

October 22, 2013

Delivery via E Mail

Mr. Ray Gosack  
City Administrator  
City of Fort Smith  
P.O. Box 1908  
623 Garrison Avenue  
Fort Smith, AR 72901

**Re: Response to City Directors Questions  
City Board of Directors Study Session – October 8, 2013  
Whirlpool Remediation Plan Update**

Dear Mr. Gosack:

On behalf of Whirlpool Corporation, ENVIRON International has prepared this response to requests the City Directors made during the City Directors Study Session on October 8, 2013. The Directors requested additional information on the use of In Situ Chemical Oxidation (ISCO) and Monitored Natural Attenuation (MNA) as remedies at other sites. A list of references used for this response is included at the end of this document.

**1. How many remediation sites are using in-situ chemical oxidation treatment?**

In-Situ Chemical Oxidation (ISCO) is a proven remedial technology and has been applied at thousands of hazardous waste sites around the US (USEPA, 2012; Hauling and Pivetz, 2006).

Below is a list of sites in USEPA Region 6, which includes Arkansas, where ISCO is being used as the primary method to treat TCE in groundwater. There are other sites in USEPA Region 6 and Arkansas where ISCO is being used to treat groundwater with contaminants of concern other than TCE.

- United States Department of Defense - Camden, AR
- Former Timex Inc. Property - Little Rock, AR
- Park Avenue Cleaners - Richardson, TX
- Rummel Creek Shopping Center - Houston, TX
- Spin City Cleaners - Plano, TX
- Former Dry Cleaners - Dallas, TX
- Former Industrial Site - Texas
- Texas Industrial Site - Texas

Sources: 2013, ADEQ. Hazardous Waste Division Website October.  
2013, USEPA CLU-IN Database, October.

## 2. How many remediation sites are using monitored natural attenuation?

Monitored Natural Attenuation (MNA) has been used at thousands of remediation sites around the US. MNA is used as a stand-alone solution or in combination with other remedial technologies (USEPA 2012; ITRC Natural Attenuation of Chlorinated Solvents in Groundwater, September 1999).

Below is a list of sites in USEPA Region 6, which includes Arkansas, where MNA is being used to treat TCE in groundwater. There are other sites in USEPA Region 6 and Arkansas where MNA is being used to treat groundwater with contaminants of concern other than TCE. Many MNA sites incorporate deed restrictions to prohibit the use of groundwater as an integral part of the remedy at these sites.

- Kearney-National Inc. Property - Fayetteville, AR
- Central Moloney, Inc. - Pine Bluff, AR
- Star Starrett Facility - Dumas, AR
- Swift Chemical Company, Inc. (Farm Site) - Rogers, AR
- Walgreens Store #03425 - Hot Springs, AR
- Altus Air Force Base - Altus, OK

Sources: 2013, ADEQ. Hazardous Waste Division Website October.  
2013, USEPA CLU-IN Database, October.

## 3. Which chemical oxidants are being considered for the ISCO treatments?

- Peroxides
- Permanganates
- Persulfate
- Ozone
- Percarbonate

I hope this additional information on ISCO and MNA and their widely accepted use and successes in achieving the remedial goals at thousands of sites over many years addresses your questions. Whirlpool and ADEQ have identified this method as the most effective solution for the Fort Smith site based on a thorough understanding and analysis of the site.

Please contact me if you need additional information.

Sincerely,

ENVIRON International Corporation



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Gillespie  
Date: 2013.10.22 16:49:59  
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Gregory R. Gillespie  
Principal Consultant

GRG:grg

cc: Jeff Noel – Whirlpool Corporation  
Robert Karwowski – Whirlpool Corporation

## References

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- Borden et al. 2011. In Situ Chemical Oxidation for Groundwater Remediation. Ed. Siegrist R. L., Crimi M., and Simpkin T. J.
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- ITRC, 2005. Technical and Regulatory Guidance For In Situ Chemical Oxidation of Contaminated Soil and Groundwater. Second Edition. Washington, D.C.: Interstate Technology & Regulatory Council, In Situ Chemical Oxidation Team. January
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- USEPA, 2012. A Citizens Guide to Monitored Natural Attenuation. EPA 542-F-12-014. September
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- USEPA, 2012. Ground Water and Ecosystems Restoration Research - In Situ Chemical Oxidation. <http://www.epa.gov/ada/gw/isco.html>, November
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- USEPA 2013. Contaminated Site Clean-Up Information (CLU-IN) - In Situ Oxidation Overview [http://clu.in.org/techfocus/default.focus/sec/In\\_Situ\\_Oxidation/cat/Overview/](http://clu.in.org/techfocus/default.focus/sec/In_Situ_Oxidation/cat/Overview/)
- USEPA OSWER, 1999 – Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tanks. USEPA Directive Number 9200.4-17P