



CASE STUDY

USE OF iSOC[®] TECHNOLOGY AT PETROLEUM TANKER SPILL

SOUTHEAST, IOWA



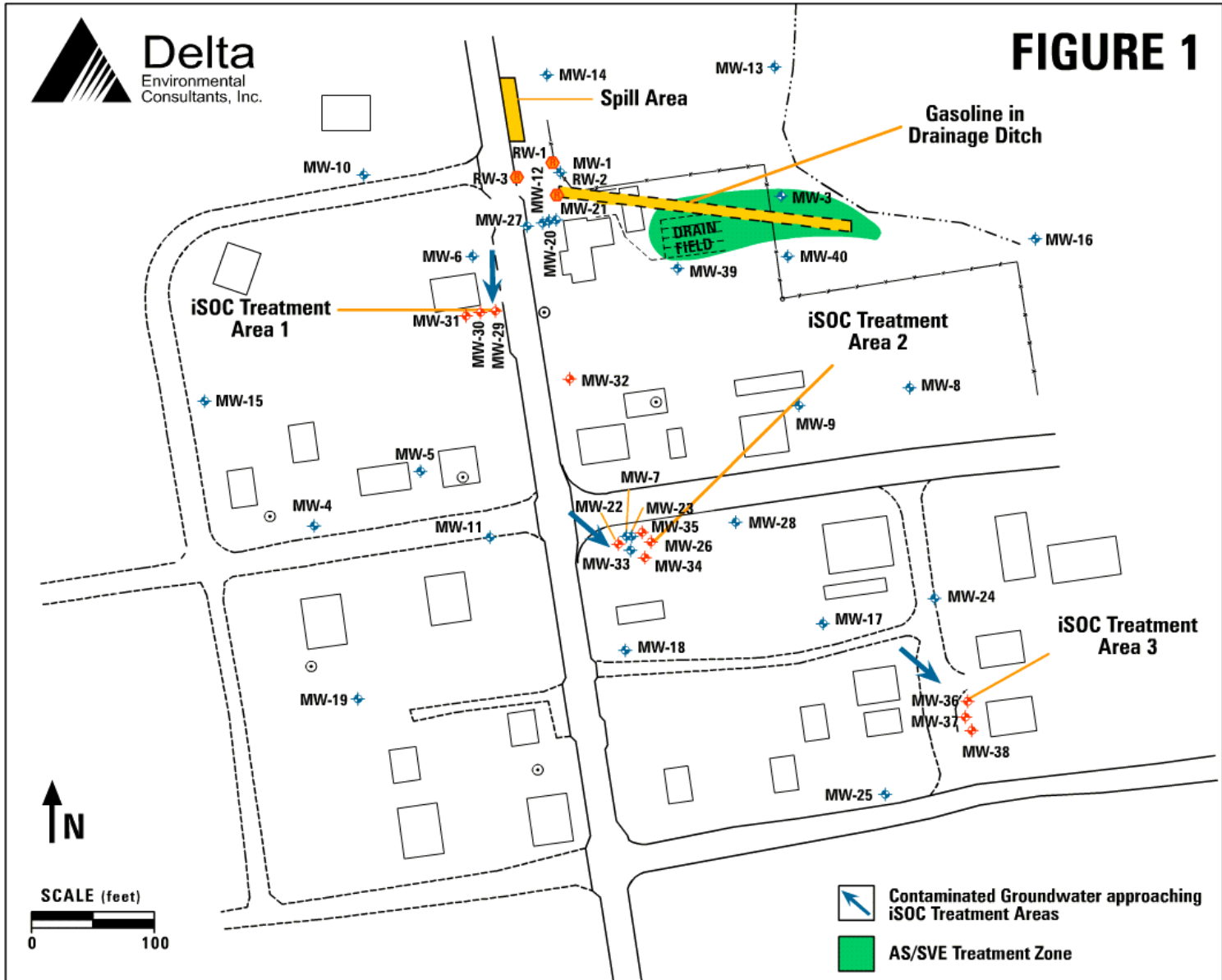
Spill History

- **Tanker truck overturned January 8th, 2001 (Spill of 2200 Gallons of unleaded gasoline in a location in Southeast Iowa)**
- **Gasoline spilled into ditch on north side of the town – Spill also entered culvert and flowed 300 feet east to the culvert outlet (see Fig 1)**



Remediation History

- **180 tons of contaminated soil immediately excavated & removed – Jan, 2001**
- **Air sparging (AS) & soil vapor extraction (SVE) systems installed in spill area – Jan, 2004 (See Fig 1)**
- **3 iSOC[®] oxygen curtains installed – Jan, 2004, down-gradient of AS & SVE systems along contaminated plume. Operation started January 23, 2004. (See Fig 1)**





Site Geology

- **Top 2 – 17 feet is silty clay, creating a confined aquifer**
- **Well – sorted medium to fine sand present at depths of 5 – 20 feet**
- **Poorly sorted fine to coarse sand at depths of 12 – 25 feet**
- **Bedrock is weathered shale**



iSOC[®] System

- **3 iSOC[®] curtains (3 iSOC[®]s per curtain) along contaminant plume at 3 separate locations on the site.**
 - **curtain 1 > 100 feet from source**
 - **curtain 2 > 300 feet from source**
 - **curtain 3 > 600 feet from source**
- **15 feet distance between iSOC[®] wells.**
- **Screen length 10 feet.**
- **Average water column thickness in wells 5.5 – 7.0 feet.**
- **Average DO > 40 ppm in iSOC[®] injection wells.**



Curtain Detail Location

Curtain 1	Curtain 2	Curtain 3
MW-29	MW-7	MW-36
MW-30	MW-22	MW-37
MW-31	MW-35	MW-38



iSOC® System Gas Cylinder in the Remediation Shed





iSOC® System Control Panel in the Remediation Shed





Monitor Well #32 (100ft. Downgradient of iSOC[®] Treatment Curtain 1)

Date	Benzene	Toluene	E-Benzene	Xylene	MTBE
1/30/04	254	6	<1	7	12
3/23/04	117	5	<1	BDL	6
6/2/04	8	1	<1	BDL	2
6/14/04	26	BDL	<1	BDL	3
6/29/04	219	8	<1	62	11
9/13/04	148	1	<1	5	5
12/7/04	50	2	<1	BDL	BDL
2/23/05	BDL	BDL	<1	BDL	BDL
6/16/05	BDL	BDL	<1	BDL	BDL

BDL: Below Detection Level

All Figures in ppb



Monitor Well #26 (15ft. Downgradient of iSOC® Treatment Curtain 2)

Date	Benzene	Toluene	E-Benzene	Xylene	MTBE
5/16/03	1150	14	6.6	15	18
10/17/03	1130	17	BDL	6	36
3/23/04	27	BDL	BDL	BDL	19
6/2/04	1450	19	BDL	15	38
6/14/04	1400	24	BDL	BDL	34
6/29/04	1990	36	BDL	12	48
9/15/04	291	4	BDL	BDL	30
12/7/04	35	BDL	BDL	BDL	7
2/23/05	14	BDL	BDL	BDL	BDL
6/16/05	104	BDL	BDL	5	BDL

BDL: Below Detection Level

All Figures in ppb



Monitor Well #34 (40ft. Downgradient of iSOC® Treatment Curtain 2)

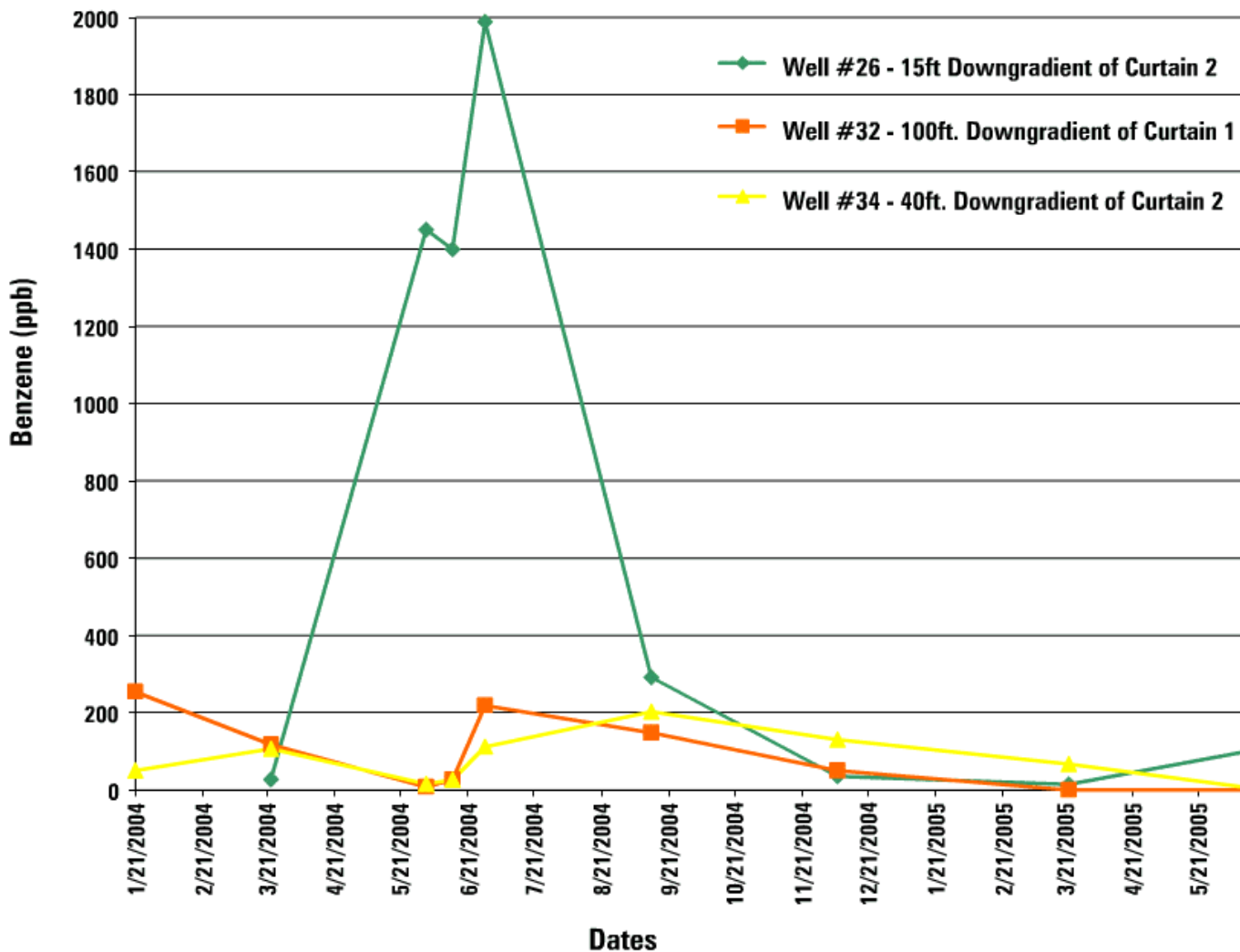
Date	Benzene	Toluene	E-Benzene	Xylene	MTBE
1/21/04	50	1	BDL	BDL	7
3/23/04	107	2	BDL	BDL	7
6/2/04	16	BDL	BDL	BDL	7
6/14/04	27	BDL	BDL	BDL	9
6/29/04	112	BDL	BDL	BDL	13
9/13/04	203	BDL	BDL	BDL	16
12/7/04	131	BDL	BDL	BDL	5
3/23/05	67	BDL	BDL	BDL	BDL
6/16/05	4	BDL	BDL	BDL	BDL

BDL: Below Detection Level

All Figures in ppb



Benzene Concentrations in MW 26, MW 32 & MW 34 (Curtains 1 & 2)





Conclusions

- **iSOC[®] Technology has been utilized to bioremediate petroleum products in ground water from a tanker truck spill, from January 2004 to present.**
- **Low – Moderate concentration petroleum plume is over 800 feet long through site.**
- **Benzene is the major contaminant in groundwater throughout this plume.**
- **3 iSOC[®] oxygen curtains are located along the plume: curtain 1 is over 100 feet from source; curtain 2 is greater than 300 feet from source; and curtain 3 is greater than 600 feet from source.**
- **The iSOC[®] oxygen curtains have significantly reduced petroleum contamination in Lowell, Iowa throughout the petroleum plume.**
- **The iSOC[®] oxygen curtains continue to operate as the surface spill location continues to generate contamination.**