Former Manufactured Gas Plant (MGP) Sites

Albion & Battle Creek Michigan

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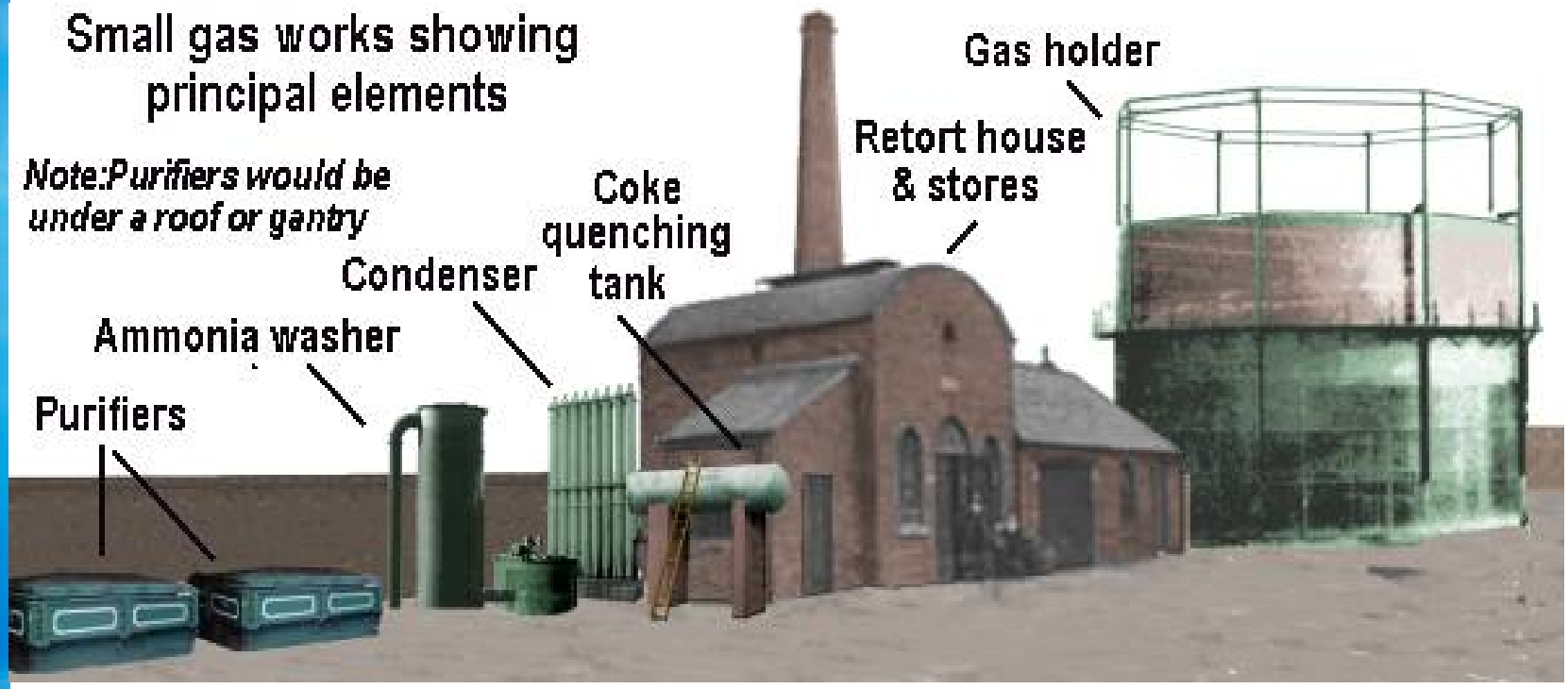
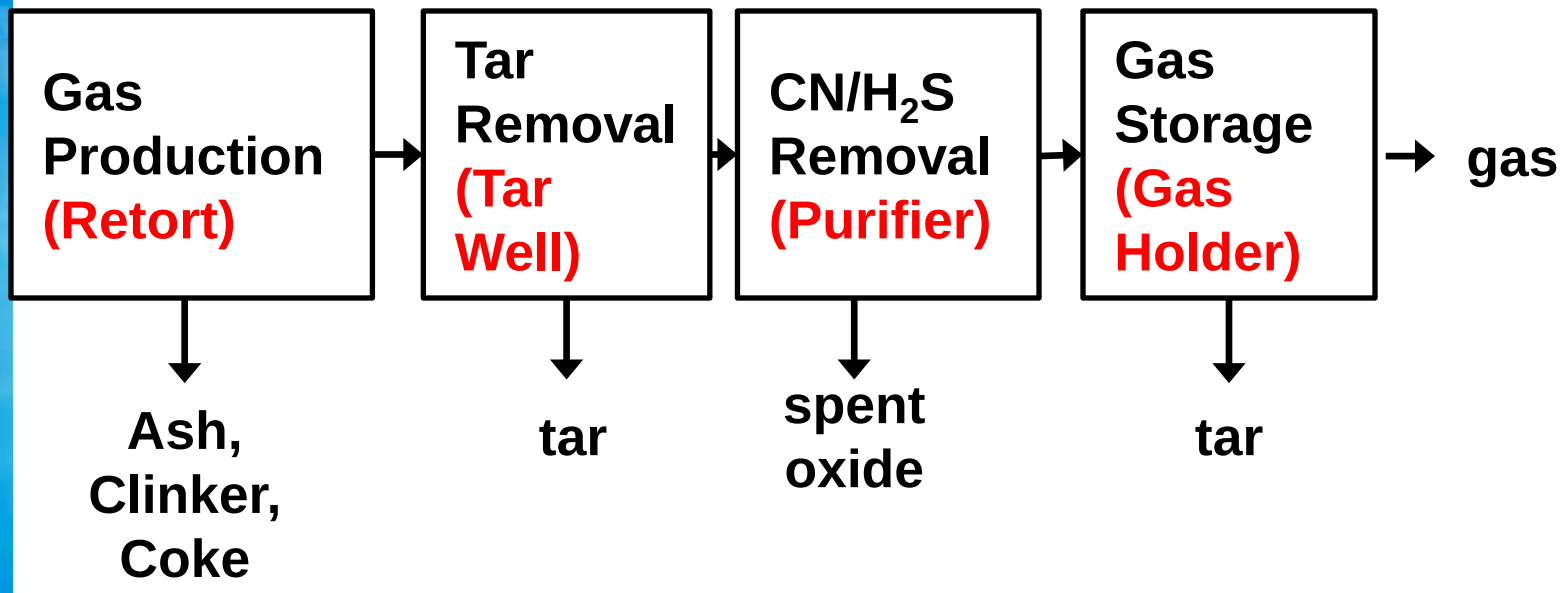
Overview

- MGP Process
- Albion
- Battle Creek
- Regulatory Challenges

Typical MGP


Small gas works showing principal elements
Note:Purifiers would be under a roof or gantry
Purifiers
Ammonia washer
Condenser
Coke quenching tank
Retort house & stores
Gas holder

MGP Process


Gas Production (Retort)
Tar Removal (Tar Well)
CN/H_2S Removal (Purifier)
Gas Storage (Gas Holder)
gas
Ash, Clinker, Coke
tar
spent oxide
tar

Albion MGP Site

Retort Ovens

Tar Well (Foreground)

Purifier

Prussian Blue Soils

Gas Holder

Other Components

- Coal Storage Area
- Ammonia Scrubbers
- Fill Material

Typical MGP Contaminants

PAHs
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Fluoranthene
Fluorene
Indeno(1,2,3,cd)pyrene
Naphthalene
Phenanthrene
Pyrene
2-Methyl Naphthalene

Metals
Aluminum
Antimony
Arsenic
Barium
Cadmium
Chromium
Copper
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Vanadium
Zinc

VOCs
Benzene
Ethyl Benzene
Toluene
Total Xylenes

Inorganics
Ammonia
Cyanide
Nitrate
Sulfate
Sulfide
Thiocyanates

Phenolic Compounds
Phenols
2-Methylphenol
4-Methylphenol
2,4-Methylphenol

Project History

- 1970s – Decommissioning
- Early 1990s – USTs removed
- Late 1990s – Part 213 releases closed/addressed under Part 201
- 2005/2006 – Investigation activities
- 2007 – Investigation report submitted

Partnership

SEMCOENERGY and DEQ

- June 2007 – initial meeting
- Common goal
- Open sharing
- Consensus building
- Strategy development

Partnership

SEMCOENERGY and DEQ

- “Multiple bites at the apple”
- DEQ approval along the way
- Status meetings

Albion MGP Site

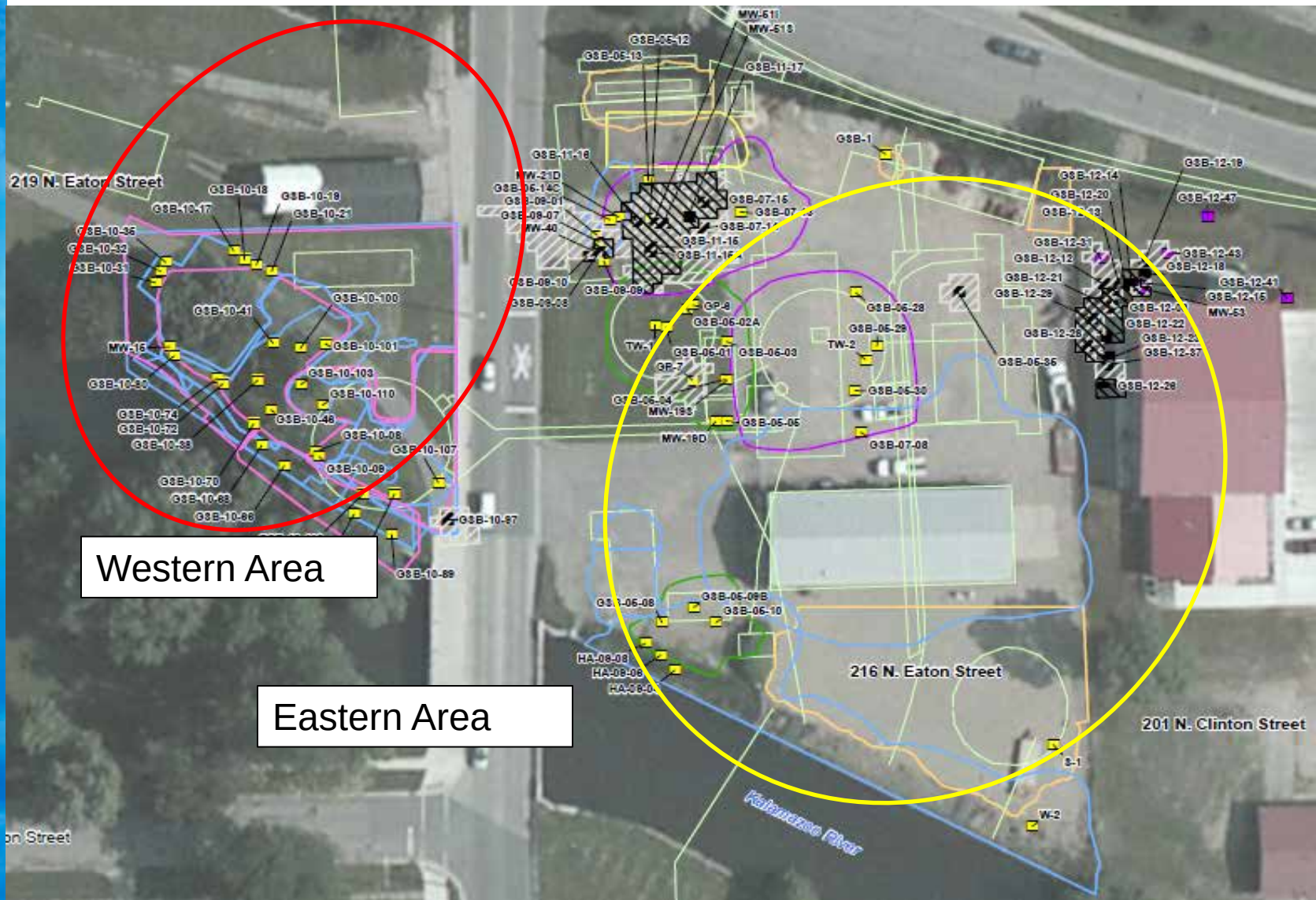
DRAFT

Figure 2

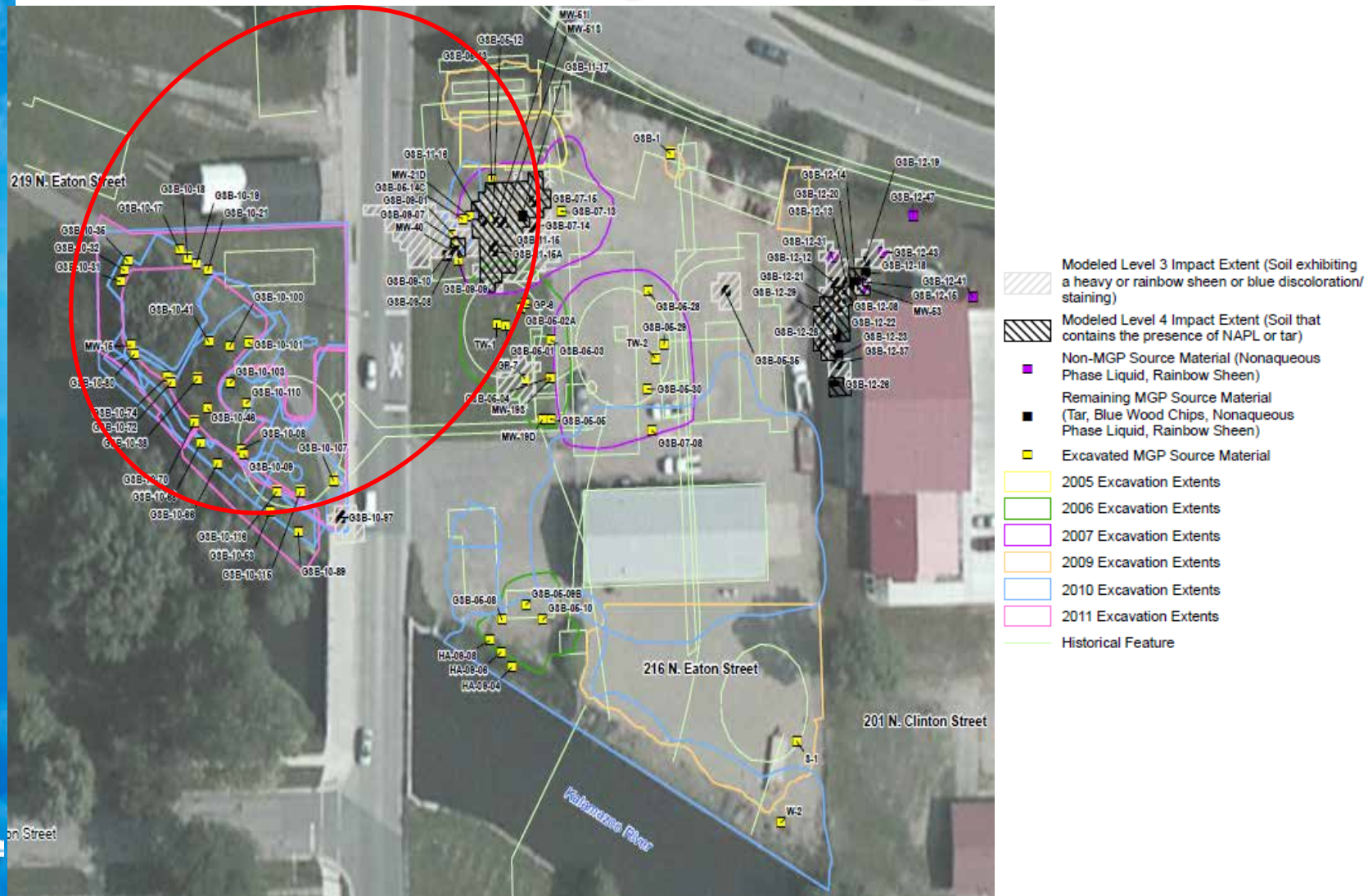
HISTORICAL AND CURRENT FEATURES
SEMCO ENERGY Gas Company
Albion Former MGP Site

Hydrogeology

Plume Stability Evaluation



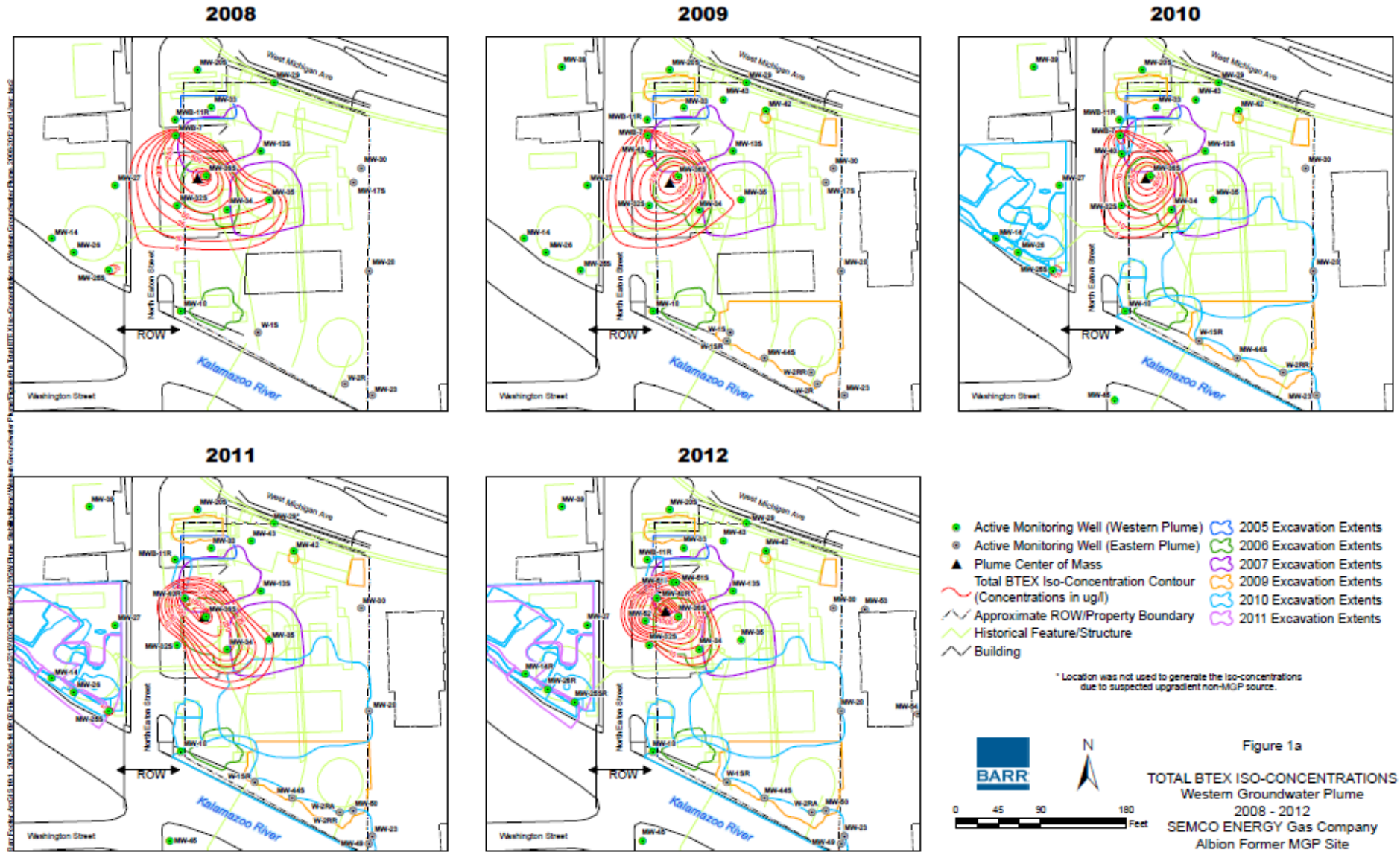
Western Area Plume Stability Analysis



Western Groundwater – Constituents of Concern

- BTEX (total):
  5.0 µg/l (benzene DWC)
- PAHs (total):
  1.6 µg/l (fluoranthene GSI)
- Cyanide:
  5.2 µg/l (GSI)
- Ammonia as nitrogen:
  10,000 µg/l (DWC)

Total BTEX Iso-Concentrations



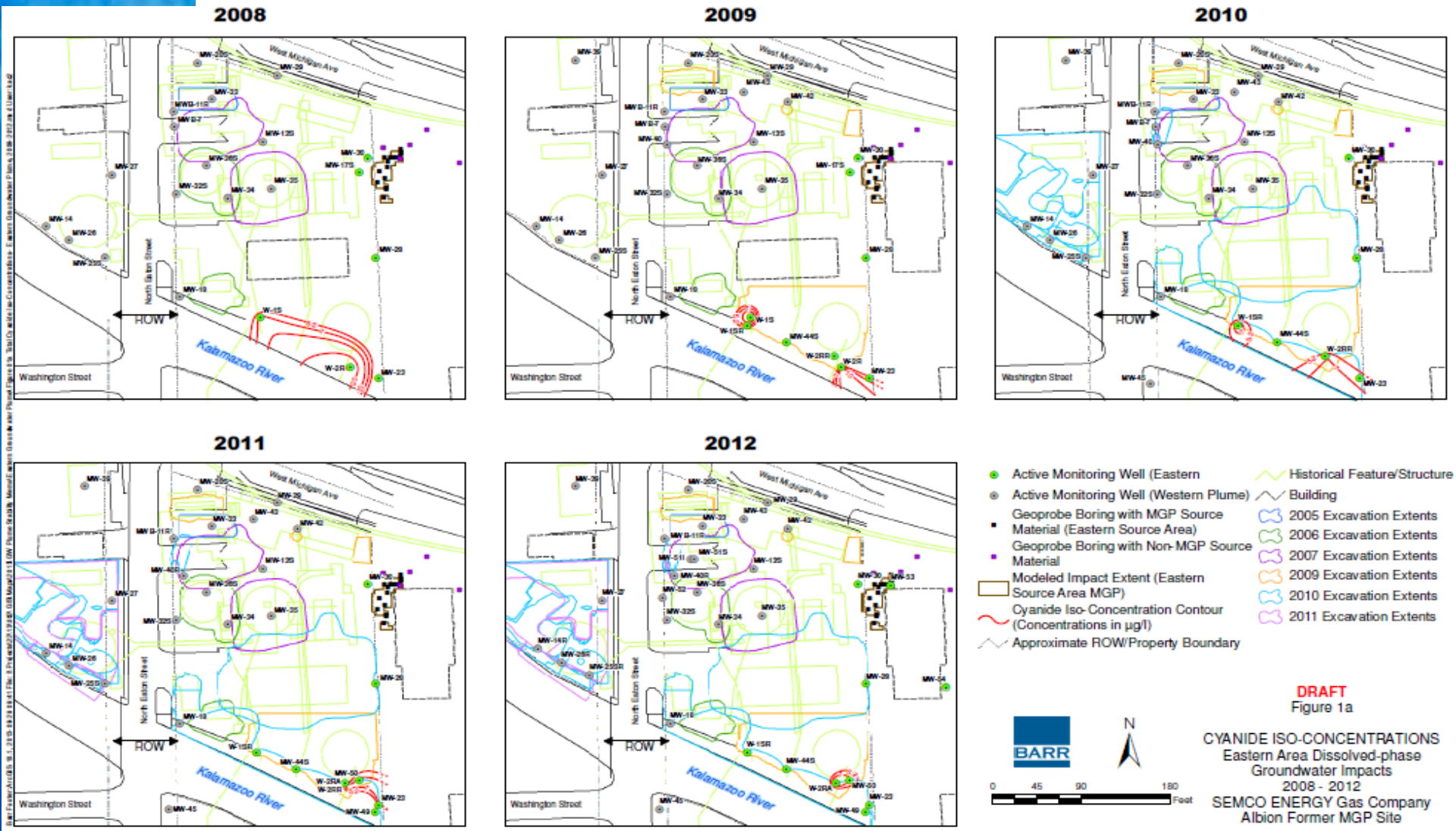
Eastern Area Plume Stability Analysis

- Modeled Level 3 Impact Extent (Soil exhibiting a heavy or rainbow sheen or blue discoloration/ staining)
- Modeled Level 4 Impact Extent (Soil that contains the presence of NAPL or tar)
- Non-MGP Source Material (Nonaqueous Phase Liquid, Rainbow Sheen)
- Remaining MGP Source Material (Tar, Blue Wood Chips, Nonaqueous Phase Liquid, Rainbow Sheen)
- Excavated MGP Source Material
- 2005 Excavation Extents
- 2006 Excavation Extents
- 2007 Excavation Extents
- 2009 Excavation Extents
- 2010 Excavation Extents
- 2011 Excavation Extents
- Historical Feature

Eastern Groundwater – Constituents of Concern

- Cyanide:
  5.2 µg/l GSI
- Sulfate:
  250,000 µg/l DWC, no GSI
- Ammonia (unionized):
  29 µg/l GSI
- PAH and BTEX not present

Cyanide Iso-Concentrations



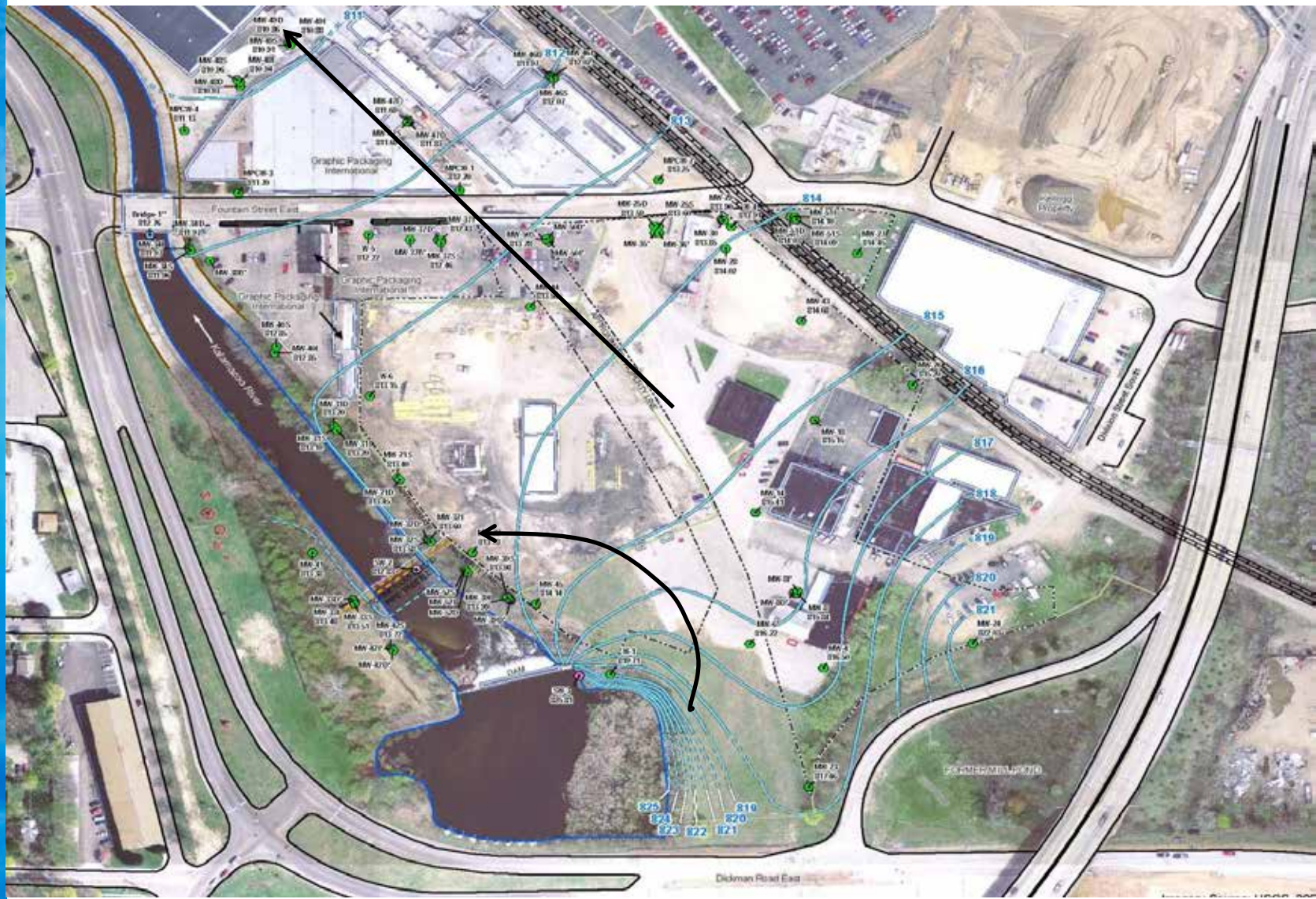
Albion GSI Summary

- Stable/decreasing dissolved impacts
- Mixing zone determination
- De minimis finding
- NFA approved August 2015
- No post-closure GW monitoring

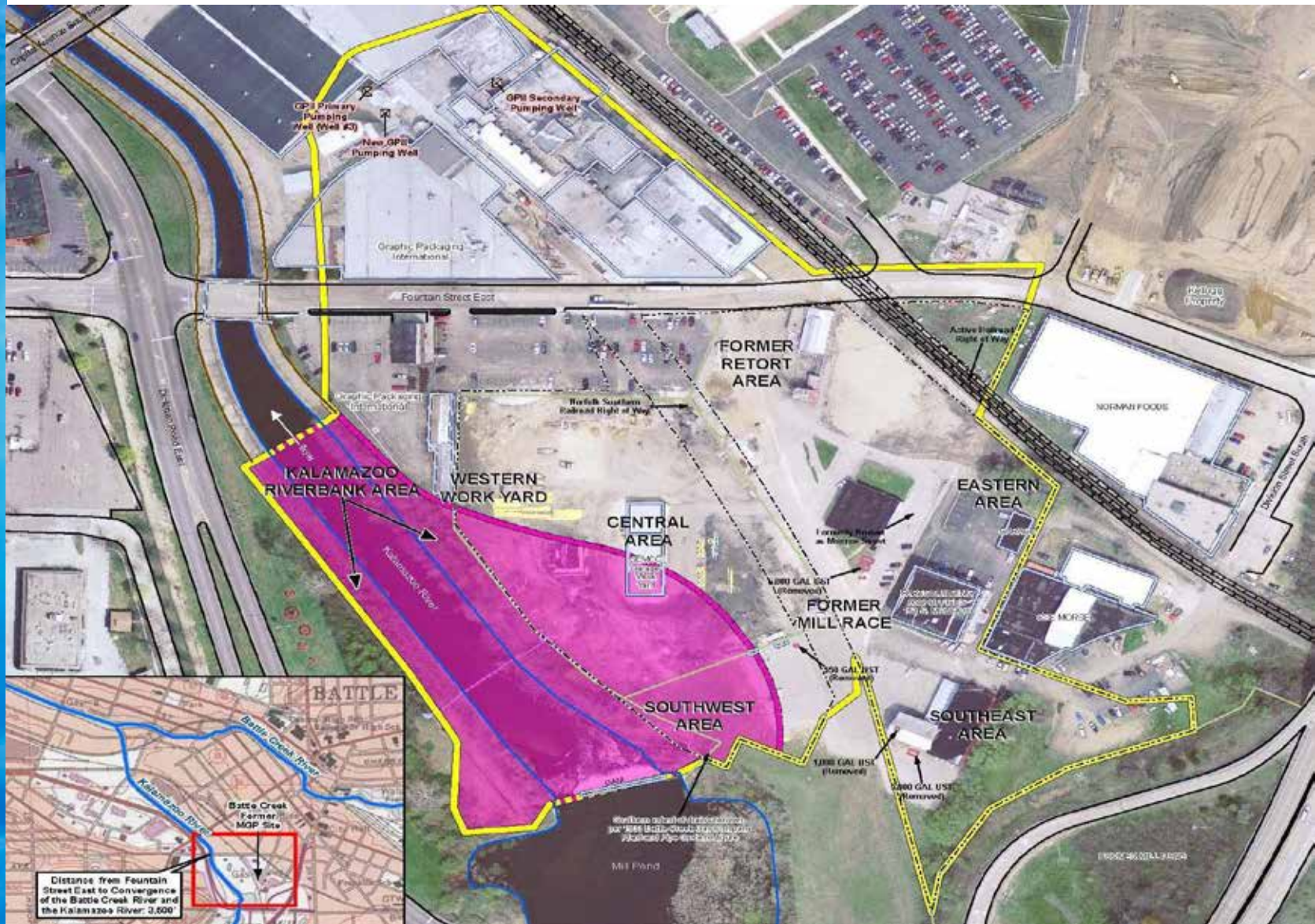
Albion Today

Battle Creek MGP Site

Hydrogeology



GSI


GPSI Primary Pumping Well (Well #3)
New GPSI Pumping Well
GPSI Secondary Pumping Well
Graphic Packaging International
Fountain Street East
FORMER RETORT AREA
Norfolk Southern Railroad Right of Way
KALAMAZOO RIVERBANK AREA
WESTERN WORK YARD
CENTRAL AREA
EASTERN AREA
FORMER MILL RACE
SOUTHWEST AREA
SOUTHEAST AREA
Kalamazoo River
Mill Pond
NORMAN FOODS
BATTLE
Battle Creek River
Battle Creek Former MGP Site
Distance from Fountain Street East to Convergence of the Battle Creek River and the Kalamazoo River: 3,500'

DNAPL Extent

GSI Monitoring Wells

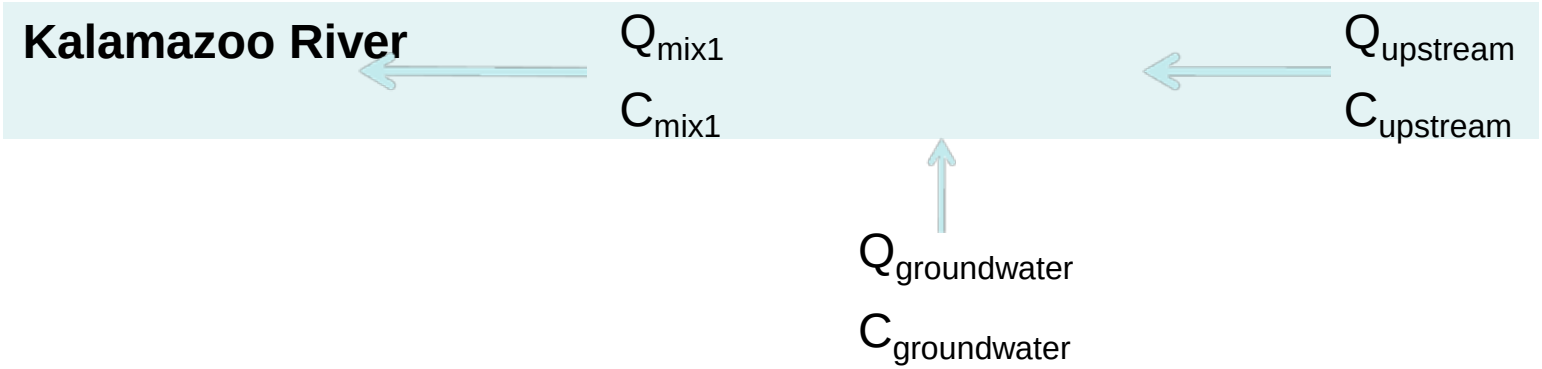
DNAPL Stability and State

- Stable groundwater plume
- 70 to 100 year-old DNAPL
- No ongoing sources
- Driving forces dissipated
- DNAPL not observed in wells

DNAPL Stability and State (continued)

- PTS water drive/centrifuge tests
  - No DNAPL driven off samples in lab tests
  - DNAPL is in residual state (not mobile)

Conservative Mixing Zone Calculations



$$Eq.\,1 \qquad C_{mix1} = \frac{(Q_{upstream} \times C_{upstream}) + (Q_{groundwater} \times C_{groundwater})}{(Q_{mix1})}$$

$$Eq.\,2 \qquad Q_{groundwater} = -(k \times i \times A)$$

De Minimis Conclusion

- Conclusion supported by:
  - Site characterization
  - Plume stability
  - DNAPL stability and state
  - Mixing zone calculations

MDEQ Evaluation

- District project manager and GSI TAPS point of contact review
- District peer review and TAPS team review combined
  - Additional information required
  - Date extension granted

MDEQ Evaluation

- Reasonable potential analysis performed by WRD
- Other factors considered:
  - Channelized Kalamazoo River
  - Site characterization
  - Source removal efforts
  - River infrastructure

MDEQ Conclusion

- No reasonable potential to exceed Michigan water quality standards
- MDEQ concurred with de minimis determination

Regulatory Challenges

De minimis determination:

- One of the first requests to DEQ
- De minimis - what does it mean?
- Reasonable potential for adverse impacts
- Water Resources Division discussions

Regulatory Challenges

Part 201 Regulatory Changes & Implementation:

- December 2012
- December 2014
- Communicating changes
- Date of the submittal dictated which statutes applied
- Statutory review times

Regulatory Challenges

Statutory review times:

- District Peer review
- TAPS Teams review
- Toxicology review
- Water Resources Division review

Project History & Partnership

- Mutually agreed to formal request for approval (2008)
- Response Activity Plan (ReAP) Requests
  - Albion: 18 ReAPs submitted
  - Battle Creek: 9 ReAPs
- Informal reviews – non-critical items

Project History & Partnership

Overcoming Challenges:

- 2008 - Meet Annually
- 2010 - Invited Barr/SEMCO to District Peer Reviews

Project History & Partnership

Results:

- April 24, 2015 – Battle Creek Remediation Plan approved
- August 18, 2015 – Albion NFA approved
- 2016 – Anticipate submittal of Battle Creek NFA

Conclusions

Large Complex sites:

- Meet regularly
- “Bites of the apple” approach

Collaborative Approach Builds Trust:

- Issues identified and resolved
- Quick decisions when needed

QUESTIONS?

Michigan Department of Environmental Quality

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