

PRESCRIPTIVE SPECIFICATIONS

CLEANING TANKS AND SUMPS

RED HILL BULK FUEL STORAGE FACILITY JOINT BASE PEARL HARBOR- HICKAM HAWAII

NAVFAC EXWC
POL FACILITIES ENGINEERING
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SECTION 33 65 00

CLEANING PETROLEUM STORAGE TANKS AND SUMPS

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 PETROLEUM INSTITUTE (API)

API RP 2003	(2008; 7th Ed) Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
API RP 2016	(2001; R 2006) Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks
API RP 2219	(2005; R 2012) Safe Operation of Vacuum Trucks in Petroleum Service
API RP 500	(2012; Errata 2014) Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
API Std 2015	(2014) Safe Entry and Cleaning of Petroleum Storage Tanks
API Std 653	(2014) Tank Inspection, Repair, Alteration, and Reconstruction

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 306	(2014) Standard for Control of Gas Hazards on Vessels
NFPA 326	(2015) Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 99-109	(Latest) Certified Equipment List
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U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-PRF-680 (2010; Rev C) Degreasing Solvent

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS O-D-1276 (Rev B; Notice 1) Disinfectant-Detergent,
General Purpose (Pine Oil)

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

29 CFR 1910.1025 Lead

29 CFR 1910.1028 Benzene

29 CFR 1910.120 Hazardous Waste Operations and Emergency Response

29 CFR 1910.1200 Hazard Communication

29 CFR 1910.134 Respiratory Protection

29 CFR 1910.146 Permit-required Confined Spaces

29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists

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

UNDERWRITERS LABORATORIES (UL)

UL 844 (2012) Standard for Luminaires for Use in Hazardous (Classified) Locations

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00.05 20 CONSTRUCTION SUBMITTAL PROCEDURES:

SD-03 Product Data

Cleaning agents; G

Gasoline-oil-resisting rubber gloves and boots

Cotton coveralls and hard hat

Respiratory protective equipment

Disinfectant

Submit identification for the items by designated name, specification number, project contracting number, and intended use.

SD-06 Test Reports

Tank contents tests

Monitoring Results

SD-07 Certificates

Qualifications of Marine Chemist; G

Qualifications of Certified Industrial Hygienist (CIH); G

Testing laboratory; G

Safety plan

Work plan

Hazardous waste disposal plan; G

Tank certification of safety

Training certification

Respiratory protective equipment

Breathing-air supply source

Combustible gas indicator

Lead-in-air analyzer

Hydrogen-sulfide (H₂S) indicator

Benzene indicator

Oxygen meter

Velometers

Lighting

First aid kit

Air Movers for Tank Ventilation

Submit certificates for the items listed. Where equipment or materials are specified to conform with the standards of organizations, such as National Institute for Occupational Safety and Health (NIOSH), Underwriters Laboratories (UL), and American Petroleum Institute (API), include a label or listing indicating compliance. In lieu of the label or listing, the Contractor may submit a test report from an approved testing organization stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms with the organization's standard or code.

SD-08 Manufacturer's Instructions

Tank cleaning agents

Submit safety data sheets for materials to be used at the job site, in accordance with 29 CFR 1910.1200.

SD-11 Closeout Submittals

Safety permits

Submit copies of permits required to comply with local, State, and Federal regulations.

1.3 DEFINITIONS

1.3.1 Certified Industrial Hygienist (CIH)

As used in this section, refers to an Industrial Hygienist employed by the Contractor and is certified by the American Board of Industrial Hygiene in comprehensive practice.

1.3.2 Marine Chemist

The holder of a valid Certificate issued by the National Fire Protection Association in accordance with the "Rules for Certification of Marine Chemists," establishing him as a person qualified to determine whether construction, alteration, repair, or shipbreaking of vessels, which may involve hazards covered by NFPA 306 can be undertaken with safety.

1.3.3 Hazardous Areas

Hazardous areas shall be defined as any area within 100 feet of active aboveground storage tanks, areas within 100 feet of leaking sections of fuel pipelines or other vapor sources, areas within 200 feet of the downwind side of potential vapor emission sources (i.e., pressure-vacuum vents or open vents on active tanks, leaking sections of pipelines), areas within existing tanks, and areas within a dike.

1.3.4 Hot Work Operations

Hot work, for work covered by this section, includes: flame heating, welding, torch cutting, brazing, carbon arc gouging, grinding, or any work which produces heat, by any means, of 400 degrees F or more; or in the presence of flammables or flammable atmospheres, other ignition sources such as spark or arc producing tools (except steel hand tools) or equipment, static discharges, friction, impact, open flames or embers, nonexplosion-proof lights, fixtures, motors or equipment.

1.3.5 Personal Monitoring

Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

1.3.6 Reproductive Hazard

A reproductive hazard is defined as any occupational stressor (biological, chemical, or physical) that has the potential to adversely affect the human reproductive process. For example, it is well known that central nervous system problems often occur in the offspring of mothers exposed to organic mercury during pregnancy. Therefore, based on the example cited, organic mercury can be classified as a reproductive stressor. Many reproductive hazards also cause other adverse health effects; for example, ethylene oxide is also known to be a carcinogen (i.e., produces cancer). Certain reproductive stressors can also have adverse effects on the male reproductive system. (If requested by the Contractor, the Contracting Officer will make available the Navy's standard on reproductive hazards.)

1.4 QUALITY CONTROL

1.4.1 Modification of References

Except as modified herein, the work shall conform with the recommendations of API RP 500, API RP 2003, NFPA 326, API Std 2015, and API RP 2016. Where the word "should" appears in these publications, substitute "shall."

1.4.2 Copies of Standards and Practices

Furnish two copies of API RP 500, API RP 2003, API Std 2015, and API RP 2016 to the field personnel charged with enacting the standards and recommended practices.

1.4.3 Safety Permits and Equipment

Acquire safety permits (specified by the facility safety authorities) and necessary safety equipment.

1.4.4 Regulatory Requirements

- a. Obtain permits required to comply with local, State, and Federal regulations.
- b. Hazardous wastes, such as water, sediment, and sludge, shall be packaged, labeled, stored, transported, treated and disposed of in accordance with 40 CFR 260 through 40 CFR 266 and State and local regulations. Transporters, sorters, treaters and disposers must be certified and have EPA ID numbers. Payment for disposal of hazardous waste will not be made until a completed hazardous waste manifest from the treatment or disposal facility is returned, and a copy furnished to the Government.

1.4.5 Medical Examinations

Before exposure to lead-contaminated fuel tank and at the completion of the work, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1025 and 29 CFR 1910.1200. The initial examination will not be required if adequate records show that employees have been examined as required by 29 CFR 1910.1025 within the last year and the blood lead levels did not exceed 30 micrograms per 100 grams of whole blood.

1.4.6 Medical Records

Maintain complete and accurate medical records of employees for a period of at least 40 years or for the duration of employment plus 20 years, whichever is longer.

1.4.7 CIH Responsibilities

- a. Certify training.
- b. Review and approve safety plans and work plan for conformance to the applicable referenced standards.
- c. Inspect tank and sump cleaning work for conformance with the approved safety and work plans.
- d. Direct monitoring.
- e. Ensure work is performed in strict accordance with specifications at all times.
- f. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.

1.4.8 Training

Train each employee performing tank and sump cleaning, waste disposal, and air sampling operations prior to the time of initial job assignment, in accordance with API Std 2015, 29 CFR 1910.120, 29 CFR 1910.134, 29 CFR 1910.1025, and 29 CFR 1910.1200. The training shall also include counseling of each employee on reproductive hazards involved in the work.

1.4.9 Respiratory Protection Program

- a. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 6 months thereafter as required by 29 CFR 1910.1025 where lead exposure is involved. Fit testing is not required for positive pressure respirators.
- b. Establish and implement a respiratory protection program as required by 29 CFR 1910.134, and 29 CFR 1926.55. Also comply with 29 CFR 1910.1025 when exposure to lead is involved.

1.4.10 Pre-Construction Conference

Along with the CIH, marine chemist, or gas-free engineer, meet with the Contracting Officer to discuss in detail the tank and sump cleaning work plan, including work procedures and precautions for the work plan.

1.4.11 Certificates

1.4.11.1 Qualifications of Marine Chemist

Submit name, address, and telephone number of the marine chemist selected to perform the required duties. Submit documentation that the marine chemist is certified by the National Fire Protection Association, including the certificate number and date of certification or recertification. The NFPA certification will be acceptable for non-ship work on this contract.

1.4.11.2 Qualifications of Certified Industrial Hygienist (CIH)

Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Provide previous experience of the CIH. Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification. The CIH shall be familiar with the hazards involved in fuel systems work.

1.4.11.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead and other contaminants. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/reaccreditation.

1.4.11.4 Safety Plan

Submit a safety plan within 45 calendar days after contract award and 30 days prior to commencing work. The safety program shall be reviewed and approved by the safety/health officer of the facility. The safety plan shall meet OSHA and EM 385-1-1 requirements, shall be a plan within the Accident Prevention Plan required in 01 35 26.05 20, and shall address the following:

- a. Identification and evaluation of the hazards and risks associated with each site being studied, including reproductive hazards and precautionary measures to be followed by workers for all hazards.
- b. Names and qualifications of each Contractor's representative in charge of the work and present at the job site when tank and sump cleaning and repair work will be performed.
- c. Identification of supervisory personnel and alternates responsible for site safety/response operations.
- d. Determination of levels of personal protection to be worn for various site operations.
- e. List of equipment with adequate nomenclature by item, that will be used at the job site and the date and location where this equipment can be inspected by the Contracting Officer.
- f. Establishment of work zones (exclusion area, contamination area, and support area).
- g. Establishment of a tank and sump entry and work permit program in accordance with 29 CFR 1910.146 and EM 385-1-1.
- h. Establishment of decontamination methods and procedures.
- i. Determination of the number of people required to enter the contamination zones during the initial entries and subsequent operations.
- j. Establishment of emergency procedures, such as: escape routes, fire protection, signals for withdrawing work parties from site, emergency communications, wind indicators, including Navy notification.
- k. Identification and arrangements with nearest medical facility for emergency medical care for both routine-type injuries and toxicological problems. Submit name, location, and telephone number of this medical facility.
- l. Establishment of continual air and personnel monitoring procedures.
- m. Establishment of procedures for obtaining and handling potentially contaminated samples.
- n. Identification of medical monitoring program, including respirator medical qualification examination for each individual at the work site.

- o. Identification of training plan to be instituted, including contents of 29 CFR 1910.1200 and 29 CFR 1910.134; its training contents; and instructor with appropriate training certification. Training plan shall also include counseling to each employee on reproductive hazards.
- p. Establishment of a respiratory protection program conforming to 29 CFR 1910.134.
- q. Establishment of a hazard communication program (29 CFR 1910.1200).

1.4.11.5 Work Plan

The shut down or interruption to normal operations or traffic shall be listed on the progress schedule and submitted to the Contracting Officer.

1.4.11.6 Hazardous Waste Disposal Plan

Prepare a Hazardous Waste Disposal Plan and submit within 45 calendar days after contract award for approval by the Contracting Officer, or if there are no hazardous wastes indicated by Government tests, submit the plan 21 days after the Contractor's tests indicate hazardous wastes. The Hazardous Waste Disposal Plan shall comply with applicable requirements of Federal, State, and local hazardous waste regulations and shall address the following:

- a. Identification of hazardous wastes associated with the work, including a sampling and testing plan for each waste stream, the purpose of each test, and the rationale for evaluating the test results. Indicate the representative sampling and specific testing methods, number of samples, and the name and qualifications of the testing laboratory.
- b. Estimated quantities of wastes to be disposed in the cleaning of each tank and sump and a description of arrangements made for storage and disposal.
- c. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA State and local hazardous waste permit applications permits and EPA Identification numbers.
- d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
- e. List of waste handling equipment to be used in performing the work, to include cleaning, treatment, volume reduction, and transport equipment.
- f. Spill prevention, containment, and cleanup contingency measures to be implemented.
- g. Work plan and schedule for waste removal and disposal.
- h. Cost for hazardous waste disposal according to this plan.

1.4.11.7 Tank Certification of Safety

Submit certification, from an NFPA certified "Marine Chemist" or CIH stating that tank and sump is safe for hot work and that special precautionary measures have been taken for workers to enter the tank or sump to perform the work.

1.4.11.8 Training Certification

Submit certifications signed and dated by the CIH specified in the testing plan and by each employee stating that the employee has received training on work practices and received counseling on and fully understands the reproductive hazards involved with lead and toluene exposure and the work.

1.4.11.9 Hazardous Waste Permits

Submit copies of EPA State and local hazardous waste permit applications permits and EPA Identification numbers of the transporter, treatment, storage and disposal facility that will be accepting hazardous waste. Include the facility location and a 24-hour point of contact.

1.4.11.10 Non-Hazardous Waste Permits

Submit EPA State local permits for disposal site for non-hazardous residues and wastes.

1.4.12 Test Results

1.4.12.1 Required Test Reports

Submit contractor's independent tests of tank and sump contents (water, sediment, and sludge).

1.4.12.2 Air Monitoring

Submit monitoring results to the Contracting Officer within 2 working days after the samples are taken, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.

1.5 DELIVERY AND STORAGE

Deliver equipment and materials to the site in an undamaged condition bearing the manufacturer's name and brand designation. Store equipment and materials off the ground to provide proper ventilation, drainage, and protection against dampness. Replace defective and damaged equipment and materials.

1.6 JOB CONDITIONS

1.6.1 Ventilation

Maintain a vapor-free condition throughout the course of the work inside the tank. The air movers shall be non-sparking, explosion-proof, electrically operated or air-driven exhaust type. A rate of one air change per hour is normally the lowest acceptable rate for tanks under 30,000 BBL. Since the

Red Hill tanks are greater than 30,000 BBL, use 10,000 cfm. Air movers shall be kept in operation whenever workers are in the tanks; except the air movers shall be shut down 15 minutes before taking tests.

1.7 SCHEDULING AND SEQUENCING

1.7.1 Sequence of Primary Phases of the Cleaning Procedure

- a. Planning the operations
- b. Preparation for cleaning
- c. Vapor-freeing of the tank
- d. Cleaning the tank and sump
- e. Clean-up, residue disposal, inspection, and acceptance.

1.7.2 General Scheduling

Complete the work specified in this section before any other work in the tank or sump is started. The work includes the complete interior cleaning of the storage tanks and sumps.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cleaning Agents

- a. Detergent: FS O-D-1276.
- b. Solvent: MIL-PRF-680, Type II, minimum flashpoint of 60 degrees C.
- c. Approved commercial cleaning agent.

2.1.2 Not used

2.1.2.1 Not used

2.1.2.2 Not used

2.2 EQUIPMENT

Furnish necessary clothing and equipment for the work and protection of people entering the tank or sump. Electrical equipment and wiring shall be in accordance with NFPA 70, Class 1, Group D, Division 1. Provide any item or items for the protection of these people including but not limited to the following:

- a. Gasoline-Oil-Resisting Rubber Gloves and Boots: Gauntlet type and conductive type respectively (acid-proof rubber is an acceptable material); furnished for each person entering or working inside the tank or sump or handling sludge materials on the exterior of the tank, plus one extra pair each for emergency use.

- b. Cotton Coveralls and Hard Hat: Light colored; one change per person per day, and an adequate supply of chemical-resistant disposable coveralls to be worn over cotton coveralls.
- c. Respiratory Protection: Provide one of the following types of NIOSH-approved respiratory protective equipment for each person working inside the tank or sump, plus one extra for emergency use. NIOSH 99-109 listing constitutes NIOSH approval.
 - (1) Self-contained breathing apparatus with a full facepiece operated in a positive pressure mode.
 - (2) A combination respirator which includes a Type C supplied-air respirator which a full facepiece operated in a positive pressure mode and an auxiliary positive pressure self-contained breathing apparatus.
 - (3) The CIH may specify airline (Type C) respirator in place of those specified above; however, the decision shall be based on the results of personal monitoring.
 - (4) CIH shall specify respiratory protection if required for personnel handling sludge material outside of the tank or sump.
- d. Safety Harness: For each person working inside tank, plus one extra for outside the tank.
- e. One-half Inch Diameter Life Rope of Required Length: For each person working inside the tank.
- f. Breathing-Air Supply Source: 29 CFR 1910.134.
- g. Combustible Gas Indicator, Lead-in-Air Analyzer, Hydrogen-Sulfide (H₂S) Indicator, Benzene Indicator, and Oxygen Meter.
- h. Shovels, Buckets, Brooms, Wrenches, Scrapers, Squeegees, Wire Brushes, Scrub-Brushes, Ladders, Staging, and Other Tools: Do not use brooms or brushes that have plastic or synthetic bristles.
- i. Lighting: UL 844, explosion-proof, minimum 50 footcandle, floodlight type, or Mining Safety and Health Administration (MSHA) approved, explosion-proof, portable battery-powered light.
- j. Air Movers for Tank Ventilation: Explosion proof electrically operated or air driven. Nonferrous fan blades. Use velometers for measuring velocity.
- k. Disinfectant for Cleaning Face Masks: Cleaner-sanitizer for cleaning and disinfecting respirator facepieces as specified in 29 CFR 1910.134, Appendix B-2.
- l. Soap for Personnel Washing: Non-phosphate type.
- m. A.B.C. Fire Extinguishers: UL listed of type and quantity recommended by qualified CIH; minimum 15 pound capacity.
- n. First Aid Kit: Minimum one 16-unit kit for each 15 persons.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

3.1.1 Permission for Each Entry Into a Tank or sump

Obtain written permission from the Contracting Officer prior to each entry into a tank or sump. Permission will be granted only under the following conditions:

- a. The Contractor's qualified supervisor is present.
- b. The Contractor's personnel have been briefed by the supervisor on the procedure and role of each employee in the event of an emergency.
- c. Required equipment is approved and properly located.
- d. Personnel are properly equipped with properly fitted protective equipment and have received adequate training from a qualified instructor.
- e. The entire area adjacent to the tank or sump is secured.
- f. A minimum of two persons outside and two or more persons inside of each tank or sump are provided at all times during cleaning operations.
- g. Tank air is monitored and corrective action is taken to ensure that the vapor concentration is less than 10 percent of the lower flammable limit (LFL), lead-in-air is less than 0.050 milligrams per cubic meter and oxygen content is a minimum of 19.5 percent.
- h. An NFPA certified "Marine Chemist" or CIH has certified that the tank is safe for hot work, and that the required special precautionary measures have been taken due to the potential health hazard to the worker that still exists, even when the vapor concentration is well below the LFL. The Contractor shall be responsible for reviewing the record drawing(s) of the tank to be cleaned.
- i. People entering the area leave smoking materials such as cigarettes and flame-producing devices at a previously determined location.
- j. When work involves handling and disposal of hazardous waste, the Contractor has a copy of 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266 in his possession.
- k. Permit only personnel authorized in the safety plan within the work area.

3.1.2 Traffic Control

Do not operate vehicles in hazardous areas.

3.1.3 Lavatory Facilities

Arrange for lavatory and toilet facilities.

3.1.4 Miscellaneous

Ensure that the manufacturers have labeled containers holding products involving hazards in use or storage, in accordance with 29 CFR 1910.1200. Label containers used to store, transport, or dispose of hazardous waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266 and State Regulations. Remove small objects of ferrous metal within the working areas to prevent the accidental striking of a spark. Place equipment upwind of tank openings at highest elevation possible; do not place in a spot lower than the surrounding terrain. Review drawings of the tank or sump to be cleaned and brief workers on the location of pits, sumps, piping, or other tank appurtenances which could be hazardous to personnel. Provide floodlights to illuminate the work area without the need for battery operated handlights. Provide means for secure, safe accessibility to tank surfaces. Install electrical equipment in accordance with API RP 500. Do not use artificial lights inside tank or sump until the tank or sump is vapor-free.

3.1.4.1 Grounding and Bonding for Equipment

Provide grounding and bonding for equipment which may generate static electricity.

3.1.4.2 Fire Extinguishers

Furnish two carbon-dioxide fire extinguishers of minimum 15 pounds capacity each, in the immediate vicinity of the work. Provide a continuous fire watch. CAUTION: Do not discharge high pressure carbon dioxide extinguishers where explosive vapors exist since the discharge can cause a spark which will ignite the vapors.

3.1.4.3 Disconnection Pipelines

Disconnect pipelines connected to the tank or sump. Insert a solid-plate blind flange between two flanges near the tank or sump, or remove a valve or piece of pipe and install a blind flange to prevent flammable material from entering the tank or sump. Blind flanges shall be of sufficient strength to withstand full pressure which might be exerted by the material being blanked off, and shall be gasketed on both sides if blind flange is inserted between two flanges. Coordinate lockout / tagout of pipelines with site fuels operator. CAUTION: Do not disconnect piping or valves until it is certain the line has been emptied of fuel.

3.1.4.4 Removal of Ignition Sources

Remove sources of ignition from the cleaning area. Do not permit ignition producing devices, including matches, lighters or cigarettes, within the underground fuel complex.

3.1.4.5 Survey of Hazardous Areas

Carefully survey the entire area around the tank or sump to be cleaned to ensure that there are no vapors present in the pit, low places, or hazardous areas and that all unauthorized personnel are cleared from the area. Hazardous areas are defined as follows:

- a. Interior of tanks or sumps.
- b. Areas within 100 feet from points having flammable vapor emissions which, for example, are from the exhaust manholes of tanks under repair, open vents or pressure vacuum vents (breather valves) of active tanks in the vicinity of tanks under repairs or cleaning.

3.1.4.6 Exit from a Tank During Emergencies

To permit quick, free exit from a tank or sump during emergencies, keep the area around the tank or sump openings and emergency routes clear of obstructions.

3.2 INSPECTION

3.2.1 Inspection of Equipment

3.2.1.1 Respirators

Respirator users shall inspect their respirators in strict accordance with the instructions provided by the manufacturer.

3.2.1.2 Air Hose from Breathing-Air Supply

If air line respirators are used, ensure that:

- a. There are no breaks in outside covering;
- b. Condition of gaskets is good;
- c. Connections are tight; and
- d. There are no restrictions in the hose.

3.2.1.3 Safety Harness and Life Line

Ensure that:

- a. There is no frayed or weak material; and
- b. Condition of harness is good.

3.2.1.4 Breathing-Air Supply Source

Ensure:

- a. Good working condition; and
- b. Location in vapor-free area.
- c. Compliance with 29 CFR 1910.134 for breathing air quality, frequency of air analysis, and presence of safety devices.
- d. Backup air supply source.

3.2.1.5 Monitoring Equipment

Calibrate each day before use:

- a. Combustible gas indicator
- b. Oxygen meter

3.2.1.6 Other Equipment

Ensure:

- a. Proper grounding and bonding;
- b. Explosion-proof motors; and
- c. Explosion-proof lighting.

3.2.2 Personnel Inspection

3.2.2.1 Clothing

Personnel for Proper Attire Commensurate with Hazards Involved: Check for:

- a. Clean clothing in good condition (wear freshly laundered clothing at the beginning of the job and at the start of each workday thereafter).
- b. Boots and gloves of approved type and in good condition.

3.2.2.2 Breathing-Air Supply

If air line respirators are used, ensure that air is supplied to the facepiece at a rate of 4 to 15 cfm. If self-contained breathing apparatus are used, ensure sufficient number of full replacement cylinders are available to last the duration of the job.

3.2.2.3 Harness and Lifeline

Harness and lifeline shall be in good condition and properly attached.

3.2.2.4 Gum or Tobacco Chewing

Ensure that gum or tobacco chewing is prohibited.

3.2.2.5 Physical Defects or Injuries

Ensure that people have no physical defects or injuries which may prevent their wearing respirators or which may cause rescue to be difficult. No beards, sideburns, or large mustaches shall be allowed on people who must wear respirators.

3.2.2.6 Alcoholic Beverages and Drugs

Ensure that people entering the tank or sump are not under influence of alcoholic beverages and drugs.

3.2.2.7 Counseling on Reproductive Hazards

Ensure that all employees have been counseled on and fully understand the reproductive hazards related to work in contaminated areas or in leaded gasoline or chemically contaminated tanks since they may be seriously affected by organic lead compounds or other chemical contaminants.

3.2.2.8 Hazardous Areas

Check hazardous areas as defined in paragraph entitled "Survey of Hazardous Areas."

3.3 TABLE OF TANK AND SUMP HISTORY / DIMENSIONS

RED HILL Tank Sump or pipeline:	CONSTRUCTED:	CAPACITY (gals):	Dimensions (approximate, dia x height, feet):	Former PRODUCT:
Tank F-1	1943	11,980,332	100 x 238	Empty since 1997
Tank F-2	1943	11,986,254	100 x 238	F-24
Tank F-3	1943	11,980,332	100 x 238	F-24
Tank F-4	1943	11,980,332	100 x 238	F-24
Tank F-5	1943	12,697,986	100 x 250	F-24
Tank F-6	1943	12,695,012	100 x 250	JP-5
Tank F-7	1943	12,703,320	100 x 250	JP-5
Tank F-8	1943	12,680,976	100 x 250	JP-5
Tank F-9	1943	12,702,900	100 x 250	JP-5
Tank F-10	1943	12,698,700	100 x 250	JP-5
Tank F-11	1943	12,715,962	100 x 250	JP-5
Tank F-12	1943	12,694,500	100 x 250	JP-5
Tank F-13	Not in Scope went through CIR in 2020 timeframe			
Tank F-14	"			
Tank F-15	1943	12,706,515	100 x 250	F-76
Tank F-16	1943	12,702,900	100 x 250	F-76
Tank F-17	Not in scope went through CIR in 2020 timeframe			

RED HILL Tank Sump or pipeline:	CONSTRUCTED:	CAPACITY (gals):	Dimensions (approximate, dia x height, feet):	Former PRODUCT:
Tank F-18	"			
Tank F-19	1943	12,712,644	100 x 250	Empty since 1997
Tank F-20	1943	12,704,916	100 x 250	JP-5
Tank F-ST1	Not in Scope went through CIR in 2020 timeframe			
Tank F-ST2	Not in Scope went through CIR in 2020 timeframe			
Tank F-ST3	Not in scope went through CIR in 2020 timeframe			
Tank F-ST4	1943	422,184	60 x 20	F-76
FOR sump for Tank 311 near Adit 3	1943	1,675	8 high x 6 deep x 4.75 wide	Waste Water
Zone 7 FOR sump	TBD	309	3 x 3 x 4.58	Empty since 2022

3.4 FUEL REMOVAL

3.4.1 Recoverable (Usable) Fuel

Government will remove all recoverable fuel (usable fuel in tank down to the point of suction loss at the nozzle) and usable fuel in pipelines prior to this contract.

3.4.2 Flowable Tank Bottom and Sludge

Government will remove the flowable tank bottom (the unusable fuel layer from loss of suction to the sludge layer) prior to this contract. Assume the volume of, sludge, sediment, and deleterious material (unusable) which is required to be removed and disposed as stated in Section 01 14 00.05 20.

3.5 TANK CLEANING

For the interior of the tanks, the upper dome, barrel and extension rings, lower dome, catwalk, tower, stairs, shell projections, structural supports, piping, tubes, sample lines, manways, product openings, and other interior accessory equipment, shall be sprayed with an environmentally acceptable cleaning solution and rinsed as necessary to pass a visual inspection utilizing ultraviolet (UV) light to induce fluorescence of petroleum products and aid in the identification and mitigation of any residual contamination, as described in the "Standard Operating Procedure for Visual Monitoring to Verify Tank Cleaning Completion."

3.5.1 Monitoring

Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 of benzene in accordance with 29 CFR 1910.1028, and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH.

- a. The CIH or the IH Technician under the direction of the CIH shall be on the jobsite directing the monitoring, and inspecting the work to ensure that the requirements of the Contract have been satisfied during the entire operation.
- b. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
- c. Submit results of air monitoring samples, signed by the CIH, within 2 working days after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area, and 0.5 ppm for benzene.

3.5.1.1 Monitoring During Tank Cleaning Work

Perform personal and area monitoring during the entire tank cleaning operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air for lead and 0.5 ppm for benzene at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air or the benzene levels are at or exceed 0.5 ppm, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Tank cleaning work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air and the benzene levels to less than 0.5 ppm at all times. As a minimum, conduct area monitoring daily on each shift in which tank cleaning operations are performed in areas immediately adjacent to the control area. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of contamination.

3.5.2 Rinsate Removal and Disposal

Pump or otherwise remove rinsate from washing each tank using the existing fuel oil recovery (FOR) line and FOR tank (AST 311). Ensure that any sludge or sediment are removed prior to washing the tank. Assume 55 gallons of nonhazardous water that shall be packaged, labeled, stored, transported, treated, and disposed of in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Slop line is not available for this activity.

3.5.3 Sludge and Sediment Removal and Disposal

Squeegee or brush any sludge, sediment, or other loose material into piles, shovel into buckets or other suitable containers, and remove from the tank.

3.5.3.1 Sludge Disposal Using Landfill

Assume the amount of nonhazardous sediment and sludge in the tank which can be disposed in a sanitary landfill is included in the remaining unusable fuel quantity provided in Section 01 14 00.05 20.

3.5.4 Washing

After water, fuel, and sludge have been removed, thoroughly wash the tank interior. Minimize the use of water; substitute power washing when practical. Start washing at the top of the tank and tower and work down to the lower dome. Wash the lower dome and tank floor last. Wash to remove oil, sludge, wax, tar, carbon, and other fuel residue adhering to the surface. Wash by the following methods:

- a. Apply a detergent cleaning solution by spray or brush and allow to soak approximately 30 minutes. The cleaning solution shall be either a one-to-one ratio of detergent conforming to FS O-D-1276 and solvent conforming to MIL-PRF-680 or an equivalent commercial cleaning agent as approved by the Contracting Officer.

- b. Rinse the surfaces thoroughly with fresh water.

3.5.5 Wash Water, Detergent Solution, and Sediment Removal

During the washing process for the large underground storage tanks, rinsate will drain or be pumped to the FOR line and out to tank AST 311. During the washing process for the surge tanks and sumps, operate a portable pump continuously with suction hose extended to the tank bottom to remove water, detergent, dirt, oil, or other loose materials washed off. For all tanks, following the final rinse, pump, squeegee, and mop the tank dry.

- a. Prior to disposal, test the wash water, sediment, and sludge in accordance with paragraph entitled "Water, Sediment, and Sludge Analysis." The Contractor shall furnish temporary tanks to hold water and detergent solution until testing is completed.
- b. For bidding purposes, assume that the sediment is nonhazardous and can be disposed of in a sanitary landfill.

3.5.6 Not Used

3.5.7 Not Used

3.5.8 Special Precautions

Special Precautions for Tanks with Pipe Columns and Braces, Pontoons, and Leaking Bottoms:

- a. Pipes used for columns and braces, pontoons and leaking bottoms are a potential source of explosive vapors even after the tank is cleaned. The tank may be determined to be vapor free below 4 percent of lower explosive limit; but after one or two hours, explosive readings must again be obtained from these sources. The Contractor shall take readings at least every half hour when working in tanks after they have been cleaned and each floating roof or pan pontoon shall be checked individually with a combustible gas indicator.
- b. If the repair work is to be performed on floating roof tanks, the interior of each pontoon on the roof shall be thoroughly cleaned of fuel, rust, water, and debris.

3.5.9 Lead-Hazard-Free Tests

In accordance with API Std 2015, tank lead-in-air tests to make sure that the tank is lead-hazard-free (CAUTION: Never take lead-hazard-free tests before or during cleaning, only after).

3.6 SUMP CLEANING

All walls, floors and other interior accessory equipment, shall be sprayed with an environmentally acceptable cleaning solution and rinsed as necessary to pass a UV visual inspection.

3.6.1 Monitoring

Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 of benzene in accordance with 29 CFR 1910.1028, and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of the CIH.

- a. The CIH or the IH Technician under the direction of the CIH shall be on the jobsite directing the monitoring, and inspecting the work to ensure that the requirements of the Contract have been satisfied during the entire operation.
- b. Take personal air monitoring samples on employees who are anticipated to have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
- c. Submit results of air monitoring samples, signed by the CIH, within 2 working days after the air samples are taken. Notify the Contracting Officer immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area, and 0.5 ppm for benzene.

3.6.1.1 Monitoring During Sump Cleaning Work

Perform personal and area monitoring during the entire sump cleaning operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air for lead and 0.5 ppm for benzene at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air or the benzene levels are at or exceed 0.5 ppm, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the Contracting Officer immediately. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Sump cleaning work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air and the benzene levels to less than 0.5 ppm at all times. As a minimum, conduct area monitoring daily on each shift in which sump cleaning operations are performed in areas immediately adjacent to the control area. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the control area. If adjacent areas are contaminated, clean and visually inspect contaminated areas. The CIH shall certify that the area has been cleaned of contamination.

3.6.2 Rinsate Removal and Disposal

Pump or otherwise remove rinsate from each sump. Ensure that the sludge and sediment are not pumped out or mixed with the water.

3.6.3 Sludge and Sediment Removal and Disposal

Squeegee or brush any sludge, sediment, or other loose material into piles, shovel into buckets or other suitable containers, and remove from the sump.

3.6.3.1 Sludge Disposal Using Landfill

Assume the amount of nonhazardous sediment and sludge in the sumps which can be disposed in a sanitary landfill is included in the remaining unusable fuel quantity provided in Section 01 14 00.05 20.

3.6.4 Washing

After water, fuel, and sludge have been removed, thoroughly wash the sump interior. Minimize the use of water; substitute brush blasting when practical. Start washing at the top of the Sump and work down to the floor. Wash by any one or a combination of the following methods:

- a. Apply a detergent cleaning solution by spray or brush and allow to soak approximately 30 minutes. The cleaning solution shall be either a one-to-one ratio of detergent conforming to FS O-D-1276 and solvent conforming to MIL-PRF-680 or an equivalent commercial cleaning agent as approved by the Contracting Officer.
- b. Hand-scrub the surfaces vigorously with long-handled stiff-bristle brushes. Wet the brushes intermittently with fresh cleaning agent during scrubbing process. For heavily oil-soaked areas which still appear to retain some residue after first scrubbing, scrub until clean.
- c. Rinse the surfaces thoroughly with fresh water.
- d. Brush-off blast clean.

3.6.5 Wash Water, Detergent Solution, and Sediment Removal

During the washing process, operate a portable pump continuously with suction hose extended to the sump bottom to remove water, detergent, dirt, oil, or other loose materials washed off. Following the final rinse, pump, squeegee, and mop the sump dry.

- a. Prior to disposal, test the wash water, sediment, and sludge in accordance with paragraph entitled "Water, Sediment, and Sludge Analysis." The Contractor can utilize the existing FOR line and Tank to hold water and detergent solution until testing is completed.
- b. For bidding purposes, assume that the sediment is nonhazardous and can be disposed of in a sanitary landfill.

3.6.6 Removal of Scale and Other Tenaciously Adhering Materials

Perform power wire brushing. The brush shall be made of spark resistant bronze wire. After power wire brushing, clean the entire sump interior surfaces by brushing, blowing with dry compressed air, and vacuuming. Remove loose materials from the sump interior.

3.6.7 Disposal of Used Blasting Abrasive

Test used abrasive in accordance with 40 CFR 261 to determine if it is a hazardous waste using the EP toxicity test for metals. Handle and dispose of abrasive determined to be hazardous waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Dispose of abrasive which is not hazardous waste at a landfill off Government property in accordance with applicable regulations. The contract price will be adjusted if the used abrasive is determined to be hazardous waste.

3.6.8 Not used

3.6.9 Lead-Hazard-Free Tests

In accordance with API Std 2015, tank lead-in-air tests to make sure that the sump is lead-hazard-free (CAUTION: Never take lead-hazard-free tests before or during cleaning, only after).

-- End of Section --

3.7 FINAL CLEAN-UP

After the Contracting Officer has inspected and accepted the tank and sump cleaning, and before final inspection, accomplish the following work:

3.7.1 Stenciling Tanks and Sumps

Stencil on the tank in 3/4 inch letters adjacent to the manhole openings the following data:

Date Cleaned -

Contractor Name -

Address -

3.7.2 Restoration of Site to Original Condition

Remove from the site debris and equipment and materials used for the cleaning operations. Restore the site to its original condition.

-- End of Section --