TLS-300i
UST Monitoring and Leak Detection System

Part 1 – General System Requirements

1.1 Description

A. These Specifications are intended to provide information by which prospective bidders may understand the requirements relative to furnishing and installing a monitoring system for underground liquid storage tanks and associated below-grade product piping.

B. These specifications shall describe specifically a continuous underground monitoring and leak detection system that shall perform in accordance with Subpart D of 40 CFR 280 and, as a standard of performance and quality, shall meet the performance specifications and functions of the Veeder-Root Company TLS-300i UST Monitoring system.

C. The underground storage tank monitoring system shall meet all applicable standards and regulatory agency requirements including, but not limited to, the standards and requirements of the following:

1. American National Standards Institute (ANSI)
2. American Petroleum Institute (API)
3. American Society for Testing and Materials (ASTM)
4. Environmental Protection Agency (EPA)
5. National Bureau of Standards (NBS)
6. National Electrical Code (NEC)
7. National Fire Protection Agency (NFPA)
8. Underwriters Laboratories Inc. (UL)
9. Canadian Standards Association (CSA)
10. Canadian Underwriters Laboratories Inc. (cUL)
11. Underground Storage Tanks: Subpart D, 40 CFR Part 280
12. Federal Communications Commission (FCC)
13. British Approval Service for Electrical Equipment in Flammable Atmospheres (BASEEFA)
14. Factory Mutual (FM)

Part 2 – Operational Specifications

2.1 In-Tank Leak Detection

A. The system shall utilize in-tank probes based on the magnetostrictive principle for liquid level measurement and in-tank leak detection.

B. The tank gauge shall be capable of performing a static tank tightness test to an accuracy of 0.1 GPH with at least a 98% probability of detection [P(D)] and no more than 1% probability of false alarm [P(FA)].

C. The system shall have the ability to be programmed to run a static 0.2 GPH quick leak test. This quick static leak test will take one hour, and commence 30 minutes after the last dispensing cycle, or five hours from the last delivery, whichever is greater.

2.2 Interstitial Leak Detection for Double-Wall Tanks

2.2.1 Wet Monitoring

A. The system shall be able of performing automatic, continuous leak sensing by monitoring the liquid level in the reservoir of a brine-filled interstitial space (annulus) of a double-wall tank to detect a breach in the inner or outer shell.

B. The system shall differentiate between a high liquid level and a low liquid level in the brine reservoir of a double-wall tank and provide a high-liquid alarm or a low-liquid alarm.

2.2.2 Dry Monitoring

A. The system shall be able of performing automatic, continuous leak sensing in the dry interstitial space (annulus) of a double-wall tank, to detect a breach in the inner or outer shell.

B. The system shall differentiate between hydrocarbons and water, and provide an indication of a fuel alarm or a liquid alarm.

C. The system shall have the ability to sense the presence of hydrocarbons and/or liquid, and provide an alarm for worst-case condition (fuel).

D. The form factor of the sensor must provide for easy field installation/removal.

E. The system shall have the ability to continuously monitor the integrity of the sensor for an open condition, alarm condition, or normal operating condition.

2.3 Containment Sump Monitoring

A. The system shall be able to perform automatic, continuous leak sensing in the containment piping sump.

B. The system shall have the ability to detect the presence of fluid (hydrocarbons and/or water) in the piping containment area and provide appropriate alarm conditions.

C. The system shall have the ability to differentiate between hydrocarbons and water, and provide an alarm for the respective condition. The system shall also have the ability to indicate when the sensing device has failed and is no longer providing environmental compliance.

D. The system shall have the ability to continuously monitor the integrity of the sensor for an open condition, alarm condition, or normal operating condition.

2.4 Environmental Compliance Reports

A. The system shall have the ability to provide a record of the last three occurrences of each type of alarm or warning condition detected by the system.

B. The system shall provide the following types of reports related to environmental compliance matters:

1. System status messages
2. In-tank warning and alarm messages
3. In-tank tightness evaluation report
4. Liquid sensor warning and alarm messages
5. Normally-closed sensor warning and alarm conditions
6. Hydrostatic sensor warning and alarm conditions (high or low liquid level conditions)
7. External input messages

2.5 Product Inventory Control (Tank Gauging)

A. The tank management system shall collect product height and temperature data from up to four magnetostrictive level sensors and compute gross and temperature-compensated net gallons. The operator may choose from inventory or delivery information to generate a complete set of printed inventory or delivery reports.

B. The system shall automatically generate an inventory increase report when a delivery of product to a tank has taken place. The report shall include the time and date of the delivery, the starting volume in the tank, the ending volume in the tank, the starting temperature of the fuel, the ending temperature of the fuel, and the inventory increase amount.

C. The system shall have the ability to store up to ten of the most recent inventory increases in memory for business management purposes.

D. The system shall provide the ability to monitor aboveground storage tanks, as well as underground storage tanks, for inventory management.

2.6 Inventory Management Reports

A. The system shall monitor inventory in U.S., Metric or Imperial units for up to four tanks and produce a combination of automatic and manual reports for each tank, which include the following information:

1. Fuel volume
2. Fuel height
3. Water height
4. Fuel temperature
5. Ullage
6. Temperature-compensated fuel volume
7. Last inventory increase amount
8. Last in-tank leak test results
9. Time and date
10. Tank identification
11. Fuel type identification
12. 90% ullage

B. A printout of the inventory status report shall be generated any time the operator presses the print button while the system is in the normal operating mode, or generated automatically four times a day with the information stored in memory.

C. The system shall provide an automatic delivery report, programmed to print from 1 to 99 minutes after a bulk delivery to a tank is complete. The information shall include station header, product label, date, starting and ending time, starting and ending volumes, temperature of the fuel, as well as the net volume increase. The information shall be available in U. S., Metric or Imperial units.

D. The system shall be able to generate reports in a display/printer format as well as a computer format upon demand.

2.7 Communications

A. The tank monitoring system shall provide the ability to communicate with locally attached electronic devices through an RS-232 port, or remote locations via either an RS-232 port or internal modem. The system shall provide data in a display or packed computer data format.

B. The communications protocol shall be Veeder-Root standard serial communications protocol or compatible.

C. The tank monitoring system shall provide all reports available on the integral printer through the communications port. These shall include all reports associated with inventory management, environmental compliance and diagnostics/troubleshooting.

D. The system shall provide for setup and configuration through the communications port using the Veeder-Root standard serial communications protocol or compatible.

2.7.1 Serial Communications

A. The system shall provide an RS-232 communications interface for data transmission to a computer, point of sale terminal, printing device, or a modem for remote communications.

B. The system shall provide an auxiliary RS-232 communications interface for linking to a second tank monitoring system.

2.7.2 Wide Area Network Software (Remote Monitoring)

A. The manufacturer shall provide a communications/database software package to poll remote tank monitoring sites from a central location.

B. The communication/database software shall provide the ability to communicate directly with the tank monitoring system, via a 25-pin RS-232 serial interface or remotely via a dial-up network over the public telephone network.

C. The software package shall provide the ability to remotely configure a system and download that information to the tank monitoring system. The software shall also provide the ability to call the tank monitoring system, upload information into the database and allow the user to make changes and transmit those changes to the system.

D. The software shall provide a communication mode, in which it can automatically and continuously poll locations that have been designated for data retrieval, and store data in a standard database format.

E. The stored data shall be easily transferable to other software packages, such as spreadsheets, database packages, etc., for data manipulation.

F. The software shall provide an immediate on-line mode to retrieve specific information from a tank monitoring system and to download setup and configuration information.

G. The software shall be able to generate inventory and environmental compliance management reports on demand for all of the data stored or specific ranges of data.

H. The software system shall provide the user the ability to retrieve all diagnostic data from the tank monitoring system. It shall also provide the ability to backup and recover data that has been stored.

I. The software package shall permit the user to connect on-line with a location and enter serial communication protocol commands for information retrieval.

2.7.3 Reports

A. The system shall be able to generate reports in a display/printer format as well as a computer format through the communication interface using the Veeder-Root serial communications protocol. All reports, including inventory, delivery, fuel management, environmental compliance (leak detect), alarm history and status may be retrieved through remote or local communications.

2.8 Input/Output Devices

2.8.1 Output Relay

A. The system shall provide the ability to enable external audible/visual alarms or control external devices through a relay contact closure.

B. The system shall provide 2 Form C contact relays per interface module.

C. The system shall provide the ability to program the relay in either a Normally Open or Normally Closed orientation.

D. The system shall provide the ability to assign in-tank, line leak, sensor, external input, or system alarm conditions to a selected relay.

E. The system shall provide the ability to designate a 20-character label to a device connected to the output relay through system programming.

2.8.2 Input Interface

A. The system shall provide the ability to accept an input from an external device and enable a relay to control an external device.

B. The system shall have the ability to define the type of input connected to the system, standard or generator.

C. The system shall have the ability to name, through system programming, each external device connected to an input position.

D. The system shall provide the ability to identify the input switch type from a stand-by generator (Normally Open or Normally Closed) to properly recognize a generator off condition.

E. The system shall provide the ability to identify which tanks supply fuel to the generator to properly conduct continuous leak tests on tanks when the generator is off.

2.9 Alarms

A. The tank monitoring system shall provide an audible and visual indication of all system, in-tank, product line leak and external sensor alarm conditions.

B. The system alarm conditions shall include:
   1. Maximum product level
   2. High level limit
   3. Overfill alarm
   4. High water alarm
   5. Second high water alarm
   6. Delivery needed alarm
   7. Low limit
   8. Theft
   9. Periodic warning and alarm
   10. Annual warning and alarm

C. The tank monitoring system shall provide an audible and visual alarm indication for in-tank leak failures (3.0 GPH, 0.1 GPH and 0.2 GPH) and external sensor leak failures (fuel, water, sensor out).

D. In conjunction with providing an audible and visual alarm, the system shall have the ability to print out all alarm conditions to the integral thermal printer.

E. The system shall have the ability to send all alarm conditions to the RS-232 serial communications port for data transmission to a central computer. The system shall have the ability to transmit the alarm condition immediately, or program a delay time before sending. The system shall also have the ability to enter a repeat function in the programming to repeat sending the alarm condition.

F. The system shall provide the operator with the ability to disable the audible portion of an alarm but the visual alarm shall not be disabled until the alarm condition has been corrected.

G. The system shall be equipped with an external audible and visual alarm with acknowledgement switch. The external alarm box and acknowledgment switch shall be manufactured in a watertight gasketed enclosure for installation in an outdoor environment. The external alarm box and acknowledgement switch shall interface to the tank monitoring system via an internal relay.

H. The system shall have the ability to store up to three alarm occurrences in memory. The operator shall have the ability to print the alarm history and alarm status on the integral printer, as well as retrieve alarm history and alarm status through the communications interface (RS-232 or 2400/1200/300 baud auto-dial fax/modem).

2.10 Setup (Startup/Installation)

A. The system shall contain parameter-driven software to adapt the tank monitor to site specifications. The parameters must be enterable in assigned fields at the time of system startup. In addition, the parameters must be field updatable so that changes in tank diameter/dimensions as well as site specifications can be added.

B. The system shall provide the use of a security code to prohibit unauthorized entry to the systems set-up parameters. The system security code shall be a six-digit number entered through the front-panel keyboard or through the external communications interface. The security code shall have the capability of containing alpha or numeric characters.

C. A four-line, 24-character customer location header to identify the site must be user-programmable. The header must appear automatically on inventory status reports, leak detection reports and automatic delivery reports each time they are printed.

D. Set-up parameters shall include the following:

1. System setup data
2. Communications setup data
3. In-tank setup data
4. In-tank leak test setup data
5. Liquid sensor setup data
6. External input setup data
7. Output relay setup data

2.11 Diagnostics/Troubleshooting

A. All diagnostic information shall be generated by the system itself. The system shall not allow the user to change or enter diagnostic information in any way. The following diagnostic information shall be included in the system:

1. Probe Diagnostics
    a. Probe type
    b. Serial number
    c. Probe length
    d. Factory calibration values
2. System diagnostics
    a. Software revision level
    b. Software part number
    c. Software creation date
3. In-tank diagnostics
4. In-tank leak results
5. Liquid sensor diagnostics
6. Alarm history report

2.12 Reports

A. The system shall provide the ability to print diagnostic information, listed in Part 2, Section 2.15, paragraph A, subsection 1 through 14, on the system's integral printer for hard-copy documentation and historical record keeping.

Part 3 – Product Specifications/Capacities

3.1 Console

A. The console shall be wall mounted using external mounting tabs.

B. The console shall be equipped with a two-line 24-character liquid crystal display for on-site viewing of all inventory, leak detect and alarm information.

C. The console shall be equipped with a 24-button front-panel keyboard with control and alphanumeric functions for programming, operating and reporting functions.

D. The console shall be equipped with three front-panel indicators to provide a visual indication of power on, warning and alarm conditions.

E. The console shall be equipped with an integral, 24-character, thermal report printer with built-in take-up spool for hard-copy documentation of inventory, leak detect, alarm information, and facsimile transmission confirmation.

F. The console shall be equipped with a back-up battery to maintain all programming information as well as inventory, leak detect and alarm information in the event of a power outage.

G. The console shall be separated into two compartments for: 1) intrinsically safe wiring and devices; 2) high-power wiring and devices.

H. The console shall have an internal quick-disconnect connector for 120 Vac wiring to the console for ease of installation, service and troubleshooting.

I. The console shall be equipped with the ability to communicate directly with an external POS terminal, printing device or PC. The system shall also have the ability to communicate with a remote device via the telephone lines.

J. The console shall be capable of selectively communicating in multiple languages, including English, French, German, Polish, Portuguese, Spanish, and Swedish.

K. The console shall be equipped with internal audible and visual warning and alarm indicators.

L. The console shall be intrinsically safe, with Underwriters Laboratories (UL), Canadian Standards Association (CSA), and Canadian Underwriters Laboratories (cUL) approvals.

M. The console shall comply with Federal Communications Commission (FCC) testing, FCC Part 68, Subpart 15.

N. The console shall be mounted and wired according to the manufacturer-supplied installation manuals, with all underground intrinsically safe field wiring enclosed in dedicated conduit and separate from all other wiring. The system's high-voltage wiring may share existing conduit with other high-voltage devices in accordance with the applicable guidelines published in the National Electrical Code (NEC).

O. The console shall continuously monitor all probes and sensors, reporting not only normal operating conditions, but also system malfunctions or failures.

3.2 Probes

A. There shall be no more than two conductors between each probe and the control console.

B. The probe shall be capable of performing a leak detect test to 0.1 GPH or higher.

C. Third-Party Certification is required in accordance with the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems" (0.2 GPH monthly monitoring).

D. Third-Party Certification is required in accordance with the U.S. EPA's "Volumetric Tank Tightness Testing Method" (0.1 GPH annual tank tightness test).

E. The probe shall be compatible with aboveground tank installations as well as underground tank installations.

F. A cap and ring kit, available from the manufacturer, shall be supplied with each probe for easy installation and removal.

G. The probe shall use a digital communications protocol format for maximum RF/EMF immunity.

3.3 Sensors

A. The system shall provide the ability to monitor up to 8 interstitial areas and/or containment areas utilizing a standard float style sensor.

3.3.1 Piping Sump Sensor

A. The piping sump sensor shall be of PVC Schedule 40 construction utilizing a float and reed switch technology to sense the presence of liquid. The sensor shall also be supplied with a PVC mounting sleeve for installation of the sensor in a containment area.

B. The piping sump sensor shall be 18.5" long to address monitoring in piping containment sumps as well as dispenser pan/sump areas.

C. The sump sensor shall be designed with a five-foot leader cable to connect the sensor to field wiring in the sensor junction box. The sensor shall be supplied with watertight cord grip assemblies to install in sensor junction box.

1. Power Requirements: Intrinsically safe power supplied by tank monitor
2. Sensor Type: Hermetically sealed magnetic reed switch
3. Contact Rating: 15 watts
4. Switch Travel: 7/8" to contact
5. Operating temperature: 0^0C to +60^0C

3.3.2 Interstitial Sensor for Double-Wall Steel Tank

A. The interstitial sensor for a double-wall steel tank shall be 2.5" high and 1.5" in diameter to fit into a riser pipe for a double-wall steel tank of 1.5" I.D. or greater.

B. The steel interstitial sensor shall be equipped with a 25-foot leader cable to connect the sensor to field wiring in the sensor junction box.

C. The sensor shall utilize a float and reed switch technology to sense and alarm for the presence of fluid.

1. Operating temperature: Hydrocarbons: -20^0c to +70^0C
   Freezing Liquids: 0^0C to 70^0C
2. Cable length: 25'
3. Dimensions: 2.5" high, 1.50" dia.
4. Can be used in the annulus of steel tanks with a sensor riser pipe of 1.5" I.D. or greater
5. Two-wire connection to the monitor

3.3.3 Interstitial Sensor for Double-Wall Fiberglass Tank

A. The interstitial sensor for a double-wall fiberglass tank shall be 2.13" long, 1.27" wide and 0.58" high. The sensor shall fit in the interstitial area of a double-wall fiberglass tank. The sensor shall be designed to fit in any size double-wall fiberglass tank from 4' in diameter to 12' in diameter.

B. The sensor shall utilize a float and reed switch technology to sense and alarm for the presence of liquid.

C. The sensor shall be designed with a pull cord hole where a pull cord may be attached to install the sensor in the interstitial area of the tank.

D. The sensor shall be designed with a protective braid covering the switch assembly and cable to provide mechanical protection.

1. Operating temperature: -20^0c TO $+70^0$C
   Hydrocarbons: 0^0C to 70^0C
2. Can be used in the annulus of fiberglass tanks with a sensor riser pipe of 4”
3. Two-wire connection to the monitor

3.3.4 Hydrostatic Sensor

A. The hydrostatic sensor shall be supplied by the manufacturer in a single-float or a dual-float configuration.

B. The dual-float hydrostatic sensor shall be 19” long with a clear lexan tubular housing for visible confirmation of sensor operation. The sensor shall be 2.5” in diameter to install in the riser pipe assembly of a double-wall tank brine reservoir.

C. The single-float hydrostatic sensor shall be 6.0” long with a clear lexan tubular housing for visible confirmation of sensor operation. The sensor shall be 2.5” in diameter to install in the riser pipe assembly of a double-wall tank brine reservoir.

D. The single- and dual-float hydrostatic sensor shall be supplied with a 12-foot leader cable to connect the sensor to field wiring in the sensor junction box.

E. The single- and dual-float hydrostatic sensor shall be supplied with a lockable, watertight riser cap to prevent accidental spills into the tank reservoir. The cap shall be equipped with a vent tube to vent air out of the reservoir area and prevent liquids from entering into the reservoir.

F. The single-float hydrostatic sensor shall indicate a low-liquid level only, in the tank reservoir.

G. The single-float hydrostatic sensor shall utilize a float and reed switch assembly for sensing the presence and change in liquid level. The switch shall have a Normally Closed dry contact.

H. The dual-float hydrostatic sensor shall indicate a high liquid level and a low liquid level in the tank reservoir.

I. The dual-float hydrostatic sensor shall utilize a dual float and reed switch assembly for sensing the presence and change in liquid level. The contact shall be Normally Closed dry contact.

1. Operating temperature: 25^0C to $+40^0$C
2. Rests in brine solution of up to 30% calcium chloride
3. Clear plastic housing for visual inspection
4. Cable length: 12’
5. Available in both a single-float and a dual-float configuration

3.4 Communications

3.4.1 RS-232 Serial Communications Interface

A. The system shall have the ability to communicate directly with a computer, teletype or printer.

B. The system shall provide direct interface via a 25-pin D-connector using standard RS-232 serial communications hand-shaking signals.

C. The system shall have the capacity to install up to three RS-232 serial communications modules.

3.4.2 Auxiliary RS-232 Serial Communications Interface

A. The system shall have the capacity for an auxiliary 25-pin D-connector to interface with a second tank monitor.

B. The system shall have the capacity to install up to two Auxiliary RS-232 serial communications modules.

Part 4 – Manufacturer’s Support/Field Service

4.1 Technical Support

A. The manufacturer shall provide technical phone support available to customers from 8:00 a.m. to 7:00 p.m. EST.

B. The manufacturer shall provide technical phone support available to authorized distributors and service contractors for on-site troubleshooting of UST system problems. Phone support shall be available from 8:00 a.m. to 7:00 p.m. EST.

4.2 Field Service

A. The manufacturer shall maintain a nationwide field service staff to provide on-site customer support and training, as well as overseeing installation of tank monitoring system by installation contractor.

B. The distributor/contractor field service representative shall be available for on-site training of company maintenance personnel on installation, programming and troubleshooting of tank monitoring system.

C. The manufacturer shall have a territorial field service staff to support the distributor/contractor field service network.

4.3 Certification Training

A. The manufacturer shall require and provide mandatory certification training for all of its authorized distributors and service contractors/installers.

B. The certification program shall consist of three certification levels covering installation, setup/operation, and service/troubleshooting of the manufacturer's UST monitoring systems.

C. The manufacturer shall provide certification information regarding contractors and installers to regulatory agencies that require certification documentation.

D. The manufacturer shall offer re-certification training to keep contractors/installers current with updated information.

E. The manufacturer shall conduct regional training seminars throughout North America.

F. The manufacturer shall provide a home study certification program for installing contractors.

4.4 Warranty Registration and Checkout Form (WRACO)

A. The manufacturer shall require that all UST monitoring systems be started up by an authorized distributor.

B. The startup shall consist of installation checkout, operation checkout and customer training on use of the equipment.

C. The manufacturer shall supply a Warranty Registration and Checkout Form to properly document the site information.

1. Installation location
2. Installer
3. Equipment identification
4. Tank information
5. Leak detector information
6. Start-up distributor information
7. Customer approval

D. The manufacturer shall compensate the authorized distributor for the start-up procedure when a properly completed Warranty Registration and Checkout form is submitted to the manufacturer.

E. Upon receipt of the Warranty Registration and Checkout form, the manufacturer will initiate the system warranty and input the data into a site database.

4.5 Replacement and Service Parts

A. The manufacturer shall offer Authorized Distributors pre-selected parts kits to service UST monitoring systems.

B. The manufacturer shall offer a pre-selected parts kits designed for service truck and shop.

C. The manufacturer shall offer a quick ship service for parts that shall ensure that a parts shipment is sent within 24 hours of request/order.

4.6 Delivery

A. The manufacturer shall have the ability to ship tank monitoring systems in three (3) working days from the time that an order is entered into the computerized system to the ship date.

4.7 ISO-9000

A. The manufacturer shall maintain an ISO-9001 rating ensuring quality management of design, manufacturing, training, and technical documentation.

Part 5 – Documentation

5.1 Manuals

A. The manufacturer shall supply product documentation that addresses the following categories as additional support:

a. Site preparation and installation instructions
b. System setup instructions
c. System operating instructions
d. Individual sensor installation instructions
e. Probe installation instructions
f. Individual module installation instructions
g. Product data sheets
h. Troubleshooting and repair manuals
i. Wiring diagrams which include the following:

1. Identification of all devices and equipment terminals, and all external connection terminal blocks.
2. All external wiring connections with approved wire colors and circuit designations.

l. Serial communications manuals

5.2 Third-Party Certification

A. The manufacturer shall supply third-party documentation for all products, certifying that performance meets or exceeds EPA requirements.

5.3 Authorized Service Personnel Listing

A. The manufacturer shall supply a formal list of all Authorized Distributors and Service Contractors for sales, installation, training and support.

Part 6 - System Warranty

6.1 System Warranty

A. The tank monitoring system shall be warranted for a period of one year from date of installation or 15 months from date of invoice.

B. The warranty is to include parts and labor, with all warranty work performed on site by an authorized manufacturer's representative.

6.2 Extended Warranty

A. The manufacturer shall offer a one-year extension on the standard warranty for an additional cost to the end user.

B. The end user may have until the expiration date of the original system warranty to purchase the option of the extended warranty.