

REM TECH 2005

INTEGRATED REMEDIAL APPROACH AT A FORMER CHEMICAL BLENDING FACILITY: EXCAVATION, DUAL- PHASE EXTRACTION AND SITE-SPECIFIC RISK ASSESSMENT

PRESENTED BY:

Michelle Wright

M.Sc., P.Eng.

Senior Engineer

Aqua Terre Solutions Inc.



Tony Knafla

M.Sc., DABT

Risk Assessment Specialist

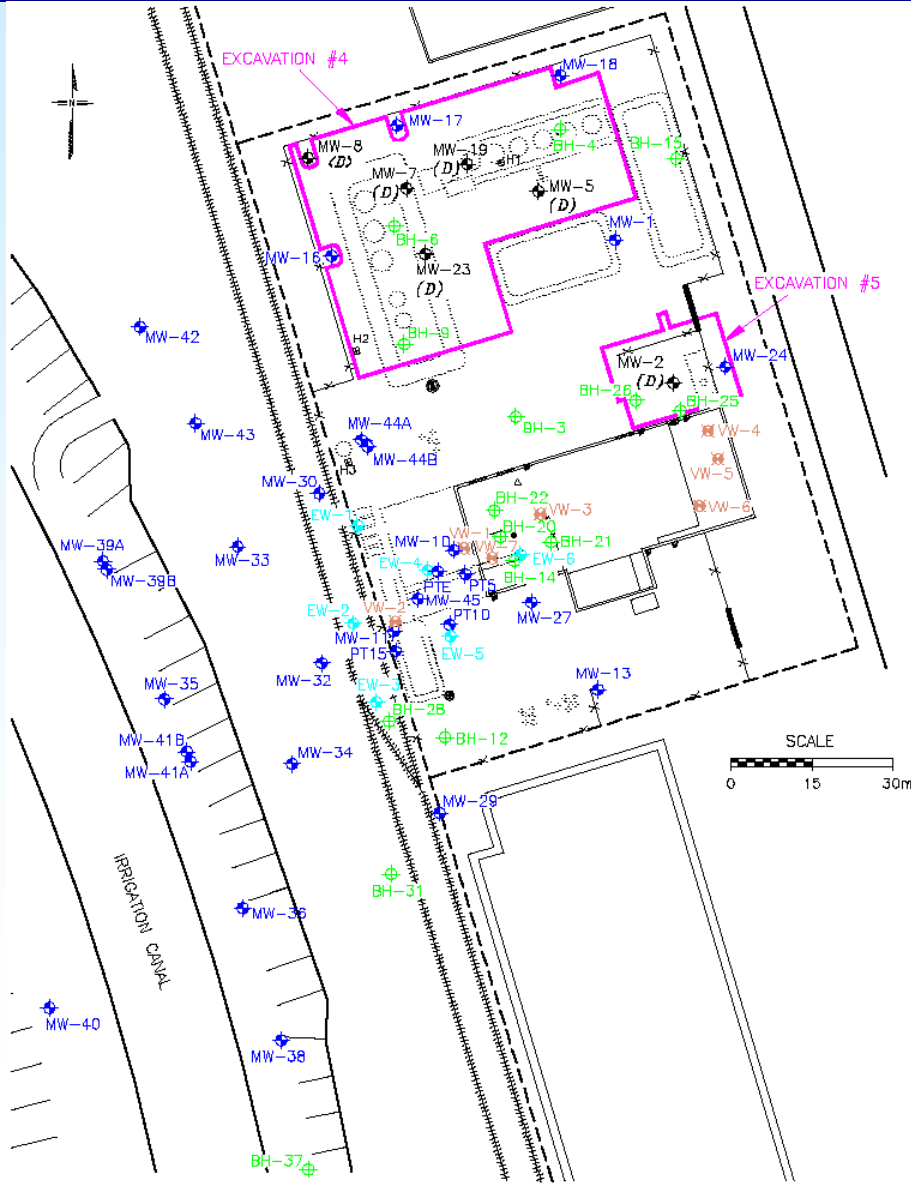
**Equilibrium Environmental
Inc.**



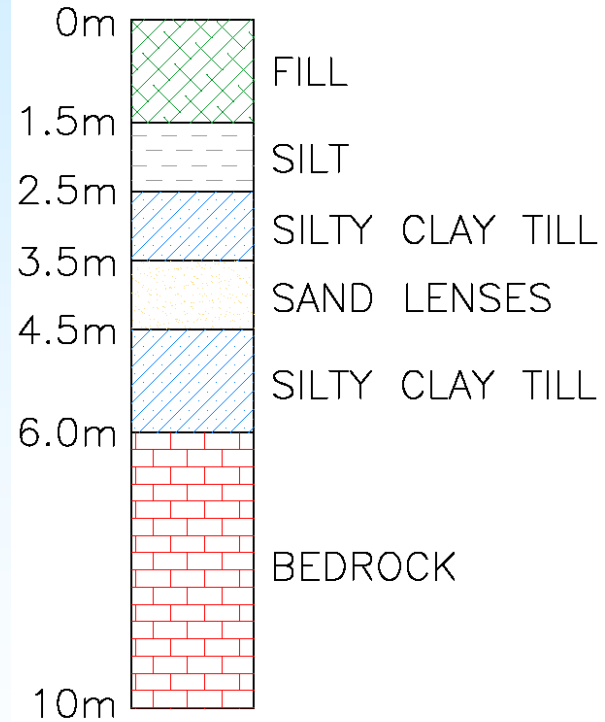
SITE DESCRIPTION

- **Former chemical blending facility included laboratories, production area, storage tanks, drum storage, truck loading areas**
- **Facility built in 1975 for the production and testing of scale and corrosion inhibitors, demulsifiers, co-polymers, defoamers, surfactants**
- **Raw chemicals delivered in drums and final products sold in drums or bulk truck loads**

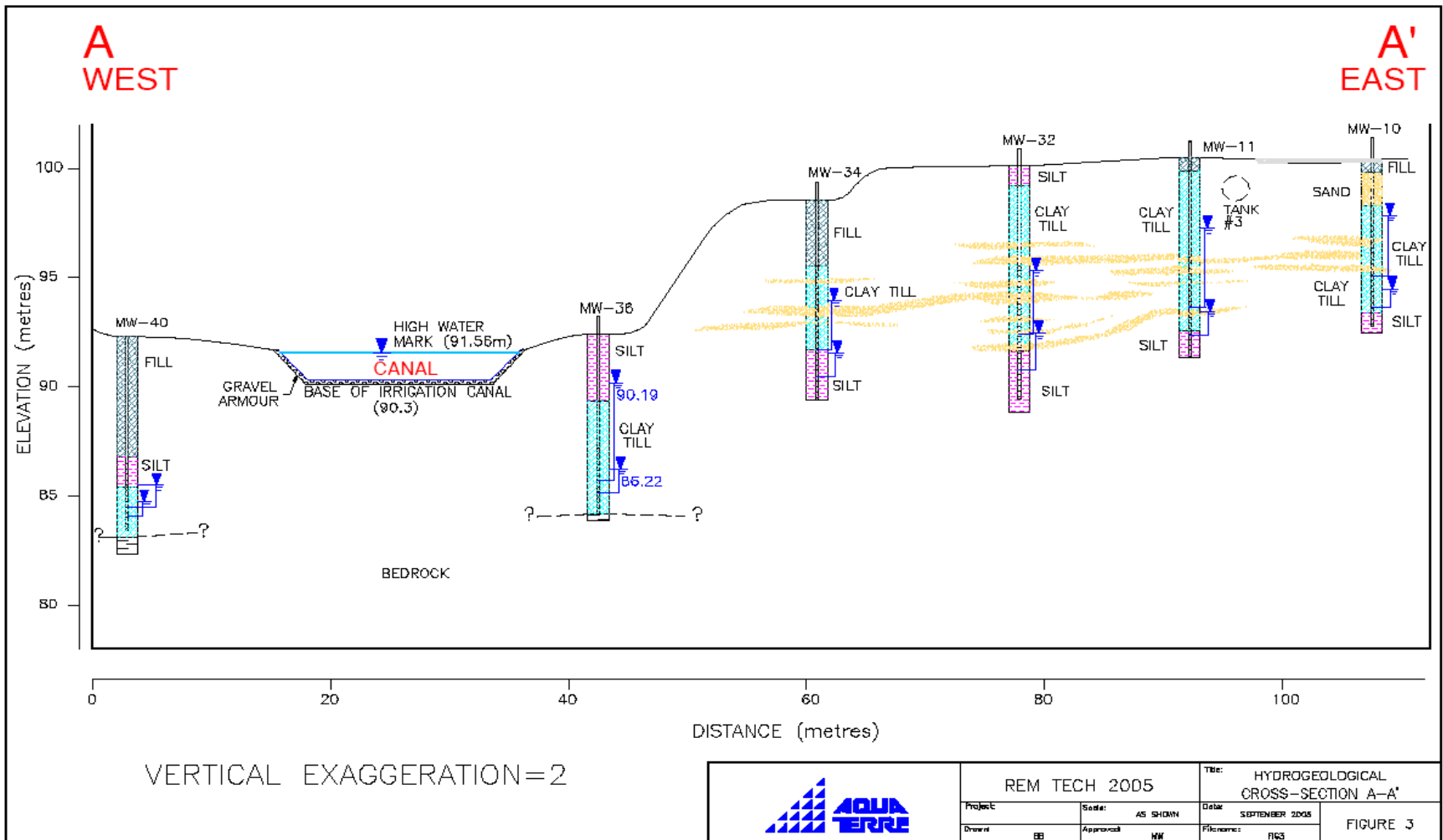
SITE INVESTIGATION



- **Stratigraphy consists of:**






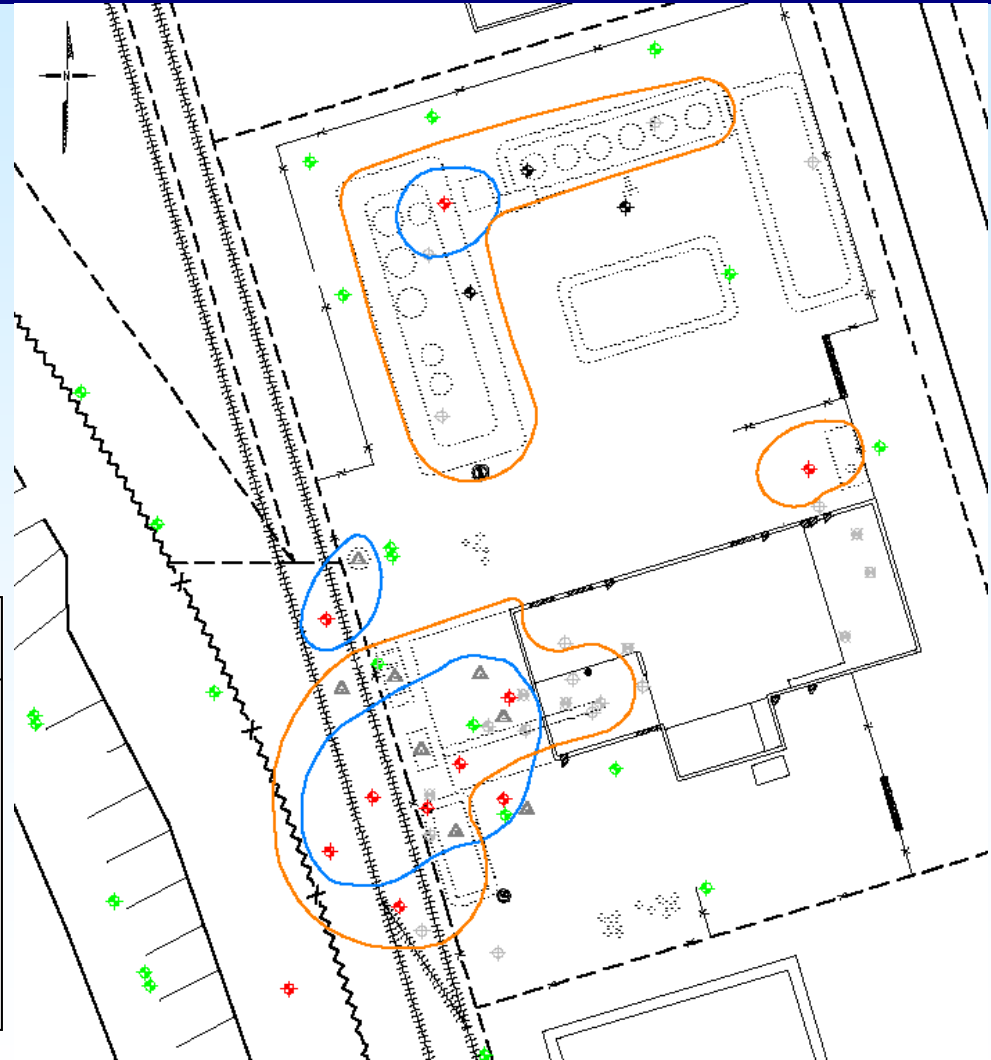
CROSS-SECTION



IMPACT ASSESSMENT

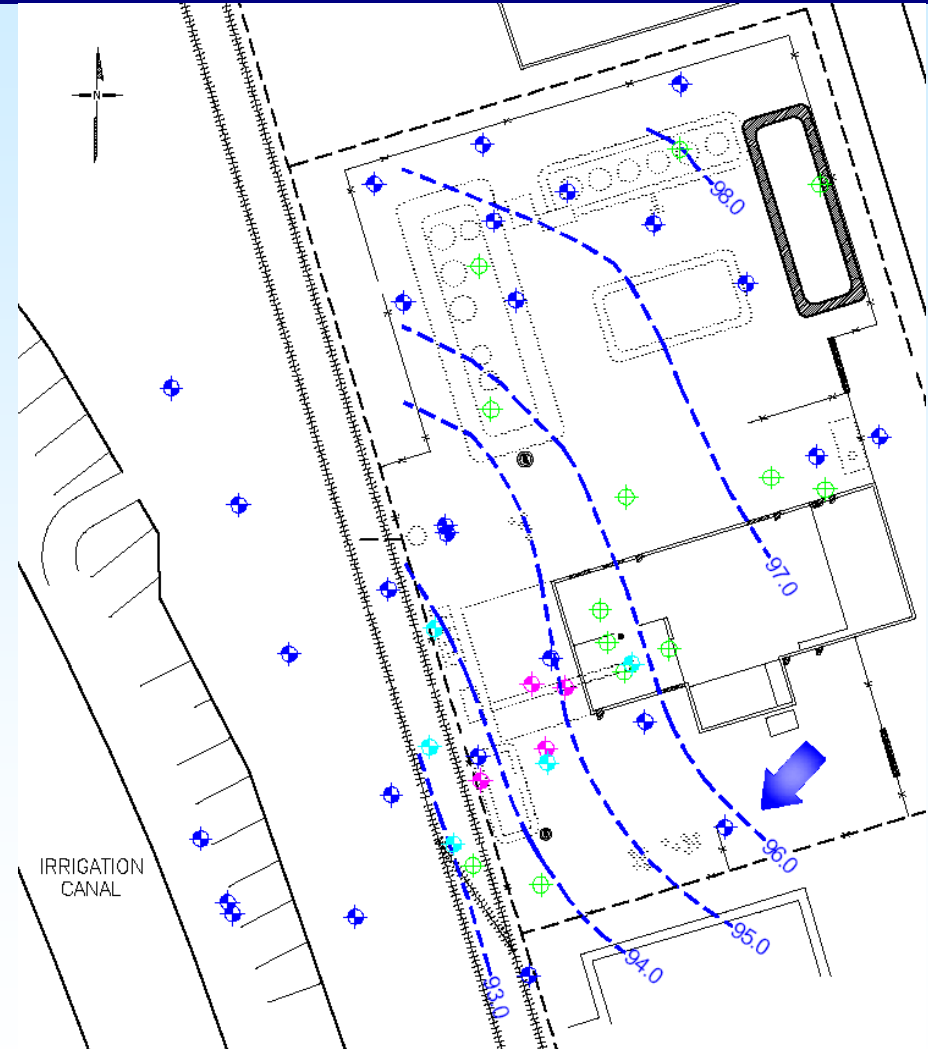
- Major contaminants of concern are xylenes, toluene, naphthalene, and acetone
- Over 200 additional compounds identified on and off site including MAHs, PAHs, ketones, alcohols and more.

LEGEND	
	EXTENT OF FREE-PHASE LIQUID HYDROCARBONS
	IMPACTED SOIL AREAS
	GROUNDWATER EXCEEDANCES



GROUNDWATER SURFACE ELEVATIONS

- **K in the range of 10^{-9} to 10^{-6} m/s**
- **Estimated range in lateral groundwater flow velocity 0.1 to 10 m/yr SSW**
- **Level loggers used to measure relative surface water elevation in canal**
- **Results show groundwater not discharging to canal**



REMEDIATION STRATEGY

- **Remove three USTs Sept. 2000**
- **Decommission all ASTs and piping Oct. 2000**
- **Biopile construction for Tank #3 excavation material**
- **Soil excavations July to October 2001**
- **30 000 tonnes of soil disposed at landfill**
- **Dual phase system pilot testing March 2001**
- **Dual phase system initiation January 2002**
- **Operation Jan 2002 to August 2005**

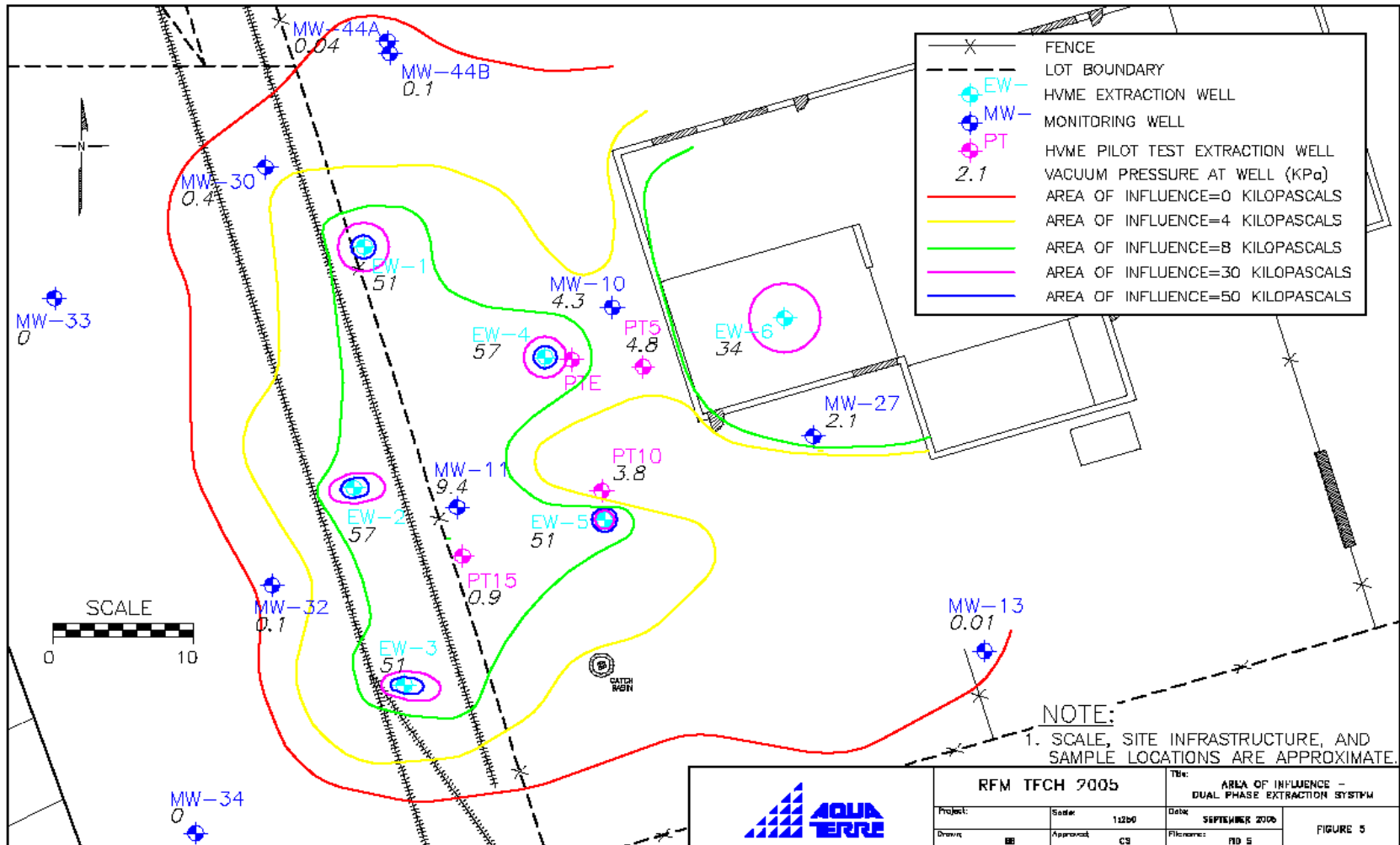
EXCAVATION



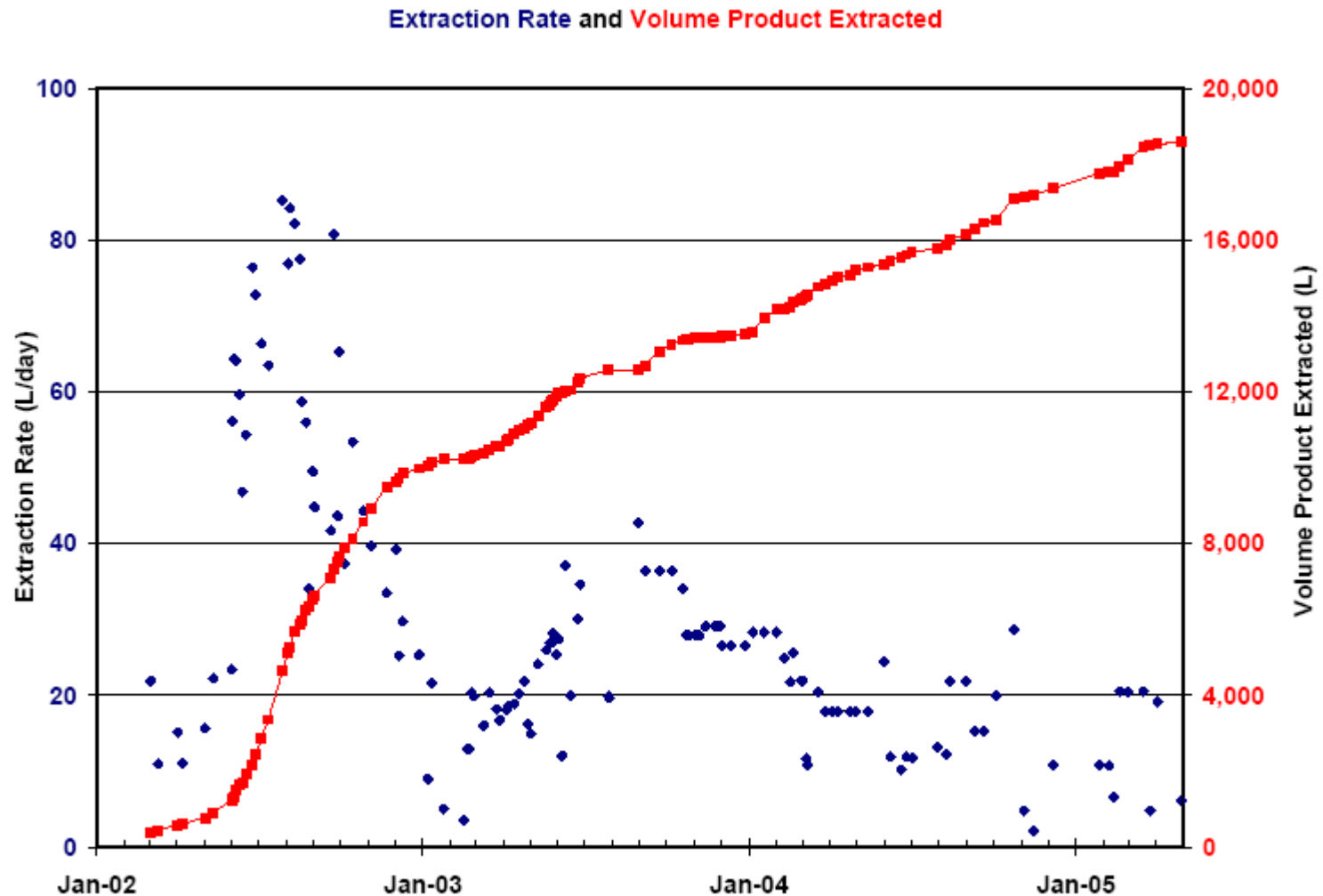
Responsible, Practical, Innovative, and Cost-Effective Environmental Solutions



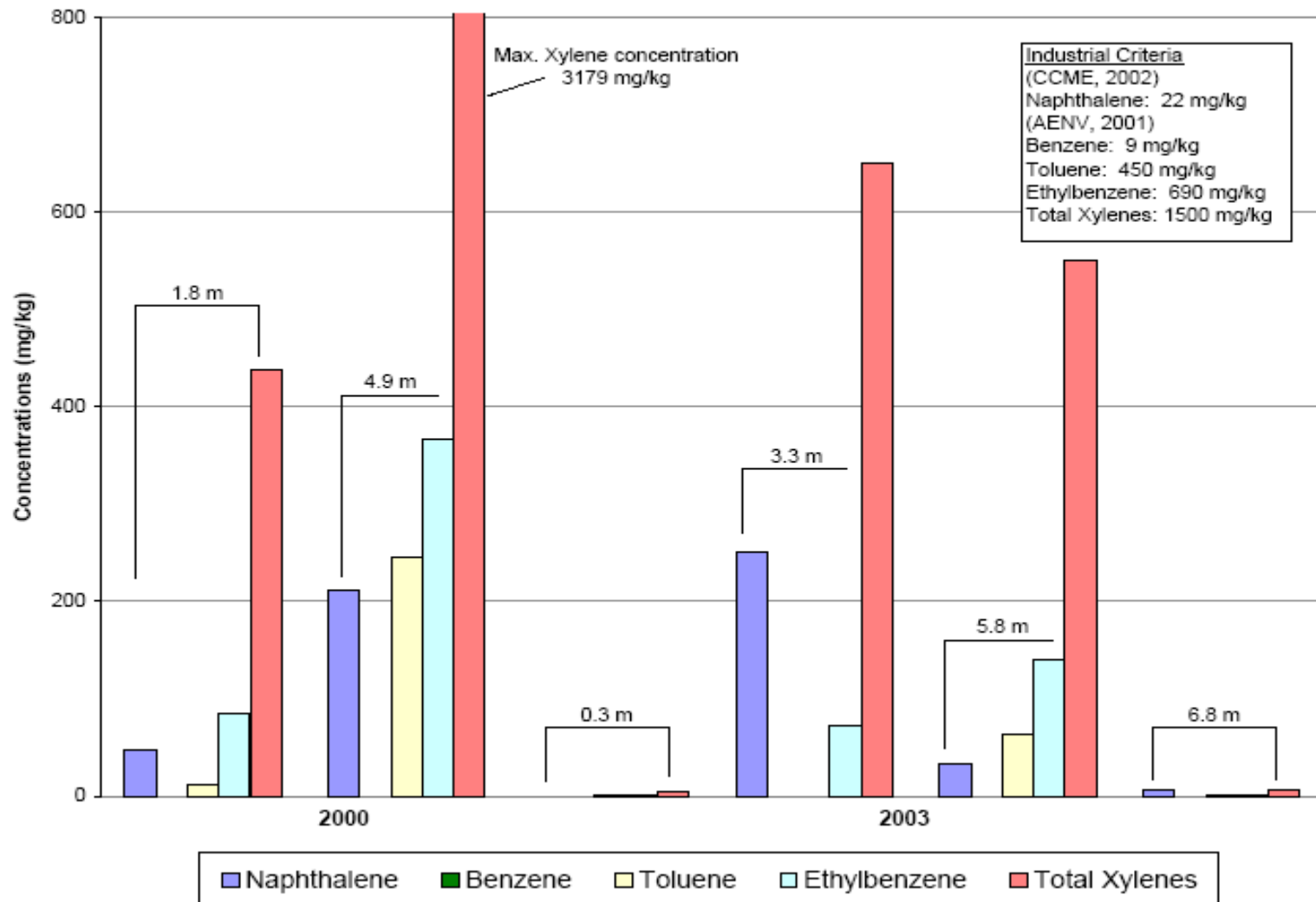
REMEDIATION SYSTEM



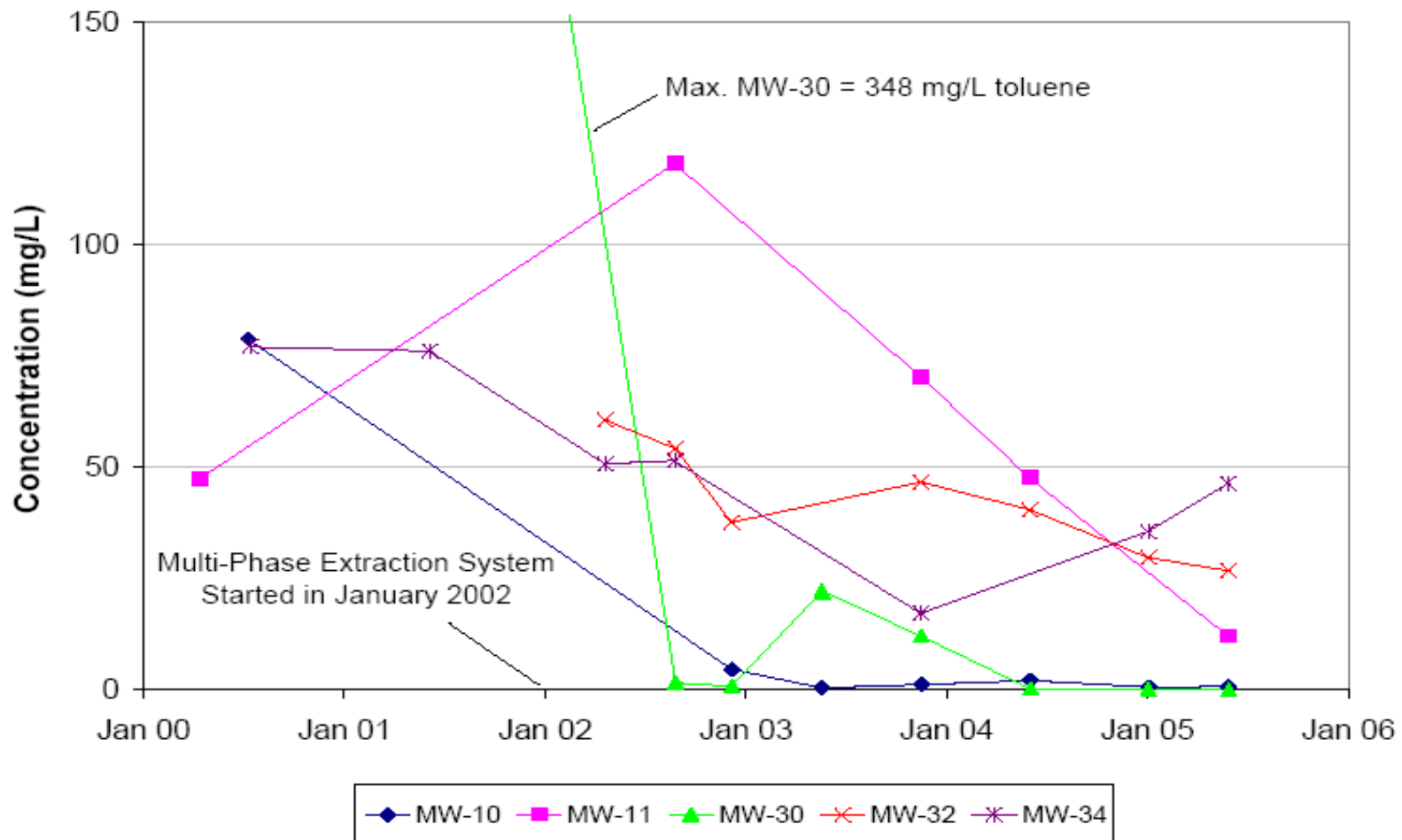
EXTRACTION RATE AND TOTAL VOLUME



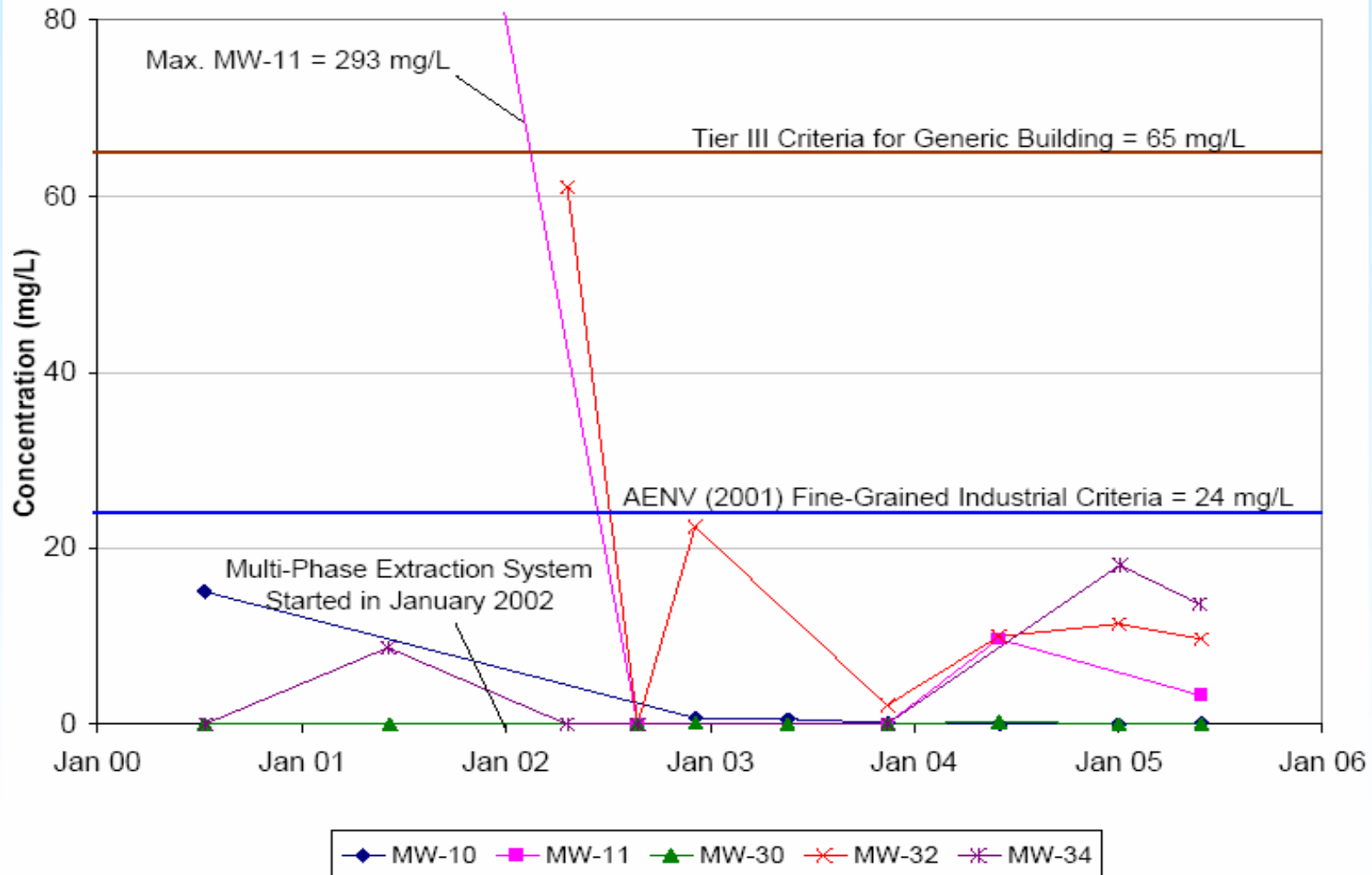
TOTAL BTEX AND NAPHTHALENE CONCENTRATIONS IN SOIL



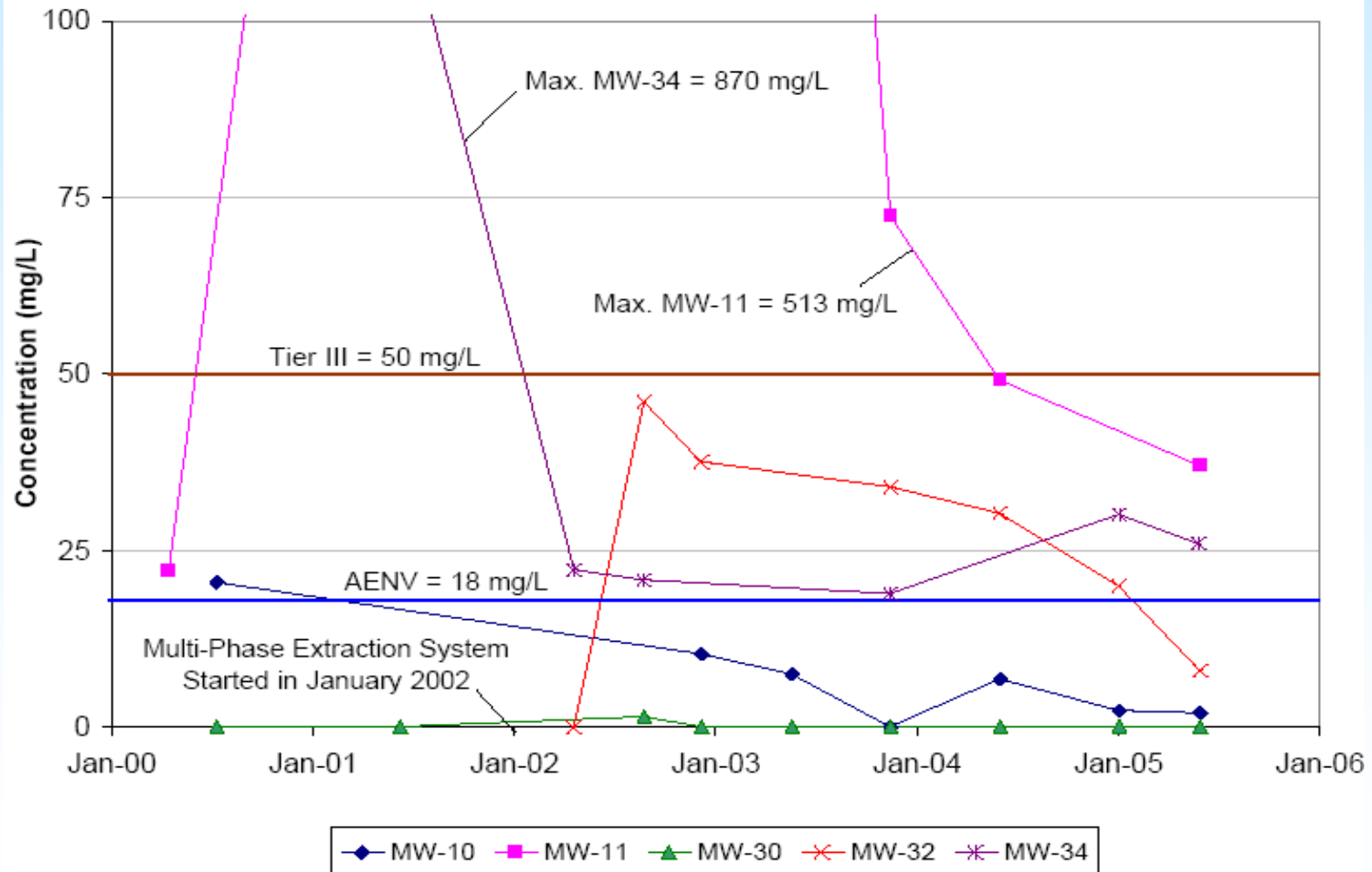
TOTAL BTEX CONCENTRATIONS IN GROUNDWATER



F1 CONCENTRATION IN GROUNDWATER



F2+F3 CONCENTRATION IN GROUNDWATER



SUMMARY

- **Assessment initiated April 2000**
- **Decommissioning and tank removal conducted Fall 2000**
- **North half of property remediated by excavation Fall 2001**
- **Dual phase system initiated January 2002**
- **Dual phase system effectively removed free-phase liquid hydrocarbons**
- **Significant reduction in dissolved phase concentrations noted**
- **Xylenes and naphthalene concentrations remain elevated in surface soils behind blend room**

- **Conventional assessment and remediation guidelines could not ensure protection of human health**
- **Risk Assessment/Tier III criteria development started in 2002**