the Contractor and subcontractors requiring access to the project site. Vehicle decals, if required, will be furnished without charge. Application for and use of vehicle decals will be as directed. Immediately report instances of lost or stolen badges to the Contracting Officer.

1.3.4 Contractor Personnel Requirements

All Contractor personnel will be required to have successfully completed the Occupational Safety and Health Administration (OSHA) 40-hr Hazardous Waste Operations and Emergency Response (HAZWOPER) course. If it has been greater than one years time since the Contractor's personnel have completed this course, than an 8-hr refresher course must be completed within each year since completion of the initial 40-hr course.

1.4 SUPERVISION

Provide at least one (1) qualified Project Manager and one (1) on-site Project Superintendent per project capable of reading, writing, and conversing fluently in English language. The Project Manager must have a minimum 10 years experience as a Project Manager or Superintendent on projects like this contract or similar in size and complexity. The Project Superintendent must have a minimum of 10 years experience as a Superintendent on projects similar in size and complexity.

The Project Manager in this context shall mean the individual with the responsibility for the overall management of the project and the Project Superintendent shall mean the individual with the responsibility for quality and production. Both the Project Manager and Project Superintendent are subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time for excess costs or damages by the Contractor.

Approval of Project Manager and on-site Project Superintendent is required prior to start of construction. Provide resumes for the proposed Project Manager and on-site Project Superintendent describing their experience with references and qualifications to the Contracting Officer for approval. The Contracting Officer reserves the right to interview the proposed Project Manager and on-site Project Superintendent at any time in order to verify the submitted qualifications.

1.5 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the safety program, preparation of the schedule prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

1.6 PARTNERING

LEVEL C PARTNERING: To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership with the Contractor and its subcontractors. The partnership will draw on the strength of each organization in an effort to achieve a quality project done right the first time, within budget, on schedule, and without any safety mishaps. This level of partnering discusses partnering concepts and benefits and should become a part of the preconstruction conference. The senior ROICC and senior Contractor persons present will jointly host the partnering sessions. The partners will determine the frequency of the follow-on sessions. Partnering sessions should be held at or near the location of the ROICC office.

1.7 AVAILABILITY OF CADD DRAWING FILES

After award and upon request, the electronic "Computer-Aided Drafting and Design (CADD)" drawing files will be made available to the Contractor for use in preparation of construction drawings and data related to the referenced contract subject to the following terms and conditions.

Data contained on these electronic files shall not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor shall make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor shall, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CADD drawing files are not construction documents. Differences may exist between the CADD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CADD files, nor does it make representation to the compatibility of these files with the Contractors hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished CADD files, the signed and sealed construction documents shall govern. The Contractor is responsible for determining if any conflict exists. Use of these CADD files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

If the Contractor uses, duplicates and/or modifies these electronic CADD files for use in producing construction drawings and data related to this

contract, all previous indication of ownership (seals, logos, signatures, initials and dates) shall be removed.

1.8 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 days after contract award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple email addresses will not be allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including field office(s). The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this email address.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01321N

NETWORK ANALYSIS SCHEDULES (NAS)

02/03

PART 1 GENERAL

1.1 DESCRIPTION

The network analysis system shall consist of the network analysis schedule (diagram) and associated reports. The scheduling of all design, procurement and construction shall be the responsibility of the Contractor.

Construction increments will be interrelated on a single schedule that represents the entire project duration from Contract Award to the Contract Completion Date. Schedule updates will build upon each other and will include design and construction increments as they are detailed, submitted and accepted. Submission of progress and revision data will be used to measure work progress, aid in the evaluation for requests for time extensions, and to provide the basis of all progress payments.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Baseline Network Analysis Schedule; G

SD-11 Closeout Submittals

As-Built Schedule; G

1.3 SCHEDULE ACCEPTANCE

Review comments made by the Government on the Contractor's schedule(s) will not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for scheduling, sequencing, and prosecuting the Work to comply with the requirements of the Contract Documents. Government acceptance extends only to the activities of the Contractor's schedule that the Government has been assigned responsibility for and agrees it is responsible. The Government will also review for contract imposed schedule constraints and conformance, and cost loading of the CPM activities. Comments offered on other parts of the schedule, which the Contractor is assigned responsibility, are offered as a courtesy and are not conditions of Government acceptance; but are for the general conformance with established industry schedule concepts.

1.3.1 Schedule Acceptance Prior to Start of Work

The Baseline Network Analysis Schedule described in the paragraph entitled "Baseline Network Analysis Schedule" must be submitted and accepted by the Government before the Contractor will be allowed to start work on the

construction stage(s) of the contract. Examples of construction stages are, but not limited to; demolition, site work, temporary work for construction, etc.

1.3.2 Acceptance

- a. When the Construction Network Analysis Schedule is submitted and accepted by the Contracting Officer, it will then be considered the "Baseline Network Analysis Schedule". The Baseline Network Analysis Schedule will then be used by the Contractor for planning, organizing, and directing the work; reporting progress; and requesting payment for work accomplished. Submittal and acceptance of the Baseline Network Analysis Schedule and accurate updated schedules accompanying the pay requests are both conditions precedent to processing pay requests.
- b. Submittal of the Network, and subsequent schedule updates, will be understood to be the Contractor's representation that the submitted schedule meets all of the requirements of the Contract Documents, accurately reflects the work accomplished, and that Work will be executed in the sequence indicated on the submitted schedule.

1.4 SOFTWARE

The scheduling software that will be utilized by the Government on this project shall be approved by the Contracting Officer. The Contractor shall provide electronic files saved in a format that is compatible with the Contracting Officer's current software version.

1.5 SUBMISSION AND ACCEPTANCE

1.5.1 Review and Evaluation

After the Government's review(s) of the Construction Network Analysis Schedule, the Contractor shall meet with the Contracting Officer to discuss the review and evaluation of the NAS submittal. Revisions necessary as a result of this review shall be resubmitted for acceptance within 10 calendar days after the meeting.

1.5.2 Baseline Network Analysis Schedule

Once review comments are resolved and the Contracting Officer has accepted the Construction Network Analysis Schedule, the Contractor shall within 5 calendar days furnish:

- a. Two copies of the network diagrams.

For major revisions, updates or changes to the network diagrams, once accepted by the Contracting Officer, the Contractor shall submit these same diagrams and reports.

1.5.3 Monthly Network Analysis Updates

At monthly intervals the Contractor and Government representatives will meet to jointly update the project schedule and agree on percentage of payment for each activity progressed during the update period. The purpose of the meeting is to determine progress payment amounts for each activity, allow all parties to evaluate project status at the data date, provide a

complete and accurate update of procurement and construction progress, create an historical record of the project and establish prediction of completion date(s) based upon current status. The Contractor is responsible to gather all supporting documentation, present the update data for the schedule and record the meeting minutes. All progress payment amounts will be derived from and tied to the cost-loaded schedule activities. Submit at monthly intervals a report of the actual construction progress by updating the required reports.

1.6 CHANGES TO THE NETWORK ANALYSIS SCHEDULE

If changes in the method of operating and scheduling are desired, the Contracting Officer shall be notified in writing stating the reasons for the change. If the Contracting Officer considers these changes to be of a major nature, the Contractor may be required to revise and submit for acceptance, without additional cost to the Government, the network diagrams and required reports. A change may be considered of a major nature if the estimated time required or actually used for an activity or the network logic has varied from the original plan to a degree that there is a reasonable doubt as to the effect on the contract completion date(s). Changes that affect activities with adequate float time shall be considered a major change when their cumulative effect could extend the contract completion date.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES

01/04

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Health and safety plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.1.3 Approving Authority

Office authorized to approve submittal.

1.1.4 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submittal register; G

Certificate of Insurance; G

Security Bonds; G

List of Proposed Subcontractors; G

List of Proposed Products; G

Construction Progress Schedule; G

Submittal Register; G

Schedule of Prices; G

Health and Safety Plan

Work Plan; G

Environmental Protection Plan; G

1.3 USE OF SUBMITTAL REGISTER

Submittal register will be delivered to the Contractor, by Contracting Officer. Register[database] will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal. A "G" indicates approval by Contracting Officer; a blank indicates approval by QC manager.

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved.

1.3.1 Submittal Register

Submit submittal register with Section 01321N NETWORK ANALYSIS SCHEDULES. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving

authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.3.2 Contractor Use of Submittal Register

Update the following fields.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.3.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to Contractor.

1.3.4 Action Codes

Entries used shall be as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.3.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.4 PROCEDURES FOR SUBMITTALS

1.4.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC manager unless otherwise specified for

specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates Contracting Officer is approving authority for that submittal item.

1.4.2 Constraints

- a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.
- b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.
- c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.
- d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.4.3 Scheduling

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.
- b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.
- c. For submittals requiring review by fire protection engineer, allow review period, beginning when Government receives submittal from QC organization, of 20 working days for return of submittal to the Contractor. Period of review for each resubmittal is the same as for initial submittal.

1.4.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to Government.

1.4.4.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

1.4.4.2 Proposing Variations

When proposing variation, deliver written request to the Contracting

Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.4.4.3 Warranting That Variations Are Compatible

When delivering a variation for approval, Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.4.4.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.4.5 Contractor's Responsibilities

- a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.
- b. Transmit submittals to QC organization in accordance with schedule on approved Submittal Register, and to prevent delays in the work, delays to Government, or delays to separate Contractors.
- c. Advise Contracting Officer of variation, as required by paragraph entitled "Variations."
- d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.
- e. Furnish additional copies of submittal when requested by Contracting Officer, to a limit of 20 copies per submittal.
- f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.
- g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.4.6 QC Organization Responsibilities

- a. Note date on which submittal was received from Contractor on each submittal.
- b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

- c. Review submittals for conformance with project design concepts and compliance with contract documents.
- d. Act on submittals, determining appropriate action based on QC organization's review of submittal.

(1) When QC manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When Contracting Officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

- e. Ensure that material is clearly legible.
- f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is Contracting Officer, QC organization will certify submittals forwarded to Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number [____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

(2) When approving authority is QC Manager, QC Manager will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number [____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is _____ approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

- g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

- h. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by Contracting Officer.
- i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.4.7 Government's Responsibilities

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received from QC manager, on each submittal for which the Contracting Officer is approving authority.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

1.4.8 Actions Possible

Submittals will be returned with one of the following notations:

- a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.
- b. Submittals marked "approved" "approved as submitted" authorize Contractor to proceed with work covered.
- c. Submittals marked "approved as noted" or "approval except as noted; resubmission not required" authorize Contractor to proceed with work as noted provided Contractor takes no exception to the notations.
- d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.5 FORMAT OF SUBMITTALS

1.5.1 Transmittal Form

Transmit each submittal, to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. The transmittal form shall identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals."

1.5.2 Identifying Submittals

Identify submittals, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location.
- b. Construction contract number.
- c. Section number of the specification section by which submittal is required.
- d. Submittal description (SD) number of each component of submittal.
- e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.
- f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal.
- g. Product identification and location in project.

1.5.3 Format for SD-02 Shop Drawings

- a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 30 by 42 inches.
- b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.
- c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."
- d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

1.5.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instruction's

- a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.
- b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.
- c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project.

1.5.5 Format of SD-05 Design Data and SD-07 Certificates

- a. Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.5.6 Format of SD-06 Test Reports

- a. Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.
- b. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

1.5.7 Format of SD-10 Operation and Maintenance (O&M) Data

- a. O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.5.8 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

- a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

1.5.9 Format of Work Plan

1.5.9.1 Work Plan

The Contractor shall prepare and submit a Work Plan consisting of the following elements.

- a. Narrative

Provide a brief description of the project objectives; work tasks; sampling and analysis procedures; decontamination procedures; removal and excavation procedures; storage, transportation, and treatment requirements; construction, extraction and treatment methods; traffic control; system control logic and well and pipe installation.

Additional clarification of selected narrative requirements is provided in the following paragraphs of this Section.

1. Description of Work Tasks

The Contractor shall identify and describe the major construction work tasks and construction methods for the free-phase product recovery system, and carrier piping to be employed including, but not limited to, trenching and pipe installation methods, and remediation equipment installation. The description shall include a discussion of good engineering practices included in the plan to ensure system compliance with Spill Prevention Control and Countermeasure Rules found in 40 CRT 112.

2. Pipe Installation

The Contractor shall describe all equipment, construction procedures, and materials associated with the installation of the carrier piping.

3. Storage, Transportation, and Treatment Requirements

The Contractor shall describe the procedures which will be followed during the handling and disposal of both petroleum contaminated materials and non-contaminated materials. All waste handling and disposal shall be in compliance with applicable local, State and Federal rules and laws for excavation, temporary containment and laboratory analytical methods as well as documentation/manifesting of waste hauling and disposal.

4. System Control Logic

The Contractor shall describe the free-phase product recovery system control logic including level switches in such detail to ensure compliance with the intent of these specifications and this Design Package. Include a description of the controls for the dual phase extraction unit, oil/water separator, product storage tank, surge tank, air stripper, sump tank, bag filters, carbon drums, including motor overload, fault protection and other safety and operational considerations.

5. Construction Permits Required

The Contractor shall provide a list of all permits and approvals necessary for construction of the entire remediation system. The listing shall include an identification of the local, State, or Federal agency responsible for issuing the permit or approval.

b. Technical Specifications

Provide, in an amendment format, any additional specifications and any modifications to the contract specifications required to accurately describe the materials and work procedures envisioned to satisfy the requirements of the delivery order.

c. Manufacture's Catalog Data

Provide the following data for each major piece of equipment for the free-phase product recovery system.

1. Capacities/Performance Curves
2. Materials of Construction
3. Outline Dimensions
4. Electrical Motor Specifications

d. Shop Drawings

Shop drawings shall detail and describe all components of the project not currently indicated on the contract drawings such that the shop drawings and the contract drawings, when taken together, provide a complete representation of the project requirements. The Contractor shall interpret shop drawings to be Contractor prepared construction drawings. Shop drawings shall be prepared

and sealed by a Registered Professional Engineer. The following paragraphs describe the required shop drawings in greater detail:

1. Erosion Control Plan

Provide in accordance with State and local regulations, consisting of site plans indicating locations of erosion control features during the various stages of construction, details of erosion control features, and applicable notes.

2. Equipment Layout Plan

Provide a drawing of the proposed free product recovery system equipment layout plan. The location of the equipment units, piping and valving arrangement, piping supports, equipment facility footprint, electrical panels and major dimensions shall be shown.

3. Process and Instrumentation Diagram

Provide a Process and Instrumentation drawing of the free-phase product recovery system in such detail and scope as necessary to determine its compliance with the objectives of these Design Specifications. At a minimum, this drawing shall schematically show flow diagrams, recovery wells, piping, valves, gauges, flow meters, major pieces of equipment, power and control wiring, and other information necessary for a complete definition of the free-phase product recovery system.

4. Electrical Site and Power Plan

Provide an electrical site plan showing at a minimum the routing of all electrical wires and conduit, identify electrical panels, and indicate all switches, outlets, lighting, motors and control units.

5. Electrical Panel Schedule and Control Logic

Provide electrical panel schedule, control panel layout and ladder logic diagram and control operating scenario. Include lighting fixture and equipment schedules.

e. Environmental Protection Plan

Prepare and submit an Environmental Protection Plan in accordance with Section 01575N, Temporary Environmental Controls. An erosion and sediment control permit is not required because the construction of the free product only recovery system will not affect an area greater than one acre. However, Best Management Practices (BMPs) are required to be incorporated throughout the length of the construction process as referenced in the North Carolina Sedimentation and Erosion Control Planning and Design Manual to prevent sediment from leaving the site.

f. Excavation Work Plan

Prepare and submit an Excavation Work Plan in accordance with Section 02111, Excavation and Handling of Contaminated Material.

g. Health and Safety Plan

Provide a site specific Health and Safety Plan (HASP). The Contractor shall describe the implementation of a health and safety program conforming to the requirements of local, State, and Federal rules and laws as specifically related to installation, operation and monitoring of the free-phase product recovery system. The HASP shall include, but is not limited to the following:

1. Names of the Health and Safety Officer and names of alternates responsible for health and safety.
2. 29 CFR 1910.
3. 29 CFR 1926.
4. 29 CFR 1926-SUBPART V, tagout and lockout procedures.
5. Contract Clause "FAR 52.236-13, Accident Prevention."
6. Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data."
7. NFPA 241.

h. Quality Control (QC) Plan

Provide a QC Plan as specified herein.

1. Table of Contents
 - I. QC ORGANIZATION
 - II. NAMES AND QUALIFICATIONS
 - III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
 - IV. OUTSIDE ORGANIZATION
 - V. APPOINTMENT LETTERS
 - VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
 - VII. TESTING LABORATORY INFORMATION
 - VIII. TESTING PLAN AND LOG
 - IX. PROCEDURES TO COMPLETE REWORK ITEMS
 - X. DOCUMENTATION PROCEDURES

2. Testing Laboratory Qualifications

As part of the QC Plan, submit qualifications for each laboratory which shall be used.

i. Sampling and Analysis Plan

Provide a Sampling and Analysis Plan describing all sampling and analyses required by the individual technical sections of the specifications necessary during the construction phase of the project. The Plan shall contain a field sampling plan and a quality assurance plan.

j. Waste Management Plan

Provide a Waste Management Plan in accordance with Section 01572,

Construction and Demolition Waste Management.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.4 Number of Copies SD-06 Test Reports

Submit in compliance with quantity with quality requirements specified for shop drawings.

1.6.5 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval.

1.6.6 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for shop drawings.

1.7 FORWARDING SUBMITTALS

1.7.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the Resident Officer in Charge of Construction (ROICC) submittals required in the technical sections of this specification, including shop drawings, product data and samples. One copy of the transmittal form for all submittals shall be forwarded to the ROICC.

The ROICC will review and approve for the Contracting Officer those submittals reserved for Contracting Officer approval to verify submittals comply with the contract requirements.

1.7.1.1 O&M Data

The ROICC will review and approve for the Contracting Officer O&M Data to verify the submittals comply with the contract requirements.; submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

- a. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.8 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.8.1 Designer of Record Approved

Designer of Record approval is required for extensions of design, critical materials, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Contractor shall provide the Government the number of copies designated hereinafter of all Designer of Record approved submittals. The Government may review any or all Designer of Record approved submittals for conformance to the Solicitation and Accepted Proposal. The Government will review all submittals designated as deviating from the Solicitation or Accepted Proposal, as described below. Generally, design submittals should be identified as SD-05 DESIGN DATA submittals.

1.8.2 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer.

Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.8.3 Government Reviewed Design or Extension of Design

The Government will review all design submittals for conformance with the technical requirements of the solicitation. Government review is required for extension of design construction submittals, used to define contract conformity, and for deviation from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the Designer of Record design documents do not include enough detail to ascertain contract compliance.

1.8.4 Information Only

All submittals not requiring Government approval will be for information only. All submittals not requiring Designer of Record or Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.9 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be

considered unless accompanied by an explanation of why a substitution is necessary.

1.10 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. The Contractor shall make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal shall be resubmitted as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.11 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.12 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby remaining upon completion of the work shall be picked up and disposed.

1.13 SUBMITTAL REGISTER

At the end of this section is a submittal register showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Government will provide the initial submittal register in electronic format. Thereafter, the Contractor shall maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall track all submittals.

1.14 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 21 calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

1.15 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.16 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.16.1 Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Preconstruction Conference.

1.16.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.17 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.18 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Three copies of the submittal will be retained by the Contracting Officer and two copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.19 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of

the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.20 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s).
SIGNATURE: _____
TITLE: _____
DATE: _____

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
03/04

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)
P.O. Box 9094
Farmington Hills, MI 48333-9094
Ph: 248-848-3700
Fax: 248-848-3701
E-mail: bkstore@concrete.org
Internet: <http://www.aci-int.org>

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1819 L Street, NW, 6th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: <http://www.ansi.org/>

Note --- ANSI documents beginning with the letter "S" can be ordered from:

Acoustical Society of America (ASA)
2 Huntington Quadrangle, Suite 1N01
Melville, NY 11747-4502
Ph: 516-576-2360
Fax: 516-576-2377
E-mail: asa@aip.org
Internet: <http://asa.aip.org>

ASME INTERNATIONAL (ASME)
Three Park Avenue

New York, NY 10016-5990
Ph: 212-591-7722
Fax: 212-591-7674
E-mail: infocentral@asme.org
Internet: <http://www.asme.org>

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: <http://www.astm.org>

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 Hoes Lane
Piscataway, NJ 08855-1331
Ph: 732-981-0060
Fax: 732-981-1712
E-mail: customer-services@ieee.org
Internet: <http://www.ieee.org>

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS
INDUSTRY (MSS)
127 Park Street, NE
Vienna, VA 22180-4602
Ph: 703-281-6613
Fax: 703-281-6671
E-mail: info@mss-hq.com
Internet: <http://www.mss-hq.com>

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
Ph: 703-841-3200
Fax: 703-841-3300
E-mail: webmaster@nema.org
Internet: <http://www.nema.org/>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
Ph: 617-770-3000
Fax: 617-770-0700
E-mail: webmaster@nfpa.org
Internet: <http://www.nfpa.org>

UNDERWRITERS LABORATORIES (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096
Ph: 847-272-8800
Fax: 847-272-8129
E-mail: northbrook@us.ul.com
Internet: <http://www.ul.com/>

U.S. ARMY CORPS OF ENGINEERS (USACE)
Order CRD-C DOCUMENTS from:
U.S. Army Engineer Waterways Experiment Station

ATTN: Technical Report Distribution Section, Services
Branch, TIC
3909 Halls Ferry Rd.
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Ph: 601-634-2664
Fax: 601-634-2388
E-mail: mtc-info@erdc.usace.army.mil
Internet: <http://www.wes.army.mil/SL/MTC/handbook.htm>

Order Other Documents from:
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Attn: CEIM-SP-D
2803 52nd Avenue
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Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: <http://www.usace.army.mil/publications>
or <http://www.hnd.usace.army.mil/techinfo/engpubs.htm>

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Ph: 202-260-2090
Fax: 202-260-6257
Internet: <http://www.epa.gov>

NOTE --- Some documents are available only from:
National Technical Information Services (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Ph: 703-605-6000
Fax: 703-605-6900
E-mail: webmaster@ntis.gov
Internet: <http://www.ntis.gov>

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)
Office of Highway Safety (HHS-31)
400 Seventh Street, SW
Washington, DC 20590-0001
Ph: 202-366-0411
Fax: 202-366-2249
Internet: <http://www.fhwa.dot.gov>
Order from:

Superintendent of Documents
U. S. Government Printing Office
Washington, DC 20402-9325
Ph: 866-512-1800 or 202-512-1800
Fax: 202-512-2250
E-mail: gpoinfo@gpo.gov
Internet: <http://www.gpo.gov>

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
1800 F Street, NW
Washington, DC 20405
Ph: 202-501-1021

Order from:
General Services Administration
Federal Supply Service Bureau
1941 Jefferson Davis Highway
Arlington, VA 22202
Ph: 703-605-5400
Internet: <http://apps.fss.gsa.gov/pub/fedspecs/indexcfm>

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road
College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
Internet: <http://www.archives.gov>

Order documents from:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325
Ph: 866-512-1800 or 202-512-1800
Fax: 202-512-2250
E-mail: gpoinfo@gpo.gov
Internet: <http://www.gpo.gov>

-- End of Section --

SECTION 01500N

TEMPORARY FACILITIES AND CONTROLS

02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 (2000) Safeguarding
Construction, Alteration, and Demolition
Operations

NFPA 70 (2002) National Electrical Code

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SA-89-006 (1988) Manual on Uniform Traffic Control
Devices for Streets and Highways

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Traffic control plan; G

Construction site plan; G

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes used for this contract. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

1.4 TEMPORARY UTILITIES

Reasonable amounts of the following utilities will be made available to the Contractor at the work site without charge.

Electricity
Potable Water

1.4.1 Utilities at Special Locations

No sanitary facilities will be available at the main Contractor laydown. Reasonable amounts of utilities will be made available without charge. The Contractor will be responsible for making connections, providing transformers and meters, and making disconnections; and for providing backflow preventer devices on connections to domestic water lines. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

1.5 HURRICANE CONDITION OF READINESS

Unless directed otherwise, comply with:

- a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards.
- b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.
- c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and COR updates and completion of required actions.
- d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

1.6 STATION OPERATION AFFECT ON CONTRACTOR OPERATIONS

1.6.1 Restricted Access Areas

The Government will monitor work on the Flightline. If work on the Flightline is necessary, notify Contracting Officer at least 14 calendar days prior to starting work in these areas.

1.6.2 Interruption of Vehicular Traffic

If during the performance of work, it becomes necessary to modify vehicular

traffic patterns at any locations, notify the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan shall be in accordance with State and local regulations and the FHWA SA-89-006, Part VI. Provide cones, signs, barricades, lights, or other traffic control devices and personnel required to control traffic. Do not use foil-backed material for temporary pavement marking because of its potential to conduct electricity during accidents involving downed power lines.

1.7 STORAGE AREAS

Contractor shall be responsible for security of his property. The Contract Clause entitled "FAR 52.236-10, Operations and Storage Areas" and the following apply:

1.7.1 Storage Size and Location

The site available for storage shall be as determined by the Contracting Officer.

1.7.2 Storage in Existing Buildings

The Contractor shall be working around existing buildings; the storage of material will not be allowed in the buildings.

1.8 TEMPORARY SANITARY FACILITIES

Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the Contracting Officer. The doors shall be self-closing. The exterior of the unit shall match the base standard color. Locate the facility behind the construction fence or out of the public view.

1.9 TEMPORARY BUILDINGS

Temporary facilities(including trailers) shall be in like new condition. Locate these facilities where directed and within the indicated operations area. Storage of material/debris under such facilities is prohibited. Contractor shall be responsible for the security of the stored property.

1.9.1 Maintenance of Temporary Facilities

Paint in accordance with base standards and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

1.9.2 Trailers or Storage Buildings

Trailers or storage buildings will be permitted, where space is available, subject to the approval of the Contracting Officer. The trailers or buildings shall be in good condition, free from visible damage rust and deterioration, and meet all applicable safety requirements. Trailers shall be roadworthy and comply with all appropriate state and local vehicle requirements. Failure to maintain storage trailers or buildings to these standards shall result in the removal of non-complying units at the Contractor's expense. A sign not smaller than 24 by 24 inches shall be conspicuously placed on the trailer depicting the company name, business

phone number, and emergency phone number. Trailers shall be anchored to resist high winds and must meet applicable state or local standards for anchoring mobile trailers.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 TEMPORARY PHYSICAL CONTROLS

3.1.1 Access Controls

3.1.1.1 Temporary Barricades

Contractor shall provide for barricading around all work areas to prevent public access.

3.1.1.2 Fencing

As necessary, prior to the start of work, enclose those areas at the construction site with a temporary safety fence, including gates and warning signs, to protect the public from construction activities. The safety fence shall match the base standard color (or bright orange where it protects excavated areas), a minimum of 42 inches high, supported and tightly secured to steel posts located on minimum 10 foot centers. Remove the fence from the work site upon completion of the contract.

3.1.1.3 Signs

Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least one sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

3.2 TEMPORARY WIRING

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

-- End of Section --

SECTION 01572

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

02/03

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the Contractor shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.2 MANAGEMENT

The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

1.3 PLAN

A waste management plan shall be submitted with the Work Plan and prior to initiating any site preparation work. The plan shall include the following:

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Actions that will be taken to reduce solid waste generation.
- c. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. Characterization, including estimated types and quantities, of the waste to be generated.
- e. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

- f. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
- g. List of specific waste materials that will be salvaged for resale, salvaged and reused, or recycled. Recycling facilities that will be used shall be identified.
- h. Identification of materials that cannot be recycled/reused with an explanation or justification.
- i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

1.4 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. The records shall be made available to the Contracting Officer during construction, and a copy of the records shall be delivered to the Contracting Officer upon completion of the construction.

1.5 COLLECTION

The necessary containers, bins and storage areas to facilitate effective waste management shall be provided and shall be clearly and appropriately identified. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials and separated by one of the following methods:

1.5.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing.

1.5.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.5.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.6 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

1.6.1 Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

1.6.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

1.6.3 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

-- End of Section --

SECTION 01575N

TEMPORARY ENVIRONMENTAL CONTROLS

02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530/F-93/004 (1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions

40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management Programs
40 CFR 273	Standards For Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	Specific Toxic Chemical Listings
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material (except hazardous waste as defined in paragraph entitled "Hazardous Waste" or hazardous debris as defined in paragraph entitled "Hazardous Debris"), including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or

irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

- a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.
- b. Surplus soil: Existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.
- c. Inert construction and demolition debris: Broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may not be reinforced with or contain ferrous wire, rods, accessories and weldments.
- d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.
- e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.
- f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.
- g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans may not be included as recyclable if sold to a scrap metal company.

1.2.3 Debris

Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.4 Hazardous Debris

As defined in paragraph entitled "Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261.

1.2.5 Chemical Wastes

This includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

1.2.6 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.7 Hazardous Waste

Any discarded material, liquid, solid, or gas, which meets the definition of hazardous material or is designated hazardous waste by the Environmental Protection Agency or State Hazardous Control Authority as defined in 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, and 40 CFR 280.

1.2.8 Oily Waste

Petroleum products and bituminous materials.

1.2.9 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.10 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.2.11 Hazardous Materials

Any material that is defined in 49 CFR 171, listed in 49 CFR 172, and regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.120, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental protection plan; G

Sedimentation and Erosion Control Plan; G

SD-06 Test Reports

Laboratory analysis

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable sub items listed below.

Preconstruction survey

Solid waste disposal permit

Waste determination documentation

Disposal documentation for hazardous and regulated waste

Contractor 40 CFR employee training records

Regulatory notification

Solid waste disposal report

Contractor Hazardous Material Inventory Log; G

1.4 LABORATORY ANALYSIS

Submit a copy of a laboratory analysis of solid waste and debris with the potential of becoming classified as a hazardous waste. Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, or Resource Conservation and Recovery Act (RCRA) exempt waste. Determinations must use EPA and State approved methods and provide written rationale for whether the waste is classified as hazardous or non-hazardous. The Contractor will bear the cost of the waste stream determinations, and the Contracting Officer reserves the right to request waste stream determinations on questionable waste streams.

1.5 REPORTS

1.5.1 Preconstruction Survey

Perform a preconstruction survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in

and adjacent to the site. Submit a report for the record.

1.5.2 Solid Waste Disposal Permit

Submit one copy of a State or local permit or license showing such agencies' approval of the disposal plan before transporting wastes off Government property.

1.5.3 Waste Determination Documentation

The Contractor will complete a Waste Determination form for all contractor derived wastes to be generated. The waste determination must be based upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). All support documentation must be attached to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

1.5.4 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA and State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.5.5 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. The Contractor will ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with Federal, State and local regulatory requirements for RCRA Large Quantity Generator. The Contractor will provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description will include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these training records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

1.5.6 Regulatory Notification

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. The Contractor will forward copies to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.5.7 Solid Waste Disposal Report

Monthly the Contractor will submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount,

location, and name of the business receiving the solid waste. The Contractor will include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification will include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor will submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received will not be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

1.6 WHM/HW MATERIALS PROHIBITION

No waste hazardous material or hazardous waste shall be disposed of on government property. No hazardous material shall be brought onto government property that does not directly relate to requirements for the performance of this contract. The government is not responsible for disposal of Contractor's waste material brought on the job site and not required in the performance of this contract. The intent of this provision is to dispose of that waste identified as waste hazardous material/hazardous waste as defined herein that was generated as part of this contract and existed within the boundary of the Contract limits and not brought in from offsite by the Contractor. Incidental materials used to support the contract including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the river or conduct waste treatment or disposal on government property without written approval of the Contracting Officer.

1.7 CLASS I AND II ODS PROHIBITION

Class I and II ODS as defined and identified herein will not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition will be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.8 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Environmental Brief: Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; types and quantities of wastes/wastewater that may be generated during the contract.

1.8.1 Hazardous Waste Generator

The Contractor will comply with all provisions of Federal, State and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of all construction derived wastes.

1.8.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause.

1.8.3 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and the Air Station are subject to Federal, State, and local regulatory agency inspections to review compliance with environmental laws and regulations. The Contractor will fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and will provide immediate notification to the Contracting Officer, who will accompany them on any subsequent site inspections. The Contractor will complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, State and local laws and regulations. The Contractor will immediately notify the Contracting Officer if a Notice of Violation (NOV) is issued to the Contractor.

The Contractor will be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, State or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, State or local environmental law or regulation. Should a Notice of Violation (NOV), Notice of Noncompliance (NON), Notice of Deficiency (NOD), or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor will fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.9 FUEL TANKS

On site fuel tanks must be over drip pans, which can contain 110% of the tank's volume. The tanks and drip pans must be covered during inclement weather and when work is not in progress on the site.

1.10 ENVIRONMENTAL MANAGER

The Contractor will appoint in writing an Environmental Manager for the project site. The Environmental Manager will be directly responsible for coordinating contractor compliance with Federal, State, local, and station requirements. The Environmental Manager will ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the Environmental Protection Plan; ensure that all environmental permits are obtained, maintained, and closed out; ensure compliance with Storm Water Program Management requirements; ensure compliance with Hazardous Materials (storage,

handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure all Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out.

1.11 ENVIRONMENTAL PROTECTION PLAN

Prior to initiating any work on site, the Contractor will meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan will be submitted in the following format and will, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources" in this section):

- a. Description of the Environmental Protection Plan
 - (1) General overview and purpose
 - (2) General site information
 - (3) A letter signed by an officer of the firm appointing the Environmental Manager and stating that he/she is responsible for managing and implementing the Environmental Program as described in this contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.
- b. Protection of Natural Resources
 - (1) Land resources
 - (2) Tree protection
 - (3) Replacement of damaged landscape features
 - (4) Temporary construction
 - (5) Stream crossings
 - (6) Fish and wildlife resources
 - (7) Wetland areas
- c. Protection of Historical and Archaeological Resources
 - (1) Objectives
 - (2) Methods
- d. Storm Water Management and Control

- (1) Ground cover
- (2) Erodible soils
- (3) Temporary measures
- (a) Mechanical retardation and control of runoff
- (b) Vegetation and mulch
- e. Prevention of Releases to the Environment
 - (1) Procedures to prevent releases to the environment
 - (2) Notifications in the event of a release to the environment
- f. Protection of the Environment from Waste Derived from Contractor Operations
 - (1) Control and disposal of solid and sanitary waste
 - (2) Control and disposal of hazardous waste (Hazardous Waste Management Section)

This item will consist of the management procedures for all hazardous waste to be generated. The elements of those procedures will coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:

- (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;
- (b) Sampling/analysis plan;
- (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
- (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
- (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);
- (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
- (g) Used oil management procedures in accordance with 40 CFR 279;
- (h) Pollution prevention\hazardous waste minimization procedures;
- (i) Plans for the disposal of hazardous waste by permitted facilities;

(j) Procedures to be employed to ensure all required employee training records are maintained.

1.11.1 Environmental Protection Plan Review

Fourteen days after the environmental protection meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work will not begin until the Environmental Protection Plan has been approved.

1.12 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Submit the "Contractor Hazardous Material Inventory Log", which provides information required by (EPCRA Sections 312 and 313) along with corresponding Material Safety Data Sheets (MSDS) to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor will be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.1.2.2 Stormwater Drainage

There will be no discharge of excavation ground water to the sanitary sewer, storm drains, or to the river without prior specific authorization of the Environmental Affairs Department in writing. Discharge of hazardous substances will not be permitted under any circumstances.

Construction site runoff will be prevented from entering any storm drain or the river directly by the use of straw bales or other method suitable to the Environmental Affairs Department. Contractor will provide erosion protection of the surrounding soils.

All materials used or produced during construction which can contaminate stormwater must be placed in secondary containment if not in immediate use.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Upon discovery, notify the Contracting Officer. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

3.3.1 Burnoff

Burnoff of the ground cover is not permitted.

3.3.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.3.3 Temporary Protection of Erodible Soils

Although submission of a Sedimentation and Erosion Control Permit is not required for this project, the Contractor must incorporate Best Management Practices throughout the length of the construction process, as referenced in the North Carolina Sedimentation and Erosion Control Planning and Design Manual to prevent sediment from leaving the site. The Contractor shall prepare a Sedimentation and Erosion Control plan, placing particular attention on protecting storm drains and watercourse access from sediment

and debris contamination. The Contractor will be responsible for providing ground cover of denuded areas in accordance with Chapter 4 of Title 15A of the North Carolina Administrative Code (T15A.04) and removal of temporary erosion/sedimentation control devices once stabilization has been accomplished.

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

3.4.1 Dumpsters

Equip dumpsters with a secure cover and paint the standard base color. Keep cover closed at all times, except when being loaded with trash and debris. Locate dumpsters behind the construction fence or out of the public view. Empty site dumpsters at least once a week, or as needed to keep the site free of debris and trash. If necessary, provide 55 gallon trash containers painted the darker base color to collect debris in the construction site area. Locate the trash containers behind the construction fence or out of the public view. Empty trash containers at least once a day. For large demolitions, large dumpsters without lids are acceptable but should not have debris higher than the sides before emptying.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris Management

The Contractor will identify all construction activities which will generate hazardous waste/debris. The Contractor must provide a documented waste determination for all resultant waste streams. Hazardous waste/debris will be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268. Hazardous waste will also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities will be identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste will be brought onto Government property. Provide to the Contracting Officer a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Regulated Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of regulated or

hazardous wastes, the Contractor will request the establishment of a Regulated Waste Storage Area, a Satellite Accumulation Area, or a 90 Day Storage Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information:

<u>Contract Number</u>	_____	<u>Contractor</u>	_____
<u>Haz/Waste or Regulated Waste POC</u>	_____	<u>Phone Number</u>	_____
<u>Type of Waste</u>	_____	<u>Source of Waste</u>	_____
<u>Emergency POC</u>	_____	<u>Phone Number</u>	_____
<u>Location of the Site:</u> _____ (Attach Site Plan to the Request)			

Attach a waste determination form. Allow ten working days for processing this request.

3.5.1.2 Sampling and Analysis of HW

a. Sampling

The Contractor will sample waste in accordance with EPA 530/F-93/004. Each sampled drum or container will be clearly marked with the Contractor's identification number and cross referenced to the chemical analysis performed.

b. Analysis

The Contractor will follow the analytical procedure and methods in accordance with the 40 CFR 261. The Contractor will provide all analytical results and reports performed to the Contracting Officer

c. Analysis Type

Identification of waste hazardous material/hazardous waste will be accomplished by analyzing for the following properties as a minimum: ignitability, corrosiveness, total chlorides, BYTU value, PCBs, TCLP for heavy metals, and cyanide.

3.5.1.3 Asbestos Certification

- a. Asbestos containing material: Items, components, or materials which are specified to be worked on under this contract likely do not involve asbestos. Other materials especially thermal insulation, in the general work area may also contain asbestos. All thermal insulation, in all work areas should be considered to be asbestos unless positively identified by conspicuous tags or previous laboratory analysis certifying asbestos free. The Contractor will not remove or perform work on any such materials without the prior approval of the Contracting Officer. The Contractor will not engage in any activity, which would remove or damage such materials or cause the generation of fibers from such materials. The Contractor will immediately stop all work which would generate further damage to the material, evacuate the potential asbestos exposed area, and notify the Contracting

Officer for resolution of the situation prior to resuming normal work activities in the affected area.

3.5.1.4 Hazardous Waste Disposal

Control of stored waste, packaging, sampling, analysis, and disposal will be determined by the details in the contract. The requirements for jobs in the following paragraphs will be used as the guidelines for disposal of any hazardous waste generated.

(a) Responsibilities for Contractor's Disposal

Any generation of WHM/HW requiring Contractor disposal of solid waste or liquid.

- a. The Contractor agrees to provide all service necessary for the final treatment/disposal of the hazardous material/waste in accordance with all local, State and Federal laws and regulations, and the terms and conditions of the contract within sixty (60) days after the materials have been generated. These services will include all necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal, and/or transportation, including manifesting or completing waste profile sheets, equipment, and the compilation of all documentation is required).
- b. Contain all waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 272, 40 CFR 273, 40 CFR 279, 40 CFR 280, and 40 CFR 761.
- d. Obtaining a representative sample of the material generated for each job done to provide waste stream determination.
- e. Analyzing for each sample taken and providing analytical results to the Contracting Officer. Provide two copies of the results.
- f. Determine the DOT proper shipping names for all waste (each container requiring disposal) and will demonstrate how this determination is developed and supported by the sampling and analysis requirements contained herein to the Contracting Officer for review.

Government Responsibilities

To review all documentation submitted by the Contractor for accuracy. Provide guidance to the Contractor in reference to environmental compliance.

Interim Waste Generation Site for Contractor Disposal of WHM/HW

The Contractor will request approval of the Government for an area suitable for packaging WHM/HW requiring disposal. The Contractor will comply with the requirements of the Virginia Department of Waste Management Regulations. The area will be barricaded and a sign identifying as follows:

Signage- "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

With additional custody sign indicating:

- (1) Site #
 - (2) Controlled by
- Call Mr./Ms. [____] at

Barricade Type: Yellow and black three (3) inch plastic tape. Corner barricades will be provided by the Government.

Contractor Disposal Turn-In Requirements

For any waste hazardous materials or hazardous waste generated which requires the Contractor to dispose of, the following conditions must be complied with:

- a. Call Environmental Affairs Department and provide the following information:
 - (1) Your name and company
 - (2) Service/contract number
 - (3) ROICC/Code 460 number
 - (4) Telephone number where you can be reached
 - (5) Material requiring disposal
 - (6) Location of material
 - (7) Volume of material in each container
- b. All material must meet the following conditions in order to be acceptable for disposal
 - (1) Drums compatible with waste contents and drums meet DOT requirements for 49 CFR 173 for transportation of materials.
 - (2) Drums banded to wooden pallets. No more than three (3) 55 gallon drums to a pallet, or two (2) 85 gallon over packs.
 - (3) Band using 1-1/4 inch minimum band on upper third of drum.
 - (4) Recovery materials label (provided by Code 106.321) located in middle of drum, filled out to indicate actual volume of material, name of material manufacturer, other vendor information as available.
 - (5) Always have three (3) to five (5) inches of empty space above volume of material. This space is called 'outage'.

3.5.2 Pollution Prevention/Hazardous Waste Minimization

The Contractor will actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on-base. The Hazardous Waste Management Section of the Environmental Protection Plan will include the Contractor's procedures for pollution prevention/hazardous waste minimization. For preparing this part of the plan, the Contractor may consult the activity Environmental Affairs Department for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material. If no

written plan exists, the Contractor may obtain information by contacting the Contracting Officer. The Contractor will describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.5.3 Hazardous Material Control

The Contractor will include hazardous material control procedures in the Safety Plan. The procedures will address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements.

The Contractor will submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, the Contractor will provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. The Contractor will also ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor will ensure that all containers of hazardous materials have NFPA labels or their equivalent. Copies of the MSDS for hazardous materials will be kept on site at all times and provided to the Contracting Officer at the end of the project. The Contractor will certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261.

3.5.4 Petroleum Products

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site will be managed in accordance with 40 CFR 279. The Contractor will determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste. All hazardous waste will be managed in accordance with the paragraph entitled Hazardous Waste/Debris Management of this section and will be managed in accordance with the approved Environmental Protection Plan.

3.5.5 Releases/Spills of Oil and Hazardous Substances

Take precautions to prevent releases/spills of oil and hazardous substances. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Air Station Fire Department, the activity's Command Duty Officer, and the Contracting Officer. The Contractor is responsible for verbal and written notifications as required by the federal 40 CFR 355, State, local regulations and Navy Instructions. Spill response will be in accordance with 40 CFR 300 and applicable State and local regulations. Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor will reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

The Contractor shall notify the Contracting Officer immediately upon discovery of any spill. The contractor shall maintain spill cleanup

equipment and materials at the work site. The Contractor shall clean up all hazardous and non-hazardous (WHM) waste spills caused by the Contractor. The Contractor shall reimburse the government for all material, equipment, and clothing generated during any spill cleanup. The Contractor shall reimburse the government for all costs incurred including sample analysis materials, equipment, and labor if the government must initiate its own spill cleanup procedures, for Contractor responsible spills, when:

- a. The Contractor has not begun spill cleanup procedure within one (1) hour of spill discovery/occurrence, or
- b. If, in the government's judgment, the Contractor's spill cleanup is not adequately abating life threatening situation and/or is a threat to any body of water or environmentally sensitive areas.

3.6 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.7 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted.

3.8 MERCURY MATERIALS

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed. Immediately report to the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

All Contractors and contract personnel performing work on items, equipment, components, materials which contain mercury or mercury compounds, such as mercury switches or fluorescent/mercury vapor lamps, shall abide by the requirement of NAVSHIPYDNORINST P5100.56, Volume III, Chapter 10, "Control of Occupations Exposure to Mercury and Mercury Compounds." Mercury may have harmful effects on personnel, materials and the environment. The Occupational Safety, Health and Environment Office (Code 106) must be contacted for approval prior to using mercury, mercury compounds, mercury containing items, equipment, materials or prior to using any materials contaminated by mercury. Mercury containing items, including fluorescent/mercury vapor lamps, must be properly disposed of in accordance with NAVSHIPYDNORINST P5100.56, Volume III, Chapter 10.

-- End of Section --

SECTION 01770N

CLOSEOUT PROCEDURES

02/03

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

Equipment/product warranty list; G

Submit Data Package 1 in accordance with Section 01781 FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION.

SD-11 Closeout Submittals

As-built drawings; G

Equipment/product warranty tag; G

Project waste summary report; G

Hazardous material reporting; G

1.2 Project Waste Summary Report

Submit the final project waste summary report as specified in Section 01575N TEMPORARY ENVIRONMENTAL CONTROLS

1.2.1 Hazardous Material Reporting

Submit hazardous material reporting information which includes actual quantities of hazardous materials stored and used during the project as specified in Section 0157N5 TEMPORARY ENVIRONMENTAL CONTROLS.

1.3 PROJECT RECORD DOCUMENTS

1.3.1 As-Built Drawings

"FAC 5252.236-9310, Record Drawings." In addition to the requirements of FAC 5252.236-9310, the Contractor shall survey the horizontal and vertical location of all underground utilities to within 0.1 feet relative to the station datum. All pipe utilities shall be surveyed at each fitting and every 100 LF of run length. Electrical and communication ductbank, direct buried conduit, and direct buried conductor shall be surveyed every 100 LF and at each change of direction. Locations and elevations shall be recorded on the Record Drawings. Submit drawings with QC certification. Submit drawings in Auto CAD format.

Record drawings shall also include the horizontal and vertical location of all recovery wells installed as part of this project.

1.4 EQUIPMENT/PRODUCT WARRANTIES

1.4.1 Equipment/Product Warranty List

Furnish to the Contracting Officer a bound and indexed notebook containing written warranties for equipment/products furnished under the contract, and prepare a complete listing of such equipment/products. The equipment/products list shall state the specification section applicable to the equipment/product, duration of the warranty, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty. The warranty period shall begin on the same date as project acceptance and shall continue for the full product warranty period. Execute the full list and deliver to the Contracting Officer prior to final acceptance of the facility.

1.4.2 Equipment Warranty Tags and Guarantor's Local Representative

Furnish with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed. The guarantor's representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide the services prescribed by the terms of the warranty. At the time of installation, tag each item of warranted equipment with a durable, oil- and water-resistant tag approved by the Contracting Officer. Attach tag with copper wire and spray with a clear silicone waterproof coating. Leave the date of acceptance and QC's signature blank until project is accepted for beneficial occupancy. Tag shall show the following information:

EQUIPMENT/PRODUCT WARRANTY TAG

Type of Equipment/Product _____
Warranty Period _____ From _____ To _____
Contract No. _____
Inspector's Signature _____ Date Accepted _____

Construction Contractor:

Name: _____
Address: _____
Telephone: _____

Warranty Contact: _____

Name: _____
Address: _____
Telephone: _____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

1.5 CLEANUP

Leave premises "broom clean." Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01781

OPERATION AND MAINTENANCE DATA
12/01

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01330 SUBMITTAL PROCEDURES.

1.1.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.1.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

1.1.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include procedures required to set up and prepare each system for use.

1.2.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown

operating procedures including the control sequence for each procedure.

1.2.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.2.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.2.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

- a. A table showing recommended lubricants for specific temperature ranges and applications.
- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.2.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.2.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.6 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog

1.2.6.1 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.2.6.2 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.2.6.3 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.2.6.4 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.3.1 Data Package 1

- a. Safety precautions
- b. Maintenance and repair procedures
- c. Warranty information

- d. Contractor information
- e. Spare parts and supply list

1.3.2 Data Package 2

- a. Safety precautions
- b. Normal operations
- c. Environmental conditions
- d. Lubrication data
- e. Preventive maintenance plan and schedule
- f. Maintenance and repair procedures
- g. Removal and replacement instructions
- h. Spare parts and supply list
- i. Parts identification
- j. Warranty information
- k. Contractor information

1.3.3 Data Package 3

- a. Safety precautions
- b. Normal operations
- c. Emergency operations
- d. Environmental conditions
- e. Lubrication data
- f. Preventive maintenance plan and schedule
- g. Troubleshooting guides and diagnostic techniques
- h. Wiring diagrams and control diagrams
- i. Maintenance and repair procedures
- j. Removal and replacement instructions
- k. Spare parts and supply list
- l. Parts identification
- m. Warranty information
- n. Testing equipment and special tool information

- o. Contractor information

1.3.4 Data Package 4

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions
- h. Lubrication data
- i. Preventive maintenance plan and schedule
- j. Troubleshooting guides and diagnostic techniques
- k. Wiring diagrams and control diagrams
- l. Maintenance and repair procedures
- m. Removal and replacement instructions
- n. Spare parts and supply list
- o. Corrective maintenance man-hours
- p. Parts identification
- q. Warranty information
- r. Personnel training requirements
- s. Testing equipment and special tool information
- t. Contractor information

1.3.5 Data Package 5

- a. Safety precautions
- b. Operator prestart
- c. Start-up, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Environmental conditions
- f. Preventive maintenance plan and schedule
- g. Troubleshooting guides and diagnostic techniques

- h. Wiring and control diagrams
- i. Maintenance and repair procedures
- j. Spare parts and supply list
- k. Testing equipments and special tools
- l. Warranty information
- m. Contractor information

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01782N

FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION

09/03

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

This section provides the requirements for operation and maintenance support information (OMSI). OMSI contains detailed as-built information describing the efficient, economical and safe operation and maintenance, and repair of the facility. OMSI is provided as hard copy, maintenance management system data. The OMSI is to be factual, concise, comprehensive and written to be easily used by maintenance personnel. Descriptive matter and theory must include technical details that are essential for a comprehensive understanding of the operation, maintenance and repair of the system. The OMSI preparer shall ensure that OMSI reflect changes to systems and equipment, made during construction. The words "system", "systems", and "equipment", when used in this document refer to as-built systems and equipment.

1.1.1 Organization of OMSI

Prepare the OMSI in three parts. PART I - Facility Information, PART II - Primary Systems Information, and PART III - Product Data. Cross-referencing within or between OMSI Parts must be specific.

1.1.2 Sources of Data

The primary sources of data needed to prepare the OMSI include the design plans and specifications, field visits and approved construction submittals. Construction submittals include Operation and Maintenance (O&M) Data, Product Data and Shop Drawings. The Contractor furnishes these submittals. Section 01330N, "Submittal Procedures" lists all submittal requirements and the Specification Section 01781, "Operation and Maintenance Data" specifies in detail the O&M requirements. Remove extraneous information from any design plans included in the OMSI manuals. Exact photocopies of design plans are not acceptable. Manufacturer's catalog data for materials, methods, and systems used in this contract shall be the primary source of information needed to prepare the OMSI.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

OMSI,100% - Prefinal Submittal; G

OMSI,Final Submittal; G

1.3 SUBMITTAL FORMAT

1.3.1 Hard Copies

1.3.1.1 Binders

Bind the OMSI in durable, hard cover, water and grease resistant binders, which hold 8.5" X 11" sheets. Binders shall have clear pockets located on the front and on the spine that hold printed sheets.

a. Facility Information binder - Bind the PART I, Facility Information in a white, post type, loose leaf binder of appropriate size.

b. Primary Systems Information binders - Bind the PART II, Primary Systems Information in blue, post type, loose leaf binders of three inch capacity. More than one system may be included in a single binder provided that all sections of each system are included in that binder.

c. Product Data binders - Bind the PART III, Product Data in red, post type, loose leaf binders of three inch capacity.

d. Identify each binder on both the cover insert sheet and the spine insert sheet with the following information:

- (1). OMSI Part I, II or III with appropriate titles
- (2). Building Number
- (3). Project Title
- (4). Activity and Location
- (5). Construction Contract Number
- (6). Prepared For: (Contracting Agency)
- (7). Prepared By
- (8). Volume Number - Each binder is a single volume. Number each volume consecutively. For example, an OMSI composed of 5 binders would have the Part I, Facility Information binder labeled volume 1 of 5 and the last Part III, Product Data binder would be volume 5 of 5.

1.3.1.2 Pages, Dividers and Tabs

Use high quality paper and dividers of heavy-duty paper with plastic reinforced holes and integrated tabs.

a. Facility Information divider - Use plain tabs to identify the major items.

b. Primary Systems Information dividers - Use blue tabs with bold type to identify the system titles. Use dividers with plain tabs to identify the different sections under each system and the major topics under each section.

c. Product Data dividers - Use plain tabs to show the UNIFORMAT II number and title. Use dividers with colored tabs to identify the specification section number with keywords to identify the section title. Use colored non-tab dividers to separate large equipment groupings such as valves, pumps, chillers and to separate the O&M data within each specification section.

1.3.1.3 Oversized Sheets

Insert oversized sheets into the binders as single foldout sheets. Oversized sheets are defined as submittals, instruction sheets, drawings, etc. larger than 8-1/2" X 11" but not exceeding 11" X 17". Oversized sheets shall be folded to expose the sheet's title block. Submittals or drawings exceeding 11" X 17", which cannot be reduced, may be inserted in labeled, clear plastic pockets.

1.3.1.4 Preface

Insert an unedited copy of the Preface sheet in the front of each volume, following a copy of the cover insert sheet. Include the information shown in the Preface located at the end of this section. No tab sheet is to be used with the Preface sheet.

1.3.1.5 Table of Contents

Provide a Master Table of Contents for the entire set of OMSI Binders. Place the Master Table of Contents after the Preface sheet of each volume. Provide a specific Table of Contents for Part I, Facility Information, for each system in Part II, Primary Systems Information, and for each division and section of Part III, Product Data.

1.3.2 Electronic Files

Provide narrative information in a Word for Windows(TM) format, unless otherwise specified by the Contracting Officer. Provide drawings and plans prepared for the OMSI manuals in a CAD format. Name and index the files for ease of identification and update. Provide all files on Compact Disk (CD).

1.3.3 Electronic Format (PDF)

Provide the OMSI on Compact Disk using Adobe Acrobat 5.0 or similar software capable of producing PDF (Portable Document Format) files. The PDF file is duplicate of the hard copy format. Scanned documents shall be scanned at 150 DPI or better. The PDF files shall be indexed by part (Facility Information, Primary Systems Information, and Product Data) and each entry identified in the table of contents. Indexes and Hyperlinks may be hidden or highlighted. Highlighted indexes may only be UNDERLINED or COLOR TEXT.

1.4 SUBMITTAL REQUIREMENTS

Provide OMSI Submittals in accordance with the following submittal requirements.

1.4.1 100% - Prefinal Submittal

Provide two hard copies. Deliver one copy to the Contracting Officer and deliver one copy to the designated point of contact at the Environmental Affairs Department. Include a copy of the preliminary submittal review comments along with the Contractor's response to each item. The Contracting Officer copy with review comments will be returned to the Contractor for preparation of the final submittal. The activity keeps their 100% OMSI Binders to operate and maintain the facility from Beneficial Occupancy Date (BOD) through submission of the final submittal. Therefore, it should contain all the required information that is available

at the time of submission.

1.4.2 Final Submittal

Provide two hard copies and two sets of electronically formatted information. Deliver one hard copy and one set of discs to the Contracting Officer. Deliver one hard copy and one set of discs to the activity point of contact. Final submittal must address all previous review comments. 100% review comments may include problems discovered during OMSI review, site validation, and facility start up. The comments will be provided to the Contractor at various times before and after the facility BOD. The 100% submittal of OMSI and review comments will be returned to the Contractor for preparation of the final submittal. If the comments require only minor corrections, the hard copies of the OMSI will not be returned and the Contractor shall correct the hard copy OMSI by submitting correction sheets and directions on how to make the corrections. The final submittal shall include a copy of the 100% submittal review comments along with a response to each item.

1.4.3 Submittal Schedule

Prefinal	_____	60 days prior to BOD
Final	_____	120-180 days after BOD

PART 2 PRODUCTS

2.1 DESCRIPTION OF WORK

2.1.1 OMSI Part I - Facility Information

a. General Facility and System Description - Describe the function of the facility. Include photographs marked up and labeled to show key operating components and the overall facility appearance. Include a copy of the final "Completion Certification". The Construction Quality Control Manager shall provide this documentation.

b. Basis of Design - Include the Basis of Design that shows the basic design scope of work, assumptions and the original intentions of the design A/E.

c. Safety Hazards - List all residual hazards identified in the Requirements Hazard Analysis as prepared by the design A/E. Provide recommended safeguards for each identified hazard.

d. Utility Connection and Cutoff Plans - Provide utility site plans that indicate the main interior and exterior connection and cutoff points for all utilities. Include enough information to enable someone unfamiliar with the facility to locate the connection and cutoff points. Indicate the room number, panel number, circuit breaker, valve number, etc., of each connection and cutoff point, and what that connection and cutoff point controls.

e. Extended Warranty Information - List all warranties for products, equipment, components, and subcomponents whose duration exceeds one year. Cross-reference the list to the warranty copies included in Part III, Product Data. For each warranty listed indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference all specific

operation and maintenance procedures that must be performed to keep the warranty valid.

f. Equipment Listing - Provide a table that lists the major equipment shown on the design equipment schedules. Show the item descriptions, locations, model numbers; and the names, addresses, and telephone numbers of the manufacturers, suppliers, contractor and subcontractors.

g. Supply Inventory Requirements - Provide a list of maintenance and repair supplies (for example, spare parts, fuels, and lubricants) required to ensure continued operation without unreasonable delays. Identify and list parts and supplies that have long lead times for purchase. Give special consideration to facilities at remote locations.

h. As-built Drawing List - Provide a list of the as-built drawings. Include drawing number and title. Identify where the drawings and specifications will be filed. Include a copy of the certificate attesting to the accuracy of the as-built drawings. The Construction Quality Control Manager shall provide this documentation.

i. Training Requirements - Provide a list of recommended training related to the operation and maintenance of each installed system that is available from the manufacturer or other source. Provide the name, address, and phone number of point of contact. The training requirements shall pertain only to systems listed in Part II, Primary Systems Information.

2.1.2 OMSI Part II - Primary Systems Information

Prepare the information required for Part II, Primary Systems Information using a systems approach. This approach requires that consideration be given to the entire system (that is, the interfaces of equipment, connections and material flow within the system).

Use Notes, Cautions and Warnings throughout the Part II, Primary Systems Information to emphasize important and critical instructions and procedures. Place notes, cautions, and warnings in bold font immediately before the applicable instructions or procedures. Notes, cautions and warnings are defined as follows:

Note: Highlights an essential operating or maintenance procedure, condition or statement.

Caution: Highlights an operating or maintenance procedure, practice, or condition, statement, etc., that, if not strictly observed, could result in damage to or destruction of equipment, loss of mission effectiveness, or health hazards to personnel.

Warning: Highlights an operating or maintenance procedure, practice, condition, or statement, etc., that, if not strictly observed, could result in injury to or death of personnel.

a. Operation

(1) System Description - Provide a detailed discussion of the system composition and operation. Include technical details that are essential for an understanding of the system.

(2) Start-Up and Shutdown Procedures - Provide step by step

instructions to bring systems from static to operational configurations and from operating to shutdown status.

(3) Normal Operating Instructions - Provide a discussion of the norms (for example, temperatures, pressures, and flow rates) expected at each zone or phase of the system. Supplement the discussion with control and wiring diagrams and data.

(4) Emergency Operating Instructions - Provide emergency operating procedures in the event of equipment malfunctions. Provide shutdown instructions for fires, explosions, spills, or other contingencies.

(5) System Flow Diagrams - Provide a flow diagram indicating system liquid, air or gas flow during normal operations. Integrate all system components into the diagram. A compilation of non-integrated, flow diagrams for the individual system components are not acceptable.

(6) Diagrammatic Plans - Provide plans indicating the location of equipment and configuration of the system installation. Include the configuration of associated piping or wiring. Subordinate structural features to utility features.

(7) Environmental Considerations - Provide a listing of the equipment which requires special operation, reporting, testing, analysis or inspection to comply with federal, state or local environmental laws. Examples of possible list items include underground storage tank testing, hazardous material or waste usage and storage documentation, and air pollution control devices. Each item in the list will include requirements for environmental operation, reporting, testing, analysis, and inspection as well as references to respective implementing regulations, statutes, or policies.

(8) Field Test Reports - Provide Field Test Reports (SD-12) that apply to equipment associated with the system.

(9) Operator Servicing Requirements - Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

(10) Safety Instructions - Provide a list of all personnel hazards and equipment safety precautions including recommended safeguards.

(11) Valve List - Provide a list of all valves associated with the system. Show valve type, identification number, function, location and normal operating position.

(12) Operating Log - Provide forms, samples, and instructions for keeping necessary operating records.

(13) Training Sessions - Provide copies of all final training session verification documents. Include the subject of the training, when & where it was accomplished, and who attended. Indicate where videotaped training sessions were delivered to for future access. The Design Quality Control Manager shall provide by this information.

b. Preventive Maintenance

(1) Preventive Maintenance Plan and Schedule - Provide a Preventive Maintenance (PM) plan using manufacturer's recommendations and sound engineering practice. Include all major pieces of equipment. Provide a check sheet that details maintenance tasks and associated frequencies. Also provide an annual schedule indicating when maintenance tasks should be performed such that work is spread as evenly as possible throughout the year.

(2) Preventive Maintenance Procedures - Provide Task Card for each individual maintenance task identified on the PM plan and Schedule. Include detailed PM procedures, safety instructions and precautions including Lock out/tag out precautions, required skill level, number of personnel needed, frequency, special tools needed, parts needed, and estimated time required to complete the task.

(3) Lubrication Schedule - Provide a lubrication schedule indicating types, grades and capacities of lubricants for specific temperature ranges and applications.

(4) Preventive Maintenance Log - Provide a tabular form for recording the accomplishment of PM. Log must record date PM was performed, findings, action taken, parts used, time required to complete the work, and other data necessary to provide a good historical record of PM activities.

c. Repair

(1) Troubleshooting Guides and Diagnostic Techniques - Provide step by step procedures for isolating the cause of system malfunctions. The procedures shall clearly state indications or symptoms of trouble; the sequential instructions, including checks and tests to be performed and conditions to be sought, to determine the cause; and remedial measures to bring the equipment and system to operating condition. Identify special test equipment required to perform the procedures. Start the troubleshooting guide at the system level and proceed to a level where detailed manufacturer's troubleshooting procedures for equipment and components can be referenced.

(2) Repair Procedures - Provide repair instructions required to restore equipment to proper operating standards. References must be specific as to location within the OMSI.

(3) Removal and Replacement Instructions - Provide or refer to the manufacturer's data for the instructions on the removal and replacement of equipment components. References must be specific as to location within the OMSI.

d. Manufacturer's Data

(1) Operation and Maintenance Data - Include the O&M Data Package information provided by the Contractor per the technical sections of the specification and Section 01781, "Operation and Maintenance Data". Incorporate this information into each system discussion

under the Operation, Preventive Maintenance and Repair sections of Part II, Primary Systems Information.

(2) Manufacturer's Equipment Information - Provide drawings, illustrations and technical data furnished by the manufacturer for the equipment and system components. Organize and index the information for easy reference.

2.1.3 PART III - Product Data

a. Record of Material and Equipment - Provide a record of materials and equipment used in the facility construction. Include manufacturer's data submittals required in the construction specification. Examples of Product Data include catalog cuts, data sheets, test reports and warranty sheets. Include shop drawings relevant to the O&M of the facility or system except those discussed in Part II, Primary Systems Information. Do not include extraneous data, (for example, transmittal sheets, certifications, welder qualifications, contractor qualifications and certificates of compliance). Highlight or note submittals that contain information on several parts or model numbers to identify installed material. Product data included in Part III, Product Data should use metric units if metric OMSI is required. The Contractor is not required to convert to metric units in product data that contains only English units.

b. Warranties - Provide copies of extended equipment warranties.

PART 3 EXECUTION

3.1 DOCUMENTATION SITE VISIT

Provide the services of one person having detailed technical knowledge of the OMSI to be on site for one day to obtain details and documentation on field changes, to take appropriate photos and to gather missing submittal data. Timing of visit will depend on actual construction progress but will generally occur approximately 60 to 120 days prior to the OMSI Prefinal submittal date.

3.2 VALIDATION

Provide the services of two people, who have detailed technical and organizational knowledge of the OMSI, to be on site for one day to perform the validation of the OMSI. The purpose of the validation is to present the OMSI to the users and to verify the OMSI's completeness and accuracy. The validation site visit will be performed at the Prefinal stage. Contact the Contracting Officer for the exact date.

3.2.1 Presentation

Provide a presentation of the OMSI Prefinal submittal to Government and other representatives at the activity site. The presentation details how the OMSI is organized, what it contains, how it is referenced and cross referenced, and how to use it in day-to-day operation, maintenance and repair.

3.2.2 Verification

Field verify the accuracy and completeness of the OMSI. This includes verifying that the systems and equipment in the OMSI accurately reflects the as-built conditions; verifying that O&M procedures are appropriate for

the systems and equipment that it supports; and that equipment nomenclature and system configurations are accurate. Make corrections and recommended in-scope changes to the OMSI prior to delivery of the final submittal.

-- End of Section --

SECTION 02111

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL

09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1556 (2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 2487 (2000) Soils for Engineering Purposes (Unified Soil Classification System)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (1996) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926 Safety and Health Regulations for Construction

40 CFR 302 Designation, Reportable Quantities, and Notification

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Excavation Work Plan; G,

Provide Excavation Work Plan within 30 calendar days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. The Contractor shall allow 30 calendar days in the schedule for the Government's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

- b. Method of excavation and equipment to be used.
- c. Shoring or side-wall slopes proposed.
- d. Dewatering plan.
- e. Storage methods and locations for liquid and solid contaminated material.
- f. Borrow sources and haul routes.
- g. Decontamination procedures.
- h. Spill contingency plan.
- i. Spill Response Materials.

SD-06 Test Reports

Compaction; G,
Test results.

1.3 REGULATORY REQUIREMENTS

1.3.1 Permits and Licenses

The Contractor shall obtain required federal, state, and local permits for excavation and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.4 DESCRIPTION OF WORK

The work shall consist of excavation and temporary storage of potentially contaminated material. The Contractor shall submit an Excavation Work Plan as specified in the Submittals paragraph. The Contracting Officer shall be notified within 24 hours, and before excavation, if contaminated material is discovered that has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Ground water is approximately 7 feet below pre-excavation ground surface.

1.5 CHEMICAL TESTING

Required sampling and chemical analysis shall be conducted in accordance with local, State, and Federal requirements.

1.6 SCHEDULING

The Contractor shall notify the Contracting Officer 14 calendar days prior to the start of excavation of contaminated material. The Contracting Officer will be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

PART 2 PRODUCTS

2.1 BACKFILL

Backfill material shall be obtained from offsite sources approved by the Contracting Officer. Backfill shall be classified in accordance with ASTM D 2487 as SW, SP, SM, or SC and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials. Backfill material shall be tested for the parameters listed below at a frequency of once per 1000 cubic yards. A minimum of one set of classification tests shall be performed per borrow source.

Backfill shall not be used until borrow physical test results have been submitted and approved.

2.2 SPILL RESPONSE MATERIALS

The Contractor shall provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located by the Contractor. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Contact FMD Drinking Water Treatment Plant should a water main be damaged. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Contracting Officer.

3.2 CONTAMINATED MATERIAL REMOVAL

3.2.1 Excavation

Excavation shall proceed to the depth and extent as necessary for proper construction. Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material.

Soils removed from excavations shall be screened with an organic vapor analyzer/photo ionization detector (OVA/PID) capable of detecting vapors to a minimum of one (1) ppm. Screened soils that exhibit OVA/PID readings greater than 10 ppm should be stockpiled on plastic, bermed and covered in accordance with the requirements of the NCDENR Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater, effective July 2000 (2000 Guidelines) or placed in a roll-off container and covered with plastic.

Screened soils that do not exhibit OVA/PID readings greater than 10 ppm may be used as backfill in the immediate area of the excavation. Should free-phase product be encountered, the product shall be collected and

temporarily stored on site in 55-gallon barrels.

3.2.2 Shoring

If workers must enter the excavation, it shall be evaluated, shored, sloped or braced as required by EM 385-1-1 and 29 CFR 1926 section 650.

3.2.3 Dewatering

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met. If dewatering is required during excavation, all collected water must be containerized and properly disposed. No dewatering shall be performed without prior approval of the Contracting Officer.

3.3 CONTAMINATED MATERIAL STORAGE

Material shall be placed in temporary storage immediately after excavation. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.3.1 Temporary Storage

Temporary storage of petroleum contaminated soil must be for less than 45 days and must be in accordance with the 2000 Guidelines. Temporary storage shall be on 10 mil thick plastic, bermed and covered with a plastic cover of at least 10 mil thickness to prevent rainwater accumulation. Liquid which collects within the berm shall be removed and stored in accordance with Paragraph 3.3.3, Liquid Storage.

3.3.2 Roll-Off Units

Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Storage.

3.3.3 Liquid Storage

Liquid collected from excavations and stockpiles shall be temporarily stored in 55 gallon barrels. Liquid storage containers shall be water-tight and shall be located within the construction area.

3.4 SAMPLING

3.4.1 Sampling of Stored Material

Stored material with contaminant levels that exceed the action levels shall be treated offsite. Analyses for contaminated material to be taken to an offsite treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility.

Documentation of all analyses performed shall be furnished to the Contracting Officer. Sampling of petroleum contaminated soil shall be in accordance with the requirements of Section 02525N, Extraction Wells, Paragraph 3.3.2 Testing Requirements for Stockpiled Soils. A minimum of one composite sample is required for each 200 cubic yards of stockpiled material. Additional sampling and analyses to the extent required by the approved offsite treatment, storage or disposal (TSD) facility shall be the responsibility of the Contractor and shall be subject to approval by the Contracting Officer.

3.4.2 Sampling Liquid

No sampling of collected fluids shall be required. Liquid shall be treated at the existing Marine Corps Air Station Wastewater Treatment Plant. Analyses for contaminated liquid to be taken to an offsite treatment facility shall conform to local, State, and Federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer.

3.5 SPILLS

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (PA), 33 U.S.C. 2701 et se.), the Contractor shall notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, the Contractor shall follow the pre-established procedures as described in the Base Wide Contingency Plan for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.6 BACKFILLING

3.6.1 Compaction

Approved backfill shall be placed in lifts with a maximum loose thickness of 8 inches. Soil shall be compacted to 95 percent of ASTM D 698 maximum dry density. Density tests shall be performed as required by the Contracting Officer. Field in-place dry density shall be determined in accordance with ASTM D 1556.

3.7 CONTAMINATED SOIL

3.7.1 Contaminated Soil

Contaminated materials removed from the site shall be disposed of in a treatment/disposal facility permitted by the State to accept such materials. The EQD must review and sign the waste manifests for the soil disposal prior to any of this soil leaving the Air Station. The manifest should contain the amount of soil (weight) and supporting laboratory results for EQD review.

3.7.2 Liquid Disposal

Liquids shall be treated on the Air Station at the existing MCAS Wastewater Treatment Plant. The sediment can be added to soil being stockpiled for disposal.

-- End of Section --

SECTION 02220

DEMOLITION
09/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6 (1990; R 1998) Safety Requirements for
Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (1996) Safety and Health Requirements
Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61-SUBPART M National Emission Standard for Asbestos

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations inside or outside the buildings. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer. In the interest of occupational safety and health, the work shall be performed in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections. In the interest of conservation, salvage shall be pursued to the maximum extent possible (in accordance with Section 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT, if applicable; salvaged items and materials shall be disposed of as specified.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Demolition plan; G,

Notifications; G,

Submit proposed demolition and removal procedures to the

Contracting Officer for approval before work is started.

SD-11 Closeout Submittals

Receipts

Receipts or bills of lading, as specified.

1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," safety requirements shall conform with ANSI A10.6.

1.4.1 Notifications

1.4.1.1 General Requirements

Furnish timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M, as applicable. Notify the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

1.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris to avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris.

1.6 PROTECTION

1.6.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.6.2 Existing Work

Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government; any damaged items shall be repaired or replaced as approved by the Contracting Officer. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Contracting Officer approval.

1.6.3 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, shall remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Contracting Officer. The Contractor shall ensure that no elements determined to be unstable are left unsupported and shall be responsible for placing and securing bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.6.4 Protection of Personnel

During the demolition work the Contractor shall continuously evaluate the site conditions and take immediate action to protect all personnel working in and around the demolition site.

1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by the Contracting Officer.

1.9 REQUIRED DATA

Demolition plan shall include procedures for coordination with other work in progress, a disconnection schedule of utility services, and a detailed description of methods and equipment to be used for each operation and of the sequence of operations. The procedures shall provide for safe conduct of the work in accordance with EM 385-1-1.

1.10 ENVIRONMENTAL PROTECTION

The work shall comply with the requirements of Section 01575N TEMPORARY ENVIRONMENTAL CONTROLS.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

Existing pavement shall be removed as specified within the Construction Drawings and as necessary for proper construction of the work.

3.1.2 Utilities and Related Equipment

Removal of existing utilities is not anticipated as part of this work. When utility lines are encountered that are not indicated on the drawings, the Contracting Officer shall be notified prior to further work in that area.

3.1.3 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat sawcuts at limits of pavement removal as indicated.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition and removal procedures, and authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.2.2 Reuse of Materials and Equipment

Remove and store materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Unsalvageable Material

Unsalvageable materials shall be disposed of by the Contractor.

3.3 CLEANUP

Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

-- End of Section --

SECTION 02525N

EXTRACTION WELLS

09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 150	(2002a) Portland Cement
ASTM D 1586	(1999) Penetration Test and Split-Barrel Sampling of Soils
ASTM D 1587	(2000) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(2000) Description and Identification of Soils (Visual-Manual Procedure)
ASTM D 4397	(2002) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 5088	(2002) Decontamination of Field Equipment Used at Nonradioactive Waste Sites
ASTM D 5092	(2002) Design and Installation of Ground Water Monitoring Wells in Aquifers

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) Safety and Health Requirements Manual
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
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1.2 DESCRIPTION OF WORK

Provide extraction wells including drilling, casing, well screen, gravel packing, grouting, development, and incidental related work complete and ready for operation.

1.3 GENERAL REQUIREMENTS

Each system, including equipment, materials, installation, and performance, shall be in accordance with local, State, and Federal regulations,

ASTM D 5092, and EPA 600-4-89-034 except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to the "Project Representative" and the "Owner" shall be interpreted to mean the Contracting Officer. Additional requirements are included under Section 01500N TEMPORARY FACILITIES AND CONTROLS.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

- Well casing

- Well screen

- Filter pack

SD-07 Certificates

- Well Drilling/Development Material Handling Plan; G

- Health and Safety Plan; G

- Field Sampling and Laboratory Testing Plan; G

- Treatment facility permit

- Installation Survey Report

- Borehole Analysis Report

SD-11 Closeout Submittals

- Recovery Well Construction Permit

- Shipment manifests

- Delivery certificates

- Treatment and disposal certificates

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in an undamaged condition. Unload and store with minimal handling. Store materials in on-site enclosures or under protective coverings. Store plastic piping and jointing materials, out of direct sunlight. Store materials off the ground. Keep insides of pipes and fittings free of dirt and debris. Replace defective or damaged materials with new materials.

1.6 QUALITY ASSURANCE

1.6.1 Well Drilling/Development Material Handling Plan

A material handling plan shall be furnished by the Contractor 15 days prior to initiation of the work that describes phases of dealing with the potentially contaminated soil and groundwater, including the following: a schedule to be employed in the well drilling and development stages, a sequence of operations, the method of drilling and development, material hauling, proposed equipment, handling of the contaminated materials, soil and water testing requirements, and safety precautions and requirements.

1.6.2 Health and Safety Plan (HASP)

Describe safety precautions for each phase of the project as specifically related to handling of soil and water removed during well drilling and development operations. Identify appropriate requirements of 29 CFR 1910 and EM 385-1-1. Identify safety equipment and procedures to be available and used during the project. Furnish the name and qualifications based on education, training, and work experience of the proposed Health and Safety Officer (HASO) and the members of the drill crew. The Contractor may perform the responsibilities of the HASO if properly qualified.

1.6.3 Field Sampling and Laboratory Testing Plan

Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Sample reports shall show sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.

1.6.4 Treatment Facility Permit

Verification that the proposed treatment facility is permitted to accept the contaminated materials specified, prior to the start of excavation.

1.6.5 Recovery Well Construction Permit

Submit a completed permit application and a proposed method of construction to the appropriate state agency prior to construction of the well. Construction of the wells will not be allowed until an approved Well Construction Permit has been submitted to the Contracting Officer.

1.6.6 NC Recovery Well Construction Record

Provide a North Carolina Well Construction Record for each recovery well for submittal to the State.

1.6.7 Shipment Manifests

Copies of manifests and other documentation required for shipment of waste materials within 24 hours after removal of waste from the site. Shipment manifests shall be signed by a representative of the EQB.

1.6.8 Delivery Certificates

Verification that the wastes were actually delivered to the approved treatment facility, within 7 days of shipment.

1.6.9 Treatment and Disposal Certificates

Verification that the wastes were successfully treated and remediated to the levels specified herein.

PART 2 PRODUCTS

2.1 WELL CASING

2.1.1 Stainless Steel Piping

ASTM A 312/A 312M, Type 304, Schedule 40S, with flush threaded joint end fittings. Threaded joints shall be wrapped with flouropolymer tape, and provided with nitrile O-ring gaskets.

2.2 WELL SCREEN

Well screens shall be located as indicated. The length of each screen shall be as indicated. Slot size shall be 0.020 inch. Slotted openings shall be distributed uniformly around the circumference of the screen. Open area shall approach the formation's natural porosity.

2.2.1 Stainless Steel Screens

ASTM A 312/A 312M, Type 304, Schedule 40S, continuous slot construction, wire wound, with flush threaded joint ends.

2.3 PRIMARY FILTER PACK

Provide clean, durable, well-rounded, and washed quartz or granite, with less than 5 percent non-siliceous material. The filter pack shall not contain organic matter or friable materials. The filter pack shall allow free flow of water in the well, and shall prevent the infiltration of aquifer materials. Filter pack shall have a uniformity coefficient less than 2.5 or less. Filter pack shall be a commercially available filter pack material with gradation specifications within the following ranges:

<u>Sieve Number</u>	<u>Cumulative Percent Retained</u>
16	0-5
18	5-15
20	30-46
25	70-86
30	88-100

2.4 ANNULAR SEALANTS

2.4.1 Bentonite Seal

Provide granular, pelletized, or chipped montmorillonite in sealed containers from a commercial source, free of impurities. Diameter of pellets shall be less than one fifth the diameter of the borehole annular space to prevent bridging. Bentonite base grout shall be in accordance with ASTM D 5092.

2.4.2 Neat Cement Grout

Provide neat cement grout in accordance with ASTM D 5092. Cement shall be in accordance with ASTM C 150. Quick setting admixtures shall not be

allowed. Drilling mud or cuttings shall not be used as a sealing material.

2.5 BOTTOM PLUGS

Provide flush threaded solid plug at the bottom of the well. Plug shall be the same material as the well to which it is attached. Joints shall be wrapped with nitrile O-ring gaskets.

2.6 WELL CAP

Provide well cap on the top of the well to seal around stinger pipe.

2.7 WELL IDENTIFICATION TAG

Provide metal identification tag as follows:

ID #:	Date:
Installed By:	
Total Depth:	
Screened Interval:	
TOC Elevation:	
Other:	
For Information, Call:	

2.8 WELL HEAD

Provide well head vault box, with watertight frame and cover. Vault shall support H-20 loading for grassed and pavement areas. Frame and cover shall be set flush with the level of the existing pavement.

2.9 POLYETHYLENE SHEETING

ASTM D 4397.

PART 3 EXECUTION

3.1 GENERAL

Notify the Contracting Officer at least 15 days prior to commencement of work. Locations of wells shall be as indicated. Drilling, installation, and development of the extraction wells shall be supervised, directed, and monitored by a well driller licensed in the State of North Carolina. Drilling, sampling, and well development equipment introduced to the well shall be decontaminated before and after each use in accordance with ASTM D 5088.

3.2 DRILLING

Borehole shall be advanced using conventional 8.25 inch ID hollow-stem auger drilling methods. If it is the opinion of the licensed driller that an alternate drilling method is required, justification for a boring method change shall be submitted to the Contracting Officer, and approval for the change granted prior to drilling. Drill crew shall be experienced and trained in drilling and safety requirements for contaminated sites.

3.2.1 Sampling

Obtain samples in accordance with ASTM D 1586 or ASTM D 1587. Perform standard penetration tests at the following depths: 0.0 to 1.5 feet; 1.5

to 3.0 feet; 3.0 to 4.5 feet; and 5 foot centers or at changes in soil formation thereafter. Each soil sample shall be screened in the field with an organic vapor analyzer/photo ionization device (OVA/PID) capable of detecting vapors to a minimum of one ppm. Log boring in accordance with ASTM D 2487 and ASTM D 2488. Groundwater elevation shall be indicated.

3.2.2 Analysis

The Contractor shall review the log data from each borehole and compare the data with the well design requirements. The Contractor shall verify the adequacy of the well design, or shall offer a proposed modification to the design based on the geologic and hydrogeologic data obtained from the borehole. This review and analysis shall be conducted for each borehole. The Contractor shall submit the borehole boring logs, the analysis of the well design, and any proposed design modifications to the Contracting Officer in a Borehole Analysis Report. Any modifications to the well design approved by the Contracting Officer shall be considered a change to the contract documents and shall be negotiated in accordance with the "CHANGES" clause.

3.3 SOIL REMOVED FROM THE BOREHOLE

3.3.1 Temporary Containment of Soil Removed from the Borehole

Soil removed from the borehole shall be placed in temporary containment vessels. Provide the temporary containment vessels during well construction near the well site. Following well construction, and at the end of each day, temporary containment vessels shall be temporarily stored in a place designated by the Contracting Officer.

3.3.2 Testing Requirements for Stockpiled Soils

3.3.2.1 Sampling

A minimum of one composite sample shall be developed and analyzed for each required test from a composite stockpile of soil removed from all well sites. To develop a composite sample of the size necessary to run the required tests, the Contractor shall take several samples from each of the temporary vessels. These samples shall be combined and thoroughly mixed to develop the composite sample.

3.3.2.2 Testing

- a. The soil shall contain no free liquid as demonstrated by , EPA Method 9095, paint filter liquids test.
- b. TPH (total petroleum hydrocarbons) concentrations shall be determined by using EPA Method 5030 and 3550/8015, which has been modified for use with soil.
- c. Material shall be analyzed for TCLP, benzene and lead only, in accordance with, EPA Method 1311/8260/6010B.

3.3.2.3 Disposal of Stockpiled Soils

- a. Soils exhibiting TPH GRO or DRO less than 10 ppm, and passing TCLP tests shall be considered clean as shall be disposed of as directed by the Contracting Officer.

- b. Soils failing the TCLP test shall be managed in accordance with applicable State and local regulations. Payment for disposal of materials failing the TCLP metals test shall be made in accordance with the "CHANGES" clause of the General Conditions.
- c. If the concentration of TPH-GRO or DRO is greater than 10 ppm, the soil shall be treated and disposed of at a State permitted soil disposal facility.

3.4 WELL INSTALLATION

Well installation shall be in accordance with NCAC Title 15A 2C, and as indicated on the well construction drawings submitted by the Contractor and approved by the Contracting Officer. Borehole shall be stable and shall be verified straight before beginning installation.

3.4.1 Casings and Screens

Well casings, screens, plugs, and caps shall be decontaminated prior to delivery by the manufacturer and shall be certified clean. Materials shall be delivered, stored, and handled in such manner as to ensure that grease, oil, or other contaminants do not contact any portion of the well screen and casing assembly prior to installation. If directed by the Contracting Officer, the well screen and casing assembly shall be cleaned with high pressure water prior to installation. Personnel shall wear clean cotton or surgical gloves while handling the assembly. Centralizers shall be used to ensure that the well screen and casing assembly is installed concentrically in the borehole. When the assembly has been installed at the appropriate elevation, it shall be adequately secured to preclude movement during placement of the filter packs and annular seals. The top of the well casing shall be capped during filter pack placement.

3.4.2 Filter Packs

Filter sand packs shall be placed as indicated on the well construction drawings to fill the entire annular space between the screen and casing assembly and the outside wall of the borehole. Place the filter pack by gravity or free fall methods.

3.4.3 Bentonite Seal

Bentonite shall be placed by gravity or free fall method. Control speed of bentonite placement to prevent bridging. Additional water shall be added to the annular space as directed by the Contractor to ensure complete hydration of the bentonite. Bentonite shall cure a minimum of 24 hours before the placement of cement grout to ensure complete hydration and expansion of the bentonite.

3.4.4 Neat Cement Grout

Cement grout shall be placed in the annular space above the bentonite seal as indicated on the well construction drawings. Cement grout shall be placed as a slurry through a tremie pipe, and injected under pressure to reduce chance of voids. Cement grout shall cure a minimum of 24 hours before beginning well development operations.

3.4.5 Well Head Completions

Well head completions shall be as indicated on the Construction plans and

as specified herein.

3.5 WELL DEVELOPMENT

Well development shall be in accordance with ASTM D 5092 except as modified herein. Bailing, surging, and pumping/overpumping/backwashing are acceptable development methods. Air surging and jetting are prohibited. Method of development shall be chosen by the Contractor and approved by the Contracting Officer. Well development shall not begin until the well installation is complete and accepted by the Contracting Officer. Well development operations shall be conducted continuously until development water flows clear and free of drilling fluids, cuttings, or other materials.

3.6 WATER FROM WELL DEVELOPMENT OPERATIONS

Water from the well development operations shall be containerized, the solids allowed to settle a minimum of 24 hours, and the clear groundwater disposed in an existing groundwater treatment system located on the Air Station. Solids from well development shall be disposed with the soils removed from the boreholes.

3.7 TRANSPORTATION OF CONTAMINATED SOIL AND WATER

The Contractor shall be solely responsible for complying with Federal, State, and local requirements for transporting contaminated materials through the applicable jurisdictions and shall bear responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall do the following:

- a. Inspect and document vehicles and containers for proper operation and covering.
- b. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
- c. Perform and document decontamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.8 DISPOSAL OF CONTAMINATED SOIL AND WATER

Contaminated materials removed from the site shall be disposed of in a treatment/disposal facility permitted by the State to accept such materials; however, land farming will not be accepted.

3.9 INSTALLATION SURVEY

Upon completion of well installation and development and acceptance by the Contracting Officer therefore, vertical and horizontal position of each well shall be determined by the Contractor and certified by the Contractor.

The survey shall document the vertical elevations of the top of the casing pipe and the ground surface elevation adjacent to each well. The survey shall also determine the horizontal location of each well based on the MCAS New River. Vertical survey shall be accurate to the nearest .01 foot. This data shall be submitted with a well location map as the Installation Survey Report.

3.10 CLEANUP

Upon completion of the well construction, remove debris and surplus

materials from the jobsite.

-- End of Section --

SECTION 02751N

CONCRETE PAVEMENT AND SLABS

11/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306R	(1988) Cold Weather Concreting
ACI 309R	(1996) Guide for Consolidation of Concrete
ACI 325.6R	(1988; R 1997) Texturing Concrete Pavements
ACI 325.9R	(1991; R 1997) Guide for Construction of Concrete Pavements and Bases

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2003) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 123	(2003) Lightweight Particles in Aggregate
ASTM C 131	(2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 142	(1997) Clay Lumps and Friable Particles in Aggregates
ASTM C 143/C 143M	(2003) Slump of Hydraulic Cement Concrete
ASTM C 150	(2002a ¹) Portland Cement
ASTM C 260	(2001) Air-Entraining Admixtures for Concrete
ASTM C 309	(2003) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 33	(2003) Concrete Aggregates
ASTM C 494/C 494M	(1999a ¹) Chemical Admixtures for Concrete

ASTM C 535	(2003e1) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 94/C 94M	(2003a) Ready-Mixed Concrete
ASTM C 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 4791	(1999) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Ready-mixed concrete plant identification

Batch ticket information

1.3 EQUIPMENT

Maintain all equipment in satisfactory working condition throughout the length of the contract.

1.3.1 Curing Compound Spray Equipment

Provide equipment with spraying nozzles and pressure that can be controlled and operated with a fine nozzle to completely and uniformly cover pavement surface with required amount of curing compound. Mechanically agitate curing compound throughout application. Small or irregular areas may be sprayed by hand methods.

1.4 QUALITY ASSURANCE

1.4.1 Required Data

Submit name and location of the ready-mixed concrete plant. Submit batch ticket information as specified in ASTM C 94/C 94M.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Material

2.1.1.1 Cement

ASTM C 150 Type I or II, with maximum alkali content of .060%.

2.1.2 Water

ASTM C 94/C 94M.

2.1.3 Aggregates

2.1.3.1 Fine Aggregates

ASTM C 33.

2.1.3.2 Coarse Aggregates

ASTM C 33, maximum size no. 57, one inch except as otherwise modified herein.

- a. Abrasion loss shall not exceed 40 percent for aggregates tested in accordance with ASTM C 131 or ASTM C 535.
- b. Aggregates shall be gravel, crushed gravel, or crushed stone.
- c. Specific gravity not less than 2.55, saturated-surface-dry (SSD).
- d. Furnish coarse aggregate in at least two separate sizes with separation at the 3/4 inch sieve when combined material graded from No. 4 to 1 1/2 inch nominal maximum size is specified. When the nominal maximum size of aggregate is 1-inch or less, such separation is not necessary.
- e. Deleterious Substances: Requirements of Table 3 as given in ASTM C 33 apply, except deleterious substances in coarse aggregate shall not exceed the following percentages by weight:
 - (1) Clay Lumps and Friable Particles: 1.0 percent when tested in accordance with ASTM C 142.
 - (2) Lightweight Pieces: 1.0 percent when tested in accordance with ASTM C 123, ASTM C 989. When blast furnace slag is used, unit weight shall control.
 - (3) Materials Finer than No. 200 Sieve: 1.0 percent when tested in accordance with ASTM C 117.
 - (4) Flat and Elongated Particles: 5 to 1 ratio with a total of 15 percent when tested in accordance with ASTM D 4791.

2.1.4 Admixtures

Where not shown or specified, admixtures may be used subject to written approval of the Contracting Officer.

2.1.4.1 Air-Entraining Admixtures

ASTM C 260.

2.1.4.2 Retarding Admixtures

ASTM C 494/C 494M, Type B or D.

2.1.4.3 Water-Reducing Admixtures

ASTM C 494/C 494M, Type A, D, E, F or G.

2.1.4.4 Accelerating Admixtures

ASTM C 494/C 494M, Type C.

2.1.5 Curing Materials

2.1.5.1 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented Type 2, Class B, or clear or translucent Type 1-D, Class B with white fugitive dye.

2.1.6 Joints, Reinforcement and

Provide as specified in Section 02762N JOINTS REINFORCEMENTS IN CONCRETE PAVEMENTS.

2.2 CONCRETE MIX DESIGN

2.2.1 Contractor-Furnished Concrete Mix Design

Contractor-furnished mix design concrete shall be designed in accordance with ACI 211.1 except as modified herein. The concrete shall have a minimum flexural strength of 650 psi at 56 days. The air content shall be 5.5 plus or minus 1.5 percent. The minimum cement factor and slump shall be as follows:

Method of Finishing to be Used	Minimum Cement Factor, <u>Lb Per Cubic Yard</u> <u>Aggregate Size</u>				Range in Slump (Inches)
	1.0	1.5	2.0	2.5	
Machine finish with- out vibration	620	592	564	536	2 to 3
Machine finish, with vibration (except slip form)	573	545	517	489	1 to 2
Hand tools	667	639	611	583	3 to 4
Slip form	573	545			0 to 1

The cement factors given in the foregoing table are minimum; if they are not sufficient to produce concrete of the flexural strength required, they shall be increased as necessary, without additional compensation under the contract. The slump will be determined by ASTM C 143/C 143M and shall be within the ranges given herein; the specific slump shall be as approved by the Contracting Officer. Obtain acknowledgement of receipt prior to beginning any concrete work. Approved admixtures shall be used in proportions recommended by the manufacturer to obtain the optimum effect, with seasonal atmospheric and job conditions considered.

2.3 FIXED FORMS

Use metal forms free from irregularities, bulges, warps, dents, and sags. Top face of form shall not vary by more than 1/8 inch in 10 feet, and lateral variation shall be less than 1/4 inch in 10 feet. Use forms sufficiently strong to resist pressure of concrete and loads resulting from finishing operations without springing, settling, or losing their shape. Clean forms before reuse. Before placing concrete, coat contact surfaces of forms with a non-staining release agent.

PART 3 EXECUTION

3.1 PREPARATION

Before placing concrete, bring surface to finish grade and elevations as shown. Moisten underlying material in advance of placing concrete to ensure a firm, moist condition at time concrete is placed. Do not permit equipment other than concrete delivery or paving equipment on prepared underlying material. In cold weather protect underlying material from frost. Do not use chemicals to eliminate frost. Maintain drainage ditches, gutters and side drains to drain the base during construction.

3.1.1 Base for Fixed Form Construction

Finish to the design profile. Test prepared surfaces with a template. Do not vary surface of base material more than 0.04 foot from indicated elevations.

3.2 FIXED FORMS

Set forms for full bearing on foundation for entire length and width and in alignment with edge of finished pavement. Support forms during entire operation of placing, compaction, and finishing so that forms will not deviate vertically more than 0.01 foot from required grade and elevations indicated. Maximum vertical deviation of top of any side form, including joints, shall not exceed 0.01 foot from a 10 foot straightedge, nor shall inside face vary more than 0.02 foot from a 10 foot straightedge. Provide stake sockets and interlocking devices that will prevent movement of the form.

3.3 JOINTS AND REINFORCEMENT

Place joints, welded wire fabric and reinforcement steel in accordance with Section 02762N JOINTS AND REINFORCEMENTS IN CONCRETE PAVEMENTS.

3.4 MEASURING AND MIXING

3.4.1 Ready-Mixed Concrete

ASTM C 94/C 94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. Additional water may be added to bring slump within required limits as specified in Section 11.7 of ASTM C 94/C 94M, provided that specified water-cement ratio is not exceeded.

3.5 CONVEYING AND PLACING CONCRETE

3.5.1 Placing

ACI 325.9R, except as modified herein. Place concrete continuously at a uniform rate, with a minimum amount of segregation, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If an emergency stop does occur within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of emergency stop has been corrected.

3.5.1.1 Cold Weather

ACI 306R. High-early-strength-concrete shall be maintained above freezing for a period greater than one-quarter of the period specified for portland cement concrete or a minimum of 48 hours.

3.5.1.2 Hot Weather

ACI 305R.

3.5.2 Consolidation

ACI 309R, Chapter 11.

3.5.3 Protection Against Rain

ACI 325.9R, Chapter 10.4.

3.6 FINISHING

Start finishing operations immediately after consolidation. Use finishing machine, except that hand finishing may be used in emergencies and for concrete slabs that are of shapes or locations that are not accessible with a finishing machine. Finishing operations shall not displace coarse aggregate from surface and shall produce a surface of uniform texture true to grade and design profile. Excessive operation over an area, which results in an excess of mortar and water being brought to the surface, will not be permitted. Finish pavement surface on both sides of a joint to the same grade.

3.6.1 Edge Slump

Determine slump of edges with a 12 foot straightedge. Before the concrete hardens, correct edge slump of pave exceeding 1/4 inch at edge of pavement. The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches from the edge.

3.6.2 Hand Finishing and Floating

As soon as placed and consolidated, strike off and screed concrete to required cross section. If necessary, place and screed additional concrete and float until a satisfactory surface has been produced. Advance floating operation not more than half the length of the float and then continue over new and previously floated surfaces. Hand finishing shall be limited to small irregular areas not accessible with finishing machine.

3.6.3 Surface Correction and Testing

After finishing is completed but while concrete is still plastic, use straightedges to eliminate minor irregularities and score marks. Check surface for trueness with straightedge held in successive positions parallel and at right angles to center line of pavement, with whole area covered to detect variations. Immediately fill depressions with freshly mixed concrete, strike off, consolidate, and refinish. Strike off and refinish projections above required elevation. Continue straightedge testing and finishing until entire surface of concrete is free from observable departure from straightedge.

3.6.4 Texturing

ACI 325.6R. Before surface sheen has disappeared and before concrete becomes nonplastic, give the pavement surface a texture as specified in paragraph entitled "Surface Finish."

3.6.5 Surface Finish

Surface finish is to be completed in a manner to match existing pavement.

3.6.5.1 Brooming

Before concrete becomes non-plastic, finish by brooming surface with a wire broom at least 18 inches wide. Gently pull the broom over surface from edge to edge just before concrete becomes non-plastic. Slightly overlap adjacent strokes of broom. Broom perpendicular to centerline of the pavement so that corrugations produced will be uniform in character and width, and not more than 1/16 inch in depth. Broomed surface shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface.

3.6.6 Edging

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish edges, including the edges at formed joints, with an edge having a maximum radius of 1/4 inch. If brooming is specified for the final surface finish, edge transverse joints before starting the brooming, then operate the broom to obliterate as much as possible mark left by edging tool without disturbing the rounded corner left by the edger.

Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. After removal of forms, repair damaged and honeycombed areas with mortar composed of one part Portland cement to two parts sand.

3.7 CURING AND PROTECTION

Immediately after the finishing operations have been completed and the water film has evaporated from the surface or as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete shall be covered and cured in accordance with ACI 325.9R using one of the following methods:

3.7.1 Liquid Membrane Curing

Uniformly coat the concrete surface with liquid membrane-forming compound with approved mechanical spray equipment at the rate of 1 gallon per 150 square feet of surface or as recommended by the manufacturer. Irregular areas or sections of paving where the use of mechanical spraying equipment is not practicable may be sprayed with approved hand spraying equipment. Coat edges of paving within 60 minutes after the removal of forms. Protect concrete surfaces from foot and vehicular traffic and other sources of abrasion for a minimum of 72 hours. Maintain continuity of applied liquid membrane-forming compound for the entire curing period. Prior to application of curing compound, fill open joints by inserting moistened paper or fiber rope, or cover joints with strips of waterproof material to prevent curing compound from entering the joint. Seven days after application of curing compound, joints may be exposed and prepared to receive joint sealant materials.

3.8 PAVEMENT PROTECTION

Protect pavement against damage. Exclude traffic by erecting and maintaining barricades and signs until concrete is at least 28 days old.

-- End of Section --

SECTION 02762N

JOINTS AND REINFORCEMENT IN CONCRETE PAVEMENTS

09/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M	(2001) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	(2002) Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A 497	(2002) Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A 615/A 615M	(2003a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 509	(2000) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 603	(1990; R 1997e1) Extrusion Rate and Application Life of Elastomeric Sealants
ASTM C 639	(2001) Rheological (Flow) Properties of Elastomeric Sealants
ASTM C 661	(1998) Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
ASTM C 679	(2003) Tack-Free Time of Elastomeric Sealants
ASTM C 719	(1993; R 1998) Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
ASTM C 792	(1993; R 1998) Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
ASTM C 793	(2002) Effects of Accelerated Weathering on Elastomeric Joint Sealants
ASTM D 1751	(1999) Preformed Expansion Joint Filler

for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

ASTM D 1752 (1984; R 1996e1) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM D 2628 (1991; R 1998) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

ASTM D 2835 (1989; R 1998) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

ASTM D 412 (1998a; R 2002e1) Vulcanized Rubber and Thermoplastic Elastomers - Tension

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS L-C-530 (Rev. C) Coating, Pipe, Thermoplastic Resin

FS SS-S-1401 (Rev C; Am 1) Sealant, Joint, Non-Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Asphalt Concrete Pavements

FS SS-S-1614 (Rev A; Am 1) Sealants, Joint, Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Tar Concrete Pavements

FS SS-S-200 (Rev E; Am 2) Sealant, Joint, Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement

FS TT-P-664 (Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preformed Compression seals

Manufacturer's catalog data in the form of catalog cuts may be submitted in lieu of drawings for the listed items.

SD-07 Certificates

Equipment list

Submit a list and description of equipment to be used. Equipment for heating, mixing and installing joint seals shall be in accordance with instructions provided by joint seal manufacturer.

Blocking media

Separating tape

Dowel

Reinforcement

Joint seal

SD-08 Manufacturer's Instructions

Joint sealants

Preformed compression seals

Instructions for joint sealants shall include, but not be limited to: storage requirements, ambient temperature and humidity ranges, and moisture condition of joints for successful installation; requirements for preparation of joints; safe heating temperature; mixing instructions; installation equipment and procedures; application and disposal requirements; compatibility of sealant with filler material; curing requirements; and restrictions to be adhered to in order to reduce hazards to personnel or to the environment. Submit instructions at least 30 days prior to use.

1.3 DELIVERY, STORAGE, AND HANDLING

Inspect for damage, unload, and store materials delivered to site in accordance with manufacturer's instructions.

1.3.1 Joint Seal Materials

Deliver liquid joint sealants and lubricants in original sealed containers and protect from freezing and high temperatures. Store preformed joint fillers in a manner to maintain straightness and avoid damage.

1.3.2 Coated Dowel Bars

Coated dowel bars shall be stored in a manner to avoid cracking or perforations in coating. Cover stored dowel bars with tarpaulin or black colored polyethylene film.

1.3.3 Reinforcement

Store reinforcement on pallets or wooden sleepers in a manner to avoid excessive rusting or contamination with soil, grease, oil, or other objectionable material. Store reinforcement in separate piles or racks to avoid loss of identification after bundles of reinforcing bars or mats are broken.

1.4 ENVIRONMENTAL REQUIREMENTS

Forming of joints or applying joint sealants shall not proceed when the underlying layer or surface is frozen, or when, in the opinion of the Contracting Officer, weather conditions will prevent the proper installation of the joint sealants. During installation, surfaces shall be dry and sealant and bond breakers shall be protected from moisture.

1.5 TRAFFIC CONTROL

Do not permit vehicular or heavy equipment traffic on the pavement in area of the joints being sealed during the protection and curing period of joint sealant. At end of curing period, traffic may be permitted on pavement when approved.

1.6 EQUIPMENT

Maintain machines, tools, and other equipment used in performance of work in proper working conditions at all times. Furnish necessary equipment and accessories to install preformed joint filler, preformed compression seal, and liquid sealant in hardened concrete in accordance with equipment list. Concrete saws shall be adequate to remove filler and saw grooves for all joints.

1.6.1 Joint and Pavement Cleaning Equipment

1.6.1.1 Sandblasting Equipment

Sandblasting equipment for cleaning joints shall include an air compressor, hose, and nozzles of proper size, shape and opening to produce a clean joint. Equip compressor with traps that will maintain compressed air free of oil and water.

1.6.1.2 Power Saws

Concrete saws shall be self-propelled and capable of sawing joints in concrete to indicated width, depth and alignment without spalling or ravelling of concrete and at a production rate to avoid uncontrolled cracking.

1.6.1.3 Vacuum Sweeper

Self-propelled, vacuum pickup sweeper capable of removing saw cuttings, loose sand, water, joint material, and debris from pavement surface.

1.6.2 Joint Sealing Equipment

Joint sealing equipment shall be of a type required by joint seal manufacturer's installation instructions. Equipment shall be capable of installing sealant to depths, widths and tolerances indicated. Inspect equipment periodically during installation of sealant as required but not less than once each work day, to ensure the equipment is functioning properly. If malfunctions are noted, joint sealing shall not proceed until they are corrected.

1.6.2.1 Hot-Poured Liquid Sealant

Unit applicators used for heating and installing hot-poured sealant materials shall be mobile and equipped with a double-wall agitator-type

kettle with an oil medium in outer space for heat transfer, a direct-connected pressure-type extruding device with nozzle or nozzles shaped for insertion in the joints to be filled, and a positive device for controlling temperature of oil and sealant. Applicator shall be so designed that sealer will circulate through delivery hose and return to kettle when not sealing joint.

1.6.2.2 Two Component Cold-Applied Liquid Sealants

For two component cold-applied machine mixed sealants equipment shall be capable of delivering each component within an accuracy of 5 percent. Equip reservoirs for each component with mechanical agitation devices. Equip equipment with thermostatically controlled indirect heating of components when required. Equipment shall include screens over each reservoir to eliminate foreign particles or partially polymerized material which may clog lines. Equipment shall be capable of intimately mixing the two components through a range of application rates from 10 to 60 gallons per hour and through a range of pressures from 50 to 150 pounds per square inch.

Hand-mixing of cold-applied two component sealant may be done at the option of the Contractor for sealants conforming to FS SS-S-200, Type H.

1.6.2.3 Preformed Joint Seal

Install seals with equipment recommended in writing by sealant manufacturer. Equipment shall be capable of installing joint seal to indicated depth without damaging, distorting, or stretching seal material.

1.6.2.4 Equipment for Silicone Sealant

Equipment for silicone sealant shall be air-powered pump, components, and hoses as recommended by the sealant manufacturer. Hoses and seals shall be lined to prevent moisture penetration and withstand pumping pressures. Equipment shall be free of contamination from previously used to other type sealant.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Joint Filler

2.1.1.1 For Expansion Joints

Preformed joint filler, ASTM D 1751, ASTM D 1752, Type II or Type III. Filler must be compatible with joint sealer material or 100% recycled material meeting ASTM D 1752, subparagraphs 5.1 to 5.4.

2.1.2 Bond Breakers

2.1.2.1 Blocking Media

Compressible, non-shrinkable, nonreactive with joint sealant and nonabsorption type such as plastic rod, free of oils or bitumens. Blocking media shall have a water absorption of not more than 5 percent by weight when tested in accordance with ASTM C 509. Blocking media shall be consistent with joint seal manufacturer's installation instructions and be at least 25 percent larger in diameter than width of joints as shown.

2.1.2.2 Separating Tape

Polyethylene or polyester tape, 3 mil minimum thickness, or masking tape, nonreactive, nonabsorptive, adhesive back tape, width equal to width of joints as indicated. Separating tape shall be consistent with joint seal manufacturer's installation instructions.

2.1.3 Joint Sealants

2.1.3.1 Two Component Cold-Applied Sealing Compound

FS SS-S-200, Type M, Type H.

2.1.3.2 Sealant, Joint, Jet-Fuel Resistant, Hot-Applied

FS SS-S-1614, for portland cement and tar concrete pavements.

2.1.3.3 Sealant, Joint, Non-Jet Fuel Resistant, Hot-Applied

FS SS-S-1401, for portland cement and asphalt concrete pavements.

2.1.3.4 Single Component Cold-Applied Silicone

Silicone sealant shall be self-leveling, non-acid curing, and meet the following requirements.

<u>TEST</u>	<u>TEST METHOD</u>	<u>REQUIREMENTS</u>
Weight Loss	ASTM C 792 Modified (See Note 1)	10 percent max.
Flow	ASTM C 639 (Type I)	Smooth and level
Extrusion Rate	ASTM C 603	30 sec. max.
Tack Free Time	ASTM C 679	5 hours max.
Hardness (Shore 00) (See Note 2)	ASTM C 661	30 - 80
Tensile Stress at 150 Percent Elongation (See Note 2)	ASTM D 412 (Die C)	30 psi max.
Percent Elongation (See Note 2)	ASTM D 412 (Die C)	700 min.
Accelerated Weathering	ASTM C 793	Pass 5000 hours
Bond and Movement Capability	ASTM C 719	Pass 10 cycles at <u>+50</u> percent movement (no adhesion or cohesion failure)
Flame Resistant	FS SS-S-200	Pass

NOTES:

1. Percent weight loss of wet (uncured) sample after placing in forced-draft

<u>TEST</u>	<u>TEST METHOD</u>	<u>REQUIREMENTS</u>
oven maintained at 158 degrees F $\pm$ 1 degree F for two hours.		

2. Specimen cured 21 days at 73 degrees F $\pm$ 1 degree F and 50 percent.

ACCELERATED WEATHERING FACTORY TEST REPORT. For Accelerated Weathering test, in lieu of testing of actual joint sealant to be used on the project, a report of a factory test, performed within two years of contract award, may be submitted.

2.1.3.5 Primers

Select concrete primer recommended by manufacturer of proposed liquid joint sealant.

2.1.3.6 Preformed Compression Seals

ASTM D 2628. ASTM D 2835, for lubricant.

2.1.4 Dowel Bars

Bars shall conform to ASTM A 615/A 615M, Grade 60 for plain billet-steel bars of size and length indicated. Remove burrs and projections from bars.

Coat sliding portion of each bar with shop applied paint conforming to FS TT-P-664. For doweled expansion joints, fit outer end of sliding portion of each dowel with a tight-fitting metal sleeve which conforms to manufacturer's recommendation for dowel bars.

2.1.5 Coated Dowel Bars

Bars shall conform to ASTM A 615/A 615M, Grade 60 for plain billet-steel bars of the size and length indicated. Remove burrs or projections from dowel bars. Coating system shall conform to FS L-C-530, Type 2. Coat bars with a double coat system or an epoxy coating system for resistance to penetration of oil and salt solutions. Systems shall be in accordance with manufacturer's recommendation for coatings which are not bondable to concrete. Bond coating to dowel bar to resist laps or folds during movement of joint. Coating thickness shall be 7 mils minimum and 20 mils maximum. For doweled expansion joints, fit the outer end of sliding portion of each dowel with a tight fitting metal sleeve which conforms to manufacturer's recommendation for dowel bars.

2.1.6 Dowel Assemblies

Support dowels with steel baskets or dowel assemblies. Supports shall conform to manufacturers recommendations for rigid welded dowel assemblies, heavy duty type. Weld spacer wires parallel to dowels and weld alternate ends of dowels to sides of assembly. At expansion joints, fit dowels with bar tubes or U-shaped channel caps. Sliding surfaces shall be parallel with longitudinal axis of pavement within a tolerance of 1/8 inch per foot.

Sliding end of assembly crossing joint shall alternate on each side of joint for all dowels in each joint.

2.1.7 Tie Bars

Bars shall be billet or axle steel deformed bars and conform to ASTM A 615/A 615M or ASTM A 617/A 617M Grade 60.

2.1.8 Reinforcement for Slabs

Welded steel wire fabric shall conform to ASTM A 185 and welded deformed steel wire fabric shall conform to ASTM A 497. Deformed steel bar mats shall conform to ASTM A 184/A 184M. Bar reinforcement shall conform to ASTM A 617/A 617M, Grade 60. Welded wire fabric shall be furnished in flat sheets only.

PART 3 EXECUTION

3.1 PREPARATION OF SEALANTS

3.1.1 Liquid Sealants

Prior to use, inspect liquid joint seal to ensure product has not become damaged during shipping and storage, material is of proper lot number and has not reached its shelf life retest date.

3.1.2 Preformed Joint Fillers

Prior to installing inspect preformed joint fillers to ensure they are straight, without damage, and resilient.

3.1.3 Hot-Applied Liquid Sealants

Do not heat sealing materials in excess of the safe heating temperature as shown in manufacturer's instructions. Do not expose sealant to direct heat or flame. Remove and waste sealant which has been over-heated, heated in excess of three hours, or has remained in application equipment at end of day's operation.

3.1.4 Cold-Applied Two Component Type Liquid Sealants

Inspect sealant components and containers prior to use, and reject materials that contain water, hard caking of separated constituents, nonreversible gel, or that are otherwise unsatisfactory. Settlement of constituents in a soft mass that can be readily and uniformly remixed in field with simple tools will not be cause for rejection. Prior to transfer of components from shipping containers to reservoirs of application equipment, mix materials in shipping containers to ensure homogeneity of components and incorporation of all constituents at time of transfer. When necessary warm components of the sealer to a temperature not exceeding 90 degrees F by placing components in heated storage, but in no case shall components be heated by direct flame or in single-walled, non-oil-bath heating kettles.

3.2 JOINTS

Joints shall be type shown and shall form a regular rectangular pattern. Joints shall conform to details shown. Seal joints by procedures indicated. Preformed joint filler installed for expansion joints shall be securely held in position during concreting operations. Wherever curved pavement edges occur, make joints to intersect tangents to curve at right angles. Joints shall be in a continuous straight line extending from edge to edge of pavement. Do not stagger joints in abutting pavements except where shown. Protect joints from curing compounds by covering with tape or rope. Take necessary precautions to ensure proper curing at joints.

3.2.1 Sawing of Joints

Sawing will be conducted when concrete has hardened sufficiently to prevent ravelling or flaking along edges of saw cut and before uncontrolled shrinkage cracking of pavement occurs. Mark alignment of joints by chalk line or other suitable guide. Saw cuts shall not vary from required alignment by more than 1/2 inch in ten feet. Saw cutting shall be carried on both during the day and at night as required. A supply of saw blades and at least one stand-by sawing unit in working condition will be readily available during sawing operations. Discontinue sawing if a crack develops ahead of a saw cut. If uncontrolled cracking has occurred do not saw cut along the cracks but notify the Contracting Officer immediately.

3.2.2 Protection of Joints

Immediately after each joint is sawed, thoroughly clean saw cut and adjacent concrete surface by flushing with water and blowing with compressed air to remove waste. Respray curing compound on surfaces affected by sawing and cleaning operations but do not permit curing compound into joints. Protect joints from intrusion of foreign materials by installation of blocking media or separating tape as indicated. Do not seal joints until concrete has cured sufficiently as required by joint sealant manufacturer's instructions.

3.2.3 Preformed Compression Seals

Install preformed compression seals in a straight line and plumbed vertically in accordance with manufacturers requirements.

3.2.4 Joints at Vertical Surfaces

Construct joints where slabs abut light pads, catch basins, manholes, footings, walls, columns, and structures as expansion joints, 3/4 inch wide and full depth or thickness of slab. Provide joints with preformed joint filler and joint sealant and form the joints by placing joint filler against the adjacent structure. Keep filler in place with stakes or other approved means until concrete is placed against filler. Fit abutting sections or ends of filler material tightly together to prevent concrete from entering expansion joint space.

3.2.5 Expansion Joints

Expansion joints shall have dimensions and spacing shown, and be filled with preformed joint filler and sealant. Hold filler in place accurately and securely during the placing and finishing of concrete. Use metal supports to support filler and protect material from damage during concrete operations. A bulkhead, when used, shall have sufficient strength to remain straight from edge to edge of slab when concrete is placed against it. Stake bulkhead in place securely at right angles to longitudinal or transverse axis and surfaces of concrete slab. Space and drive flat metal stakes to hold filler firmly in position. Deposit concrete and compact and strike off before bulkhead is removed. Do not remove stakes until the concrete has been finished. Under no circumstances shall concrete be left above expansion material or across joint at any point. Cut away carefully concrete spanning ends of the joint next to forms after forms are removed. Fit abutting sections of joint filler material tightly together to prevent concrete from entering expansion joint space.

3.2.6 Contraction Joints

Saw joints to dimensions indicated. Joint lines shall be within specified tolerance, straight, and extend for width of transverse joint, and for entire length of longitudinal joint.

3.2.7 Construction Joints

3.2.7.1 Butt Type Joints

Provide butt type joints as indicated by placing fresh concrete against hardened concrete. Clean vertical surface of hardened concrete and then coat with curing compound or asphalt emulsion bond breaker before concrete is placed. After concrete has cured, saw joint line in accordance with procedures specified for sawing joints and to dimensions shown.

3.2.7.2 Emergency Stops

If an emergency stop occurs remove the concrete back to indicated location of transverse joint and install a dowelled construction joint as shown.

3.2.7.3 Keyed Joints

Locate keyways as indicated. When concrete is placed using side or stationary forms, use plastic or metal forms securely fastened to concrete form to form keyway in plastic concrete. When concrete is placed using slip-form pavers, form the keyway by metal forms permanently attached to side forms or during slip-form operation by inserting preformed metal or plastic keyway liners which may be left in place.

3.2.8 Preparation of Joints

Seal joints unless otherwise indicated. Immediately before installation of sealant, thoroughly clean joints until laitance, curing compound, preformed joint filler, and protrusions of hardened concrete are removed from sides and upper edges of joint space.

3.2.8.1 Cleaning of Sawed Joints

Use a power-driven concrete saw to saw through preformed joint filler and to widen joint to indicated dimensions. Blow loosened materials from joint with compressed air. Clean exposed concrete joint faces and pavement surfaces extending at least one inch from edges of joints by thoroughly sandblasting and air blowing until surfaces are free of dust, dirt, curing compound, preformed joint filler, and other material that might prevent bonding of sealer to concrete.

3.2.9 Disposal of Debris

Remove from joints and pavement surface saw cuttings, excess joint material, dirt, water, sand, and other debris. Dispose of the debris immediately in accordance with Section 02220 DEMOLITION.

3.3 INSTALLATION

Joint preparation, primer and sealant shall be in accordance with joint seal manufacturer's instructions.

3.3.1 Bond Breakers

Immediately after joints receive final cleaning, install specified bond breaker in the bottom of joint reservoir.

3.3.2 Bonding Agents and Primer

Apply joint seal bonding agents and primer in accordance with joint seal manufacturer's instructions. When primed joint becomes dusty or otherwise contaminated prior to sealing, re-sandblast, air blow, and re-prime joint.

3.3.3 Installation of Liquid Sealants

Joints shall be dry and free of debris and contaminants prior to placement of sealant. Fill joints to depths and tolerances indicated without formation of voids or entrapped air. Remove excess or spilled sealant from pavement and discard.

3.3.4 Installation of Preformed Compression Seal

Install preformed compression seals in accordance with manufacturer's instructions to dimensions and tolerances indicated. Seal shall be plumb and shall not be stretched or twisted during installation.

3.3.5 Dowel Bars

Install bars accurately aligned, vertically and horizontally, at indicated locations and to dimensions and tolerances indicated. Before installation thoroughly grease sliding portion of each dowel. Dowels must remain in position during concrete placement and curing.

3.3.6 Coated Dowel Bars

Install bars, accurately aligned vertically and horizontally, at indicated locations and to dimensions and tolerances indicated. Reject coatings which are perforated, cracked or otherwise damaged. While handling avoid scuffing or gouging of coatings.

3.3.7 Dowel Assemblies

Dowels for transverse contraction joints shall be installed in unreinforced concrete by presetting in steel baskets. At transverse expansion joints set dowels with dowel assemblies. In reinforced concrete, set dowels at joints with steel baskets, unless approved otherwise. Dowels in longitudinal construction joints must be drilled and grouted with an approved grout. Before construction commences method for installing dowel bars shall be approved.

3.3.8 Tie Bars

Install bars, accurately aligned horizontally and vertically, at indicated locations. For slipform construction, insert bent tie bars by hand or other approved means.

3.3.9 Setting Slab Reinforcement

Type and amount of steel reinforcement shall be as shown. For pavement thickness of 12 inches or more, install reinforcement steel by strike-off method wherein concrete is deposited on underlying material, consolidated

and struck to indicated elevation of steel reinforcement. Place reinforcement on prestruck surface, then place remaining concrete and finish in required manner. If second lift causes steel to be displaced horizontally from its original position, increase thickness of first lift and depress reinforcement into plastic concrete to required elevation. Increase in thickness shall be only as necessary to permit correct horizontal alignment to be maintained. Remove and replace portions of bottom layer of concrete that have been placed more than 30 minutes without being covered with top layer. Wire mesh reinforcement may be placed with mechanical mesh placers and vibrated into place. For pavements less than 12 inches thick, reinforcement may be positioned on suitable chairs prior to concrete placement or reinforcement steel may be depressed into plastic concrete to the required elevation after concrete has been spread. At expansion, contraction and construction joints, place reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other foreign materials. Place reinforcement accurately and wire securely. Laps at splices shall be 12 inches minimum and distances from ends and sides of slabs and joints shall be as indicated.

3.4 FIELD QUALITY CONTROL

3.4.1 Joints

Joints which have been cleaned and have backer rods or bond breaking tape installed shall be inspected and approved prior to sealing.

3.4.2 Joint Seal Test Section

Inspect joint seal test section. Correct deficiencies and obtain approval of test section by the Contracting Officer prior to installing additional joint seal.

3.4.3 Joint Sealer

Inspect installed joint seals for conformance to contract requirements, joint seal manufacturer's instructions, and test section. Obtain approval for each joint seal installation.

3.4.4 Reinforcement

Inspect reinforcement prior to installation to assure it is free of loose flaky rust, loose scale, oil, mud, or other objectionable material.

3.4.5 Dowels

Inspect dowel placement prior to placing concrete to assure that dowels are of size indicated, and are spaced, aligned and painted and oiled as specified. Dowels shall not deviate from vertical or horizontal alignment after concrete has been placed by more than 1/8 inch per foot.

3.5 ACCEPTANCE

Joint sealer that fails to cure properly, or fails to bond to joint walls, or reverts to uncured state or fails in cohesion, or shows excessive air voids, blisters, surface defects, swelling, or other deficiencies, or is not recessed within indicated tolerances shall be rejected. Remove rejected sealer and reclean and reseal joints in accordance with the specifications.

-- End of Section --

SECTION 02900

FREE PRODUCT EXTRACTION SYSTEM

08/04

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Provide in accordance with Section 02111, "Excavation and Handling of Contaminated Materials", Section 02220, "Demolition", and Section 02525N, "Extraction Wells".

1.1.1 Certified Geologist or Registered Professional Engineer

A State of North Carolina Certified Professional Geologist or Registered Professional Engineer shall be provided to start up, balance, and provide to the government reports for product recovery operations, as specified herein.

1.1.2 Standard Products

Material and products shall be the standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate equipment that has been in satisfactory operation at least 2 years.

1.2 SUBMITTALS

Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-03 Product Data:

- Suction Lines; G
- Carrier Pipe; G
- Well Heads, Junction Boxes and Covers; G
- Dual Phase Extraction (DPE) System; G
- Vapor-Liquid Separator; G
- Bag Filters; G
- Booster Pumps; G
- Air Stripper Blower; G
- Carbon Adsorption Drums; G
- Valves and Gauges
- Product Storage Tank; G
- Free Product Recovery System Control Panel; G

SD-10 Operation and Maintenance Data

- a. Free Product Extraction System, as specified
- b. Product Recovery Wells
- c. Spare Parts List
- d. Operation and Maintenance Manual

1.3 DESCRIPTION OF WORK

The work includes modifications to the existing pump and treatment system at the Building AS-4141 project site. The design generally consists of the following:

Removal and disposal of existing oil/water separator and air compressor from the treatment system area

Pressure test the 3-inch PVC discharge line from the treatment system to the nearby lift station. This is to ensure the 3-inch PVC discharge line meets the required specifications.

Remove all pneumatic tubing, discharge tubing and other debris from the existing 8-inch carrier pipe.

Install three (3) 6-inch diameter recovery wells within the existing free-phase product plume at the Building AS-4141 project site.

Install proposed suction lines from the proposed recovery wells to the proposed treatment system.

Install junction boxes at each bend in the existing carrier pipe.

Install and connect proposed suction lines, to be placed within the existing 8-inch PVC carrier pipe, from all four (4) recovery wells to the proposed treatment system.

Convert the existing 3,000-gallon product storage tank into an oil/water separator.

Obtain and install the proposed vapor-liquid separator, DPE blower, 500-gallon product storage tank and four (4) carbon adsorption drums.

Install new high level float switches in the vapor-moisture separator, converted 3,00-gallon oil/water separator, new 500-gallon product storage tank, existing 550-gallon surge tank and existing 250-gallon sump tank and appropriately connect to the existing control panel.

Replace all existing transfer pumps.

Replace the packing within the existing tower air stripper. Additionally, replace the existing air stripper blower and associated piping.

All treatment system equipment is to be connected to the existing control panel and modifications made to the control panel as necessary.

PART 2 PRODUCTS

2.1 COMPATIBILITY, DURABILITY AND AVAILABILITY

All products, materials and equipment incorporated into the remediation system shall be compatible with the fluids and contaminants with which they will be in contact and shall be suitable for continuous operation under the environmental conditions in which the system will be operating.

Products and materials shall be of sufficient strength and design and remediation system components installed in a manner that provides for continuous operation for the anticipated lifetime of the remediation system

of ten years at required loads, pressures and flow rates.

Products, materials and equipment shall be obtained from manufacturers regularly engaged in the production of such items. If metallic piping is proposed, the Contractor shall consider cathodic protection.

2.2 MATERIALS

2.2.1 Suction Lines

Provide appropriately sized HDPE suction pipes suitable for service as required for the extraction of free-phase JP-5 fuel by a system of product recovery wells. Provide all valves, gauges and other miscellaneous fittings as required, rated for vacuum service. Layout of piping shall be as indicated on the Construction Drawings. Minimize headloss through the suction piping system.

2.2.2 Carrier Pipe

Provide carrier pipe if necessary for protection of suction piping. Carrier pipe material shall be of adequate strength to resist any external forces, both during and after installation, and shall be installed in a manner which considers removal and replacement of suction piping.

2.2.3 Well Heads, Junction Boxes and Covers

2.2.3.1 Requirements

Well heads, junction boxes and covers shall be capable of supporting an H-20 live load as defined by AASHTO. The well heads and junction boxes shall allow adequate operator access to piping, valves and controls.

2.2.3.2 Certification

Provide certification by the manufacturer that the well heads, junction boxes and covers meet the design requirements.

2.2.4 Clean Outs

Provide as necessary.

2.3 EQUIPMENT

2.3.1 Dual Phase Extraction (DPE) System

Provide DPE system with explosion-proof assembly capable of extracting 320 actual cubic feet per minute (ACFM) at a vacuum of 20 inches of mercury continuously. The blower shall be a Model A300, 30 HP, 230 volt, 3 phase, 60 Hz assembly as manufactured by Atlantic Fluidics, or an approved equivalent. The assembly shall come complete with but not limited to high/low oil reservoirs and heat exchangers, oil recirculation tank, AKG oil heat exchanger, high temperature switch, high and low level oil switches, inlet vacuum gauge, and discharge pressure gauge.

2.3.2 Vapor-Liquid Separator

A Product Recovery Management (PRM) Model MS200 Moisture Separator shall be provided with a 6 inch cleanout, internal ball float assembly for mechanical HL backup protection, intrinsically safe three float stem

mounted in sight tube to control transfer pump, Solberg FT-235P-400 inlet filter, inlet sample port, inlet 0-30" Hg vacuum gauge, Kunkle vacuum relief valve, Moyno 36701 progressive cavity transfer pump with Nitrile Stator and 2 Hp, 230 Volt, 3 phase, and an explosion proof motor. The complete Vapor-Liquid Separator shall be provided as described herein, or an approved equivalent.

2.3.3 Bag Filters

The bag filter system shall be a single (1) duplex bag filter style system. Each bag filter housing shall be a single-wall, 304 stainless steel capable of holding 18-inch deep bag filters. All bag filter housing inlet and outlets shall be 2 inch 150 Class ANSI B16.5 flange inlets and outlets. Each bag filter housing shall have an inner stainless steel bag filter support basket. Bag filter media shall be 20 micron.

Bag filters shall be Rosedale Products Inc. Model 4 bag filter units or equivalent approved by the Contracting Officer.

2.3.4 Booster Pumps

a. Air Stripper Transfer Pump

Recovered water is to be pumped from the 550-gallon surge tank to the air stripper. The transfer pump must be able to supply 20 gpm at a minimum of 16 feet or 6.9 psi of head.

Based on the requirements of the air stripper transfer pump, a closed-coupled centrifugal Goulds Model 3642 pump, or approved equal, has been selected. The Goulds Model 3642 pump is rated at 1/2 HP, 230 volt, 3-phase explosion proof.

b. Sump Tank Transfer Pump

Water from the existing 250-gallon sump tank is to be pumped through the proposed bag filters and carbon adsorption drums prior to discharge to the MCAS WWTP. Based on the calculations provided within, the transfer pump from the sump tank must be able to supply 20 gpm at a minimum of 5 feet or 2.16 psi of head.

Based on the requirements of the sump tank transfer pump, a closed-coupled centrifugal Goulds Model 3642 pump, or approved equal, has been selected. The Goulds Model 3642 pump is rated at 1/2 HP, 230 volt, 3-phase explosion proof. The selected pump manufacturer information is provided in the attached appendices.

2.3.5 Air Stripper Blower

The existing air stripper blower is to be replaced. Based on the air stripper calculations provided within, the optimal air flow rate is approximately 270 cubic feet per minute (cfm). The optimal air flow rate is based on the 20 gpm design flow rate for the proposed DPE system. Additionally, the anticipated pressure loss associated with the 2-inch Jaeger Product Tri-Packs was determined to be approximately 0.2 inches of water per foot of packing material. Therefore, with a 10 foot packing bed depth, the anticipated pressure loss is anticipated to be approximately 2 inches of water.

Based on the requirements of the air stripper blower, a ROTRON Model

DR808AY72MX regenerative blower, or approved equal, was selected. The selected regenerative blower has a maximum air flow rate of 350 scfm with a maximum pressure of 116 inches of water and is rated with a 7.5 HP motor, 230/460 volt, 3-phase and should be intrinsically safe.

2.3.6 Carbon Adsorption Drums

Four (4) granular activated carbon canisters shall be single-wall, steel storage drum 24.5 inches in diameter by 33.5 inches in height. Each granular activated carbon canister shall be constructed of carbon steel with a baked enamel exterior paint and an epoxy-enamel exterior and have a carbon capacity of 200 pounds and bed area of 2.6 square feet. Provide 2 inch NPT inlet and outlet.

Granular activated carbon canisters shall be Carbonair Model LPC3 GAC canister units or equivalent approved by the Contracting Officer. Any granular activated carbon canister alternate must be recommended to and pre-approved in writing by the Contracting Officer.

2.3.7 Valves and Gauges

Valves such as gate valves, check valves, ball valves, etc. and gauges shall be suitable for use in petroleum contaminated waste streams. Valves shall have a minimum working pressure rating of 150 psig. Gauges shall be rated for the intended service.

2.3.8 Product Storage Tank

Provide a product storage tank in accordance with Section 13210N, "Aboveground Fuel Oil Storage Tanks".

2.3.9 Free Product Recovery System Control Panel

Provide a control panel for the Free Product Recovery System to include at a minimum a master on/off switch with indicator light to cut off power to the entire system, control logic as described in the Basis of Design and all gauges and control circuits for a complete system.

2.4 ACCESSIBILITY

Parts subject to wear or requiring adjustment, inspection, cleaning or repair shall be accessible and convenient for removal when required.

2.5 FREE PRODUCT RECOVERY SYSTEM

The product recovery system modifications shall be provided by the Contractor. A complete system modification shall include, but is not limited to, three (3) new vertical recovery wells, product recovery piping installed inside existing carrier piping, well heads, junction boxes, controls, all valves, gauges, DPE system, vapor/liquid separator, booster pumps, bag filters, carbon adsorption drum, product storage tank, and appurtenances necessary for a complete and operable system. Additionally, as part of the system modifications, the following existing components shall be abandoned and/or removed and disposed of properly; oil/water separator, air compressor, and all pneumatic tubing and debris from 8-inch carrier piping.

2.6 PRODUCT RECOVERY WELLS

The product recovery wells shall be provided by the Contractor. A complete system shall include, but is not limited to, well casings, well screens, filter packs, bentonite seals, and other necessary appurtenances. Well development must be completed by the Contractor. Recovery wells shall be located approximately as indicated on the Construction Drawings and constructed in accordance with Section 02525N, "Extraction Wells".

2.7 DUAL PHASE EXTRACTION SYSTEM

The Dual Phase Extraction (DPE) system shall be provided by the Contractor. A complete system shall include, but is not limited to an explosion-proof liquid ring pump, oil operated with wiring installation and controls, vapor-liquid separator, and progressive cavity transfer pump as indicated in the Basis of Design and on the Construction Drawings, airtight pipe connections and wellheads where specified, vacuum pressure testing and successful startup of operation. Provide documentation as required by the Contracting Officer.

PART 3 EXECUTION

3.1 GENERAL

System shall be operated so as to optimize the recovery of free-phase product while limiting the average total production of process waste water.

System as operated shall effect a capture zone sufficient in size to encompass the free-phase product plume.

Product recovery operations shall be supervised, directed, and monitored by a Certified Professional Geologist or Registered Professional Engineer with experience in hydrogeology and product recovery.

3.2 WELL HEAD, JUNCTION BOXES AND COVERS

A reinforced, cast-in-place well head or below-grade vault box shall be provided for each recovery well. Junction boxes shall be installed as indicated. The vault box shall be installed level on a flat and stable subgrade. Where an unstable material exists, the Contractor shall excavate the unstable material and replace with compacted granular material. The top of the vault cover shall be set at an elevation flush with the existing grade. Installation shall be in accordance with manufacturer's recommendations.

3.3 START-UP AND TESTING

The contractor shall provide all start-up and testing services and make all adjustments at no additional cost to the Government.

Upon completion and before final acceptance of the work, each system shall be tested as in service to determine compliance with the contract requirements and warranty. The vapor extraction supply system shall be pressure tested to not less than 1.2 times the design vacuum requirement of 20 inches mercury, with no leakage or reduction in gauge pressure after 4 hours. All equipment shall be tested under every condition of operation. All controls shall be tested to demonstrate performance of their required function. All piping shall be thoroughly flushed and cleaned before being placed in operation. The Contractor shall furnish all instruments,

connecting devices and personnel necessary for testing. All defects in the work provided by the Contractor shall be corrected by the Contractor and re-tested until proven satisfactory. Each system shall be completely tested for compliance with the specifications and all conditions thereof, and all adjusting and balancing shall be completed to the satisfaction of the Contracting Officer. Responsibility for adjustment of controls and balancing of systems shall extend throughout the Operation, Maintenance and Monitoring periods after the completed systems begin operation. The contractor shall furnish all materials and labor to make all repair required.

3.4 SPARE PARTS LIST

The Contractor shall provide a list of recommended critical spare parts for the system together with a price list and source of the recommended spare parts. This list shall be provided prior to the completion of the initial six months operation of the system by the Contractor.

3.5 FINAL CLEANUP

Remove waste material and other debris from the site regularly.

3.6 CONTROL LOGIC

The control logic is indicated in the Basis of Design and on the plans.

3.7 INSTRUMENTATION AND CONTROLS

Install all system components and appurtenances in accordance with the manufacturer's recommendations and as shown. Provide all necessary interconnections, services, and adjustments required for a complete operable system.

3.8 OPERATION, MAINTENANCE AND MONITORING

After successful completion of Start-Up and Testing activities, the Free Product Recovery System shall be operated, maintained, and monitored as indicated in the Corrective Action Plan which has been utilized as the Basis of Remedial System Design. The Contractor shall provide an Operation and Maintenance Manual upon successful start-up of the system.

Operate and maintain the vertical recovery well system until no measurable amount of free-phase product is present within each well field (<0.01 -inch). Shut down the system and monitor for rebound upon removal of free-phase product.

A certified Professional Geologist or Registered Professional Engineer in the State of North Carolina shall monitor the ground water treatment system's operation, and provide initial and periodic reports as specified above.

3.8.1 Recovered Product Storage Tank Purge Frequency

The recovered product storage tank shall be purged as required. Free product shall be delivered to the MCAS Central Heating Facility for recycling. The Contractor will coordinate product disposal with the Central Heating Plant through the EQD.

-- End of Section --

ADDRESS VERIFICATION REPORT

=====
This report lists any Reference Organization that appears in a Section
Reference Article without a corresponding listing in either the Sources for
Reference Publications Section (01 42 00, 01420, or 01090) or the
Supplemental Reference List.

HINT: Double-clicking a Section number will open the Section in the Editor.
=====

SECTION REFERENCE ORGANIZATION

ALL REFERENCE ADDRESSES HAVE BEEN VERIFIED

BRACKET VERIFICATION REPORT

=====
This report lists all brackets remaining in the text..

HINT: Double-clicking a Section number will open the Section in the Editor.
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SECTION	SUBPART	BRACKETS	EXPLANATORY NOTES
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NO BRACKETS FOUND IN TEXT			
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REFERENCE VERIFICATION REPORT

Unresolved References

=====
This report lists all References that appear in a Section, but that are not listed in either that Section's Reference Article or the Supplemental Reference List.

HINT: Double-clicking a Section number will open the Section in the Editor.
=====

SECTION	SUBPART	REFERENCE
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NO REFERENCES FOUND IN TEXT

REFERENCE VERIFICATION REPORT

Duplicate References

=====
This report lists References that are found in both the Section Reference
Article and the Supplemental Reference List.

The Reference descriptions listed are from the Supplemental Reference List.

HINT: Double-clicking a Section number will open the Section in the Editor.
=====

SECTION	REFERENCE
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NO REFERENCES FOUND IN TEXT

REFERENCE TITLE REPORT

=====
This report lists Reference Identifiers with conflicting Reference Titles in
two or more Section Reference Articles.

HINT: Double-clicking a Section number will open the Section in the Editor.
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SECTION	REFERENCE	REFERENCE TITLE
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ALL REFERENCES HAVE BEEN VERIFIED

SECTION VERIFICATION REPORT

=====
This report lists all Sections that are referenced in other Sections, but
that are not in the Job or Master.

HINT: Double-clicking a Section number will open the Section in the Editor.
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SECTION	SUBPART	SECTION REFERENCED
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ALL SECTIONS HAVE BEEN VERIFIED

SUBMITTAL VERIFICATION REPORT

=====
Search for "Submittal Formatting Requirements" in SpecsIntact help for more
information about the contents of this report.
=====

Section Submittal Discrepancies

=====
Sections that do not cite Submittal Items in both the Submittal Article and
elsewhere in the text, that cite invalid Classifications, or that contain
Submittal Descriptions or Classifications outside the Submittal Article:
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HINT: Double-clicking a Section number will open the Section in the Editor.
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SECTION	SUBPART	SUBMITTAL DISCREPANCY
02900	2.2.1	Suction Lines was not found in the Submittal Article.
02900	2.2.2	Carrier Pipe was not found in the Submittal Article.
02900	2.2.3	Well Heads, Junction Boxes and Covers was not found in the Submittal Article.
02900	2.3.2	Vapor-Liquid Separator was not found in the Submittal Article.
02900	2.3.3	Bag Filters was not found in the Submittal Article.
02900	2.3.4	Booster Pumps was not found in the Submittal Article.
02900	2.3.5	Air Stripper Blower was not found in the Submittal Article.
02900	2.3.6	Carbon Adsorption Drums was not found in the Submittal Article.
02900	2.3.8	Product Storage Tank was not found in the Submittal Article.
02900	2.5	FREE PRODUCT RECOVERY SYSTEM was not found in the Submittal Article.
02900	2.7	DUAL PHASE EXTRACTION SYSTEM was not found in the Submittal Article.
02900	1.2	Suction Lines; G was not found outside the Submittal Article.
02900	1.2	Carrier Pipe; G was not found outside the Submittal Article.

SECTION	SUBPART	SUBMITTAL DISCREPANCY
02900	1.2	Well Heads, Junction Boxes and Covers; G was not found outside the Submittal Article.
02900	1.2	Dual Phase Extraction (DPE) System; G was not found outside the Submittal Article.
02900	1.2	Vapor-Liquid Separator; G was not found outside the Submittal Article.
02900	1.2	Bag Filters; G was not found outside the Submittal Article.
02900	1.2	Booster Pumps; G was not found outside the Submittal Article.
02900	1.2	Air Stripper Blower; G was not found outside the Submittal Article.
02900	1.2	Carbon Adsorption Drums; G was not found outside the Submittal Article.
02900	1.2	Product Storage Tank; G was not found outside the Submittal Article.
02900	1.2	Free Product Recovery System Control Panel; G was not found outside the Submittal Article.
02900	1.2	Free Product Extraction System was not found outside the Submittal Article.

Discrepancies Between Submittal Articles and Submittal Procedures Section

=====
Submittal Descriptions from Section Submittal Articles that differ from
Descriptions in the Submittal Procedures Section (01 33 00, 01330, or
01300), or that are missing from the Submittal Procedures Section:

HINT: Double-clicking a Section number will open the Section in the Editor.
=====

STANDARD DESCRIPTION

SECTION	SUBPART	INVALID DESCRIPTION
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All the Submittal Descriptions in Sections processed match.

SECTION 13210N

ABOVEGROUND FUEL OIL STORAGE TANKS

2/02

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B16.26 (1988) Cast Copper Alloy Fittings for Flared Copper Tubes

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M (2003a) Carbon Structural Steel

ASTM A 569/A 569M (1998) Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial

ASTM B 117 (2002) Operating Salt Spray (Fog) Apparatus

ASTM B 88 (2002) Seamless Copper Water Tube

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58 (2002) Pipe Hangers and Supports - Materials, Design and Manufacture

MSS SP-69 (2002) Pipe Hangers and Supports - Selection and Application

MSS SP-80 (2003) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 30 (2003) Flammable and Combustible Liquids Code

NFPA 30A (2003) Code for Motor Fuel Dispensing Facilities and Repair Garages

NFPA 70 (2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 142 (2002) Steel Aboveground Tanks for Flammable and Combustible Liquids

UL 674	(1994; Rev thru Oct 1998) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations
UL 698	(1995; Rev thru Mar 1999) Industrial Control Equipment for Hazardous (Classified) Locations
UL 886	(1994; Rev thru Apr 1999) Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations

1.2 SYSTEM DESCRIPTION

Provide aboveground storage tank systems and fuel piping systems complete and ready for operation. Fuel piping systems shall include aboveground piping, and connections to existing piping systems.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aboveground storage tanks (AST) G

Submit shop drawings for each size of AST for approval. Indicate types, sizes, locations, installation details, and other construction details.

SD-03 Product Data

Aboveground storage tanks (AST) G

Leak Detection System G

High level alarm system G

Tank Level Gage System G

Alarm Control Panel System G

SD-06 Test Reports

Field acceptance test G

SD-08 Manufacturer's Instructions

Installation instructions

SD-10 Operation and Maintenance Data

Aboveground storage tanks (AST), Data Package 2 G

Submit in accordance with Section 01782 FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION.

1.4 DELIVERY AND STORAGE

Handle and store aboveground storage tanks and containment piping systems, to prevent distortions and other damage that could affect their structural, mechanical, or electrical integrity. Replace damaged items that cannot be restored to original condition. Store items subject to deterioration by exposure to elements, in a well-drained location, protected from weather, and accessible for inspection and handling.

PART 2 PRODUCTS

2.1 ABOVEGROUND STORAGE TANKS (AST)

Each provided AST shall be UL listed for compliance with UL 142, as a 500 gallon capacity single walled, steel aboveground storage tank. Each tank shall bear the UL label in compliance with UL 142.

2.1.1 Single-wall Aboveground Horizontal Tank

- a. Tank System: tank shall be shipped as a completed unit, that is, completely fabricated in manufacturer's factory.
- b. Tank: Listed under UL 142; in compliance with NFPA 30; ASTM A 569/A 569M or ASTM A 36/A 36M carbon steel; warranted for a minimum of 20 years by the manufacturer.
- c. Corrosion Protection: Coating on steel components exterior to the concrete encasement shall meet requirements of ASTM B 117.
- d. Overspill Protection:
 - (1) High level alarm with control circuit to shut down the DPE pump to the recovery wells upon the product storage tank reaching 95% capacity.
- e. Exterior Finish: Provide exterior polyurethane paint on tank, factory applied, coordinate paint color with Contracting Officer.
- f. Venting: NFPA 30; 2 inch atmospheric vent and emergency vent.
- g. Level Gauge: Provide a direct reading level gauge as recommended by the tank manufacturer. The gauge shall be mounted in a clearly visible location.

2.2 ACCESSORIES FOR AST's

Provide the following accessories coordinated with each tank design: high level alarm switch, and vent.

2.2.1 High Level Alarm System

Provide each tank with a vertical float type high level switch with alarm setting at 95 percent tank capacity. Switch output shall provide control signal to the alarm control panel to shut off the DPE pump. Provide tank with a vertical float type level switch with setting at 90% tank capacity.

Upon emptying of the tank the switch shall provide a control signal to the system control panel to activate a manual switch to reset the system.

2.2.2 Tank Level Gage System

Provide tank manufacturer's standard cataloged level gage system.

2.3 PIPING SYSTEMS

2.3.1 Copper Tubing System

Provide ASTM B 88, Type K or Type L copper tubing with ASME B16.26 flared fittings or compression type fittings for fuel oil supply, fuel oil return, and secondary (controls) piping.

2.3.2 Gate Valves

MSS SP-80, Class 125.

2.3.3 Check Valves

MSS SP-80, Class 125, swing check.

2.3.4 Pipe Hangers and Supports

Provide MSS SP-58 and MSS SP-69, Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Indicated hangers which are not covered by MSS SP-69 configurations, shall meet the applicable design requirements of MSS SP-58, and the hanger spacing requirements of MSS SP-69. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor.

2.3.5 Dielectric Connections

Provide dielectric connections at piping connections of dissimilar metals.

2.4 ELECTRICAL REQUIREMENTS

Provide switches and devices necessary for the tank electrical systems system; wiring, fittings, and components shall be explosion-proof in compliance with applicable requirements of UL 674, UL 698, and UL 886 for Class I, Division 1, Group C and D hazardous locations. Electrical installations shall conform to requirements of NFPA 70.

2.4.1 System Control Panel

Control panel shall be in NEMA 4X enclosure, suitable for the environment, and the panel shall include solid state circuitry, and visual alarms. Locate each panel at indicated spot. Panel shall incorporate a manual, self-test system which permits verification of proper operation of high level alarm audible and visual alarm equipment. Provide a manual reset button to reset the recovery system.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Fuel Storage Tanks

Install vault type fuel storage tanks, vents, and other connections in accordance with NFPA 30 and NFPA 30A and published installation instructions of the manufacturer.

3.2 FIELD TESTING.

Prior to application of test pressure, remove or valve off piping components which may be damaged by test and install a calibrated test gage in the system. Maintain test pressure for at least one hour on all new piping work. In the event of leakage, locate and repair leak and repeat test. Submit a field acceptance test report for each new AST system installation and each new piping system installation.

3.2.1 Storage Tank Test

Pressure test tanks at not less than 5 psig or more than 7 psig and as recommended by the manufacturer.

-- End of Section --

SECTION 16050N

BASIC ELECTRICAL MATERIALS AND METHODS

02/03

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2002) National Electrical Safety Code

IEEE Std 100 (2000) IEEE Standard Dictionary of
Electrical and Electronics Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C57.12.28 (1999) Pad-Mounted Equipment - Enclosure
Integrity

NEMA ICS 6 (1993; R 2001) Industrial Control and
Systems: Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147 Control of Hazardous Energy (Lock Out/Tag
Out)

1.2 RELATED REQUIREMENTS

This section applies to certain sections of Division 2, "Site Construction," and Division 13, "Special Construction,". This section applies to all sections of Division 16, "Electrical," of this project specification unless specified otherwise in the individual sections.

1.3 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.
- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures,

equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be as necessary for the equipment selected by the Contractor and proper and safe operation of the Free-Phase Product Recovery System. Final connections to the power distribution system shall be made by the Contractor as directed by the Contracting Officer.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Submittals required in the sections which refer to this section must also conform to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.5.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.5.2 Drawings

Submit drawings a minimum of 14 by 20 inches in size using a minimum scale of 1/8 inch per foot, except as specified otherwise. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.3 Instructions

Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation

of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

1.5.4 Certificates

Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certifications from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5.4.1 Reference Standard Compliance

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

1.5.4.2 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.5 Operation and Maintenance Manuals

Comply with the requirements of Section 01782 FACILITY OPERATION AND MAINTENANCE SUPPORT INFORMATION and the technical sections.

1.5.5.1 Operating Instructions

Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar

circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.6.2 Regulatory Requirements

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

1.6.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4 Service Support

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.5 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.6.6 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer.

1.6.7 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

- a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
- c. Safety precautions.

- d. The procedure in the event of equipment failure.
- e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.8 NAMEPLATES

ASTM D 709. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.9 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

- a. When the enclosure integrity of such equipment is specified to be in accordance with NEMA C57.12.28, such as for pad-mounted transformers[and pad-mounted SF6 switches], provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPS0710D72 or approved equal.

1.10 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.10.1 Motors and Equipment

Provide motors, controllers, integral disconnects, and contactors with their respective pieces of equipment. Extended voltage range motors shall not be permitted. Control voltage for controllers and contactors shall not exceed 120 volts nominal. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment. Where fuse protection is specifically recommended by the equipment manufacturer, provide fused switches in lieu of non-fused switches indicated.

1.10.2 Wiring and Conduit

Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment. Control wiring and conduit shall be provided under, and conform to the requirements of the section specifying the associated equipment.

1.11 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation.

1.12 LOCKOUT REQUIREMENTS

Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF EQUIPMENT

3.1.1 Factory Applied

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test.

3.1.2 Field Applied

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.4 CABLE TAG INSTALLATION

Install cable tags in each manhole, handhole, and vault as specified, including each splice. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes, handholes, and vaults.

-- End of Section --

SUBMITTAL REGISTER

TITLE AND LOCATION

Free-Phase Product Recovery System

CONTRACTOR

(a)	(b)	(c)	(d)	(e)	(f)	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION	(l)	(m)	(n)	APPROVING AUTHORITY		MAILED TO CONTR/ AUTH	REMARKS	
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY					DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	DATE OF ACTION	
TRANSMITTAL ACTIVITY NO		SPEC SET	DESCRIPTION ITEM SUBMITTED	PARRA G# RAPH	GOVT CLASS SIF EAT ION R	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	01310N		SD-01 Preconstruction Submittals List of contact personnel Personnel list Vehicle list	1.3.1 1.3.3	G G G												
	01321N		SD-01 Preconstruction Submittals Baseline Network Analysis Schedule SD-11 Closeout Submittals As-Built Schedule	1.5.2	G												
	01330		SD-01 Preconstruction Submittals Submittal register	1.3.1	G												
	01500N		SD-01 Preconstruction Submittals Traffic control plan Construction site plan	1.6.2 1.3	G G												
	01575N		SD-01 Preconstruction Submittals Environmental protection plan Sedimentation and Erosion Control Plan; G SD-06 Test Reports Laboratory analysis Laboratory analysis	1.11 1.4 1.5.3	G												
			SD-11 Closeout Submittals Preconstruction survey Solid waste disposal permit Waste determination documentation	1.5.1 1.5.2 1.5.3													

SUBMITTAL REGISTER										CONTRACT NO.							
TITLE AND LOCATION Free-Phase Product Recovery System										CONTRACTOR							
TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH#	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY			MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS			
					APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION C O D E	DATE OF ACTION	DATE FWD TO APPR AUTH/	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER			ACTION C O D E	DATE OF ACTION	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	01575N		Waste determination documentation	3.5.1													
			Disposal documentation for hazardous and regulated waste	1.5.4													
			Contractor 40 CFR employee training records	1.5.5													
			Regulatory notification	1.5.6													
			Solid waste disposal report	1.5.7													
			Contractor Hazardous Material Inventory Log	1.12	G												
	01770N		SD-10 Operation and Maintenance Data														
			Equipment/product warranty list	1.4.1	G												
			SD-11 Closeout Submittals														
			As-built drawings	1.3.1	G												
			Equipment/product warranty tag	1.4.2	G												
			Project waste summary report	1.2	G												
			Hazardous material reporting	1.2.1	G												
	01782N		SD-11 Closeout Submittals														
			Prefinal Submittal	1.4.1	G												
			Final Submittal	1.4.2	G												
	02111		SD-03 Product Data														
			Excavation Work Plan	1.4	G												
			SD-06 Test Reports														
			Compaction	3.6.1	G												
	02220		SD-07 Certificates														

CONTRACT NO.

[illegible]

CONTRACT NO.

SUBMITTAL FORM, Jan 96

Free-Phase Product Recovery System

[illegible]

APPENDIX C
COST ESTIMATE

B-System Report

SUBMITTAL: 100% DRAFT FINAL
 SOFTWARE VERSION: SUCCESS 5.X
 REPORT REVISION DATE JULY 2002
 ESTIMATE SAVED AS: 206-074 Building AS-4141.pws

CONSTRUCTION CONTRACT: N62470-05-D-6200
 DATABASE USED: UPB2000 ENGLISH
 PRINTING DATE: 07/25/2007
 Page No. 1

PROJECT:
 PROJECT SITE: Building AS-4141, MCAS New River, NC
 A/E NAME: CATLIN Engineers and Scientists
 PROJECT SIZE: 0.00 DOLLAR
 CONSTRUCTION FUNDS AVAILABLE: 0 USD
 CURRENCY: DOLLARS

ESTIMATOR:
 CAT CODE:
 UIC: N62863
 PROJECT #: 206-074
 DATE OF ESTIMATE: July 25, 2007
 BID DATE: OCTOBER 2007

WBS CODE	DESCRIPTION	COST/PROJECT		TOTAL MARKED UP COSTS				
		UOM BASED ON	COST/ WBS UNIT	MATL	LABOR	EQUIP	UNIT COST	TOTAL
		0 DOLLAR						
	Free Product Recovery System at Building AS-4141, PROJECT TOTALS							280,000
PROJECT NOTE: This Template is used to prepare English estimates for Southern Division of NAVFAC. The Labor rates included in the Template are from the UPB2000 English Database and are based on 30 major cities across the U.S.								
	****PROJECT SUBTOTALS****			60,522	156,318	62,667	0	279,507
BASE BID				60,522	156,318	62,667	0	279,507
	<u>-01310N Administrative Requirements</u>			0	8,697	0	0	8,697
	<u>-01321N Network Analysis Schedules (NAS)</u>			0	4,066	0	0	4,066
	<u>-01330 Submittal Procedures</u>			0	17,519	0	0	17,519
	<u>-01500N Temporary Facilities and Controls</u>			0	5,491	0	0	5,491
	<u>-01575N Temporary Environmental Controls</u>			0	13,728	0	0	13,728
	<u>-01782N Facility Operation and Maintenance</u>			0	8,987	0	0	8,987
	<u>-02111 Excavation and Handling of</u>			294	9,298	3,235	0	12,827
	<u>-02525N Extraction Wells</u>			8,159	7,069	10,834	0	26,062
	Drilling and Well Installation			4,687	6,836	10,825	0	22,348
	Well Development and Waste Disposal			3,472	233	9	0	3,714
	<u>-02751N Concrete Pavement and Slabs</u>			3,501	8,747	3,678	0	15,926
	<u>-02900 Free Product Recovery System</u>			43,997	64,064	44,702	0	152,763
	<u>-13210N Aboveground Fuel Oil Storage Tanks</u>			1,121	653	218	0	1,992
	<u>-16050 Basic Electrical Materials and</u>			3,450	8,000	0	0	11,450

CATLIN Engineers and Scientists

Free Product Recovery System at Building AS-4141, MCAS New R

Michael D. Mason

Michael E. Mason, P.E.

PROJECT FILE LOCATION: S:\wpmktg\Cost Estimates\206-074 Building AS-4141.pws
07/25/2007

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at

Report Total: \$279,507

Project Note: This Template is used to prepare English estimates for Southern Division of NAVFAC. The Labor rates included in the Template are from the UPB2000 English Database and are based on 30 major cities across the U.S.

Free Product Recovery System at Building AS-4141, MCAS New R

Michael D. Mason
Michael E. Mason, P.E.

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

LEVEL		QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
					<u>Estimate Tree Structure Rollups</u>				
					BASE BID				

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

Michael D. Mason
Michael E. Mason, P.E.

LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				\$279,507
01321N Network Analysis Schedules (NAS)								
				Tree Depth= 2				
006	Subcontractor: 03	U.C. per MH -->	1	03PM	102			102
Project Manager - Civil/Mep		4	4	1.000	\$408	\$0	\$0	\$408
Subtotal					\$1,848	\$0	\$0	\$1,848
1st Layer Markups assigned to Detail Items					\$185	\$0	\$0	\$185
3rd Layer Level Markups					\$2,033	\$0	\$0	\$2,033
TOTAL 01321N Network Analysis Schedules (NAS)			24		\$4,066	\$0	\$0	\$4,066

Estimate Tree Structure Rollups
BASE BID

\$279,507

01330 Submittal Procedures

				Tree Depth= 2				
006	Subcontractor: 03	U.C. per MH -->	1	03PM	102			102
Project Manager - Civil/Mep		12	12	1.000	\$1,224	\$0	\$0	\$1,224
007	Subcontractor: 03	U.C. per MH -->	1	03CE	84			84
Civil Engineer - Civil/Mep		40	40	1.000	\$3,360	\$0	\$0	\$3,360
008	Subcontractor: 03	U.C. per MH -->	1	03CLER	28.8			28.8
Clerical-civil/Mep		8	8	1.000	\$230	\$0	\$0	\$230
035	Subcontractor: 03	U.C. per MH -->	1	03TECH	48			48
Technician - Civil/Mep		40	40	1.000	\$1,920	\$0	\$0	\$1,920
036	Subcontractor: 03	U.C. per MH -->	1	03CADD	38.4			38.4
Cadd Operator -civil/Mep		32	32	1.000	\$1,229	\$0	\$0	\$1,229
Subtotal					\$7,963	\$0	\$0	\$7,963
1st Layer Markups assigned to Detail Items					\$796	\$0	\$0	\$796
3rd Layer Level Markups					\$8,760	\$0	\$0	\$8,760
TOTAL 01330 Submittal Procedures			132		\$17,519	\$0	\$0	\$17,519

CATLIN Engineers and Scientists

Free Product Recovery System at Building AS-4141, MCAS New R

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

Michael D. Mason
Michael E. Mason, P.E.

LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
								\$279,507
01500N Temporary Facilities and Controls				Tree Depth= 2				
016 Subcontractor: 08	U.C. per MH -->	1	08PM	96				96
Project Manager For Traffic	8	8	1.000	\$768	\$0	\$0	\$0	\$768
042 Subcontractor: 05	U.C. per MH -->	1	05CHES	72				72
Chief Estimator/Scheduler	24	24	1.000	\$1,728	\$0	\$0	\$0	\$1,728
Subtotal				\$2,496	\$0	\$0	\$0	\$2,496
1st Layer Markups assigned to Detail Items				\$250	\$0	\$0	\$0	\$250
3rd Layer Level Markups				\$2,746	\$0	\$0	\$0	\$2,746
TOTAL 01500N Temporary Facilities and Controls			32	\$5,491	\$0	\$0	\$0	\$5,491

Estimate Tree Structure Rollups
BASE BID \$279,507

01575N Temporary Environmental Controls

				Tree Depth= 2				
007 Subcontractor: 03	U.C. per MH -->	1	03CE	84				84
Civil Engineer - Civil/Mep	32	32	1.000	\$2,688	\$0	\$0	\$0	\$2,688
006 Subcontractor: 03	U.C. per MH -->	1	03PM	102				102
Project Manager - Civil/Mep	16	16	1.000	\$1,632	\$0	\$0	\$0	\$1,632
035 Subcontractor: 03	U.C. per MH -->	1	03TECH	48				48
Technician - Civil/Mep	16	16	1.000	\$768	\$0	\$0	\$0	\$768
036 Subcontractor: 03	U.C. per MH -->	1	03CADD	38.4				38.4
Cadd Operator -civil/Mep	24	24	1.000	\$922	\$0	\$0	\$0	\$922

CATLIN Engineers and Scientists

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

Michael D. Mason

Michael E. Mason, P.E.

<u>LEVEL</u>	<u>QTY</u>	<u>Hrs</u>	<u>Crew/ProdFact</u>	<u>LABOR</u>	<u>MATERIAL</u>	<u>EQUIPMENT</u>	<u>OTHERS</u>	<u>TOTAL</u>
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
								\$279,507
01575N Temporary Environmental Controls				Tree Depth= 2				
008	Subcontractor: 03	U.C. per MH -->	1	03CLER	28.8			28.8
Clerical-civil/Mep			8	1.000	\$230	\$0	\$0	\$230
Subtotal					\$6,240	\$0	\$0	\$6,240
1st Layer Markups assigned to Detail Items					\$624	\$0	\$0	\$624
3rd Layer Level Markups					\$6,864	\$0	\$0	\$6,864
TOTAL 01575N Temporary Environmental Controls			96		\$13,728	\$0	\$0	\$13,728

Estimate Tree Structure Rollups
BASE BID

\$279,507

01782N Facility Operation and Maintenance Support Inform

				Tree Depth= 2				
008	Subcontractor: 03	U.C. per MH -->	1	03CLER	28.8			28.8
Clerical-civil/Mep			6	1.000	\$173	\$0	\$0	\$173
Subtotal					\$4,085	\$0	\$0	\$4,085
1st Layer Markups assigned to Detail Items					\$408	\$0	\$0	\$408
3rd Layer Level Markups					\$4,493	\$0	\$0	\$4,493
TOTAL 01782N Facility Operation and Maintenance Support Information			50		\$8,987	\$0	\$0	\$8,987

CATLIN Engineers and Scientists

07/25/2007

Success Estimating and Cost Management System

Page No.

4

DETAIL REPORT NO.1A

Michael D. Mason
Michael E. Mason, P.E.

Reported From: Free Product Recovery System at
Report Total: \$279,507

<u>LEVEL</u>	<u>QTY</u>	<u>Hrs</u>	<u>Crew/ProdFact</u>	<u>LABOR</u>	<u>MATERIAL</u>	<u>EQUIPMENT</u>	<u>OTHERS</u>	<u>TOTAL</u>
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
								\$279,507
02111 Excavation and Handling of Contaminated Material				Tree Depth= 2				
33 23 1180	U.C. per EA -->			419.5	232.5	500		1152
Mobilization/Demobilization, Drill Equipment or Trencher, Crew	1		1.000	\$420	\$233	\$500	\$0	\$1,152
33 23 1188	U.C. per LS -->			41.95	23.25	128.2		193.4
Security Pass/Protocol	1		1.000	\$42	\$23	\$128	\$0	\$193
G10308051330	U.C. per LF -->			2.99		0.95		3.94
Trenching Common Earth (2x2x4)	180		1.000	\$538	\$0	\$171	\$0	\$709
0222002700a	U.C. per LF -->			2.65		0.34		2.99
Compact trench with vibratory plate	180		1.000	\$477	\$0	\$61	\$0	\$538
Utility Contractor	U.C. per HR -->			65				65
Utility Contractor	6		1.000	\$390	\$0	\$0	\$0	\$390
Roll-off Box	U.C. per EA -->					500		500
Mobilize and haul roll-off box	1		1.000	\$0	\$0	\$500	\$0	\$500
Disposal	U.C. per EA -->			1000				1000
Disposal of Contaminated Materials in roll-off box	1		1.000	\$1,000	\$0	\$0	\$0	\$1,000
Crew B-3B	U.C. per DAY -->			356.5		290.1		646.6
2-laborers, 1 equip oper.(med), 1 backhoe	5		1.000	\$1,783	\$0	\$1,451	\$0	\$3,233
Pickup Truck	U.C. per DAY -->					84.8		84.8
Crew Pickup Truck 3/4 ton	5		1.000	\$0	\$0	\$424	\$0	\$424
Subtotal				\$4,649	\$256	\$3,235	\$0	\$8,140
3rd Layer Level Markups				\$4,649	\$38	\$0	\$0	\$4,688
TOTAL 02111 Excavation and Handling of Contaminated Material				\$9,298	\$294	\$3,235	\$0	\$12,827

CATLIN Engineers and Scientists

Free Product Recovery System at Building AS-4141, MCAS New R

Michael D. Mason
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DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
				02525N Extraction Wells				
						\$279,507		
						\$26,062		

Free Product Recovery System at Building AS-4141, MCAS New R

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LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				Estimate Tree Structure Rollups				
				BASE BID				\$279,507
				02525N Extraction Wells				\$26,062
Drilling and Well Installation								
					Tree Depth= 3			
Pickup Truck	U.C. per DAY -->					84.8		84.8
Crew Pickup Truck 3/4 ton	2		1.000	\$0	\$0	\$170	\$0	\$170
Well Seal	U.C. per EA -->				10.15			10.15
4 x 2 inch well seals	4		1.000	\$0	\$41	\$0	\$0	\$41
Subtotal				\$3,418	\$4,076	\$10,825	\$0	\$18,319
3rd Layer Level Markups				\$3,418	\$611	\$0	\$0	\$4,029
TOTAL Drilling and Well Installation				\$6,836	\$4,687	\$10,825	\$0	\$22,348

DETAIL REPORT NO.1A

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Michael D. Mason
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LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
				02525N Extraction Wells				
								\$279,507
								\$26,062

Well Development and Waste Disposal

				Tree Depth= 3				
33231193	U.C. per DAY -->				136.85			136.85
Well Development Equipment Rental	1		1.000	\$0	\$137	\$0	\$0	\$137
Subtotal				\$116	\$3,019	\$9	\$0	\$3,145
3rd Layer Level Markups				\$116	\$453	\$0	\$0	\$569
TOTAL Well Development and Waste Disposal				\$233	\$3,472	\$9	\$0	\$3,714

Estimate Tree Structure Rollups
BASE BID

\$279,507

02751N Concrete Pavement and Slabs

				Tree Depth= 2				
020700728	U.C. per LF -->			1.6	2.53	5.39		9.52
Saw Cutting Concrete slabs, mesh reinforcing, 8 inches	320		1.000	\$512	\$810	\$1,725	\$0	\$3,046
0331005000	U.C. per SF -->			0.75	2.04	0.025		2.815
8" Slab on grade, including textured finish, not incl. forms	450		1.000	\$338	\$918	\$11	\$0	\$1,267
0321022420	U.C. per LS -->				230			230
12" long, 3/4" reinforcing steel	1		1.000	\$0	\$230	\$0	\$0	\$230
Crew B-3B	U.C. per DAY -->			356.5		290.1		646.6
2-laborers, 1 equip oper.(med), 1 backhoe	4		1.000	\$1,426	\$0	\$1,160	\$0	\$2,586
Dump Truck	U.C. per DAY -->					442.25		442.25
16-ton Dump Truck	1		1.000	\$0	\$0	\$442	\$0	\$442
0311320050	U.C. per LF -->			1.37	1.13			2.5
Expansion Joint, 4-1/2" high	450		1.000	\$617	\$509	\$0	\$0	\$1,125
0311321100	U.C. per LF -->			0.48	1.26			1.74
Hot applied fuel resistant, 1/2"x1" sealant	450		1.000	\$216	\$567	\$0	\$0	\$783

CATLIN Engineers and Scientists

DETAIL REPORT NO.1A

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Reported From: Free Product Recovery System at
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LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<i>Estimate Tree Structure Rollups</i>				
				BASE BID				
								\$279,507
02751N Concrete Pavement and Slabs				Tree Depth= 2				
0311323000	U.C. per LF -->			0.59	0.025			0.615
Polyethylene backer rod, 1/2"	450		1.000	\$266	\$11	\$0	\$0	\$277
Concrete Disposal	U.C. per LS -->			1000				1000
Disposal of concrete debris	1		1.000	\$1,000	\$0	\$0	\$0	\$1,000
Pickup Truck	U.C. per DAY -->					84.8		84.8
Crew Pickup Truck 3/4 ton	4		1.000	\$0	\$0	\$339	\$0	\$339
Subtotal				\$4,374	\$3,044	\$3,678	\$0	\$11,096
3rd Layer Level Markups				\$4,374	\$457	\$0	\$0	\$4,830
TOTAL 02751N Concrete Pavement and Slabs				\$8,747	\$3,501	\$3,678	\$0	\$15,926

Estimate Tree Structure Rollups
BASE BID

\$279,507

02900 Free Product Recovery System

				Tree Depth= 2				
Ball Valve	U.C. per EA -->				4.44			4.44
2 inch PVC Ball Valve	4		1.000	\$0	\$18	\$0	\$0	\$18
HDPE Pipe	U.C. per LF -->			7.39	3.72	0.83		11.94
4 inch diameter HDPE (SDR 13.5) suction pipe	800		1.000	\$5,912	\$2,976	\$664	\$0	\$9,552
Suction Line Fittings	U.C. per LS -->				1000			1000
Miscellaneous Fittings for connection	1		1.000	\$0	\$1,000	\$0	\$0	\$1,000
Junction Box	U.C. per EA -->			375	765	122		1262
3x3x3 junction box	9		1.000	\$3,375	\$6,885	\$1,098	\$0	\$11,358
MISCPLUM	U.C. per LS -->				1000			1000
Miscellaneous PVC fillings and plumbing supplies	1		1.000	\$0	\$1,000	\$0	\$0	\$1,000
Stinger Casing	U.C. per LF -->			2.62	1.28	8		11.9
2 inch diameter Sch 40 PVC casing pipe	48		1.000	\$126	\$61	\$384	\$0	\$571

CATLIN Engineers and Scientists

Free Product Recovery System at Building AS-4141, MCAS New R

Michael D. Mason
Michael E. Mason, P.E.

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

<u>LEVEL</u>	<u>QTY</u>	<u>Hrs</u>	<u>Crew/ProdFact</u>	<u>LABOR</u>	<u>MATERIAL</u>	<u>EQUIPMENT</u>	<u>OTHERS</u>	<u>TOTAL</u>
				<i>Estimate Tree Structure Rollups</i>				
				BASE BID				
								\$279,507
02900 Free Product Recovery System				Tree Depth= 2				
Gate Valve	U.C. per EA -->			40.14	69.58			109.72
2 inch diameter Bronze Gate Valve	4		1.000	\$161	\$278	\$0	\$0	\$439
Carrier Pipe	U.C. per LF -->				11.78			11.78
8 inch diameter SCH 80 PVC	80		1.000	\$0	\$942	\$0	\$0	\$942
HDPE Pipe Fuser	U.C. per DAY -->			850		500		1350
Rental of Fusing machine for HDPE + operator	1		1.000	\$850	\$0	\$500	\$0	\$1,350
DPE System	U.C. per LS -->			5300		37654.4		42954.4
Liquid ring pump, moisture chamber and control panel	1		1.000	\$5,300	\$0	\$37,654	\$0	\$42,954
Tripack	U.C. per CF -->				260			260
2 inch diameter Jaegar Pack for Air Stripper	10		1.000	\$0	\$2,600	\$0	\$0	\$2,600
A/S Blower	U.C. per EA -->				1300			1300
Air Stripper Blower Unit	1		1.000	\$0	\$1,300	\$0	\$0	\$1,300
Bag Filter	U.C. per EA -->				1100			1100
Rosedale Model 4 Bag Filter	1		1.000	\$0	\$1,100	\$0	\$0	\$1,100
Carbon Drums	U.C. per EA -->				450			450
CarbonAir LPC3 Carbon Drums	4		1.000	\$0	\$1,800	\$0	\$0	\$1,800
Booster Pumps	U.C. per EA -->				750			750
Booster Pumps	2		1.000	\$0	\$1,500	\$0	\$0	\$1,500
Demolition	U.C. per LS -->			500		500		1000
Demolition and abandonment of treatment system components	1		1.000	\$500	\$0	\$500	\$0	\$1,000
Oil/water Separator	U.C. per LS -->			1000	500			1500
Modification of existing product tank	1		1.000	\$1,000	\$500	\$0	\$0	\$1,500
Pickup Truck	U.C. per DAY -->					84.8		84.8
Crew Pickup Truck 3/4 ton	30		1.000	\$0	\$0	\$2,544	\$0	\$2,544
Crane	U.C. per DAY -->					271.6		271.6
Flatbed Truck with Crane	5		1.000	\$0	\$0	\$1,358	\$0	\$1,358

CATLIN Engineers and Scientists

Free Product Recovery System at Building AS-4141, MCAS New R

Michael D. Mason
Michael E. Mason, P.E.

DETAIL REPORT NO.1A

Reported From: Free Product Recovery System at
Report Total: \$279,507

LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<i>Estimate Tree Structure Rollups</i>				
				BASE BID				\$279,507
02900 Free Product Recovery System				Tree Depth= 2				
Laborer	U.C. per HR -->			28.75				28.75
Laborers (2)	320		1.000	\$9,200	\$0	\$0	\$0	\$9,200
Foreman	U.C. per HR -->			30.75				30.75
Foreman	160		1.000	\$4,920	\$0	\$0	\$0	\$4,920
Equipment Operator	U.C. per HR -->			36.85				36.85
Equipment Operator (light)	16		1.000	\$590	\$0	\$0	\$0	\$590
Junction Box cover	U.C. per EA -->				1740			1740
H-20 rated junction box cover with spring assist	9		1.000	\$0	\$15,660	\$0	\$0	\$15,660
HDPE Reducer	U.C. per EA -->				49.74			49.74
HDPE reducer SLP x THRD	4		1.000	\$0	\$199	\$0	\$0	\$199
HDPE Tee	U.C. per EA -->				39.66			39.66
4 inch HDPE Tee	1		1.000	\$0	\$40	\$0	\$0	\$40
HDPE 90	U.C. per EA -->				39.66			39.66
4 inch HDPE 90 Elbow	3		1.000	\$0	\$119	\$0	\$0	\$119
HDPE 45	U.C. per EA -->				36.25			36.25
4 inch HDPE 45 Elbow	2		1.000	\$0	\$73	\$0	\$0	\$73
SCH 80 Pipe	U.C. per LF -->			0.66	1.38			2.04
2 inch Sch 80 PVC pipe	150		1.000	\$99	\$207	\$0	\$0	\$306
Subtotal				\$32,032	\$38,258	\$44,702	\$0	\$114,992
3rd Layer Level Markups				\$32,032	\$5,739	\$0	\$0	\$37,771
TOTAL 02900 Free Product Recovery System				\$64,064	\$43,997	\$44,702	\$0	\$152,763

CATLIN Engineers and Scientists

07/25/2007

Success Estimating and Cost Management System

Page No. 11

DETAIL REPORT NO.1A

Michael D. Mason
Michael E. Mason, P.E.

Reported From: Free Product Recovery System at
Report Total: \$279,507

LEVEL	QTY	Hrs	Crew/ProdFact	LABOR	MATERIAL	EQUIPMENT	OTHERS	TOTAL
				<u>Estimate Tree Structure Rollups</u>				
				BASE BID				
								\$279,507
13210N Aboveground Fuel Oil Storage Tanks				Tree Depth= 2				
AST	U.C. per EA -->				975			975
500 gallon Aboveground Storage Tank	1		1.000	\$0	\$975	\$0	\$0	\$975
ULABAS	U.C. per HR -->			28.07				28.07
2 laborers + 1 truck, flatbed	2		1.000	\$56	\$0	\$0	\$0	\$56
X-ELECTRN	U.C. per HR -->			24.26				24.26
Outside Electrician	2		1.000	\$49	\$0	\$0	\$0	\$49
0164002400	U.C. per DAY -->			443.44		435		878.44
Truck Mounted, hydraulic, 12 ton capacity Crane	0.50		1.000	\$222	\$0	\$218	\$0	\$439
Subtotal				\$326	\$975	\$218	\$0	\$1,519
3rd Layer Level Markups				\$326	\$146	\$0	\$0	\$473
TOTAL 13210N Aboveground Fuel Oil Storage Tanks				\$653	\$1,121	\$218	\$0	\$1,992

Estimate Tree Structure Rollups
BASE BID

\$279,507

16050 Basic Electrical Materials and Methods

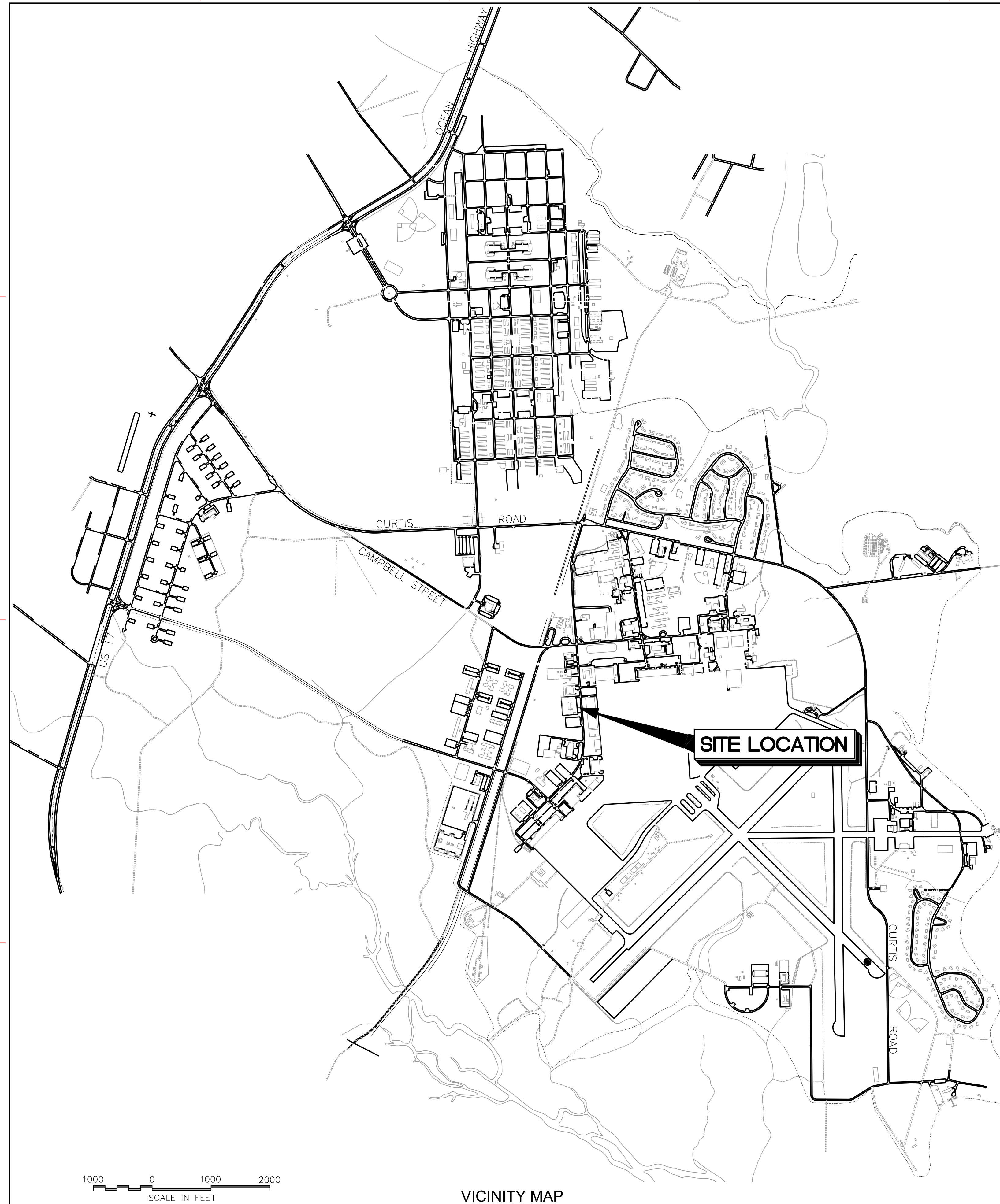
				Tree Depth= 2				
Basic Electrical	U.C. per LS -->			4000	3000			7000
Provide Basic Electrical Service for Project	1		1.000	\$4,000	\$3,000	\$0	\$0	\$7,000
Subtotal				\$4,000	\$3,000	\$0	\$0	\$7,000
3rd Layer Level Markups				\$4,000	\$450	\$0	\$0	\$4,450
TOTAL 16050 Basic Electrical Materials and Methods				\$8,000	\$3,450	\$0	\$0	\$11,450

APPENDIX D

CONSTRUCTION DRAWINGS

BUILDING AS-4141
FREE-PHASE PRODUCT
RECOVERY
SYSTEM MODIFICATIONS
AT MARINE CORPS AIR STATION
NEW RIVER
NORTH CAROLINA

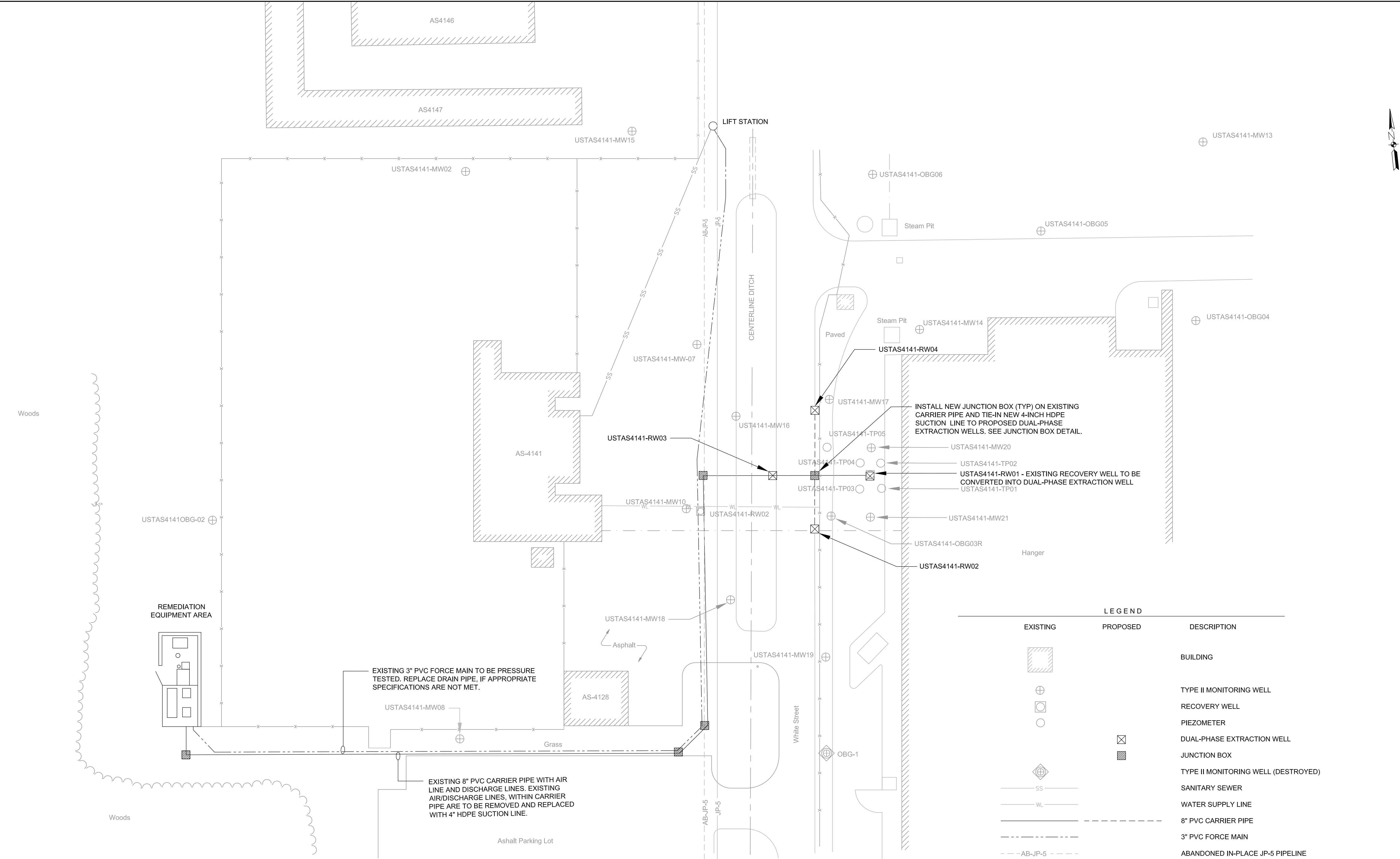
SHEET NO.	SHEET TITLE
T1	COVER SHEET
C1	SITE LAYOUT
C2	EXISTING & PROPOSED TREATMENT SYSTEM EQUIPMENT LAYOUT
C3	SYSTEM DETAILS (SHEET 1 OF 3)
C4	SYSTEM DETAILS (SHEET 2 OF 3)
C5	SYSTEM DETAILS (SHEET 3 OF 3)



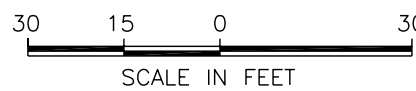
VICINITY MAP

A horizontal scale bar labeled "SCALE IN FEET". The bar has markings at 1000, 0, 1000, and 2000. The segment from 0 to 1000 on the right is solid black. The segment from 1000 to 0 on the left is divided into four equal parts by three vertical lines, with alternating black and white segments.

[illegible]



NOTE:
1. SITE MAP ADAPTED FROM SHAW ENVIRONMENTAL, INC. ANNUAL MONITORING REPORT, DATED JANUARY 2004, LEJEUNE GIS DATABASE AND FIELD MEASUREMENTS BY CATLIN IN DECEMBER 2005.
2. JP-5 PIPELINE LOCATION OBTAINED FROM AS-BUILT DRAWING NO. M2, TITLED REPLACE JP-5 FUEL LINE, DATED NOVEMBER 16, 2000. LOCATION SHOULD BE CONSIDERED APPROXIMATE.
3. ALL UNDERGROUND UTILITY LOCATIONS TO BE FIELD VERIFIED PRIOR TO EXCAVATION.

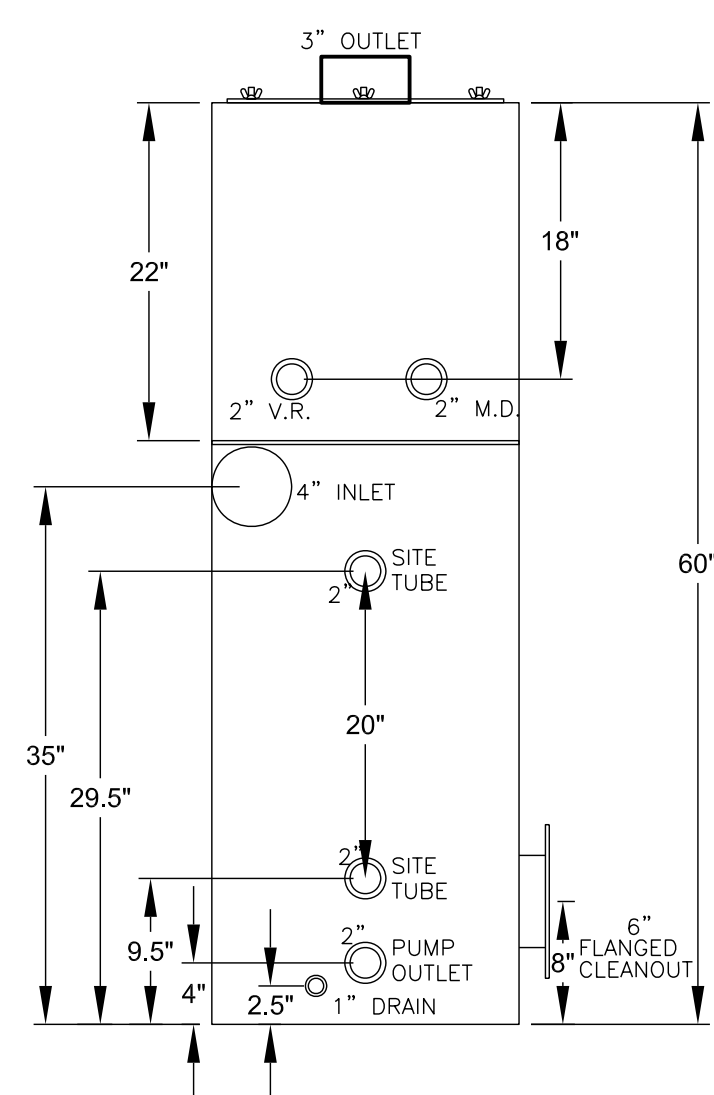


LEGEND		
EXISTING	PROPOSED	DESCRIPTION
		BUILDING
		TYPE II MONITORING WELL
		RECOVERY WELL
		PIEZOMETER
		DUAL-PHASE EXTRACTION WELL
		JUNCTION BOX
		TYPE II MONITORING WELL (DESTROYED)
		SANITARY SEWER
		WATER SUPPLY LINE
		8" PVC CARRIER PIPE
		3" PVC FORCE MAIN
		ABANDONED IN-PLACE JP-5 PIPELINE
		EXISTING JP-5 PIPELINE
		OVERHEAD STEAM LINE
		FENCE

NAVJAG SITE ENGINEERING COMMAND		MARINE CORPS AIR STATION, NEW RIVER, N.C.	
BUILDING AS-4141		FREE-PHASE PRODUCT RECOVERY SYSTEM MODIFICATIONS	
SITE LAYOUT			
CODE ID NO.	SIZE	D	A
SCALE:	AS SHOWN		
FED NO.	FILE		
STA. PROJ. NO.	7777		
SPEC. NO.	N/A		
CONSTR. CONTR. NO.	N/A		
NAVJAG DRAWING NO.			
SHEET 2 OF 6			
C1			
206074-BOD-JUN07-C1			



NOT TO SCALE

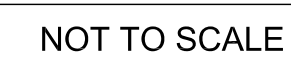


NOT TO SCALE



SIDE VIEW

NOT TO SCALE



NOT TO SCALE

206074-BOD-JUN07-C:



NOTE: ALL PVC PIPE TO BE SCHEDULE 80.

[illegible]