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Agency Secretary

# State Water Resources Control Board

## Division of Water Quality

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Arnold Schwarzenegger  
Governor

~ Sent Via Email~

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To: Interested Parties

## ADVISORY REGARDING THERMOPLASTIC FLEXIBLE PIPING<sup>1</sup>

This letter is an advisory of two important, interrelated matters associated with the use of thermoplastic flexible piping in underground storage tanks (USTs): the revised requirements of Underwriters Laboratories (UL) Standard for Nonmetallic Underground Piping for Flammable Liquids (UL 971, January 2, 2004 revisions, effective July 1, 2005); and our concerns regarding the use of certain thermoplastic flexible piping in California.

This advisory stems from observations from several states that indicate certain thermoplastic flexible piping may not be performing as intended. One concern is that certain types of piping may not be fully compatible with the products stored. Many reported thermoplastic flexible piping problems appear to be a direct or secondary result of plastic swelling caused by exposure to hydrocarbon fuels and vapors.<sup>2</sup> As we understand it, certain thermoplastic flexible piping materials swell when exposed to hydrocarbon fuels. In response, the piping can: crack; rupture; kink; separate; elongate and move fittings; or dislodge boots. This indicates that these materials may not have been designed to withstand the conditions found at operating UST facilities, including long-term exposure to hydrocarbon fuels. Other potential sources of problems include improper piping installation, inadequate piping maintenance, and failure of UST owners and operators to properly respond to leak detection alarms. Photographs that illustrate various problems associated with thermoplastic flexible piping are available at:

[www.dep.state.fl.us/waste/quick\\_topics/publications/pss/tanks/FlexPipe/MSshow.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/pss/tanks/FlexPipe/MSshow.pdf)

### Revised UL 971

The observations discussed above indicating compatibility problems with certain thermoplastic flexible piping have prompted UL to revise UL 971. The revised standard was published January 2, 2004, and became fully effective on July 1, 2005. In order for manufacturers to continue to apply the UL mark to piping manufactured on or after July 1, 2005, their piping must undergo a new review by UL and be tested for compliance with the revised standard. Only new piping that UL finds to be in compliance with the revised standard will be authorized to continue to bear the UL

<sup>1</sup>For the purpose of this letter, thermoplastic flexible piping is piping that was subject to “separate examination and unique tests” pursuant to UL 971 (October 30, 1990 version), or piping with a manufacturer’s recommended minimum bend radius less than or equal to 6 feet pursuant to UL 971 (January 2, 2004 revision).

<sup>2</sup>Exposure of piping surfaces (e.g., exterior of primary piping, interior/exterior of secondary piping) to hydrocarbons can result from a variety of factors, including: releases; hydrocarbons in containment sumps; use of contaminated soil as backfill; or surface spills that migrate to subsurface soil.

mark.<sup>3</sup> Revision of the UL 971 standard does not affect the UL listing of piping already manufactured or installed.

The revised UL 971 standard includes more stringent physical testing, which is intended to better simulate long-term use and actual field conditions. For example, prior to conducting compatibility and permeability tests, the revised standard requires piping samples to be preconditioned by subjecting them to bend, drop, and impact tests. Conducting compatibility and permeability tests on piping that has been preconditioned with the abuse piping may experience during transport, assembly, and installation, better replicates installation and field conditions. As another example, the revised standard requires piping samples to be subject to more stringent compatibility and permeability testing, to address piping degradation resulting from long-term exposure to fuel. The revised standard accomplishes this by establishing criteria for dimensional stability and increased minimum property retention values. Other major revisions to UL 971 include evaluating piping as a system (rather than evaluating individual components only) and a requirement for installation of piping by qualified persons.

The January 2, 2004 revision of UL 971 is an improvement but does not fully address the thermoplastic flexible piping problems that have been observed. In fact, UL 971 is currently being revised again to include even more stringent testing and to set higher performance criteria, so that thermoplastic flexible piping manufactured in the future will not experience the types of problems observed in the past.

### **Use of Thermoplastic Flexible Piping in California**

As the local agencies may know from previous State Water Board Resources Control Board staff correspondence, we had expressed concerns regarding the use of thermoplastic flexible piping in California.<sup>4</sup> Although we were aware of problems with certain thermoplastic flexible piping in other states, at the time of these transmittals we were not certain whether these problems were occurring in California. As a result, we advised local agency inspectors to report unusual conditions of thermoplastic flexible piping during facility inspections. We are now aware of problems with certain thermoplastic flexible piping in California. The thermoplastic flexible piping problems observed are not specific to a single manufacturer or to a single version of flexible piping. Our primary concern is that materials used to construct certain thermoplastic flexible piping may not be sufficiently compatible with fuels and other hazardous substances commonly stored in USTs.

If UST owners or operators choose to install thermoplastic flexible piping, we strongly recommend installing only flexible piping that has been manufactured to meet the post-July 1, 2005 revised UL 971 standard, because we expect this piping to be less susceptible to degradation. Enclosure I provides more information on the use of nonmetallic piping manufactured both before and after July 1, 2005.

Although installing thermoplastic flexible piping that meets the revised UL standard should help mitigate some of our concerns, it is important to remember that having UL approved piping may not

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<sup>3</sup>For a list of piping manufacturers that have successfully completed testing pursuant to UL 971 (January 2, 2004 revision), go to [www.ul.com](http://www.ul.com), and follow the following five steps; 1) click on 'Certifications', 2) click on 'Standard Number', 3) type in 971 and click on 'search', 4) click on 'QLXT.GuideInfo', and 5) click on 'View Listings'.

<sup>4</sup>April 23, 2003 e-mail to UST local agencies from Ms. Laura Chaddock, and October 7, 2003 Flexible Pipe Advisory letter to UST local agencies from Ms. Leslie Graves.



be enough to maintain compliance with all applicable requirements. In addition to the requirement that piping be approved by an independent testing organization (Cal. Code Regs., tit. 23, § 2631, subd. (b)), California requires that primary containment be compatible with the hazardous substance stored and that secondary containment be constructed to prevent structural weakening as a result of contact with any hazardous substance released from the primary containment (Health & Saf. Code, §§ 25291(a), 25290.2(c), and 25290.1(c)).

Given the history of certain thermoplastic flexible piping and the remaining uncertainties with regard to long term performance, we recommend that the following procedures be implemented by UST owners and operators whose facilities already have thermoplastic flexible piping in use:

Frequent Visual Inspection of Thermoplastic Flexible Piping: All portions of the piping that can be viewed without excavation (i.e., piping within sumps and under-dispenser containment boxes) should be inspected periodically for any visible signs of degradation. Enclosure II provides guidance on what to look for during the inspection.

Periodic Containment Testing of Thermoplastic Flexible Piping (Primary and Secondary): In addition to the required continuous interstitial monitoring and annual leak detection equipment maintenance, we recommend that periodic containment testing of primary and secondary piping be conducted more frequently than required. Conducting these tests more often than required can lead to earlier identification of problems, thus helping to minimize the possibility of a release of hazardous substance to the environment.

Replace or Repair Thermoplastic Flexible Piping Exhibiting Signs of Degradation: Thermoplastic flexible piping that shows signs of degradation indicating structural weakening may not be in compliance and may need to be replaced.

We recommend that, before deciding to install thermoplastic flexible piping at a new UST facility or as a replacement to existing piping, UST owners and operators consider how they would implement these ongoing inspection and testing recommendations. UST owners and operators should also consider the historical performance of the type of piping they plan to install, and the potential risk of release that piping may present.

Please contact Ms. Laura Chaddock, Chief of the UST Leak Prevention Technical Unit, at (916) 341-5870 or [lchaddock@waterboards.ca.gov](mailto:lchaddock@waterboards.ca.gov), or Ms. Leslie Graves, Chief of the UST Enforcement Unit, at (916) 341-5810 or [lgraves@waterboards.ca.gov](mailto:lgraves@waterboards.ca.gov) with any questions or concerns you may have related to this matter. UST owners and operators with site-specific concerns regarding their UST facility should contact their local agency. A comprehensive list of UST local agencies can be found at <http://www.swrcb.ca.gov/ust/contacts/>.

Sincerely

*[Original Signed By]*

Elizabeth L. Haven, Manager  
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[Enclosure 1](#)  
[Enclosure 2](#)

***California Environmental Protection Agency***



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