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Standard Guide for Investigation of the Source and Cause of Releases from Underground Storage Tank Systems[1]

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INTRODUCTION

This guide provides a framework for the development of procedures and directions for the investigation of underground storage tank (UST) equipment problems and the source and cause of releases. Source and cause investigations are similar to origin and cause investigations in property insurance claims. It gives the user practical suggestions of how to investigate equipment and installation problems, document findings, collect and preserve failed equipment for forensic evaluation or laboratory analysis if necessary, and implement visual and analytical processes to document the source of a release. Use of this guide may result in the identification of equipment and installation problems that can be corrected in future tank system designs and equipment maintenance programs to prevent releases to the environment. Use of this guide may assist regulatory agencies to determine and document the source and cause of releases from UST systems.

1. Scope

1.1 *Overview*—This guide is an organized collection of information and series of options for industry, regulators, consultants and the public, intended to assist with the development of investigation protocols for underground storage tank facilities in the United States. While the guide does not recommend a specific course of action, it establishes an investigation framework, and it provides a series of techniques that may be employed to: identify equipment problems; in some cases collect and preserve failed equipment for forensic evaluation or laboratory analysis; identify the source of a release; and document the investigation. The guide includes information on methods of investigation, documentation, collecting and preserving samples; chain of custody; storage; shipping; working with equipment manufacturers; and notification of regulators and listing laboratories. The goal in using the guide is to identify the appropriate level of investigation and to gather and preserve information, in an organized manner, which could be used in the future to improve system design or performance. While this guide may act as a starting point for users with limited experience in failure investigation, the user is encouraged to consult with failure analysis experts for specific investigation procedures that may be needed for certain equipment and the investigation should be conducted by a qualified professional. As users develop their specific investigation protocols, they may find that the investigations can be streamlined for certain types of facilities.

1.2 *Limitations of This Guide:*

1.2.1 Given the variability of the different investigators that may wish to use this guide and the different types of facilities and failures that will be investigated, it is not possible to address all the relevant standards that might apply to a particular investigation. This guide uses generalized language and examples to guide the user. If it is not clear to the user how to apply standards to their specific circumstances, it is recommended that users seek assistance from qualified professionals.

1.2.2 This guide does not address safety issues associated with the investigation, taking samples and storing equipment. Users are cautioned to exercise proper care in handling equipment that was in contact with flammable and combustible liquids and vapors. Some of the activities described in this guide may be subject to OSHA (Occupational Safety and Health Administration) regulations or may only be conducted by individuals with appropriate HAZWOPER (Hazardous Waste Operations and Emergency Response) training certifications recognized by federal and state regulatory authorities, such as HAZWOPER training.

1.2.3 This guide does not address laboratory investigations of material properties and detailed failure analysis.

1.2.4 This guide does not cover underground storage tank systems storing liquefied petroleum gas (LPG).

[1] This guide is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.01 on Storage Tanks.

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1.2.5 This guide does not replace state-required closure assessments and investigations. Requirements vary from state to state and often include specific sampling requirements. The user should comply with the requirement of the authority having jurisdiction.

1.2.6 Prior to implementing the steps described in Section 5, users of this guide must determine if the authority having jurisdiction has any qualification requirements for the individual performing the investigation.

1.2.7 Investigations addressed by this guide may involve knowledge, skills, and abilities generally attributed to individuals certified as tank systems installers, inspectors, or removers, or those who are trained in soil and groundwater sampling protocols (for example, geologists, groundwater professionals, or engineers).

1.3 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E1188 Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator

E1990 Guide for Performing Evaluations of Underground Storage Tank Systems for Operational Conformance with 40 CFR, Part 280 Regulations

E2681 Guide for Environmental Management of Underground Storage Tank Systems Storing Regulated Substances

F1127 Guide for Containment of Hazardous Material Spills by Emergency Response Personnel

2.2 *Other Standards:*

STD 2015 Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, 6th Edition—August 2001[3]

RP 2016 Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks, 1st Edition—August 2001[3]

PEI/RP 100 Recommended Practices for Installation of Underground Liquid Petroleum Storage Systems[4]

PEI/RP 1700 Tank Closure and Removal[4]

NFPA 30 Flammable and Combustible Liquids Code[5]

2.3 *Federal Regulations:*[6]

§49 CFR §172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

§29 CFR §1910.146 Occupational Safety and Health Standards, Subpart J, General Environmental Controls, Permit-required Confined Spaces

3. Terminology

3.1 *Definitions:*

3.1.1 *compromised, adj*—a loss of structural integrity or diminished ability to perform as designed.

3.1.2 *equipment problems or problem equipment, n*—any failure, malfunction, compromised condition or other issue that has resulted in impairment, abnormal equipment condition or operation or that has resulted in a release or suspected release.

3.1.3 *free product, n*—a regulated substance that is present as a nonaqueous phase liquid (for example, liquid not dissolved in water).

3.1.4 *release, v*—any spilling, leaking, emitting, discharging, escaping, leaching or disposing from an UST into groundwater, surface water or subsurface soils.

3.1.5 *release prevention, n*—activities that reduce the risk of human and environmental exposure to petroleum or hazardous substances. In the United States, underground storage tank and toxic use reduction regulations are examples of such requirements.

3.1.6 *regulated substance, n*—Any substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (but not including any substance regulated as a hazardous waste under subtitle C); and Petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

3.1.6.1 *Discussion*—The term regulated substance includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

3.1.7 *tightness test, n*—a procedure capable of detecting a 0.1 gallon per hour leak rate from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

3.1.7.1 *line tightness test, n*—A periodic test of piping that can detect a 0.1 gallon per hour leak rate at one and one-half times the operating pressure.

3.1.7.2 *tank tightness test*—includes a wide variety of test methods that must be able to detect a leak at least as small as 0.1 gallon per hour with certain probabilities of detection and of false alarm.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005-4070, http://www.api.org.

[4] Available from Petroleum Equipment Institute (PEI), P. O. Box 2380, Tulsa, OK 74101-2380, http://www.pei.org.

[5] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

[6] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.