

# ENVIRONMENTAL PROTECTION AGENCY

## 40 CFR Part 280

### Evaluation of the Potential for External Corrosion and Review of Cathodic Protection

### Monitoring Associated with sti-P3 Underground Storage Tanks: Notice of Data Availability

**AGENCY:** Environmental Protection Agency.

**ACTION:** Notice of Data Availability.

**SUMMARY:** The Environmental Protection Agency (EPA) is today publishing a notice of data availability regarding a report completed by Tillinghast, a Towers Perrin Company, on behalf of the Steel Tank Institute (STI). The Tillinghast report examines the potential for external corrosion of sti-P3 underground storage tanks (USTs) as well as owners' and operators' corrosion monitoring practices for USTs. The Agency's current regulations for corrosion monitoring require periodic post-installation monitoring of cathodically protected steel underground storage tanks. The Steel Tank Institute approached EPA in 1992, requesting it alter the mandated monitoring frequency for cathodic protection monitoring of steel USTs, and specifically, USTs manufactured by STI members under the "sti-P3" specification. EPA responded by agreeing to

consider data supplied by an independent, third-party examination of STI's initial findings, as part of an overall data collection process. This notice summarizes the methodology, findings, and conclusions of the study. EPA encourages public review and comment on the Tillinghast report, as it may be used in arriving at a final determination regarding STI's request for EPA to modify the current requirements for cathodic protection monitoring for steel underground storage tanks.

**DATES:** Written comments on this notice must be submitted on or before [insert date 60 days after publication in the Federal Register].

**ADDRESSES:** Written comments on today's supplemental notice should be addressed to the docket clerk at the following address: U.S. Environmental Protection Agency, RCRA Docket (OS-305), 401 M Street, S.W., Washington, DC 20460. One original and two copies of comments should be sent and identified by regulatory docket reference number XX-XXXXX. The docket is open from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding Federal holidays. Docket materials may be reviewed by appointment by calling (202) 260-9327. Copies of docket materials may be made at no cost, with a maximum of 100 pages of material from any one regulatory docket. Additional copies are \$0.15 per page. For a copy of the Tillinghast report, contact the EPA RCRA Docket.

**FOR FURTHER INFORMATION CONTACT:** For general information about this supplemental notice, contact the RCRA/Superfund/OUST Hotline, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency Washington, DC 20460, (800)

424-9346 (toll-free) or (703) 412-9810 (local). For the hearing impaired, the number is (800) 553-7672 (toll-free).

## **SUPPLEMENTARY INFORMATION:**

### **I. Background**

#### *A. Technical Requirements for Underground Storage Tanks*

Final regulations for Underground Storage Tanks (USTs) containing regulated substances were promulgated by the Agency in September and October, 1988 and became effective in December, 1988 and January, 1989. The regulations include technical requirements for new and existing underground storage tanks and piping, financial responsibility requirements for UST owners and operators, and state program approval requirements. In order to prevent releases, EPA included in the technical requirements four important categories of preventative measures: (1) tank design and installation, (2) release detection, (3) corrosion protection, and (4) spill and overfill control. All UST systems installed after December 22, 1988 must meet Federal requirements immediately. Owners of tank systems installed on or before that date have until December 22, 1998 to either upgrade their tanks with corrosion protection and spill and overfill devices, replace them with new tank systems, or close them in accordance with the regulatory requirements.

According to a study conducted for EPA in 1987, corrosion of tanks and piping was a major cause of UST system releases. At that time, most installed USTs and piping were constructed of "bare steel" -- steel without corrosion protection. When buried in the ground, steel without corrosion protection can be destroyed by external corrosion, resulting in leaks. One type of corrosion protection is cathodic protection, which is a technique to prevent corrosion of a surface by making that surface the cathode of an electrochemical cell. For UST systems, this can be done by applying either galvanic anodes or impressed electric current.

The UST regulations include requirements for the operation and maintenance of corrosion protection of steel UST systems. As part of these requirements, owners and operators of steel UST systems equipped with cathodic protection must ensure that all cathodic protection systems are tested within 6 months of installation and at least every 3 years thereafter, or according to another reasonable time frame established by the implementing agency. *See* 40 CFR 280.31(b)(1). The Preamble to the rule noted that, "After consultation with groups of industry experts during the public comment period, EPA now agrees with the commenters who recommended that all cathodic protection systems should be tested at the same frequency and the Agency is now requiring in the final rule that all cathodic protection systems be tested within 6 months of installation and at least every 3 years thereafter. These intervals are sufficient to detect any damage or failure of the system and to take remedial action in time to prevent structural failures due to corrosion. EPA understands that this time interval is consistent with sound practice as is now recommended in the recently revised NACE [(National Association of Corrosion Engineers)] code and by major tank manufacturers." *See* 53 **Fed. Reg.** 37137.

## *B. Steel Tank Institute Request and Study Report*

The Steel Tank Institute (STI) is a trade organization comprised of steel tank manufacturers. STI members manufacture pre-engineered underground storage tanks built to the "sti-P3" specification, for storage of liquids at atmospheric pressure. Tanks meeting the sti-P3 specification employ three types of corrosion protection: (1) dielectric coating, (2) electrical isolation, and (3) cathodic protection through factory-installed anodes. More than 200,000 sti-P3 tanks have been fabricated and placed in use since 1969, the vast majority since 1985, and they are commonly installed today.

Single-wall sti-P3 tanks in service for storage of Federally regulated substances are covered by the cathodic protection monitoring requirements outlined above. Those tank owners who installed sti-P3 tanks in Federally regulated service between late 1988 and February of 1993 were eligible to enroll in STI's "Watchdog" cathodic protection monitoring service. The Watchdog service, performed through STI, provides cathodic protection monitoring in compliance with the EPA requirements. Since February of 1993, a simplified, user-friendly cathodic protection monitoring test system with a buried reference cell is installed with new sti-P3 tanks subject to Federal UST regulations. Those sti-P3 systems installed prior to 1988 have been operated without cathodic protection monitoring in most cases.

In the spring of 1992, STI requested that EPA alter the frequency of cathodic protection monitoring from the current requirements, to monitoring within 6 months of installation and

subsequently only after any disturbance of the excavation (e.g., retrofit of Stage II vapor recovery systems). Periodic monitoring would therefore not be required. STI provided data on the performance of sti-P3 tanks and on potential costs for cathodic protection monitoring of sti-P3 tanks in support of its request.

STI and its members believe that the mandated frequency for cathodic protection monitoring should be changed for the following reasons:

- \* The sti-P3 tank has a very good performance record;
- \* The much more frequent monthly leak detection checks required by the UST regulations supersede the need for cathodic protection monitoring;
- \* There is inequity in that thousands of existing steel tanks without corrosion protection, which are much more likely to fail before phase-out in 1998, are not subject to the cathodic protection monitoring requirement;
- \* Periodic tank deflection monitoring for fiberglass-reinforced plastic (FRP) tanks was not required in EPA's UST regulations due to the low incidence of failure in FRP tanks (less than 0.5 percent), and sti-P3 tanks have similarly low failure rates;
- \* UST buyers consider cathodic protection monitoring and the associated recordkeeping required with steel tanks to be an inconvenience, and this affects buyers' choices among UST technologies;
- \* There is a high cost of compliance to industry; and
- \* Regulatory enforcement efforts are directed at clean-ups and leak detection, not cathodic protection -- an indicator that monitoring cathodic protection is not an essential activity

towards protecting human health and the environment.

The Agency took no regulatory action in response to STI's request and the supporting information. STI asked Tillinghast, an international risk management and actuarial consulting firm with experience in underground storage issues, to conduct an independent, third-party audit of STI's data. In May of 1993, STI provided the Agency with a report prepared by Tillinghast titled "Evaluation Of The Potential For External Corrosion And Review Of Cathodic Protection Monitoring Associated With sti-P3 Underground Storage Tanks." An abstract of the report follows.

The pollution prevention components of the UST regulations (including corrosion protection) are very important to the UST program. Therefore, the Agency has decided to publish this Notice of Data Availability and solicit public comment on the report to ensure a more complete understanding of the issue at hand. This Notice includes several questions to help guide public discussion. The Agency is interested in responses to any of the questions listed below, and other issues the public may identify, such as the costs/benefits of the monitoring requirement itself.

## **II. Abstract**

In May 1993, Tillinghast completed a study on behalf of the Steel Tank Institute (STI) which surveyed tank owners, tank installers, and regulators to identify any instances of failures of

sti-P3 tanks attributed to external corrosion and to obtain experience information on cathodic protection monitoring practices. A summary of Tillinghast's methodology, findings, and conclusions follows.

### *Methodology*

Tillinghast telephone-surveyed randomly selected sti-P3 underground storage tank (UST) owners and tank installers as well as Federal and State UST regulators about the condition and general maintenance of sti-P3 tanks. These individuals, along with data from the STI Watchdog program (a corrosion monitoring program initiated by STI in 1988 to assist tank owners in complying with EPA corrosion monitoring requirements) provided information on the frequency, conditions, and other aspects of the cathodic protection monitoring practices for sti-P3 tanks. In addition, the survey sought performance history on sti-P3 tanks which were not subject to cathodic protection testing. Tillinghast also examined environmental impairment, warranty, and product liability insurance claims from the Steel Tank Insurance Company (STICO, a captive insurance company formed by steel tank manufacturers).

Tillinghast selected a sample of owners and installers through STI's computer data base containing over 200,000 registered tanks. The sample covered the following nine states: Washington, Virginia, Vermont, South Dakota, Colorado, Florida, Texas, Missouri and Kentucky. The nine states represented a variety of climates, tank environments, saturation periods, water tables, and soil conditions. Tillinghast's sample also included a variety of tank sizes

(from 500 to 20,000 gallons) and contained petroleum marketers and non-marketers. Tillinghast examined the following registration periods: 1970-75, 1980-81, 1985, and 1990. The examined registration periods begin in 1970 when sti-P3 tanks first became well known to owners/operators and continue to the present.

Tillinghast successfully contacted 110 owners with immediate supervision over 385 sti-P3 tanks and secondary responsibility for approximately 2500 sti-P3 tanks at other locations. In addition, researchers contacted 37 installers throughout the geographic sample who had experience in over 5000 sti-P3 tank installations. Finally, Tillinghast contacted the Environmental Protection Agency's ten Regional UST offices as well as each of the nine State UST regulatory offices included in the sample.

Tillinghast obtained summary information on 103 environmental impairment and product liability insurance closed claims for sti-P3 tanks from STICO to identify any instances where payment was made due to a product release. Tillinghast also randomly selected eight of the 103 claims to specifically review the "cause of incident" data.

### *Findings*

Tillinghast identified findings related to the following areas: testing of cathodic protection systems, cathodic protection monitoring practices, environmental and product liability claims, and understanding of and compliance with EPA's technical requirements.

Tillinghast's survey of tank owners and installers covered over 8,000 sti-P3 tanks. Within the surveyed population, respondents reported three instances of sti-P3 tank external corrosion -- one of which involved a product release. Of the regulators Tillinghast surveyed, those who had witnessed the removal of sti-P3 tanks reported that the tanks and sacrificial anodes were in "excellent condition upon removal." Regulators did not provide information on the ages of the tanks that were considered to be in "excellent condition upon removal."

Tillinghast reported that corrosion monitoring requirements (and the technical basis for those requirements) are not well understood by most tank owners, installers, or regulators. Furthermore, Tillinghast reported that unless an sti-P3 owner/installer signed up for STI's Watchdog program, cathodic protection monitoring for sti-P3 tanks installed since the promulgation of EPA's technical regulations was generally not being performed, although some large sti-P3 tanks users did perform independent testing.

Tillinghast's review of data from STI and from owners' research indicated that test variability can be high for corrosion monitoring tests conducted on any given site. Watchdog participants and major oil companies (many of whom conduct their own corrosion monitoring) reported few readings less than the 850 millivolt compliance point for corrosion monitoring. Tillinghast identified human error (in tank installation or testing) as one cause for obtaining disreputable corrosion monitoring results. Unusually dry soil conditions and other physical factors also influenced the accuracy of cathodic protection system testing.

Tillinghast obtained data from installers, tank owners, and major oil companies on the annual cost of corrosion monitoring. The data showed the annual cost of corrosion monitoring to range from \$130 to \$500 per location (each location having an average of 3.2 tanks). The impact of these costs was greatest on small, single location owners due to the necessity of hiring a contractor to travel to the site to perform the monitoring.

Tillinghast's investigation of STICO limited warranty and environmental and product liability insurance closed claims revealed that most of the sti-P3 claims that entailed both administrative and investigative costs involved improper installation techniques or errors in tank manufacturing workmanship. Fifty-six of the 103 claims incurred administrative expense but no claims costs or expenses, leaving 47 others which incurred some sort of investigative cost (e.g., tightness test). Only four of the 47 incidents in which investigative cost was incurred actually involved a claims payment. Tillinghast's review of eight randomly chosen closed claims for "cause of incident" data demonstrated that a pattern of faulty workmanship, bad installation, or a combination of both resulted in corroded sti-P3 tanks.

### *Conclusions*

Tillinghast found no instances of external corrosion of sti-P3 tanks that had been properly fabricated, transported, and installed. Of the more than 8000 sti-P3 tank installations represented by owners and installers, only three instances of external corrosion were reported, a frequency of 0.04%, and only one involved a product release. Tillinghast did not have enough corrosion

monitoring data to statistically determine an optimum monitoring frequency for cathodic protection. Tillinghast's survey concluded that less than 10% of the Watchdog participants or major oil companies who maintain their own corrosion monitoring programs and installed sti-P3 tanks in 1990, reported readings below the 850 millivolt compliance point for corrosion monitoring. Finally, Watchdog monitoring data from 1991, 1992, and the first quarter of 1993 indicate that based on cathodic protection monitoring readings, the number of sti-P3 tanks with cathodic protection readings of -850 millivolts or greater is increasing.

### **III. Public Comments**

EPA is interested in any comments that the public may have on the content of this report, and is especially interested in any additional quantitative data commenters may provide. In particular, the Agency is interested in receiving answers to the questions listed below.

\* What data are available that confirm or refute the report's findings on corrosion protection of sti-P3 USTs? In particular, have problems with corrosion protection (such as external corrosion) on sti-P3 tanks been observed? If so, what were the numbers, types, severity, and impacts of these problems? What were the ages of any sti-P3 tanks with problems with corrosion protection, and were these problems caused during, before, or after installation? What are the sti-P3 label numbers, if available, for verification purposes?

\* For any sti-P3 tanks observed to have problems with corrosion protection,

including tanks and piping, did cathodic protection monitoring indicate a lack of protection? If so, when was a lack of protection found -- within 6 months of installation or during a later test? If monitoring was not performed, would it have indicated a lack of protection if it had been done?

\* What data are available addressing the above issues for cathodically protected steel USTs that are not sti-P3 USTs? If problems were observed, were they observed with field installed or with factory installed cathodic protection systems?

\* What information is available confirming or refuting the study's representation of the costs and benefits of cathodic protection monitoring of UST systems?

\* How does the simplified, permanently installed cathodic protection monitoring system, now installed with new Federally regulated sti-P3 tanks, change cathodic protection monitoring practices and its costs and benefits?

\* If the study were performed 10 years later and again 20 years later, would the findings be expected to be the same? Why or why not?

\* What experiences or studies in other applications of cathodic protection may provide insights into the long-term performance of cathodic protection on USTs and the costs and benefits of cathodic protection monitoring?

#### **IV. Schedule for Final Determination**

After review and evaluation of the public comments on this notice, EPA will conduct internal deliberations to arrive at a final determination of the Agency's position on the required frequency of cathodic protection monitoring. The Agency plans to reach a determination by [Date], 1993. This determination may take the form of no action, guidance, changes to the technical regulations, or some other regulatory action.

Dated: [Date], 1993

**Richard J. Guimond**

*Acting Assistant Administrator.*

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