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UST(Underground Storage Tanks) Leak Detection System

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UST(UNDERGROUND STORAGE TANKS) LEAK DETECTION SYSTEM

THE NEED

Low range differential pressure (LRDP) leak detection system used to detect leaks in underground storage tanks (UST) was developed by Vista Research, Inc. This leak detection and monitoring system is used for early detection of small leaks in bulk fuel UST's. The technology works independently of the tank size and rate of leakage as low range differential pressure (LRDP) system is a mass-based. If a tank is leaking, the LRDP quantitatively measures the leak rate in gallons per hour underground storage tanks (UST). It works by measuring the differential pressure changes in the tank over time.

THE TECHNOLOGY

The LRDP system consists of an in-tank sensor unit to make the measurements, a local controller to implement and analyze the data from a test, and a host computer to initiate, report, and archive the results of a test. The LRDP is also being integrated in the DoD Fuels Automated System (FAS) so that it is compatible with DoD bulk storage facilities. The key component of the LRDP system is a vertical reference tube that spans the full usable height of the tank. The fuel in the tank is allowed to enter or leave the reference tube through a valve located at the bottom of the tube. When the tank is to be tested, the valve is closed, isolating the fuel in the tube from the fuel in the rest of the tank. With the exception of a level change due to a leak, the level of the fuel in the reference tube mimics the level of the fuel in the tank. The differential pressure sensor, which is placed in a sealed container at the bottom of the tube (and tank), is used to detect very small level (pressure) changes between the fuel in the tube and the fuel in the tank (see Figure1). Thus, when the valve is closed, the differential pressure sensor directly senses and quantifies the fuel level changes due to a leak, if a leak is present. This mass-based system achieves a very high level of performance against small leaks because of (1) its high precision and (2) its inherent method of compensating for the thermal expansion and contraction of the fuel in the tank. The system has a precision of 0.0002 in. for a single level measurement and a sensitivity to measure volume changes as small as 0.03 gal/h in a 100-ft-diameter tank. This high degree of precision is obtained because the differential pressure sensor does not have to operate over the

entire height of the tank (e.g., 20 ft). Thus, the LRDP not only delivers high performance, but it is also rugged and field-worthy.

FIGURE 1 SCHEMATIC AND INSTALLATION PHOTOGRAPHS OF THE LRDP SYSTEM

THE BENEFITS

- Fully automatic
- Used for on-line monitoring and tightness testing
- Can be permanently installed
- Much lower probability of false
- Better detection sensitivity than other methods
- Computer controlled system that is easily installed and operated
- Can also be used as mobile systems, trucked in for periodic tests
- Once integrated, can be used to test all of the tanks in a fuel farm or bulk storage terminal

STATUS

The LRDP system was developed by the Naval Facilities Engineering Service Center (NFESC) and its industrial partner, Vista Research, Inc., and is being readied for commercial use under the DOD program called the Environmental Security Technology Certification Program (ESTCP). The ESTCP program is designed to demonstrate and validate new, innovative technologies that can be used to address environmental and regulatory problems at all DOD military facilities.

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REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

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