

Case Closed?:

Full Remediation of a 1980's Era Superfund Site



**International Symposium on
Bioremediation and Sustainable
Environmental Technologies**

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Agenda

- › Site History / Site Clean-up
- › New Conceptual Model
- › Recent Developments / Wrap-up

Facility Operations / History

Facility:

- Food and chemical research facility
- Laboratories and pilot plant
- 1930 to 1989

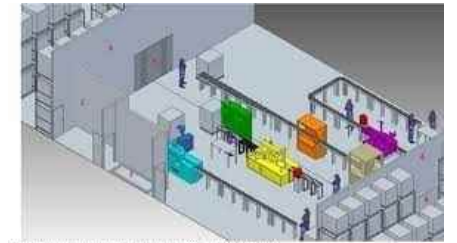


Fig. 49 Areas with numbers show designs based on GMP.

Waste:

- Research labs generated small volumes of solvent waste
- Onsite disposal (soil absorption pit) from 1940s to 1962



Reporting:

- Historical disposal practices reported to state in 1981 per RCRA reporting requirements



Investigation / Response Actions

Regulatory Framework:

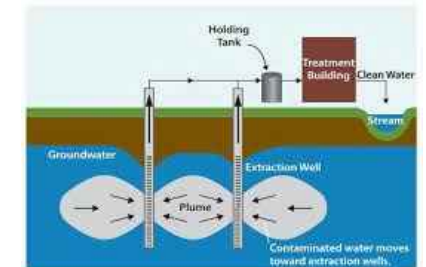
- **NPL (Superfund) listing: 1984**
- **Consent Order: 1984**
- **Modification #1 to Consent Order: 2014**

Investigation:

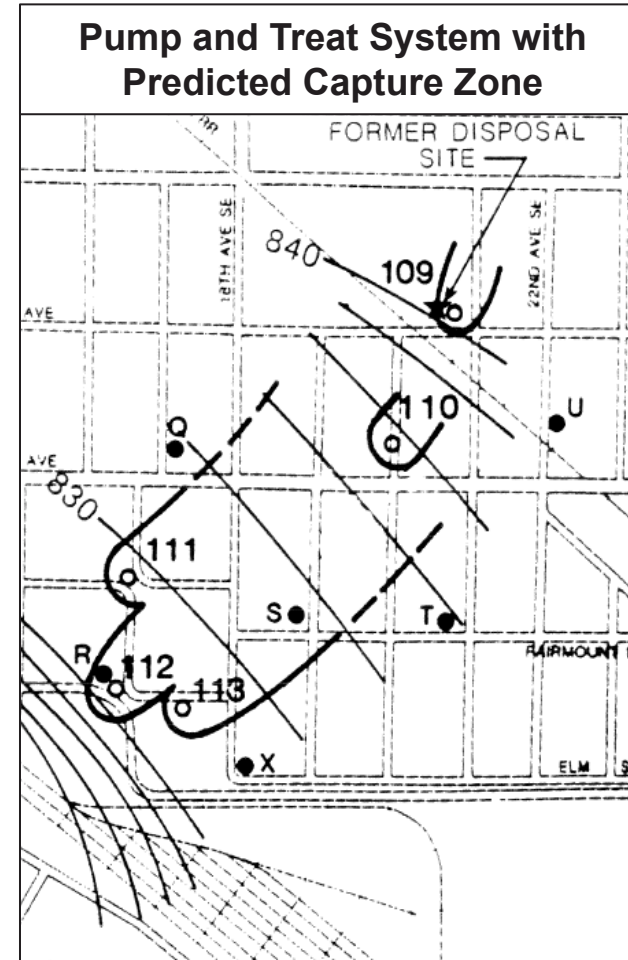
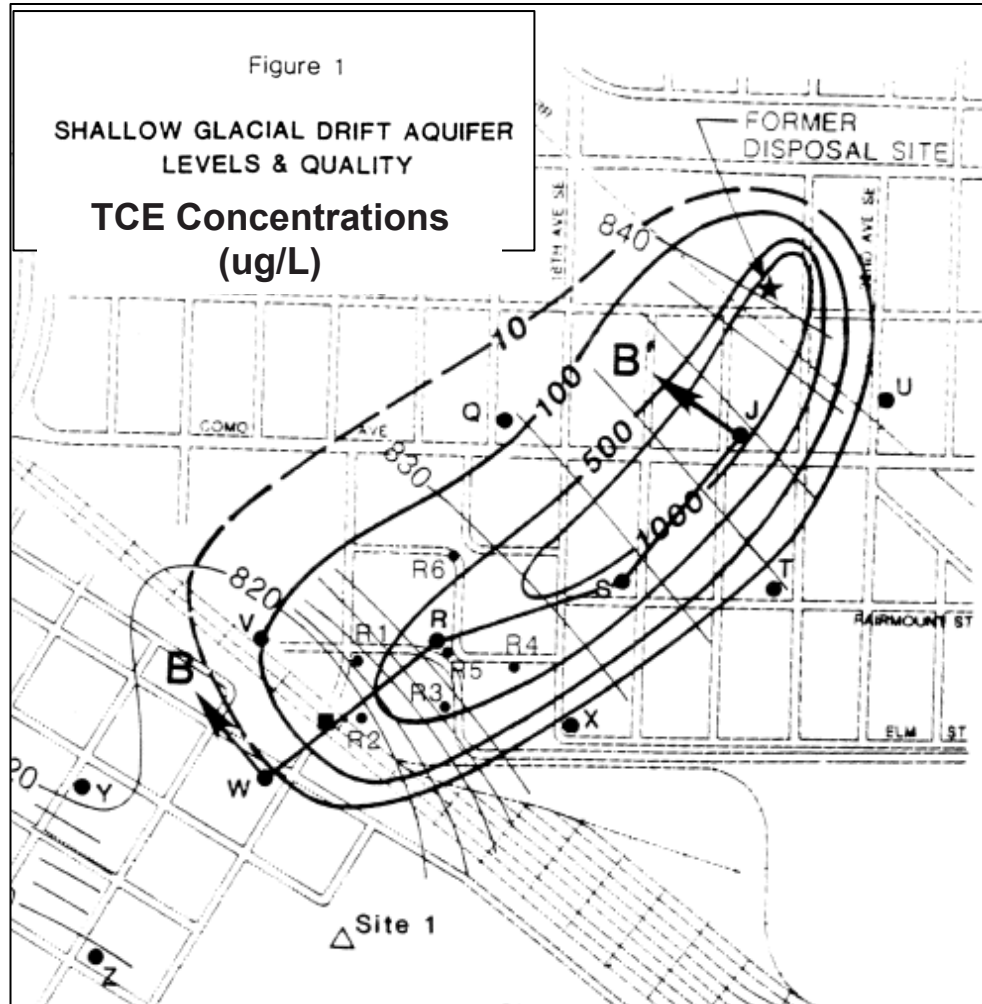
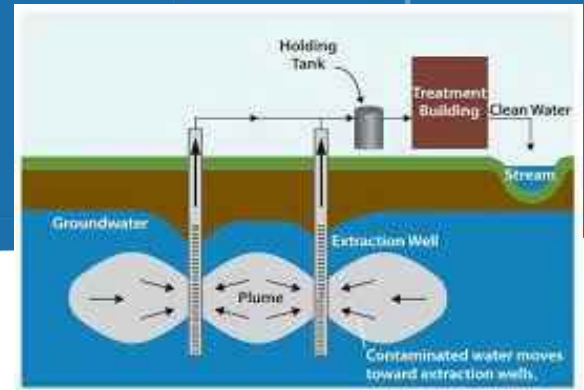
- **Delineation of soil impacts at disposal site**
- **Delineation of dissolved plume**

Remediation:

- **Soil excavation to 12 ft: 1981**
- **Groundwater pump and treat: 1985 to 2010**



Pump and Treat (1985 – 2010)

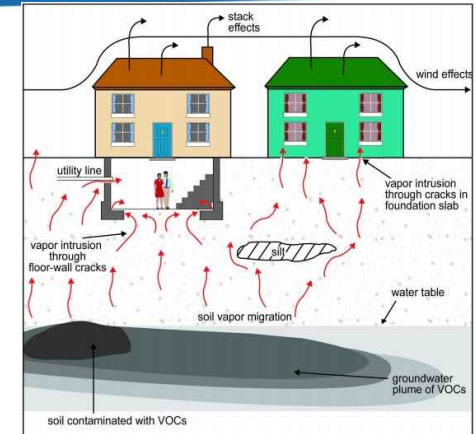


- Pump and treat system shut off in 2010 because TCE concentrations had decreased to site-specific objective of 270 ug/L

Additional Investigation

Vapor Intrusion:

- VI pathway identified as "data gap" in 2010 as part of remedy completion evaluation
- Sub-slab testing indicated high concentrations down gradient and upgradient (!)



File Research:

- Review state agency records for corrective action sites upgradient of site

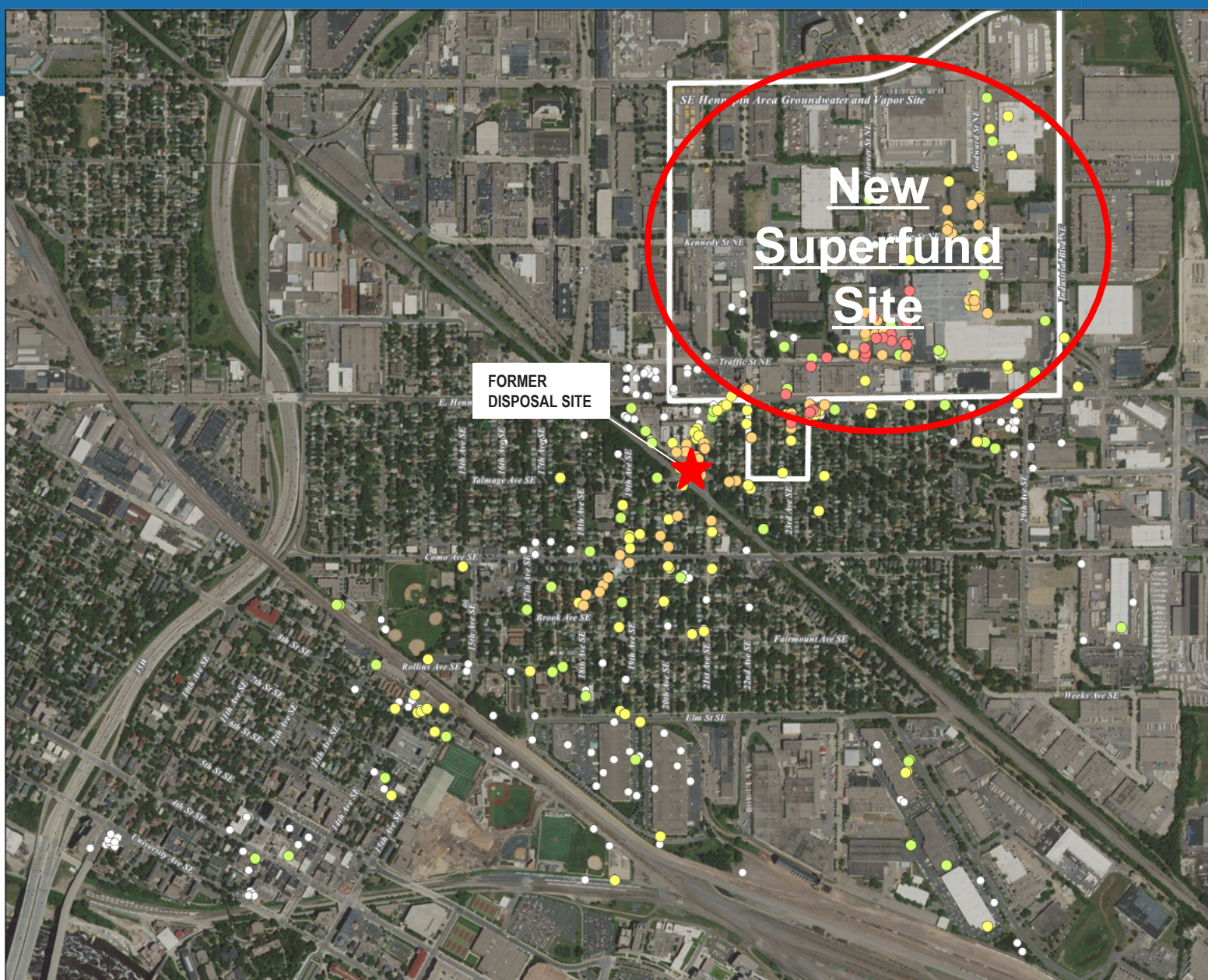


Additional Investigation:

- New monitoring wells (in some cases, replacing wells plugged in 2010)



TCE in GW (Data Compiled 2013 – 2016)



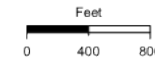
LEGEND

GW Sampling Results

- Not detected
- 0 - 5 µg/L
- 5 - 100 µg/L
- 100 - 1000 µg/L
- > 1000 µg/L

Notes

1. Groundwater results shown are the most recent concentrations of TCE in groundwater for samples collected 1990 through June 2017 from the Glacial Drift Aquifer. If most recent data have multiple sample depths, the maximum result is shown.
2. Background Imagery: World Imagery - 1m; Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.



Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (m)

TCE CONCENTRATIONS IN GLACIAL DRIFT AQUIFER

East Hennepin Avenue Site
Minneapolis, MN

GSI Job No.	4679	Drawn By:	XO/CDM
Issued:	18-Jan-2018	Chk'd By:	TEM
Map ID:	001_01	App'd By:	TEM

FIGURE 1

TCE in sub-slab vapors (2013 – 2016)



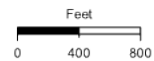
LEGEND

Sub-slab Vapor Sampling Results

- ≤ 2 µg/m³
- 2 - 70 µg/m³
- 70 - 230 µg/m³
- 230 - 500 µg/m³
- 500 - 3,000 µg/m³
- 3,000 - 30,000 µg/m³
- > 30,000 µg/m³

Notes

1. Sub slab results shown are the maximum TCE concentration in sub-slab samples collected 2013-2017.
2. Background Imagery: World Imagery - 1m; Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swiss topo, and the GIS User Community.



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TCE CONCENTRATIONS IN SUB-SLAB

East Hennepin Avenue Site
Minneapolis, MN

GSI Job No.	4679	Drawn By:	XO/CDM
Issued:	23-Jan-2018	Chk'd By:	LMB
Map ID:	001_05	App'v'd By:	TEM

FIGURE 2

Agenda

- › Site History / Site Clean-up
- › **New Conceptual Model**
- › Recent Developments / Wrap-up

Facility Records and Employee Testimony

Facility History

- Facility was research lab (<1000 gal waste per year)
- On-site disposal from 1940s to 1962

Facility Records

- No documents recording purchase, use, or disposal of TCE at the Facility
- (But no real documentation of anything from 1940s to 1960s)

Employee Testimony (1990s Insurance Lit.)

15 depositions including:

Chemist (1934-1962)

Chem Eng. (1958 and later)

Chemist (1943-1984)

Chemist (1963-1987)

Manager (1949 - 1983)

Manager (1956 and later)

- In deposition testimony, several employees provide consistent testimony that mostly petroleum solvents were used at Facility.
- Also recalled using smaller amount of several different chlorinated solvents including: chloroform, 1,1,1-trichloroethane, and others
- Employees recalled rare or no use of trichloroethene (TCE)
- Lab waste collected in designated solvent waste containers prior to disposal; collection method contributed to mixing of waste.



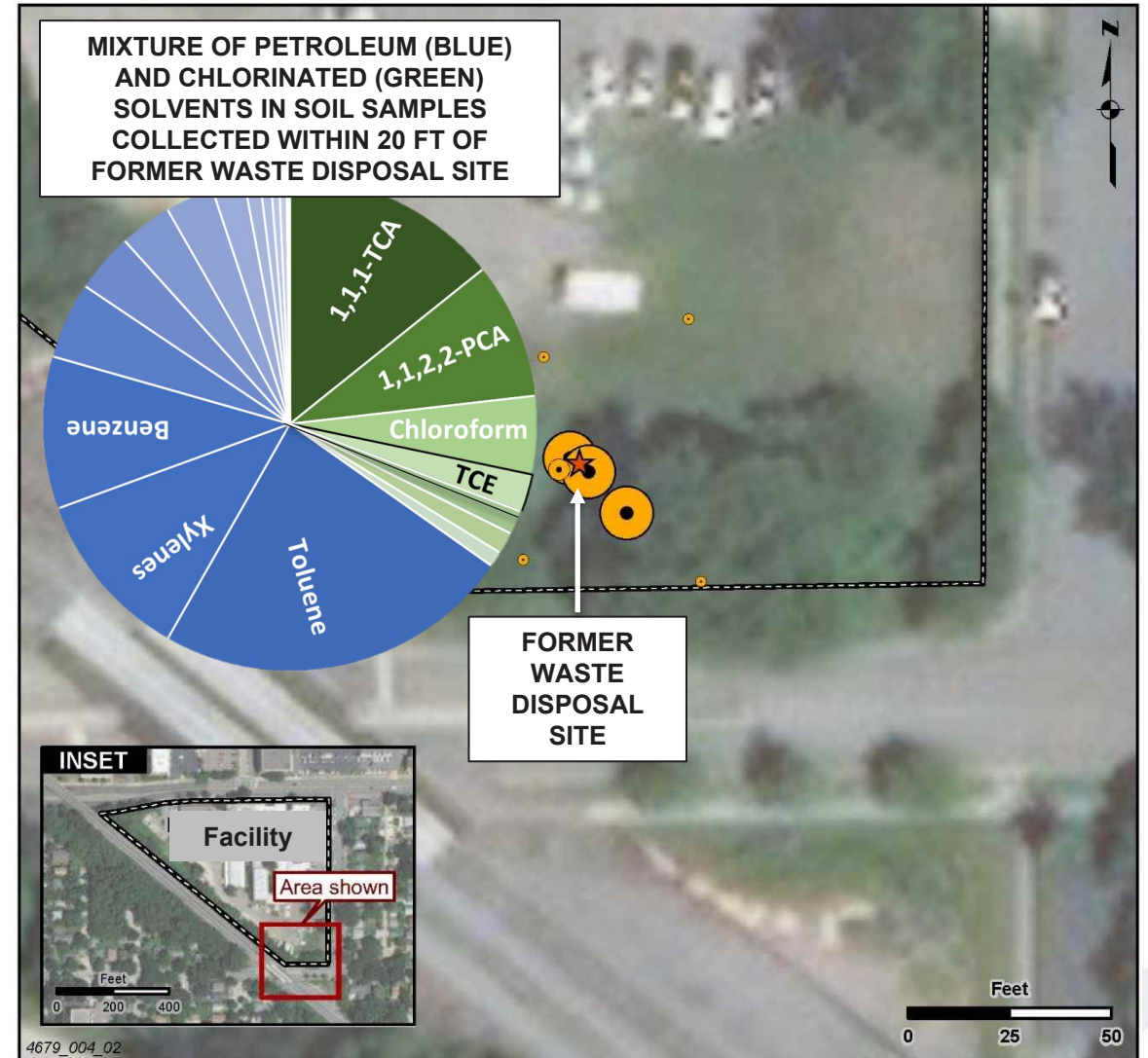
1980s Disposal Site Soil Test Results

Data Review:

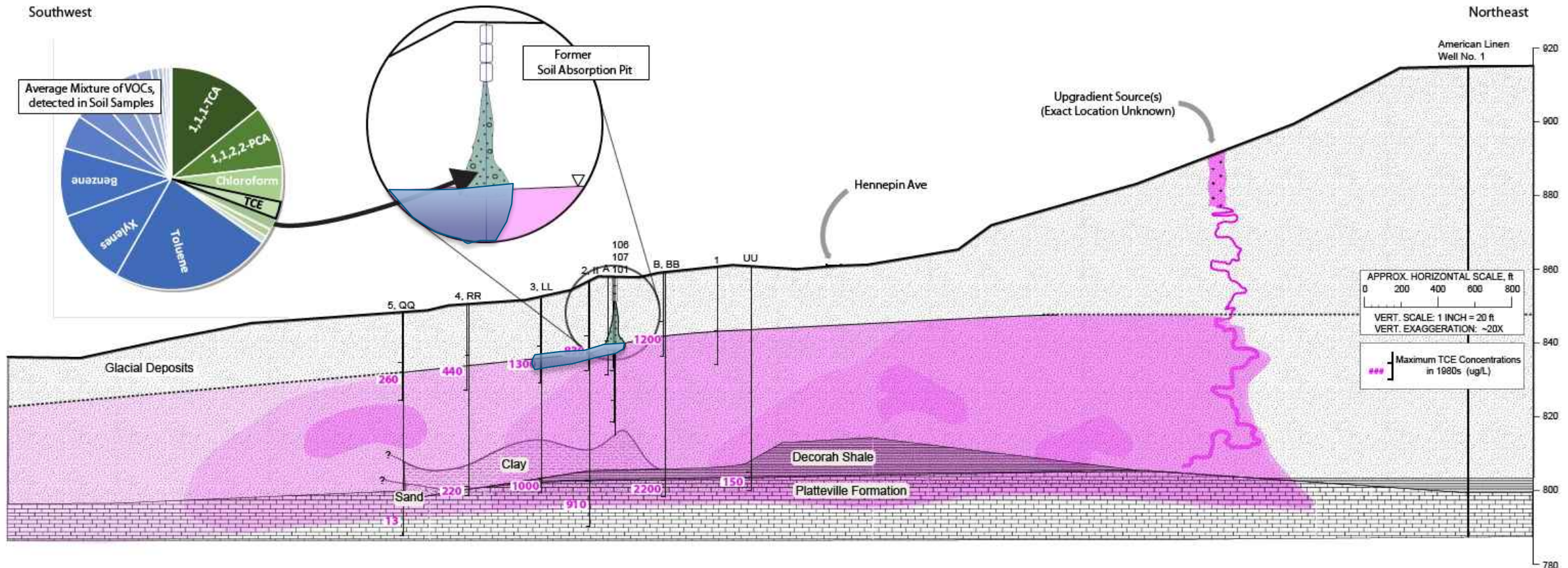
- Laboratory solvent waste was mix of petroleum solvents and chlorinated solvents
- TCE was a minor component of the waste
- Highest concentrations at the water table

KEY POINT:

Site investigation results (1980s) consistent with employee deposition testimony (1990s)

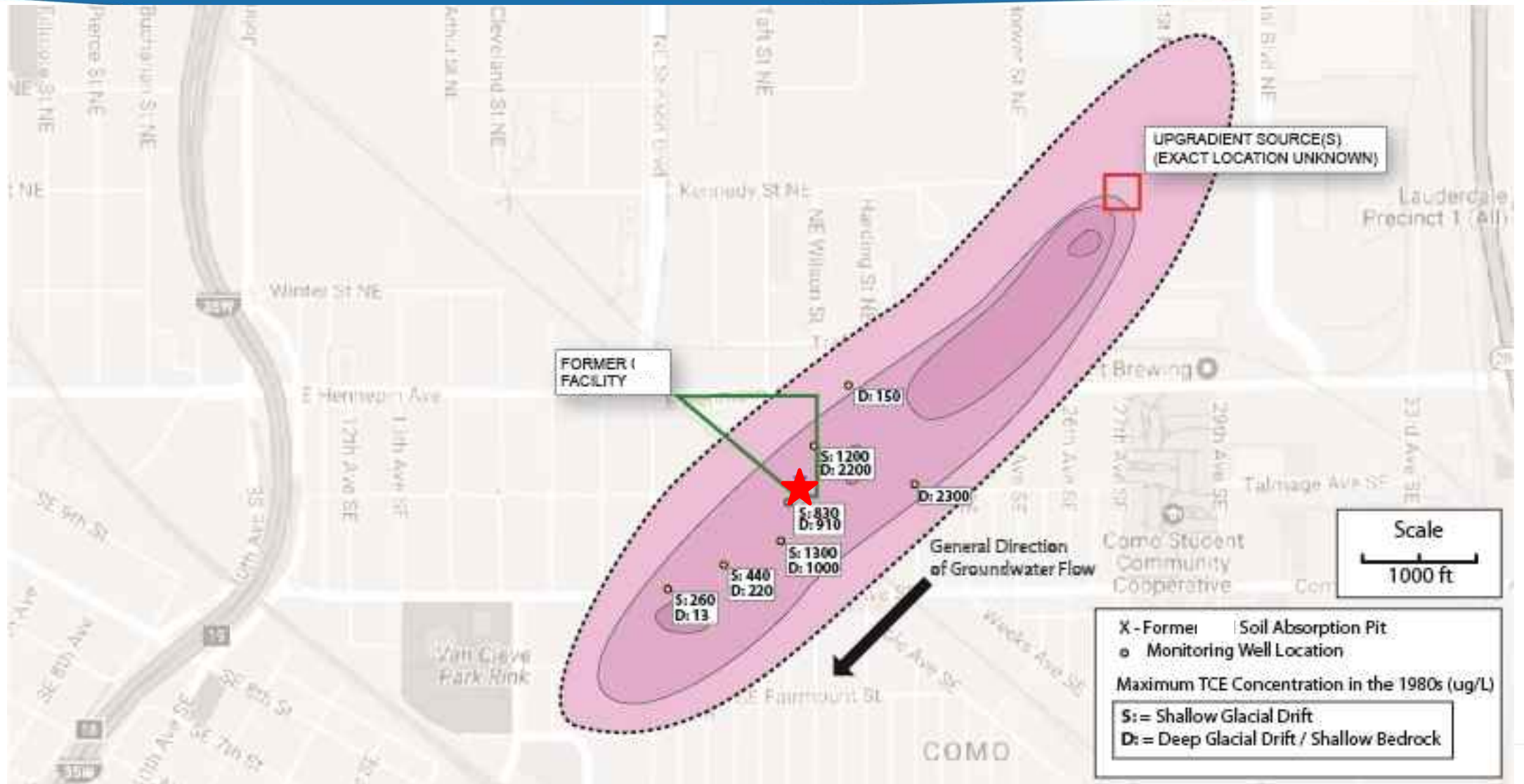


Updated Conceptual Model of 1980s Plume



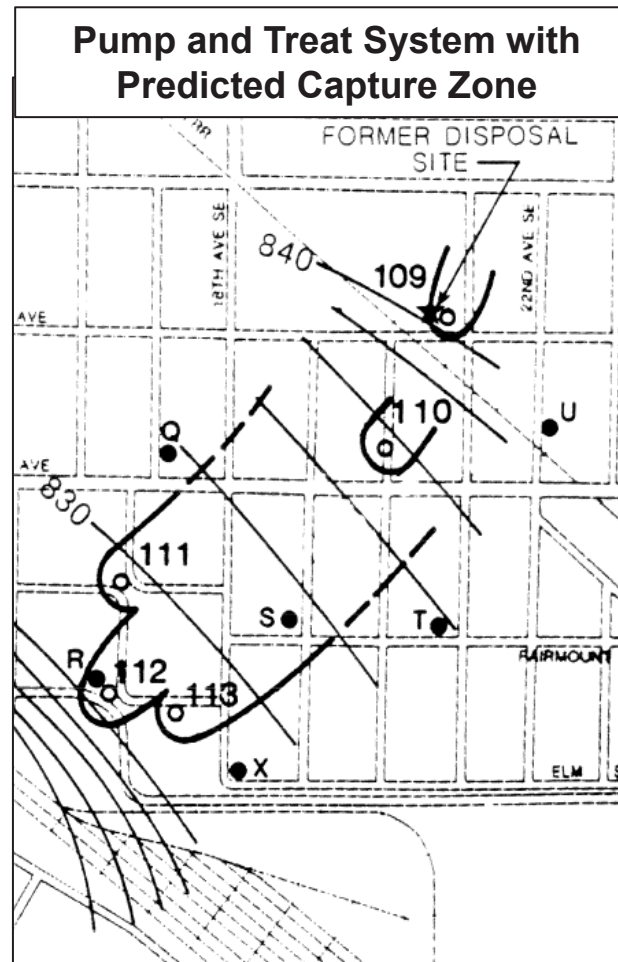
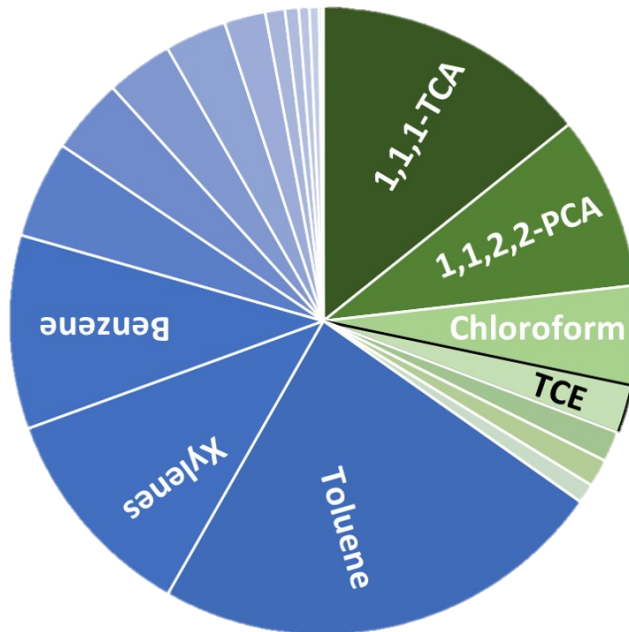
- TCE concentration higher in upgradient wells than downgradient wells; no evidence of impact from disposal site.
- Mixture of chlorinated VOCs and BTEX in two wells suggests small shallow plume of mixed VOCs associated the disposal site.

Updated Conceptual Model of 1980s Plume



Evidence of Full Site Remediation

**SITE FINGERPRINT
(1980s soil test results)**

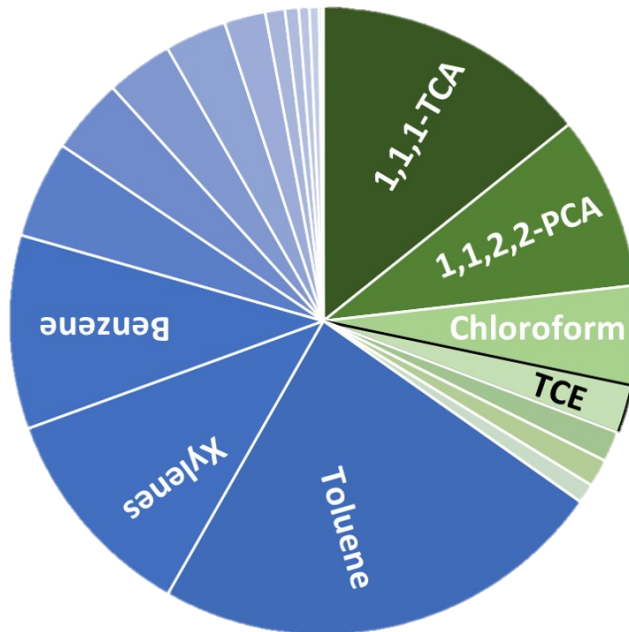


Question:

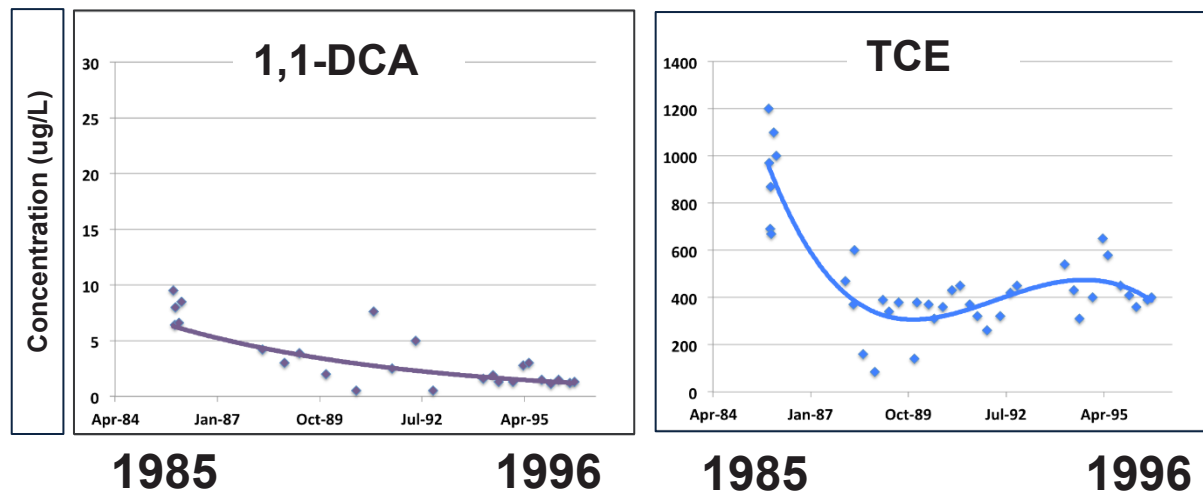
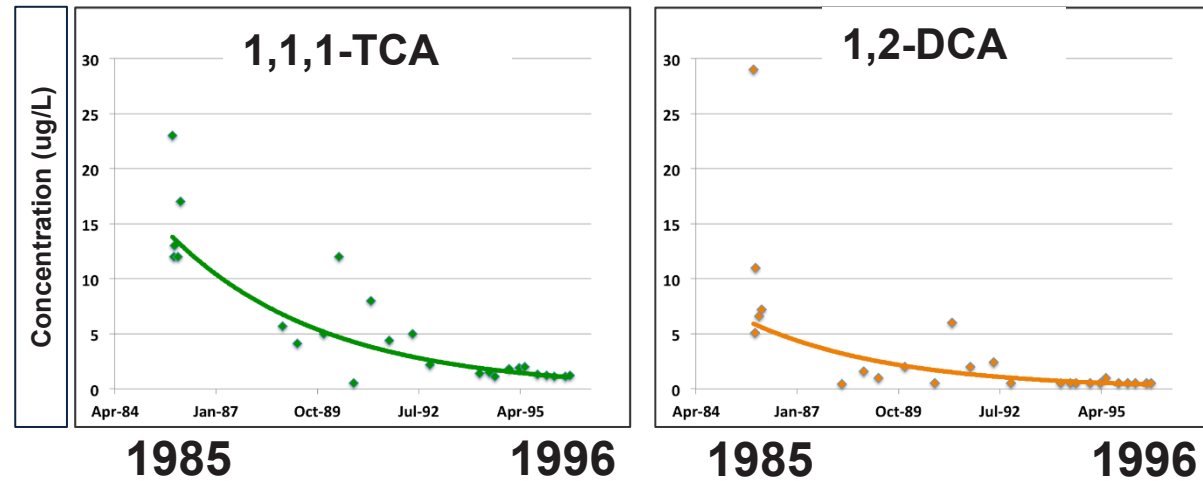
Did pump and treat system remediate site impacts in groundwater?

Evidence of Full Site Remediation

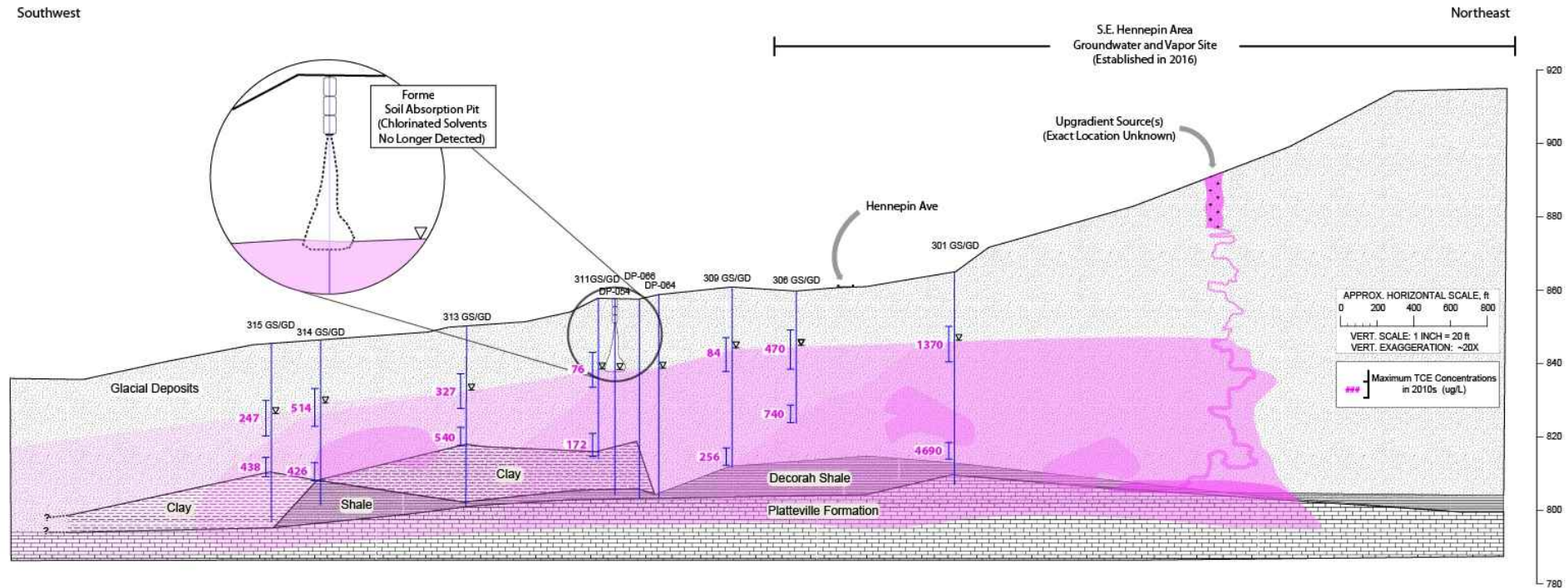
**SITE FINGERPRINT
(1980s soil test results)**



PUMPING SYSTEM CONCENTRATION: 1985 to 1996



Updated Conceptual Model of Current Conditions



**Small contribution from Facility has been fully remediated;
TCE plume due solely to upgradient sources**

KEY POINT: TCE concentrations are higher up gradient and cross gradient of Facility and are lower at Facility and down gradient (southwest).

Agenda

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- › **Recent Developments / Wrap-up**

Recent Developments

Remedy Completion 2017/2018

- RP submits remedy completeness report
- EPA contractor supports evaluation method and finding
- State indicates "can't prove remedy completion"



Five Year Review 2021

- State led review of site conditions
- No monitoring or other activities since 2016
- State indicates remedy "not complete"



Oversight 2022

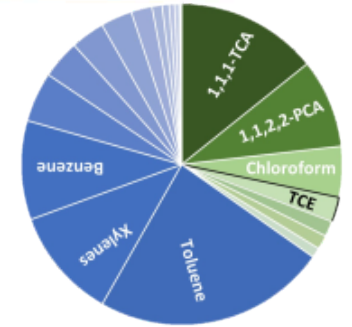
- Oversight lead transferred from State to USEPA
- Upgradient area added to Federal NPL (i.e., Superfund site list) with USEPA lead



Wrap Up

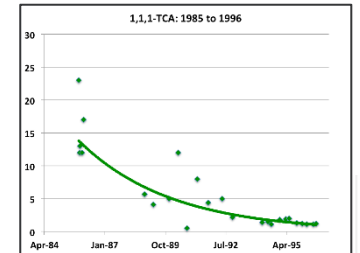
Fingerprint:

- Fingerprint of site waste (mixed solvents) is distinct from upgradient source (mostly TCE)



Remediation:

- Monitoring results from site pump and treat system document site remediation
- EPA contractor supported analysis and findings



Regulatory Status:

- RP documented remedy completion
- State did not support finding
- Oversight transferred to USEPA lead
- Site is obvious candidate for delisting

