1/1/1997

ATTACHMENMT A

IT CORPORATION'S APPROACH TO UNDERGROUND STORAGE TANK TESTING AND MANAGEMENT

2083 Report

The activities described below constitute a well-conceived, comprehensive underground storage tank management program that is phased to permit tasks to be performed in a stepwise, cost-effective manner. This IT-proposed approach is also responsive to the fact that limited financial resources for tank management usually restrict the total level of concurrent activity. Performance of the tasks sequentially (performance of portions of tasks concurrently is also effective) permits directing available resources towards the most pressing potential problems. The activities typically performed by IT to support an underground storage tank management program are the following:

- Development of a tank inventory database
- Prioritization of tanks for testing
- Selection of appropriate testing methods for each tank type
- Implementation of testing program
- Selection of alternative remedial response options for leaking tanks
- Performance of selected remediation methods.

The first five activities are included in the revised Statement of Work and are discussed below.

TANK DATABASE

IT can assist the Laboratory in developing a database suitable for a personal computer for its underground storage tanks. The database would comprise fields containing information on the tank/piping systems, substances stored in tanks, tank testing/monitoring information, and site specific hydrogeologic information. Database output could be coded to meet any reporting formats the Laboratory may require. In addition, the database could be queried on several fields to provide report-specific information.

TANK PRIORITIZATION

IT will assist the Laboratory in prioritizing its USTs for tank testing. Tank notification forms, submitted to the State of New Mexico to comply with the 1984 amendments to RCRA, provide base-line data on each tank. Using notification form data such as age, capacity, substance stored, and tank/piping material, IT has prepared a draft prioritization of the Laboratory's nonradioactive materials tanks. These tanks are grouped as Priority I, II, or III and presented in Tables 1 through 3, respectively. Final tank prioritizations should consider not only notification form data, but also tank inventory records, site inspections, and engineering as-builts (where available).

SELECTION AND DESCRIPTION OF TESTING METHODS

There are four classes of methods utilized by IT Corporation to detect leaks in underground storage tanks:[1]

- Volumetric (quantitative) leak testing, for leak indication and leak rate measurement
- Nonvolumetric (qualitative) leak testing, for leak indication
- Inventory control
- Leak effects monitoring (e.g., monitoring wells).

In conjunction with inventory control, IT proposes periodic volumetric testing methods for the Laboratory's nonradioactive materials tanks and leak effects monitoring for the radioactive materials tanks. The remainder of the proposal addresses nonradioactive materials tanks only.

There are ten volumetric testing methods currently commercially available which meet the testing criteria specified in the original task order. IT has no resident tank-testing technology and therefore selects various testing methods depending on specific client requirements. Based on the range of tank

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[1] From S. Niaki and J. Broscious (IT Corporation), 1986, Underground Tank Leak Detection Methods: A State-of-the-Art Review, EPA/600/2-86/001, prepared for the U.S. Environmental Protection Agency, Cincinnati, Ohio, 121 p.

capacities, ages and substances stored at the Laboratory, there are three volumetric tests which should be considered--Heath Petro Tite Tank and Line Testing, Horner Ezy-Chek Leak Detector, and Tank Auditor. Each of these methods is described below.

Heath Petro Tite Tank and Line Testing - Manufacturer's Specifications[1]
This test is essentially a fluid-static (standpipe) test. The tank and standpipe (installed in the tank opening) are completely filled. A loss can be observed and measured to 0.01 gallons. A one-gallon graduate is used to measure the exact amount of gasoline (or other liquid) added to or drained from the standpipe to maintain a constant level. The constant level results in a uniform tank pressure.

A circulating pump draws tank fluids from at least six inches below the tank top through a suction tube; if necessary, the tube is lengthened by a hose extension. The liquid is discharged under approximately 25 pounds per square inch pressure through a discharge hose into sections of tubing which have been coupled together to form an outlet jet at the bottom of the tank. This jet is adjusted to be above any water or other contaminants in the tank bottom and is adjusted to be below any drop tube. The jet is directed 45 degrees upward from the center line of the long tank axis. These suction and jet systems create a vortex-like swirling motion in the tank and attempt to produce a uniform temperature throughout the tank.

The uniform temperature obtained by circulation is electrically measured by a thermistor in the bottom of the suction tube. The thermistor is located approximately six inches below the top of the tank. Temperature changes are constantly measured. Volume changes are calculated from the temperature changes. The calculated volumes are subtracted from the volume change measured by the graduate. Measured volume changes are due to tank-end deflection or leakage. Any difference between the calculated and measured volumes in the 15 to 30 minutes after tank-end deflections cease (approximately two hours) is considered to be leakage if it is equal to or more than 0.05 gallons per hour.

The minimum time to perform the test is 2.5 hours. The entire test can usually be completed in one working day.

Horner Ezy-Chek Leak Detector - Manufacturer's Specifications(1)

In this method, the level change is measured by monitoring the pressure change through a bubbling system. The storage tank is typically overfilled into the fill pipe. However, the testing can be taken at any level in the standpipe: above the highest point in the tank, in the fill pipe, or in the tank.

The system consists of a standpipe, an averaging temperature probe, an air supply tank and chart recorder. The liquid level change is monitored with a sensitive pressure gage. The pressure recorder has a full range of approximately one ounce of pressure. The air supply forces a small flow of low pressure air into the top 1/2-inch of liquid in the tank, through a 1/4-inch tube clamped to the fill pipe. The recorder measures the pressure necessary to cause the bubbling action. If the recorder charts a straight line, the liquid level is not changing. The temperature change is monitored with an averaging temperature probe to compensate for the volume change due to the temperature variation during the testing period.

Complete tank testing includes at least four 15-minute testing periods and could usually be performed with 0.01 gallons per hour leak detection accuracy within four hours after the tank is topped off.

Tank Auditor - Manufacturer's Specifications(1)

This is an electromechanical system for detecting leaks in underground piping and tank systems. The method operates on the Archimedes Principle of Buoyancy.

The major component of this system consists of a product height deviation transducer, a temperature probe height deviation transducer, a temperature probe, and a recorder. A force deflection transducer supports a negatively buoyant member within the liquid-filled fill pipe. Buoyancy forces are changed due to product level change and create a linear deflection of the force transducer that is sensed by a noncontact electronic probe with a voltage output proportionate to the deflection of the force transducer. The temperature probe, consisting of a thin-walled hollow cylinder closed at the bottom and opened at the top, is placed into the fill pipe. The length of

this probe is equal to or greater than the tank diameter. The probe is filled with product. A force transducer, similar to the product height deviation transducer, is used to sense height deviations within the probe. A recorder receives the output voltage from the transducers and the results are printed on a strip chart. At the end of a 15-minute test, the recording is stopped. The total volume change due to a leak is calculated. At the beginning and end of each test, both transducers are calibrated by addition and/or removal of known volumes of the product from the temperature probe and the tank.

If the tank is filled prior to a test, the test is conducted at least three to four hours after tank fillup. The average time required to test a single tank, including setup and dismantling, is one hour. Typically, an additional hour of testing is required due to unusual situations such as piping leaks, tank leaks, presence of an air pocket, siphon systems, and common vents. The detection method has an accuracy of 0.05 milliliters (0.00001 gallons) gross volume change in a four-inch fill pipe and 129 milliliters (0.03 gallons) gross volume change in a half-full, 10.5-foot-diameter tank. Therefore, the tank could be tested even when it is partially full.

For the petroleum-product tanks, IT recommends the Petro Tite method. In IT's experience, Petro Tite and Ezy-Chek yield comparable results on tanks with 10,000-gallon capacity or smaller. However, on larger capacity tanks with long horizontal dimensions, Petro Tite has been more reliable as a result of the method's unique product circulation, multiple equipment set-ups at each tank end, and overall temperature compensation for the entire tank length. The Ezy-Chek method averages temperatures measured in a single vertical profile with a temperature coil. While the temperature measurements are very accurate at that point, temperatures may vary significantly twenty to thirty feet away from the coil in the other end of the tank.

For the Laboratory's acid tanks, IT recommends the Tank Auditor method. It is one of the few methods utilizing equipment materials compatible with acid mixtures.

Several assumptions have been made in preparing cost estimates for tank testing, including:

- All tanks are U.L. standard horizontal tanks.
- All tanks which do not test tight will require unsurfacing to expose couplings, bushings, etc. While IT can provide the service, we assume the Laboratory has the equipment and personnel to arrange and provide for unsurfacing.
- All tanks which do not test tight will require retesting, once unsurfaced. If logistics allow, unsurfacing will be performed at the time of testing, otherwise, retesting will be scheduled for the following phase.

REMEDIATION OPTIONS

It is probable that the tank testing program will identify some leaking tank systems among the Laboratory's tank population.(2) This raises several issues, which were discussed at the May 13 meeting, and are discussed briefly below:

- Given a finite UST budget, what allocation of funds should be made to a tank-testing program? remediation program?
- What are the Laboratory's federal/state/local regulatory requirements for reporting a leaking tank? remediating a leaking tank?

Regarding the first issue, all participants in the meeting agreed that while it is important to budget remediation dollars, it is equally important to identify all existing problems in the tank population (i.e., leaking tank systems) such that remediation dollars can be applied to the highest priority problems.

Regarding the second issue, leak reporting and remediation regulatory requirements are dependent on the specific characteristics of each leak. Leaking tank systems may be repaired, replaced, removed, or abandoned in place, depending on the cost-effectiveness of each option and Laboratory

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(2) For purposes of the cost estimates, we have very conservatively assumed that fifty percent of the tanks are leaking. Thirty percent of the tanks "first-time" tested at retail outlets are found leaking.

policy. Following tank remediation, current state regulations require that the tank site be investigated to determine the extent of contamination and the potential threat to public health and the environment caused by the contamination. The investigation may include sampling and analysis of soil, water, and/or vapors, hydrogeologic characterizations, plume migration evaluations, and health and environmental risk assessments. Corrective actions are then performed at each site and may include soil treatment or removal, vapor abatement, product recovery, and/or ground-water decontamination.

IT proposes to include general guidelines for remedial options in the final report which can be applied to each leaking tank system identified by tank testing. Concurrently, IT proposed to assist the Laboratory in development of a Leak Response Plan for its underground storage tanks. This plan would outline the regulatory requirements for reporting and remediating leaking tank systems, the individuals to be contacted, criteria for initiating emergency response, procedures for correcting the tank leak, and procedures for site investigations.

TABLE 1
PRIORITY 1 TANKS

TANK	AGE	CAPACITY	MATERIAL	PROTECTION INTERNAL	PROTECTION EXTERNAL	PIPING	SUBSTANCE STORED
TA-16-543	34	30,000	Steel	Unknown	Painted	Bare Steel	Fuel Oil
TA-16-544	34	30,000	Steel	Unknown	Painted	Bare Steel	Fuel Oil
TA-16-545	34	30,000	Steel	Unknown	Painted	Bare Steel	Fuel Oil
TA-16-546	34	30,000	Steel	Unknown	Painted	Bare Steel	Fuel Oil
TA-0-1051-1	37	10,000	Steel	None	Painted	Bare Steel	Fuel Oil
TA-0-1051-2	37	10,000	Steel	None	Painted	Bare Steel	Fuel Oil
TA-0-1051-3	37	10,000	Steel	None	Painted	Bare Steel	Fuel Oil
TA-3-191	22	Unavailable	Steel	Unknown	Unknown	Copper	Gasoline
TA-59-6	20	Unknown	Steel	Unknown	Painted	Bare Steel	Diesel
TA-16-196	35	4,000	Steel	Unknown	Painted	Bare Steel	Gasoline
TA-35-197	8	24,000	Steel	Unknown	Painted	Bare Steel	Dielectric Oil
Motor Pool-1	9	10,000	Steel	Unknown	Painted	Bare Steel	Gasoline
Motor Pool-2	9	10,000	Steel	Unknown	Painted	Bare Steel	Diesel
Tank Farm-4	4	25,000	Steel	Unknown	Painted	Bare Steel	Gasoline
Tank Farm-5	4	25,000	Steel	Unknown	Painted	Bare Steel	Gasoline
Tank Farm-2	4	25,000	Steel	Unknown	Painted	Bare Steel	Fuel Oil
Tank Farm-3	4	15,000	Steel	Unknown	Painted	Bare Steel	Gasoline

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TABLE 2
PRIORITY II TANKS

TANK	AGE	CAPACITY	MATERIAL	PROTECTION		PIPING	SUBSTANCE STORED
				INTERNAL	EXTERNAL		
TA-3-36-1	8	6,000	Steel	None	Painted	Bare Steel	Gasoline
TA-3-36-2	8	5,000	Steel	None	Painted	Bare Steel	Gasoline
TA-55-17	11	3,000	Steel	Unknown	Painted	Bare Steel	Diesel
TA-3-36-3	8	3,000	Steel	None	Painted	Bare Steel	Diesel
Tank Farm-1	4	8,000	Steel	Unknown	Painted	Bare Steel	Kerosene
TA-21-155	7	1,000	Steel	Unknown	Painted	Bare Steel	Diesel
TA-50-37	7	1,000	Steel	Unknown	Painted	Bare Steel	Diesel

TABLE 3
PRIORITY III TANKS

TANK	AGE	CAPACITY	MATERIAL	PROTECTION INTERNAL	PROTECTION EXTERNAL	PIPING	SUBSTANCE STORED
A. PETROLEUM PRODUCT TANKS							
TA-15-274	23	200	Steel	Unknown	Painted	Copper	Gasoline
TA-35-159	10	800	Steel	Unknown	Painted	Bare Steel	Dielectric Oil
TA-55-15	11	550	Steel	Unknown	Painted	Bare Steel	Diesel
TA-55-16	11	550	Steel	Unknown	Painted	Bare Steel	Diesel
Motor Pool-3	9	500	Steel	Unknown	Painted	Bare Steel	Reclaimed Oil
Motor Pool-4	9	500	Steel	Unknown	Painted	Bare Steel	Reclaimed Oil
TA-3-1255	6	800	Steel	Unknown	Painted	Bare Steel	Diesel
TA-15-287	7	1,400	Stainless Steel	Unknown	Painted	Stainless Steel	Dielectric Oil
TA-16-205	2	560	Steel	Unknown	Painted	Bare Steel	Diesel
B. ACID TANKS							
TA-21-325	14	5,200	Stainless Steel	None	Fiberglass Coated	Stainless Steel	Acid (HNO_3)
TA-3-40	3	300	Fiberglass	None	None	PVC	Cr^6 (chromic acid; mixed)

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