



## Project Summary

# Survey of Vendors of External Petroleum Leak Monitoring Devices for Use with Underground Storage Tanks

B. Eklund and W. Crow

Underground storage tanks (UST's) and their associated piping are major potential sources of environmental contamination. Since the 1984 Amendments to the Resource Recovery and Conservation Act (RCRA) require regulation of underground storage tank systems, the U.S. Environmental Protection Agency (EPA) is currently investigating topics related to UST's to aid in developing regulations. EPA has contracted with the Radian Corporation to compile information on the various types of external (out-of-tank) monitoring systems or techniques which can be used to detect leaks or spills of petroleum hydrocarbon products. The compiled data were used to categorize external petroleum leak monitoring devices or techniques by functions and type, and the data will aid in the future development of uniform performance criteria for commercially available external leak monitoring methods. The present study, which is limited to external (outside-the-tank) petroleum leak monitoring devices, supports the EPA effort by providing information on the number, type, and performance capabilities of available leak monitors.

The literature was searched to collect general information on external petroleum leak monitors and, more specifically, to develop a list of vendors. Additional information was collected from equipment vendors, trade groups, and other researchers.

*This Project Summary was developed by EPA's Environmental Monitor-*

*ing Systems Laboratory, Las Vegas, NV, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).*

### Introduction

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### Procedures

The literature was searched to collect general information on external petroleum

leak monitors and, more specifically, to develop a list of vendors. Additional information was collected from equipment vendors, trade groups, and other researchers. A questionnaire soliciting information on leak monitoring devices was developed and sent to the identified vendors. The questionnaire covered six topics: principle of operation, detection specificity, detection capability, experience, cost, and recommended procedures. The vendor list included vendors of UST monitoring systems and detectors that could potentially be used for the detection of petroleum hydrocarbon leaks or spills. It should be noted that this survey does not necessarily represent a complete list of vendors that manufacture external monitors for detecting petroleum leaks or spills from underground storage tanks and piping. Some vendors were likely to have been inadvertently omitted, and devices that are currently being marketed could have changed since this survey was performed. However, these data will be useful in identifying the different categories of commercial leak monitoring devices and aiding in the development of performance criteria for each monitoring category. This report summarizes and tabulates vendor responses to the questionnaire. The report also includes a discussion of related issues that remain to be resolved before final performance criteria can be established.

The data collection approach used in this study has limitations. Reliance on vendor-supplied data was necessary because of a lack of published, objective evaluative test results. However, since these vendor data have not been independently verified, it is possible that some of these data are erroneous, biased, or self-serving.

## Conclusions

The literature search yielded relatively little useful information on external leak detection monitoring devices. The vendor survey, however, was successful in gaining information from approximately 70 percent of the vendors that were queried. Except for a notable lack of data regarding any common interference, operational, or maintenance problems, vendor responses were generally thorough.

A total of 49 vendors was identified that manufacture devices related to the out-of-tank measurement of petroleum hydrocarbon spills or leaks from UST installations. Vendor specifications were received for 63 of 69 (91 percent) different products. Survey forms were

completed by 30 of the 42 vendors that were queried. Survey forms were received for 44 of the 62 (71 percent) devices covered by the survey.

Vendor responses provided a basis for dividing the external (out-of-tank) leak monitoring devices for UST systems into four categories: intermittent liquid-phase detection, intermittent gas-phase detection, continuous liquid-phase detection, and continuous gas-phase detection. An examination of vendor survey data yielded the following information:

- Commercial external (out-of-tank) leak monitors are designed primarily to detect leaks or spills of petroleum hydrocarbons;
- Most leak monitoring systems cannot immediately distinguish between surface spills and leaks;
- Most leak monitoring devices do not measure leak rates, although some devices (gaseous detectors) are capable of measuring hydrocarbon concentrations;
- No uniform performance specifications exist for external leak monitoring devices;
- Most leak monitoring systems require the installation of observation wells or boreholes;
- Vendor responses were limited with regard to:
  - Operational problems,
  - Interferences,
  - Maintenance problems, and
  - Performance testing procedures;
- Most leak monitoring systems can be retrofitted at existing UST installations;
- Intermittent monitoring techniques are more labor-intensive than continuous techniques, but may be more reliable;
- Gas-phase detection can be more sensitive than liquid-phase detection, but the instrumentation may be more subject to false alarms and subject to interferences.
- Equipment and installation costs (for permanent external leak detection systems) may vary considerably as these costs are dependent on the type of devices selected and the number of sensors used in each installation, local construction codes and permitting costs, and local labor costs; and
- Operational and maintenance costs for permanent external leak monitoring systems may vary also but are thought to be low based on informa-

tion obtained from equipment vendors.

The performance characteristics for each leak detection category are summarized in Table 1. The data presented in Table 1 are based on information obtained from vendors and have not been verified by independent testing; therefore, these data may be biased.

**Table 1. Characteristics of Leak Detection Sensors**

	<i>Leak Detection Category</i>			
	<i>Intermittent Liquid-Phase</i>	<i>Continuous Liquid-Phase</i>	<i>Intermittent Gas-Phase</i>	<i>Continuous Gas-Phase</i>
<i>Type of Compounds Detected</i>	<i>Liquid hydrocarbons</i>	<i>Vapor/liquid hydrocarbons</i>	<i>Hydrocarbon vapors</i>	<i>Hydrocarbon vapors</i>
<i>Detection Adjustable for Specific Compounds</i>	<i>Generally not</i>	<i>Generally not</i>	<i>Varies between techniques</i>	<i>Generally not</i>
<i>Potential Interferences</i>	<i>None</i>	<i>Physical and chemical</i>	<i>Chemical</i>	<i>Chemical</i>
<i>Severity of Interferences</i>	<i>Low</i>	<i>Variable</i>	<i>Potentially high</i>	<i>Potentially high</i>
<i>False Positives or Negatives</i>	<i>Unlikely</i>	<i>Unlikely</i>	<i>Both possible</i>	<i>Both possible</i>
<i>Temperature Range</i>	<i>&gt;0°C</i>	<i>-45 to 120°C</i>	<i>-20 to 60°C</i>	<i>-70 to 70°C</i>
<i>Can Systems Be Retrofitted?</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Are Wells Required?</i>	<i>Yes</i>	<i>Usually</i>	<i>Usually</i>	<i>Usually</i>
<i>Can Devices Be Used in Wet Soils?</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Years on Market</i>	<i>&gt;5</i>	<i>0-15</i>	<i>2-10</i>	<i>0-20</i>
<i>Detection Limits</i>				
<i>Lower</i>	<i>1/64 to 1/32 in.</i>	<i>1/32 to 1/8 in.</i>	<i>0.1 to 1500 ppm</i>	<i>10 to 100 ppm</i>
<i>Upper</i>	<i>None</i>	<i>None</i>	<i>2000 ppm to 100% LEL</i>	<i>1% to 100% LEL</i>
<i>Response Characteristics</i>				
<i>Lag Time</i>	<i>N/A</i>	<i>1 sec. to 10 hr.</i>	<i>1 sec.</i>	<i>1 sec. to 10 min.</i>
<i>Rise Time</i>	<i>N/A</i>	<i>1 sec. to 60 sec.</i>	<i>3 sec. to 30 sec.</i>	<i>1 sec. to 20 sec.</i>
<i>Fall Time</i>	<i>N/A</i>	<i>1 sec. to ?</i>	<i>5 sec. to ?</i>	<i>20 sec. to several minutes</i>
<i>Drift</i>	<i>N/A</i>	<i>N/A</i>	<i>Negligible to &lt;1%/day full scale</i>	<i>Negligible to &lt;1%/day full scale</i>
<i>Precision</i>	<i>N/A</i>	<i>Unknown</i>	<i>5% to unknown</i>	<i>5% to unknown</i>

**NOTE:** The information presented in this table is based on information provided by vendors of monitoring devices and not on actual performance data which has been independently verified.

*B. Eklund and W. Crow are with Radian Corporation, Austin, TX 78766.*

*J. Jeffrey van Ee is the EPA Project Officer (see below).*

*The complete report entitled "Survey of Vendors of External Petroleum Leak Monitoring Devices for Use with Underground Storage Tanks," (Order No. PB 87-212 346/AS; Cost: \$18.95, subject to change) will be available only from:*

*National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161  
Telephone: 703-487-4650*

*The EPA Project Officer can be contacted at:  
Environmental Monitoring Systems Laboratory  
P. O. Box 93478  
U.S. Environmental Protection Agency  
Las Vegas, NV 89193*

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