# MassDEP Field Assessment and Support Team (FAST)

| FALL RIVER – Route 24 Off-Ramp Gasoline Tanker Accident | January 27, 2014 |
|---|---|

**Background**

At approximately 7:00 AM on Monday, January 27, 2014, a tanker carrying 11,000 gallons of gasoline overturned on the exit 5 off-ramp to Route 24 in Fall River (see Figure 1). The driver was rescued by passing motorists and did not sustain major injuries.

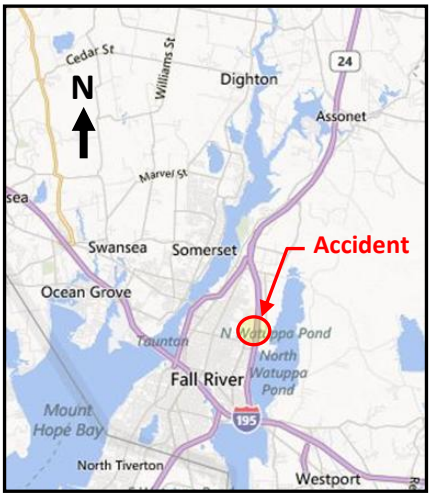

Figure 1 – Locus

The gasoline subsequently ignited and a decision was made by the Fall River Fire Department to allow it to burn. Thick black smoke emanating from the fire traveled to the north/northeast direction, though no evacuations were reportedly ordered. By about 9:00 AM, the fire had burned itself out, and foam was applied to stabilize the scene.

The tanker had come to rest in a wetland area proximate to Terry Brook, about 2900 feet westerly of North Watuppa Pond, a drinking water supply for the City of Fall River. Despite the complete loss of all 11,000 gallons of gasoline, no separate-phase product or sheen was observed on Terry Brook, and it was clear that a large percentage of the gasoline had been combusted in the fire.

**Scope of FAST Activities**

FAST assets and response personnel arrived at the site at approximately 11 AM, and were briefed by SERO ER staff. By that time, the remnants of the tanker were visible in a wetland area proximate to the off-ramp, covered in foam. There were no odors of gasoline, even directly adjacent to the tanker remains. Moreover, there were no sheens or separate-phase gasoline product noted in the spill area, or in Terry Brook.

While there were initial concerns that Terry Brook discharged into North Watuppa Pond, SERO ER staff were able to contact the Department of Community Utilities for the City of Fall River, who confirmed that Terry Brook is in fact intercepted by a 24 inch diameter culvert approximately 1100 feet downstream of the spill area, just east of Meridian Street. This culvert flows in a southerly direction, west of North Watuppa Pond, where it discharges into a larger engineered channel, which drains additional watershed areas westerly of the drinking water supply. Eventually, water from this interceptor system discharges into South Watuppa Pond, which is not a drinking water supply. This diversion system was constructed in 1915 for the apparent purpose of protecting the purity of the North Watuppa drinking water supply.

Absent odor, vapor, NAPL, or drinking water concerns, limited efforts were undertaken to investigate the extent to which gasoline constituents were dissolved in Terry Brook and the Interceptor drainage system. Of additional interest were possible chemicals that may have been present in the foam applied at the site.

The foam used on the tanker was reportedly "*Universal Gold 1%/3%*", an Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF). It is marketed as a biodegradable "environmentally responsible" material. According to its MSDS Sheet, this product consists primarily of a proprietary blend of detergents and surfactants, as well as (2-Methoxymethylethoxy) Propanol and Polysaccharide. Reportedly, it does not

contain "*components subject to the reporting requirements of CERCLA*." (http://www.kidde-fire.com/utcfs/ws-465/Assets/NMS420-UniversalGold1-3.pdf)

**Surface Water Testing**

Water samples were obtained from 5 locations, as depicted in Figures 2 and 3.


Figure 2 – Watershed Area

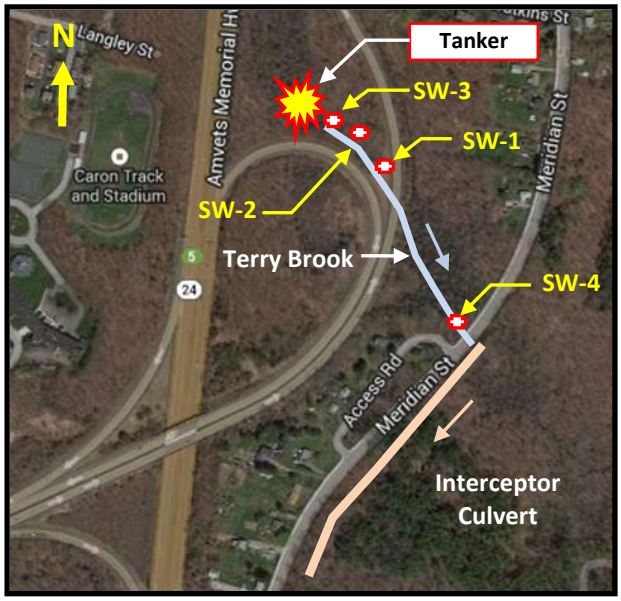


Figure 3 – Detail

Samples were obtained in 40 mL VOA vials, filled half way. Some samples were also collected in 9 oz polyethylene jars, for PID headspace analyses.

Samples in 40 mL vials were analyzed on a HAPSITE Gas Chromatograph/Mass Spectrometer (GC/MS), using a headspace technique. Samples SW-1 and SW-5 were analyzed on-site in the FAST mobile laboratory, while samples SW-2, SW-3, and SW-4 were analyzed the following day in the NERO Laboratory.

A summary of data is provided in Table 1. The GC/MS laboratory report sheets for each sample are included as an appendix.

Basically, testing data indicated low to moderate dissolved concentrations of gasoline hydrocarbons, including Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX). Many additional hydrocarbon peaks were also present in the source area, identified by the mass spectrometer as various branched and cyclic aliphatics and mono-aromatic compounds, all constituents in gasoline (Figure 4). A search of peaks in the Total Ion Chromatogram did not indicate the presence of significant levels of volatile compounds that may have been present in the foaming agent, though this is not surprising, since many of these detergents/surfactants and propanols are not readily volatilized in a headspace sampling technique and/or otherwise will not be detected on a mass spectrometer used in environmental applications.

| Table 1 – Surface Water Screening Results (GC/MS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | Concentration (µg/L)[1] | | | | | | |
| | SW-1 | SW-2 | SW-3 | SW-4 | SW-5 | Aquatic Toxicity Guideline | |
| | | | | | | Acute | Chronic |
| Benzene | 1000 | 500 | 700 | 100 | <3 | 4600 | 460 |
| Toluene | 1000 | 800 | 500 | 100 | <2 | 1400 | 1400 |
| Ethylbenzene | 100 | 100 | 60 | 10 | <2 | 1800 | 180 |
| Total Xylenes | 400 | 500 | 190 | 50 | <5 | 200 | 200 |
| 1,3,5 Trimethylbenzene | 60 | 60 | 30 | <5 | <2 | 5400 | 540 |
| 1,2,4-Trimethylbenzene | 200 | 200 | 80 | 10 | <3 | 5400 | 540 |

[1]Results reported to 1 significant figure commensurate with screening/headspace procedure

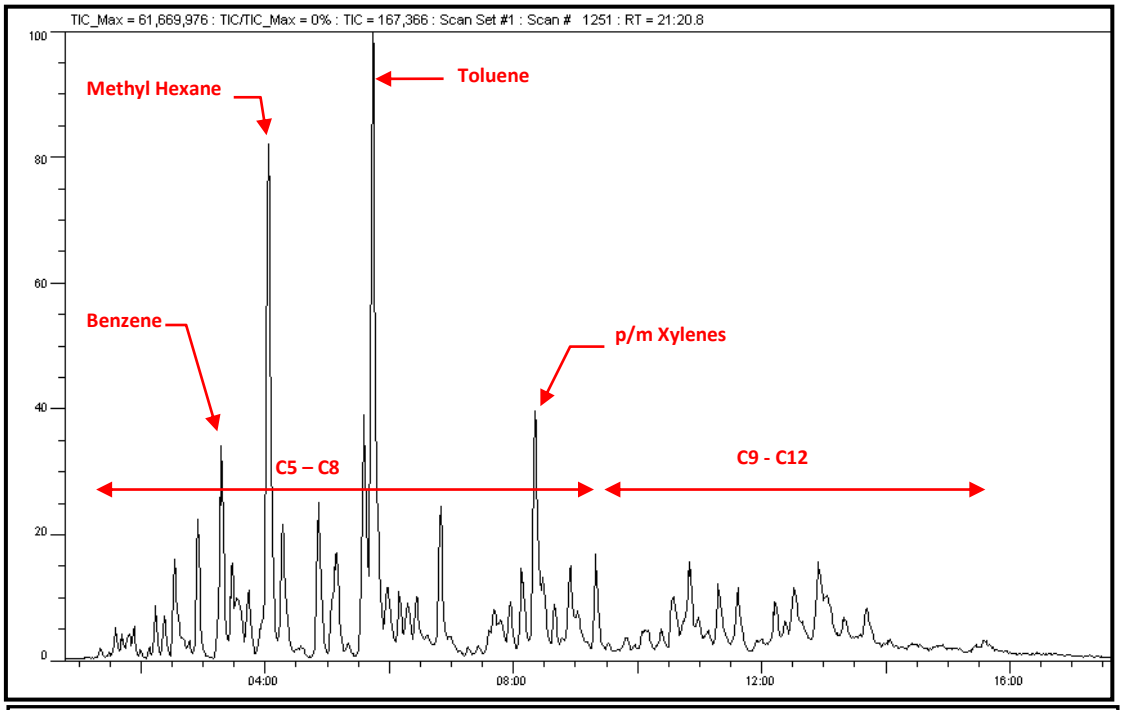


Figure 4 – Total Ion Chromatogram in Spill Area (SW-3)

As can be seen in Table 1, the concentrations of dissolved BTEX compounds were relatively modest. While concentrations of Xylenes in Terry Brook near the spill site exceeded aquatic toxicity guidelines, levels dropped significantly at SW-4, 1100 feet downstream of the spill area. At SW-5, 7800 feet downstream of the spill area, no gasoline (or any VOC) compounds were detected, which is consistent with the substantial increase in flow at this point, due to inflow from other areas of the watershed.

While the BTEX (and Trimethylbenzenes) compounds dominate the water-soluble fraction of gasoline, there were also detectable levels of numerous other gasoline components, as indicated in the Total Ion Chromatogram for SW-3 (Figure 4), obtained just downstream of the spill area. Ethanol was detected in

this sample, but only at low levels; it is likely present at much higher concentrations but cannot be adequately quantified by the headspace screening technique used.

These other gasoline constituents – which were not present in SW-5, are not likely to be a significant threat to aquatic life.

**Conclusion**

Despite the loss of 11,000 gallons of gallons at a point less than 3000 feet from a major drinking water supply reservoir, there was remarkably little impacts to the environment. This was attributable to the fire which consumed virtually all of the released product, and the watershed protection system installed by the City of Fall River almost 100 years ago.

While low levels of dissolved gasoline constituents may continue to be present in Terry Brook until such time as residual product is removed from (or biodegraded at) the spill area, such concentrations are not expected to pose more than a localized and temporary concern to any aquatic life that may be present in the brook.

| MassDEP Field Assessment and Support Team (FAST) | | | | SURFACE WATER | | | RTN: | 4-24970 |
|---|---|---|---|---|---|---|---|---|
| City or Town: | Fall River | | Address: | Route 24 Off Ramp | | | | Location: |
| Date Sampled: | 1/27/14 | Time: | 11:29 AM | Field ID: | SW-1 | Collector: | Clark | Terry Brook near Spill Site |
| Date Analyzed: | 1/28/14 | Time: | 4:10 PM | Lab ID: | 008 | Analyst: | Fitzgerald | |

NOTE - ALL REPORTED VALUES ARE ESTIMATES, BASED UPON HEADSPACE ANALYSIS AND APPLICATION OF HENRY'S LAW

| Method Analytes | Est Conc µg/L | | Sample | Dilution | Hdspc | K | DW | Aquatic Toxicty µg/L | |
|---|---|---|---|---|---|---|---|---|---|
| | Result | R.L. | ppbV | Factor | ppbV | (25°C) | µg/L | Acute | Chronic |
| Vinyl Chloride | N.D. | 2 | N.D. | 170 | N.D. | 1.14 | 2 | 400,000 | 40,000 |
| Bromomethane | N.D. | 20 | N.D. | 170 | N.D. | 0.301 | 10 | 300 | 30 |
| Chloroethane | N.D. | 41 | N.D. | 170 | N.D. | 0.275 | NS | NA | NA |
| Trichloromonofluoromethane | N.D. | 29 | N.D. | 170 | N.D. | 4.51 | NS | NA | NA |
| 1,1-Dichloroethene | N.D. | 2 | N.D. | 170 | N.D. | 0.634 | 7 | 12,000 | 1,200 |
| Methylene Chloride | N.D. | 18 | N.D. | 170 | N.D. | 0.09 | 5 | NA | 6,700 |
| 1,1,2-Trichlorotrifluoroethane | N.D. | 35 | N.D. | 170 | N.D. | 14.34 | NS | NA | NA |
| 1,1-Dichloroethane | N.D. | 140 | N.D. | 170 | N.D. | 0.012 | 70 | NA | 990 |
| Cis 1,2-Dichloroethylene | N.D. | 6 | N.D. | 170 | N.D. | 0.167 | 70 | 140,000 | 14,000 |
| Chloroform | N.D. | 8 | N.D. | 170 | N.D. | 0.151 | 70 | NA | 970 |
| 1,2-Dichloroethane | N.D. | 37 | N.D. | 170 | N.D. | 0.024 | 5 | NA | 990 |
| 1,1,1-Trichloroethane | N.D. | 3 | N.D. | 170 | N.D. | 0.705 | 200 | 9000 | 900 |
| Benzene | **1000** | 7 | 171 | 170 | 29031 | 0.116 | 5 | 4600 | 460 |
| Carbon Tetrachloride | N.D. | 3 | N.D. | 170 | N.D. | 1.132 | 5 | 2000 | 200 |
| 1,2-Dichloropropane | N.D. | 9 | N.D. | 170 | N.D. | 0.116 | 5 | NA | 25,000 |
| Trichloroethylene | N.D. | 7 | N.D. | 170 | N.D. | 0.197 | 5 | 1900 | 190 |
| cis-1,3-Dichloropropene | N.D. | 8 | N.D. | 170 | N.D. | 0.146 | NS | 90 | 9 |
| trans-1,3-Dichloropropene | N.D. | 56 | N.D. | 170 | N.D. | 0.036 | NS | 90 | 9 |
| 1,1,2-Trichloroethane | N.D. | 35 | N.D. | 170 | N.D. | 0.034 | 5 | NA | 15,000 |
| Toluene | **1000** | 4 | 267 | 170 | 45325 | 0.272 | 1,000 | 1400 | 1,400 |
| 1,2-Dibromoethane | N.D. | 53 | N.D. | 170 | N.D. | 0.029 | NS | NA | 9600 |
| Tetrachloroethylene | N.D. | 3 | N.D. | 170 | N.D. | 0.726 | 5 | NA | 1,100 |
| Chlorobenzene | N.D. | 9 | N.D. | 170 | N.D. | 0.128 | 100 | NA | 38 |
| Ethylbenzene | **100** | 4 | 29 | 170 | 5012 | 0.323 | 700 | 1800 | 180 |
| p/m-Xylene (see note) | **200** | 4 | 37 | 170 | 6316 | 0.27 | 10,000 | 200 | 200 |
| Styrene | N.D. | 9 | N.D. | 170 | N.D. | 0.113 | 100 | 2500 | 250 |
| o-Xylene | **200** | 9 | 26 | 170 | 4500 | 0.114 | part of total Xylenes | | |
| 1,1,2,2-Tetrachloroethane | N.D. | 99 | N.D. | 170 | N.D. | 0.015 | 5 | NA | 4,000 |
| 1,3,5-Trimethylbenzene | **60** | 5 | 12 | 170 | 2060 | 0.272 | NS | 5400 | 540 |
| 1,2,4-Trimethylbenzene | **200** | 6 | 29 | 170 | 5007 | 0.212 | NS | 5400 | 540 |
| 1,3-Dichlorobenzene (meta) | N.D. | 13 | N.D. | 170 | N.D. | 0.108 | 1 | NA | 1500 |
| 1,2-Dichlorobenzene (ortho) | N.D. | 18 | N.D. | 170 | N.D. | 0.079 | 9 | 780 | 78 |
| 1,4-Dichlorobenzene (para) | N.D. | 14 | N.D. | 170 | N.D. | 0.099 | 0.7 | NA | 310 |
| 1,2,4-Trichlorobenzene | N.D. | 57 | N.D. | 170 | N.D. | 0.058 | 2 | NA | 340 |
| HexachloroButadiene | N.D. | 18 | N.D. | 170 | N.D. | 0.334 | 6 | NA | 13 |

Instrument: HAPSITE Smart Plus GC/MS Method: FAST TO-14 Last Calib: 3/14/13 Reporting Limit (R.L.) is lowest calib standard

Quality Control: 3-6 point calib w/ %RSD<30, Internal Stds, daily blank, daily calib check standard R.L= estimated aqueous conc

Headspace procedure involves half-filling a 40 mL vial and shaking it vigorously 30 seconds twice over a minimum 10 minute time period, at about 25°C. Calculated aqueous concentration assumes 75% of equilbrium conditions using Henry's Law.

N.D. = Not Detected K = dimensionless Henry's Law Constant DW = Drinking Water standard NA = Information Not Available

Aquatic Toxicity values from various sources as selected in MassDEP Method 1 Standard calculations for GW-3 (2013 proposal)

**COMMENTS: Chromatogram contains numerous other hydrocarbon peaks consistent with gasoline.**

| MassDEP Field Assessment and Support Team (FAST) | | | | SURFACE WATER | | | RTN: | 4-24970 |
|---|---|---|---|---|---|---|---|---|
| City or Town: | Fall River | | Address: | Route 24 Off Ramp | | | | Location: |
| Date Sampled: | 1/27/14 | Time: | 11:34AM | Field ID: | SW-2 | Collector: | Clark | Terry Brook near Spill Site |
| Date Analyzed: | 1/28/14 | Time: | 1:32 PM | Lab ID: | 005 | Analyst: | Fitzgerald | |

NOTE - ALL REPORTED VALUES ARE ESTIMATES, BASED UPON HEADSPACE ANALYSIS AND APPLICATION OF HENRY'S LAW

| Method Analytes | Est Conc µg/L | | Sample | Dilution | Hdspc | K | DW | Aquatic Toxicty µg/L | |
|---|---|---|---|---|---|---|---|---|---|
| | Result | R.L. | ppbV | Factor | ppbV | (25°C) | µg/L | Acute | Chronic |
| Vinyl Chloride | N.D. | 2 | N.D. | 170 | N.D. | 1.14 | 2 | 400,000 | 40,000 |
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| Trichloromonofluoromethane | N.D. | 29 | N.D. | 170 | N.D. | 4.51 | NS | NA | NA |
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| 1,1-Dichloroethane | N.D. | 140 | N.D. | 170 | N.D. | 0.012 | 70 | NA | 990 |
| Cis 1,2-Dichloroethylene | N.D. | 6 | N.D. | 170 | N.D. | 0.167 | 70 | 140,000 | 14,000 |
| Chloroform | N.D. | 8 | N.D. | 170 | N.D. | 0.151 | 70 | NA | 970 |
| 1,2-Dichloroethane | N.D. | 37 | N.D. | 170 | N.D. | 0.024 | 5 | NA | 990 |
| 1,1,1-Trichloroethane | N.D. | 3 | N.D. | 170 | N.D. | 0.705 | 200 | 9000 | 900 |
| Benzene | **500** | 7 | 81 | 170 | 13823 | 0.116 | 5 | 4600 | 460 |
| Carbon Tetrachloride | N.D. | 3 | N.D. | 170 | N.D. | 1.132 | 5 | 2000 | 200 |
| 1,2-Dichloropropane | N.D. | 9 | N.D. | 170 | N.D. | 0.116 | 5 | NA | 25,000 |
| Trichloroethylene | N.D. | 7 | N.D. | 170 | N.D. | 0.197 | 5 | 1900 | 190 |
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| trans-1,3-Dichloropropene | N.D. | 56 | N.D. | 170 | N.D. | 0.036 | NS | 90 | 9 |
| 1,1,2-Trichloroethane | N.D. | 35 | N.D. | 170 | N.D. | 0.034 | 5 | NA | 15,000 |
| Toluene | **800** | 4 | 214 | 170 | 36411 | 0.272 | 1,000 | 1400 | 1,400 |
| 1,2-Dibromoethane | N.D. | 53 | N.D. | 170 | N.D. | 0.029 | NS | NA | 9600 |
| Tetrachloroethylene | N.D. | 3 | N.D. | 170 | N.D. | 0.726 | 5 | NA | 1,100 |
| Chlorobenzene | N.D. | 9 | N.D. | 170 | N.D. | 0.128 | 100 | NA | 38 |
| Ethylbenzene | **100** | 4 | 33 | 170 | 5579 | 0.323 | 700 | 1800 | 180 |
| p/m-Xylene (see note) | **200** | 4 | 42 | 170 | 7201 | 0.27 | 10,000 | 200 | 200 |
| Styrene | **10** | 9 | 1 | 170 | 182 | 0.113 | 100 | 2500 | 250 |
| o-Xylene | **300** | 9 | 30 | 170 | 5078 | 0.114 | part of total Xylenes | | |
| 1,1,2,2-Tetrachloroethane | N.D. | 99 | N.D. | 170 | N.D. | 0.015 | 5 | NA | 4,000 |
| 1,3,5-Trimethylbenzene | **60** | 5 | 12 | 170 | 1992 | 0.272 | NS | 5400 | 540 |
| 1,2,4-Trimethylbenzene | **200** | 6 | 29 | 170 | 5003 | 0.212 | NS | 5400 | 540 |
| 1,3-Dichlorobenzene (meta) | N.D. | 13 | N.D. | 170 | N.D. | 0.108 | 1 | NA | 1500 |
| 1,2-Dichlorobenzene (ortho) | N.D. | 18 | N.D. | 170 | N.D. | 0.079 | 9 | 780 | 78 |
| 1,4-Dichlorobenzene (para) | N.D. | 14 | N.D. | 170 | N.D. | 0.099 | 0.7 | NA | 310 |
| 1,2,4-Trichlorobenzene | N.D. | 57 | N.D. | 170 | N.D. | 0.058 | 2 | NA | 340 |
| HexachloroButadiene | N.D. | 18 | N.D. | 170 | N.D. | 0.334 | 6 | NA | 13 |

Instrument: HAPSITE Smart Plus GC/MS Method: FAST TO-14 Last Calib: 3/14/13 Reporting Limit (R.L.) is lowest calib standard

Quality Control: 3-6 point calib w/ %RSD<30, Internal Stds, daily blank, daily calib check standard R.L= estimated aqueous conc

Headspace procedure involves half-filling a 40 mL vial and shaking it vigorously 30 seconds twice over a minimum 10 minute time period, at about 25°C. Calculated aqueous concentration assumes 75% of equilbrium conditions using Henry's Law.

N.D. = Not Detected K = dimensionless Henry's Law Constant DW = Drinking Water standard NA = Information Not Available

Aquatic Toxicity values from various sources as selected in MassDEP Method 1 Standard calculations for GW-3 (2013 proposal)

**COMMENTS: Chromatogram contains numerous other hydrocarbon peaks consistent with gasoline.**

| MassDEP Field Assessment and Support Team (FAST) | | | | SURFACE WATER | | | RTN: | 4-24970 |
|---|---|---|---|---|---|---|---|---|
| City or Town: | Fall River | | Address: | Route 24 Off Ramp | | | | Location: |
| Date Sampled: | 1/27/14 | Time: | 11:43 AM | Field ID: | SW-3 | Collector: | Clark | Terry Brook at Spill Site |
| Date Analyzed: | 1/28/14 | Time: | 3:14 PM | Lab ID: | 007 | Analyst: | Fitzgerald | |

NOTE - ALL REPORTED VALUES ARE ESTIMATES, BASED UPON HEADSPACE ANALYSIS AND APPLICATION OF HENRY'S LAW

| Method Analytes | Est Conc µg/L | | Sample | Dilution | Hdspc | K | DW | Aquatic Toxicty µg/L | |
|---|---|---|---|---|---|---|---|---|---|
| | Result | R.L. | ppbV | Factor | ppbV | (25°C) | µg/L | Acute | Chronic |
| Vinyl Chloride | N.D. | 2 | N.D. | 170 | N.D. | 1.14 | 2 | 400,000 | 40,000 |
| Bromomethane | N.D. | 20 | N.D. | 170 | N.D. | 0.301 | 10 | 300 | 30 |
| Chloroethane | N.D. | 41 | N.D. | 170 | N.D. | 0.275 | NS | NA | NA |
| Trichloromonofluoromethane | N.D. | 29 | N.D. | 170 | N.D. | 4.51 | NS | NA | NA |
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| 1,1,2-Trichlorotrifluoroethane | N.D. | 35 | 3 | 170 | N.D. | 14.34 | NS | NA | NA |
| 1,1-Dichloroethane | N.D. | 140 | N.D. | 170 | N.D. | 0.012 | 70 | NA | 990 |
| Cis 1,2-Dichloroethylene | N.D. | 6 | N.D. | 170 | N.D. | 0.167 | 70 | 140,000 | 14,000 |
| Chloroform | N.D. | 8 | N.D. | 170 | N.D. | 0.151 | 70 | NA | 970 |
| 1,2-Dichloroethane | N.D. | 37 | N.D. | 170 | N.D. | 0.024 | 5 | NA | 990 |
| 1,1,1-Trichloroethane | N.D. | 3 | N.D. | 170 | N.D. | 0.705 | 200 | 9000 | 900 |
| Benzene | **700** | 7 | 101 | 170 | 17128 | 0.116 | 5 | 4600 | 460 |
| Carbon Tetrachloride | N.D. | 3 | N.D. | 170 | N.D. | 1.132 | 5 | 2000 | 200 |
| 1,2-Dichloropropane | N.D. | 9 | N.D. | 170 | N.D. | 0.116 | 5 | NA | 25,000 |
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| 1,1,2-Trichloroethane | N.D. | 35 | N.D. | 170 | N.D. | 0.034 | 5 | NA | 15,000 |
| Toluene | **500** | 4 | 128 | 170 | 21823 | 0.272 | 1,000 | 1400 | 1,400 |
| 1,2-Dibromoethane | N.D. | 53 | N.D. | 170 | N.D. | 0.029 | NS | NA | 9600 |
| Tetrachloroethylene | N.D. | 3 | N.D. | 170 | N.D. | 0.726 | 5 | NA | 1,100 |
| Chlorobenzene | N.D. | 9 | N.D. | 170 | N.D. | 0.128 | 100 | NA | 38 |
| Ethylbenzene | **60** | 4 | 16 | 170 | 2637 | 0.323 | 700 | 1800 | 180 |
| p/m-Xylene (see note) | **90** | 4 | 22 | 170 | 3675 | 0.27 | 10,000 | 200 | 200 |
| Styrene | N.D. | 9 | N.D. | 170 | N.D. | 0.113 | 100 | 2500 | 250 |
| o-Xylene | **100** | 9 | 14 | 170 | 2373 | 0.114 | part of total Xylenes | | |
| 1,1,2,2-Tetrachloroethane | N.D. | 99 | N.D. | 170 | N.D. | 0.015 | 5 | NA | 4,000 |
| 1,3,5-Trimethylbenzene | **30** | 5 | 6 | 170 | 965 | 0.272 | NS | 5400 | 540 |
| 1,2,4-Trimethylbenzene | **80** | 6 | 13 | 170 | 2144 | 0.212 | NS | 5400 | 540 |
| 1,3-Dichlorobenzene (meta) | N.D. | 13 | N.D. | 170 | N.D. | 0.108 | 1 | NA | 1500 |
| 1,2-Dichlorobenzene (ortho) | N.D. | 18 | N.D. | 170 | N.D. | 0.079 | 9 | 780 | 78 |
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| 1,2,4-Trichlorobenzene | N.D. | 57 | N.D. | 170 | N.D. | 0.058 | 2 | NA | 340 |
| HexachloroButadiene | N.D. | 18 | N.D. | 170 | N.D. | 0.334 | 6 | NA | 13 |

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**COMMENTS: Chromatogram contains numerous other hydrocarbon peaks consistent with gasoline.**

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|---|---|---|---|---|---|---|---|---|
| City or Town: | Fall River | | Address: | Route 24 Off Ramp | | | Location: | |
| Date Sampled: | 1/27/14 | Time: | 1:25 PM | Field ID: | SW-4 | Collector: | Clark | Terry Brook @ Meridian St |
| Date Analyzed: | 1/28/14 | Time: | 2:42 PM | Lab ID: | 006 | Analyst: | Fitzgerald | |

NOTE - ALL REPORTED VALUES ARE ESTIMATES, BASED UPON HEADSPACE ANALYSIS AND APPLICATION OF HENRY'S LAW

| Method Analytes | Est Conc µg/L | | Sample | Dilution | Hdspc | K | DW | Aquatic Toxicty µg/L | |
|---|---|---|---|---|---|---|---|---|---|
| | Result | R.L. | ppbV | Factor | ppbV | (25°C) | µg/L | Acute | Chronic |
| Vinyl Chloride | N.D. | 2 | N.D. | 170 | N.D. | 1.14 | 2 | 400,000 | 40,000 |
| Bromomethane | N.D. | 20 | N.D. | 170 | N.D. | 0.301 | 10 | 300 | 30 |
| Chloroethane | N.D. | 41 | N.D. | 170 | N.D. | 0.275 | NS | NA | NA |
| Trichloromonofluoromethane | N.D. | 29 | N.D. | 170 | N.D. | 4.51 | NS | NA | NA |
| 1,1-Dichloroethene | N.D. | 2 | N.D. | 170 | N.D. | 0.634 | 7 | 12,000 | 1,200 |
| Methylene Chloride | N.D. | 18 | N.D. | 170 | N.D. | 0.09 | 5 | NA | 6,700 |
| 1,1,2-Trichlorotrifluoroethane | N.D. | 35 | 3 | 170 | N.D. | 14.34 | NS | NA | NA |
| 1,1-Dichloroethane | N.D. | 140 | N.D. | 170 | N.D. | 0.012 | 70 | NA | 990 |
| Cis 1,2-Dichloroethylene | N.D. | 6 | N.D. | 170 | N.D. | 0.167 | 70 | 140,000 | 14,000 |
| Chloroform | N.D. | 8 | N.D. | 170 | N.D. | 0.151 | 70 | NA | 970 |
| 1,2-Dichloroethane | N.D. | 37 | N.D. | 170 | N.D. | 0.024 | 5 | NA | 990 |
| 1,1,1-Trichloroethane | N.D. | 3 | N.D. | 170 | N.D. | 0.705 | 200 | 9000 | 900 |
| Benzene | **100** | 7 | 18 | 170 | 3035 | 0.116 | 5 | 4600 | 460 |
| Carbon Tetrachloride | N.D. | 3 | N.D. | 170 | N.D. | 1.132 | 5 | 2000 | 200 |
| 1,2-Dichloropropane | N.D. | 9 | N.D. | 170 | N.D. | 0.116 | 5 | NA | 25,000 |
| Trichloroethylene | N.D. | 7 | N.D. | 170 | N.D. | 0.197 | 5 | 1900 | 190 |
| cis-1,3-Dichloropropene | N.D. | 8 | N.D. | 170 | N.D. | 0.146 | NS | 90 | 9 |
| trans-1,3-Dichloropropene | N.D. | 56 | N.D. | 170 | N.D. | 0.036 | NS | 90 | 9 |
| 1,1,2-Trichloroethane | N.D. | 35 | N.D. | 170 | N.D. | 0.034 | 5 | NA | 15,000 |
| Toluene | **100** | 4 | 35 | 170 | 6027 | 0.272 | 1,000 | 1400 | 1,400 |
| 1,2-Dibromoethane | N.D. | 53 | N.D. | 170 | N.D. | 0.029 | NS | NA | 9600 |
| Tetrachloroethylene | N.D. | 3 | N.D. | 170 | N.D. | 0.726 | 5 | NA | 1,100 |
| Chlorobenzene | N.D. | 9 | N.D. | 170 | N.D. | 0.128 | 100 | NA | 38 |
| Ethylbenzene | **10** | 4 | 3 | 170 | 586 | 0.323 | 700 | 1800 | 180 |
| p/m-Xylene (see note) | **20** | 4 | 6 | 170 | 962 | 0.27 | 10,000 | 200 | 200 |
| Styrene | N.D. | 9 | N.D. | 170 | N.D. | 0.113 | 100 | 2500 | 250 |
| o-Xylene | **30** | 9 | 3 | 170 | 553 | 0.114 | part of total Xylenes | | |
| 1,1,2,2-Tetrachloroethane | N.D. | 99 | N.D. | 170 | N.D. | 0.015 | 5 | NA | 4,000 |
| 1,3,5-Trimethylbenzene | N.D. | 5 | N.D. | 170 | N.D. | 0.272 | NS | 5400 | 540 |
| 1,2,4-Trimethylbenzene | **10** | 6 | 2 | 170 | 405 | 0.212 | NS | 5400 | 540 |
| 1,3-Dichlorobenzene (meta) | N.D. | 13 | N.D. | 170 | N.D. | 0.108 | 1 | NA | 1500 |
| 1,2-Dichlorobenzene (ortho) | N.D. | 18 | N.D. | 170 | N.D. | 0.079 | 9 | 780 | 78 |
| 1,4-Dichlorobenzene (para) | N.D. | 14 | N.D. | 170 | N.D. | 0.099 | 0.7 | NA | 310 |
| 1,2,4-Trichlorobenzene | N.D. | 57 | N.D. | 170 | N.D. | 0.058 | 2 | NA | 340 |
| HexachloroButadiene | N.D. | 18 | N.D. | 170 | N.D. | 0.334 | 6 | NA | 13 |

Instrument: HAPSITE Smart Plus GC/MS Method: FAST TO-14 Last Calib: 3/14/13 Reporting Limit (R.L.) is lowest calib standard

Quality Control: 3-6 point calib w/ %RSD<30, Internal Stds, daily blank, daily calib check standard R.L= estimated aqueous conc

Headspace procedure involves half-filling a 40 mL vial and shaking it vigorously 30 seconds twice over a minimum 10 minute time period, at about 25°C. Calculated aqueous concentration assumes 75% of equilbrium conditions using Henry's Law.

N.D. = Not Detected K = dimensionless Henry's Law Constant DW = Drinking Water standard NA = Information Not Available

Aquatic Toxicity values from various sources as selected in MassDEP Method 1 Standard calculations for GW-3 (2013 proposal)

**COMMENTS: Chromatogram contains numerous other hydrocarbon peaks consistent with gasoline.**

| MassDEP Field Assessment and Support Team (FAST) | | | | SURFACE WATER | | | RTN: | 4-24970 |
|---|---|---|---|---|---|---|---|---|
| City or Town: | Fall River | | Address: | Route 24 Off Ramp | | | | Location: |
| Date Sampled: | 1/27/14 | Time: | 2:55 PM | Field ID: | SW-5 | Collector: | Clark | Interceptor Drain 7000 ft from spill |
| Date Analyzed: | 1/27/14 | Time: | 3:37 PM | Lab ID: | 003 | Analyst: | Fitzgerald | |

NOTE - ALL REPORTED VALUES ARE ESTIMATES, BASED UPON HEADSPACE ANALYSIS AND APPLICATION OF HENRY'S LAW

| Method Analytes | Est Conc µg/L | | Sample | Dilution | Hdspc | K | DW | Aquatic Toxicty µg/L | |
|---|---|---|---|---|---|---|---|---|---|
| | Result | R.L. | ppbV | Factor | ppbV | (25°C) | µg/L | Acute | Chronic |
| Vinyl Chloride | N.D. | 1 | N.D. | 85 | N.D. | 1.14 | 2 | 400,000 | 40,000 |
| Bromomethane | N.D. | 10 | N.D. | 85 | N.D. | 0.301 | 10 | 300 | 30 |
| Chloroethane | N.D. | 20 | N.D. | 85 | N.D. | 0.275 | NS | NA | NA |
| Trichloromonofluoromethane | N.D. | 15 | N.D. | 85 | N.D. | 4.51 | NS | NA | NA |
| 1,1-Dichloroethene | N.D. | 1 | N.D. | 85 | N.D. | 0.634 | 7 | 12,000 | 1,200 |
| Methylene Chloride | N.D. | 1 | N.D. | 85 | N.D. | 0.09 | 5 | NA | 6,700 |
| 1,1,2-Trichlorotrifluoroethane | N.D. | 17 | N.D. | 85 | N.D. | 14.34 | NS | NA | NA |
| 1,1-Dichloroethane | N.D. | 70 | N.D. | 85 | N.D. | 0.012 | 70 | NA | 990 |
| Cis 1,2-Dichloroethylene | N.D. | 3 | N.D. | 85 | N.D. | 0.167 | 70 | 140,000 | 14,000 |
| Chloroform | N.D. | 4 | N.D. | 85 | N.D. | 0.151 | 70 | NA | 970 |
| 1,2-Dichloroethane | N.D. | 19 | N.D. | 85 | N.D. | 0.024 | 5 | NA | 990 |
| 1,1,1-Trichloroethane | N.D. | 1 | N.D. | 85 | N.D. | 0.705 | 200 | 9000 | 900 |
| Benzene | N.D. | 3 | N.D. | 85 | N.D. | 0.116 | 5 | 4600 | 460 |
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| trans-1,3-Dichloropropene | N.D. | 28 | N.D. | 85 | N.D. | 0.036 | NS | 90 | 9 |
| 1,1,2-Trichloroethane | N.D. | 18 | N.D. | 85 | N.D. | 0.034 | 5 | NA | 15,000 |
| Toluene | N.D. | 2 | N.D. | 85 | N.D. | 0.272 | 1,000 | 1400 | 1,400 |
| 1,2-Dibromoethane | N.D. | 26 | N.D. | 85 | N.D. | 0.029 | NS | NA | 9600 |
| Tetrachloroethylene | N.D. | 2 | N.D. | 85 | N.D. | 0.726 | 5 | NA | 1,100 |
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| Styrene | N.D. | 5 | N.D. | 85 | N.D. | 0.113 | 100 | 2500 | 250 |
| o-Xylene | N.D. | 5 | N.D. | 85 | N.D. | 0.114 | part of total Xylenes | | |
| 1,1,2,2-Tetrachloroethane | N.D. | 49 | N.D. | 85 | N.D. | 0.015 | 5 | NA | 4,000 |
| 1,3,5-Trimethylbenzene | N.D. | 2 | N.D. | 85 | N.D. | 0.272 | NS | 5400 | 540 |
| 1,2,4-Trimethylbenzene | N.D. | 3 | N.D. | 85 | N.D. | 0.212 | NS | 5400 | 540 |
| 1,3-Dichlorobenzene (meta) | N.D. | 7 | N.D. | 85 | N.D. | 0.108 | 1 | NA | 1500 |
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| 1,2,4-Trichlorobenzene | N.D. | 29 | N.D. | 85 | N.D. | 0.058 | 2 | NA | 340 |
| HexachloroButadiene | N.D. | 9 | N.D. | 85 | N.D. | 0.334 | 6 | NA | 13 |

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**COMMENTS:**