UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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LEAK DETECTION FOR FUELING SYSTEMS

02/20

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USACE / NAVFAC / AFCEC / NASA **UFGS-33 01 50.31 (February 2020)**

Preparing Activity: USACE **Superseding UFGS-33 58 00 (April 2008)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021

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SECTION 33 01 50.31

LEAK DETECTION FOR FUELING SYSTEMS
02/20

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NOTE: This guide specification outlines many of the requirements for leak detection systems for fueling applications.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

PART 1 GENERAL

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NOTE: This specification does not address the monitoring of tank bottoms for field-fabricated, vertical storage tanks.

Use this UFGS in conjunction with UFC 3-460-01 "Design: Petroleum Fuel Facilities". Include in this specification any additional equipment/devices necessary to meet state and local regulations.

UFC 3-460-01 requires underground storage tanks and underground piping to be monitored for leaks in accordance with 40 CFR 280, 40 CFR 281, 49 CFR 195, and any applicable state and local requirements.

In order to meet SPCC (40 CFR 112) program requirements and/or as a best management practice, all underground pipes associated with Aboveground Storage Tanks (ASTs) shall meet the secondary containment and/or leak detection provisions of 40 CFR 280, 40 CFR 281, and any applicable state and local requirements - see spec writer notes under UNDERGROUND PIPING section.

Various methods can be used to conform to the leak detection and monitoring requirements of the CFRs. This specification covers the preferred methods related to tanks and piping. Variations from this specification must be coordinated with and approved by the Using Agency.

****

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

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 540	(1999; R 2004) Electrical Installations in Petroleum Processing Plants
API RP 1130	(2007; R 2017) Computational Pipeline Monitoring for Liquids
API RP 2003	(2015; 8th Ed) Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents

ASTM INTERNATIONAL (ASTM)

ASTM B117	(2019) Standard Practice for Operating

Salt Spray (Fog) Apparatus

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 142	(2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IEEE 1100	(2005) Emerald Book IEEE Recommended Practice for Powering and Grounding Electronic Equipment

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2018) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 77	(2014) Recommended Practice on Static Electricity
NFPA 407	(2017) Standard for Aircraft Fuel Servicing
NFPA 780	(2017) Standard for the Installation of Lightning Protection Systems

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Leak Detection System; G[, [_____]]

Electronic Monitoring/Alarm Panel

Computational Pipeline Monitoring System

SD-03 Product Data

Leak Detection System; G[, [_____]]

Electronic Monitoring/Alarm Panel

Computational Pipeline Monitoring System

SD-06 Test Reports

Leak Detection System Test

SD-07 Certificates

Demonstrations

SD-08 Manufacturer's Instructions

Leak Detection System

SD-10 Operation and Maintenance Data

Leak Detection System; G[, [_____]]

Electronic Monitoring/Alarm Panel; G[, [_____]]

Computational Pipeline Monitoring System; G[, [_____]]

1.3 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace

damaged or defective items.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide materials and equipment that are standard products of a manufacturer regularly engaged in the manufacturing of such products, that are of a similar material, design and workmanship, and that have been in satisfactory commercial or industrial use for a minimum 2 years prior to bid opening. The 2 year period shall include applications of the equipment and materials under similar circumstances and of similar size. Materials and equipment must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.[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 manufacturer's factory tests, can be shown.]

2.1.1 Nameplates

****

NOTE: In a salt water environment, substitute acceptable non-corroding metal such as, but not limited to, nickel-copper, 304 stainless steel, or monel. Aluminum is unacceptable. Nomenclature (or system identification) should be established by the designer.

Require melamine plastic nameplates for all NAVFAC projects. Also for NAVFAC projects, require nameplates to be associated or keyed to system charts and schedules.

****

Attach nameplates to all specified equipment defined herein. List on each nameplate the manufacturer's name, address, [contract number,] [acceptance date,] component type or style, model or serial number, catalog number, capacity or size, and the system which is controlled. Construct plates of [anodized aluminum] [stainless steel] [melamine plastic, 3 mm 0.125 inch thick, UV resistance, black with white center core, matte finish surface and square corners] [_____]. Install nameplates in prominent locations with nonferrous screws, nonferrous bolts, or permanent adhesive. Minimum size of nameplates shall be 25 by 65 mm one by 2.5 inches. Lettering shall be the normal block style with a minimum 6 mm 0.25 inch height. Accurately align all lettering on nameplates. [For plastic nameplates, engrave lettering into the white core.] [Key the nameplates to a chart and schedule for each system. Frame charts and schedule under glass, and locate where directed near each system. Furnish two copies of each chart and schedule. Each nameplate description shall identify its function.]

2.1.2 Metallic Requirements

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NOTE: Include the bracketed information if aviation fuel will be handled.

****

Internal parts and components of equipment, piping, piping components, and

valves that could be exposed to fuel during system operation shall not be constructed of zinc coated (galvanized) metal[, brass, bronze, or other copper bearing alloys]. Do not install cast iron bodied valves in piping systems that could be exposed to fuel during system operation.

2.2 ELECTRICAL WORK

****

NOTE: Coordinate the ignition temperature of the fuel(s) to be handled with the electrical design. Ignition temperatures will be as defined in NFPA 497M. Fuel ignition temperatures will dictate the maximum allowable temperature rating of the electrical equipment.

****

Provide controllers, integral disconnects, contactors, controls, and control wiring with their respective pieces of equipment. Provide electrical equipment, including motors and wiring, as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Provide switches and devices necessary for controlling and protecting electrical equipment. Controllers and contactors shall have a maximum of 120-volt control circuits and shall have auxiliary contacts for use with the controls provided.

2.2.1 Underground Wiring

Enclose underground electrical wiring in PVC coated conduit. Dielectrically isolate conduit at any steel storage tank connection.

2.2.2 Grounding and Bonding

Grounding and bonding shall be in accordance with NFPA 70, NFPA 77, NFPA 407, NFPA 780, API RP 540, API RP 2003, IEEE 142, and IEEE 1100. Provide jumpers to overcome the insulating effects of gaskets, paints, or nonmetallic components.

2.3 LEAK DETECTION SYSTEM

****

NOTE: This paragraph and subsequent sub-paragraphs address primarily leak detection systems that conform to 40 CFR 280 and 40 CFR 281. For leak detection systems applicable to large fuel distribution systems (49 CFR 195), refer to paragraph COMPUTATIONAL PIPELINE MONITORING SYSTEM.

****

Provide a system, including sensors and detectors, that is intrinsically safe for use in a Class 1, Division 1, Group D environment as defined by NFPA 70. System shall be compatible with the fuel to be handled. Sensors shall distinguish and report the difference between hydrocarbons and water. Output and transmission from sensors and detectors shall be electronic. Sensors shall have a minimum probability of detection of 95 percent and a maximum probability of false alarm of 5 percent. Sensors and detectors shall be compatible with the electronic monitoring/alarm panel. Sensors shall be reusable after an alarm condition is sensed. Submit shop drawings for the leak detection system that include the following.

a. Wiring schematics for all parts of the system showing each operating device and listing their normal ranges of operating values (including pressures, temperatures, voltages, currents, speeds, etc.).

b. Single line diagrams of the entire system, including any required alterations to the existing piping and tank(s).

c. Diagrams for posting that include distance markings such that alarm indications can be correlated to leak location in plan view. The diagrams shall include a piping and wiring display map with schematic diagrams from the leak detection system manufacturer. The diagrams shall be framed under glass or laminated plastic and be posted where indicated by the Contracting Officer.

2.3.1 Underground Storage Tanks

****

NOTE: 40 CFR 280 and 40 CFR 281 define and regulate underground storage tank (UST) systems. According to these CFRs, UST systems are defined as one or more combination of underground tanks (including underground pipes connected thereto) that are used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground.

Per the CFRs, UST systems do not cover underground tanks less than or equal to 416 L 110 gallons, uand tanks used for storing heating oil for consumptive use on the premises where stored. NOTE: Heating oil tanks must meet secondary containment and leak detection requirements of 40 CFR 280 / 281 to meet provisions of Spill Prevention Countermeasure and Control (SPCC) Program.

UFGS 33 56 10 requires all new underground storage tanks be the double-walled type. The required leak detection method for these type tanks is to continuously and automatically monitor the tank's interstitial space. The system used must be capable of detecting both fuel released through a tank's interior wall as well as the influx of ground water through a tank's exterior wall.

****

System shall continuously and automatically monitor the interstitial space of an underground tank for breaches in the integrity of the inner and/or outer tank shells. Monitor the interstitial space by using either an electronic capacitance type liquid sensor or a positive pressure system. Monitoring the interstitial space of a fiberglass reinforced plastic (FRP) tank may be performed using a liquid-filled interstitial space monitoring system. The liquid solution used in a liquid-filled interstitial shall be freeze protected (brine) and shall contain appropriate corrosion inhibitors. The monitoring system shall detect and discriminate between high and low brine level conditions.

2.3.2 Aboveground Vaulted Storage Tanks

****

All aboveground storage tanks require leak detection. This leak detection can be:

Visual - such as a dedicated indicator on a vaulted tank.

Manual - such as a manual access port used to stick the interstice.

Electronic - such as an electronic capacitance type, or similar.

NOTE: Provide electronic and/or visual interstitial monitoring if required by the Using Agency. Interstitial monitoring for aboveground tanks is not required.

As mentioned previously, this specification does not address the monitoring of tank bottoms for field-fabricated, vertical storage tanks. For these type applications refer to Standard Design AW 78-24-27 ABOVEGROUND VERTICAL STEEL TANKS W/FLOATING PANS AND FIXED ROOFS.

****

System shall continuously and automatically monitor the interstitial space of a vaulted tank for breaches in the integrity of the primary tank and the exterior vaulted shell. Provide a manual access port that can be used to stick the interstice. In addition, provide either (1) a visual method that can automatically monitor the interstitial space such as a Pop-Up gauge, or (2) an electronic method such as an electronic capacitance type liquid sensor.

2.3.3 Underground Piping associated with tanks less than or equal to 50,000 gallons

****

NOTE: This section addresses the leak detection requirements associated with underground fuel pipes (both pressurized and suction) that are regulated by 40 CFR 280 and 40 CFR 281.

For pipes associated with tanks less than or equal to 50,000 gallons in capacity that are not part of an airport hydrant system, the following is required per 40 CFR 280 Subpart D:

Pressurized and suction piping must be double walled with interstitial monitoring - include CONTAINMENT SUMPS paragraph.

Pressurized piping must be equipped with an automatic line leak detection system - include paragraph from this UNDERGROUND PIPING section.

The use of integrally installed liquid and/or vapor sensors installed within the interstitial space of double-walled piping is discouraged and is not covered in this specification.

For UST systems with field-constructed tanks and airport hydrant fuel distribution systems, 40 CFR 280 Subpart K allows for alternative leak detection strategies. The specification writer must delineate leak detection system requirements for such systems under the COMPUTATIONAL PIPELINE MONITORING SYSTEM paragraph, and design a system that meets the Subpart K regulatory required leak rate. In order to do so the specification writer must consider pipe segment volumes, in conjunction with the specified achievable leak detection rate of the equipment.

****

Leak Detection System associated with tanks less than or equal to 50,000 gallons shall continuously and automatically monitor for piping leaks using an automatic line leak detector. Detector shall detect a minimum leak rate of 0.003 L/s 3 gallons per hour at 69 kPa 10 psig line pressure within 1 hour. Detector shall detect leaks against a minimum 1.8 m 6 feet of head pressure. Detector shall detect leaks from any portion of the underground product piping.

2.3.4 Containment Sumps

****

NOTE: Provide leak detection system on sumps if required by the approved SPCC plan and/or local regulatory requirements. Sumps may used in various locations (e.g., low drain points, high vent points, aboveground to belowground piping transitions, underneath fuel dispensers, above UST manways, etc.).

Within each sump, require liquid sensors to be installed to monitor for the influx of liquids (fuel or water). Where double-wall piping is used for the fuel distribution, slope the piping appropriately from sump to sump in order to assure immediate notification of any piping failure.

****

Leak Detection System on sumps shall continuously and automatically monitor each containment sump [and dispenser sump] with an electronic capacitance type liquid sensor. Sensor shall detect liquids within a minimum of 25 mm 1 inch above a sump's bottom. The leak detection system must be capable of triggering shutdown of the submersible turbine pump or the dispenser pump.

2.3.5 Monitoring Wells

****

NOTE: For wells where groundwater could possibly come in contact with the sensor being used, specify a hydrocarbon/groundwater type sensor. For locations where groundwater is not a concern, specify a vapor type sensor.
****

System shall continuously and automatically monitor each monitoring well with a [hydrocarbon/groundwater] [vapor] sensor. [Hydrocarbon/groundwater sensor shall distinguish the difference between hydrocarbons and water while totally immersed in groundwater. Sensor shall sense when the groundwater level has reached a minimum definable setpoint.] [Vapor sensor shall detect vapors of the fuel to be handled as well as sense the presence of liquid.]

2.4 ELECTRONIC MONITORING/ALARM PANEL FOR PIPELINES ASSOCIATED WITH TANKS GREATER THAN 50,000 GALLONS

****
NOTE: Use a single panel to monitor all applicable sensors and detectors if possible. Delete any of the items of this paragraph that are not applicable.
****

Panel shall perform continuous integrity checks on the status of each sensor's connections and wiring. Panel shall include a battery backup (rechargeable) that can operate the complete leak detection system during a power failure for a minimum period of 48 hours. Submit shop drawings of the panel layout along with panel mounting and support details. Panel shall be compatible with and connected to the following:

a. Tank interstitial sensors and detectors.

b. Sump sensors and detectors.

c. Automatic line leak detectors.

d. Monitoring well sensors and detectors.

e. Digital tank gauge system as defined in Section 33 56 10 FACTORY-FABRICATED FUEL STORAGE TANKS.

2.4.1 Panel Housing

****
NOTE: Panels located outdoors require NEMA 4 enclosures. Panels located indoors only require a standard industrial enclosure. Explosion-proof enclosures are currently unavailable.
****

Panel housing shall be a [NEMA 4 rated enclosure in accordance with NEMA 250] [standard industrial enclosure]. Panel housing shall have a hinged door to swing left or right (doors shall not swing up or down).

2.4.2 Panel Alarms

****
NOTE: Delete any of the items of this paragraph

that are not applicable.
****

Panel shall account for the effects of thermal expansion or contraction of the fuel product, vapor pockets, tank or piping deformation, evaporation or condensation, as well as groundwater levels (if applicable) prior to initiating an alarm condition. Panel shall produce an audible and visual alarm in the event any of the following occur.

a. Sensing of a hydrocarbon liquid from a sensor or detector.

b. Sensing of a hydrocarbon vapor from a sensor or detector.

c. Sensing of water from a sensor or detector.

d. Failure of an automatic line leak test.

e. Loss of pressure in positively pressurized tank interstitial.

f. Sensing a high or low liquid level in liquid-filled tank interstitial.

g. Sensing minimum groundwater setpoint.

h. Failure of any integrity check.

i. Sensing tank high, high-high, or low level alarm conditions.

2.4.2.1 Audible Alarm

****
NOTE: If speakers external to the panel are necessary, indicate their location on the drawings.
****

Panel shall have [internal] [external] speakers that produce a buzzer sound of [70] [_____] decibels or greater in the event of a detected alarm condition. The audible alarm must be located in an area easily heard [in the control room] [near the dispensers] [near the pumps] in the event of an alarm condition.

2.4.2.2 Visual Alarm

Panel shall have a visual alarm that illuminates in the event of a detected alarm condition. Visual alarm shall include either individual lights for each alarm condition or shall include a single light and a liquid crystal display (LCD) panel that displaces information regarding each alarm condition. The visual alarm must be located in an area where it can be seen [in the control room] [near the dispensers] [near the pumps] when illuminated in the event of an alarm condition.

2.4.3 Acknowledge Switch

Panel shall have a manual acknowledge switch that will deactivate the audible alarm. Acknowledge switch shall not deactivate subsequent audible alarms unless depressed manually again for each occurrence. Under no circumstance shall this acknowledgement switch extinguish the visual alarms until the alarm condition has been corrected. Switches shall be an integral component located on the front panel and be either a key switch

or push button.

2.5 COMPUTATIONAL PIPELINE MONITORING SYSTEM

****

NOTE: EPA established minimum detectable leak rates for UST systems with field-constructed tanks and airport hydrant systems in 40 CFR 280 Subpart K. Specification writer must consider pipe segment volumes, in conjunction with the specified achievable leak detection rate of the equipment, in order to design a system that meets the regulatory required leak rate. Additional applicable requirements for large fuel distribution applications are in 49 CFR 195.

Pipeline systems must be designed so that they can meet the regulatory required minimum detectable leak rates in 40 CFR 280 Subpart K. This means the designer must consider pipe segment volumes in coordination with available leak detection equipment, and must install proper isolation valves, high point vents / low point drains, and pressure relief valves. The install of a permanent leak detection system versus the use of portable vendor equipment to conduct leak detection tests is at the discretion of the Using Agency. The designer should consider the life cycle cost of a permanent installed leak detection system versus the cost of testing systems using portable vendor provided equipment, in order to determine if the installation of a permanent system makes sense. The use of portable vendor provided equipment is often cheaper.

CPM system can be permanently mounted or can be configured to be portable. For permanently mounted systems, indicated the location of the system on the drawings. For portable systems, indicate the piping connection point(s) on the drawings.

****

CPM system shall conform to API RP 1130. System shall detect leaks as small as 0.004 percent of the pipeline volume within 1 hour. System shall account for thermal effects on the piping and fuel. System shall be compatible with the fuel to be handled. System shall be [permanently mounted where indicated][provided as a complete, portable system].

2.6 FINISHES

2.6.1 Factory Coating

****

NOTE: For all Navy projects (regardless of location), the 500 hour salt spray test is required and must be specified.

For Army projects, a salt spray test is optional. The 125 hour test is suggested for mild or noncorrosive environments. The 500 hour test is

suggested for extremely corrosive environments.
****

Unless otherwise specified, provide equipment and components fabricated from ferrous metal with the manufacturer's standard factory finish.[Each factory finish shall be capable of withstanding [125][500] hours exposure to the salt spray test specified in ASTM B117. For test acceptance, the test specimen shall show no signs of blistering, wrinkling, cracking, or loss of adhesion and no sign of rust creepage beyond 3 mm 1/8 inch on either side of the scratch mark immediately after completion of the test.] For equipment and component surfaces subject to temperatures above 50 degrees C 120 degrees F, the factory coating shall be appropriately designed for the temperature service.

2.6.2 Field Painting

Painting required for surfaces not otherwise specified shall be field painted as specified in [Section 09 97 13.27 HIGH PERFORMANCE COATING FOR STEEL STRUCTURES][Section 09 90 00 PAINTING, GENERAL]. Do not paint stainless steel and aluminum surfaces. Do not coat equipment or components provided with a complete factory coating. Prior to any field painting, clean surfaces to remove dust, dirt, rust, oil, and grease.

PART 3 EXECUTION

3.1 INSTALLATION

****
NOTE: During design, layout equipment and components to allow adequate access for routine maintenance. Do not rely solely on the Contractor to make these judgments. Show access doors where applicable for maintenance.
****

Install parts requiring periodic inspection, operation, maintenance, and repair in locations that allow ready access. Install leak detection system and components in accordance with manufacturer's installation instructions.

3.1.1 Storage Tank Sensors/Detectors

Install interstitial tank sensors and detectors at the tank's low end. Sensor installation shall be in accordance with the tank manufacturer's recommendations and shall not compromise the tank's secondary containment in any manner. Sensors shall be easily removed from a tank. Connection of metal conduit to steel tanks shall be with dielectric fittings.

3.1.2 Automatic Line Leak Detector

Install detector on discharge side of each submersible pump in accordance with the pump and detector manufacturer's recommendations.

3.1.3 Sensors in Sumps

Install sensors in the low point of a sump in accordance with sump and sensor manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

3.2.1 Leak Detection System Test

Activate and test the entire leak detection system in accordance with manufacturer's testing procedures. Use the electronic monitoring/alarm panel to record and present the results.

3.2.2 Storage Tank Tightness Tests

For tanks less than or equal to 50,000 gallons, storage tank tightness tests must be performed in accordance with Section 33 56 10 FACTORY-FABRICATED FUEL STORAGE TANKS. Use the electronic monitoring/alarm panel to record and present the results.

For tanks greater than 50,000 gallons, storage tank tightness test must be performed with a system that is certified to be able to detect leaks at no more than 0.5 gallons per hour.

3.2.3 Tank Fill Tests

High liquid level alarm tests on storage tanks shall be performed in accordance with Section 33 56 10 FACTORY-FABRICATED FUEL STORAGE TANKS. Use the electronic monitoring/alarm panel to record and present the results.

3.3 DEMONSTRATIONS

Conduct a training session for designated Government personnel in the operation and maintenance procedures related to the equipment/systems specified herein. Include pertinent safety operational procedures in the session as well as physical demonstrations of the routine maintenance operations. Furnish instructors who are familiar with the installation/equipment/systems, both operational and practical theories, and associated routine maintenance procedures. The training session shall consist of a total of [_____] hours of normal working time and shall start after the system is functionally completed, but prior to final system acceptance. Submit a letter, at least 14 working days prior to the proposed training date, scheduling a proposed date for conducting the onsite training.

-- End of Section --