




DuPont Site and RFI Review

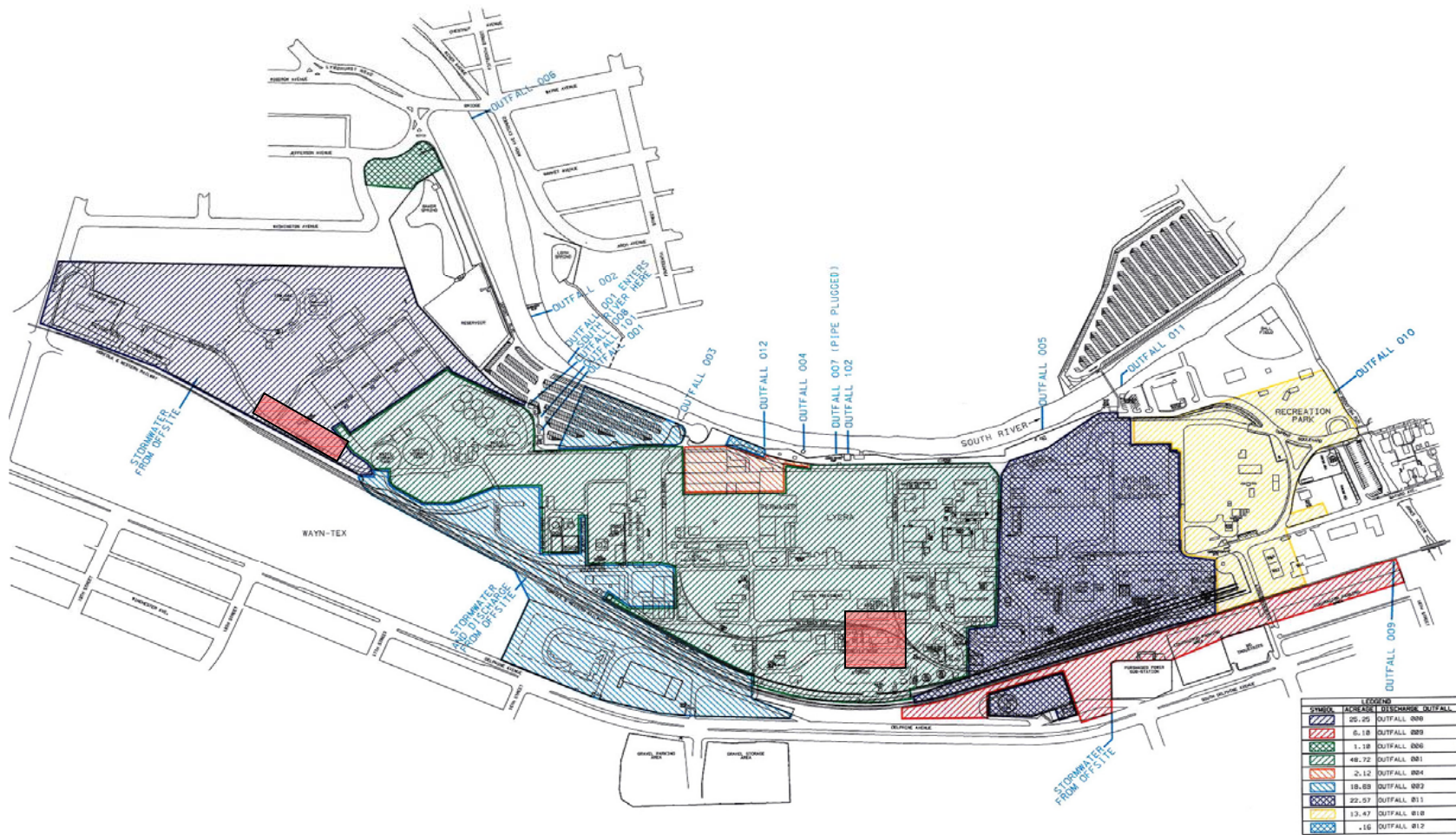
South River Science Team Meeting

October 8, 2002

Discussion Items

-  Areas of known soil contamination
-  Storm water management
-  RFI Results

Outfall Locations and Areas of Elevated Hg in Soil



Storm Event Monitoring

- 📄 June 01 storm event sampled at four outfalls
- 📄 Grab samples collected after 30 minutes
- 📄 Composite flow-based samples collected in 20 minute intervals over storm duration
- 📄 Outfall 001 is combined ww and storm water
- 📄 Clean metals protocol was not used
- 📄 Analysis per EPA 245.1

Storm Event Monitoring Results

Total Mercury (mg/l)

	2001	2001
	Grab	Composite
Outfall 901 (001)	<0.00020	0.00033
Outfall 911 (011)	<0.00020	<0.00020
Outfall 003	<0.00020	<0.00020
Outfall 008	<0.00020	<0.00020

Upcoming Activities

- 📁 Re-affirmation of site waste management protocols
- 📁 Storm water and wastewater analysis using clean metals protocol and low-level detection

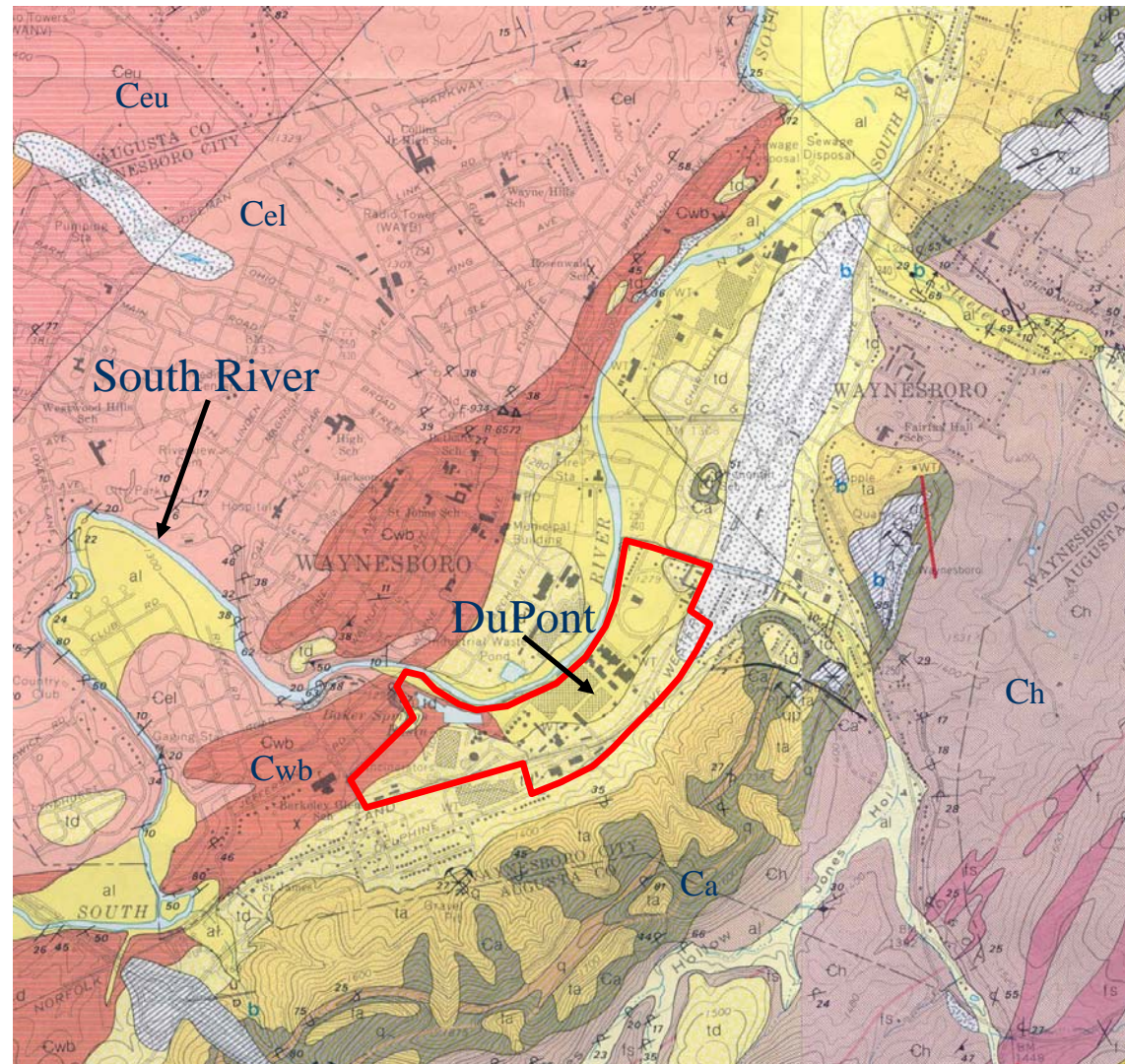
DuPont Site RFI Results



RFI Objectives






- Further characterize the site geology, hydrogeology, and groundwater migration pathways
- Characterize site-wide soil and groundwater quality
- Evaluate current releases and potential for future releases to the South River

Regional Geologic Map





Site Geology

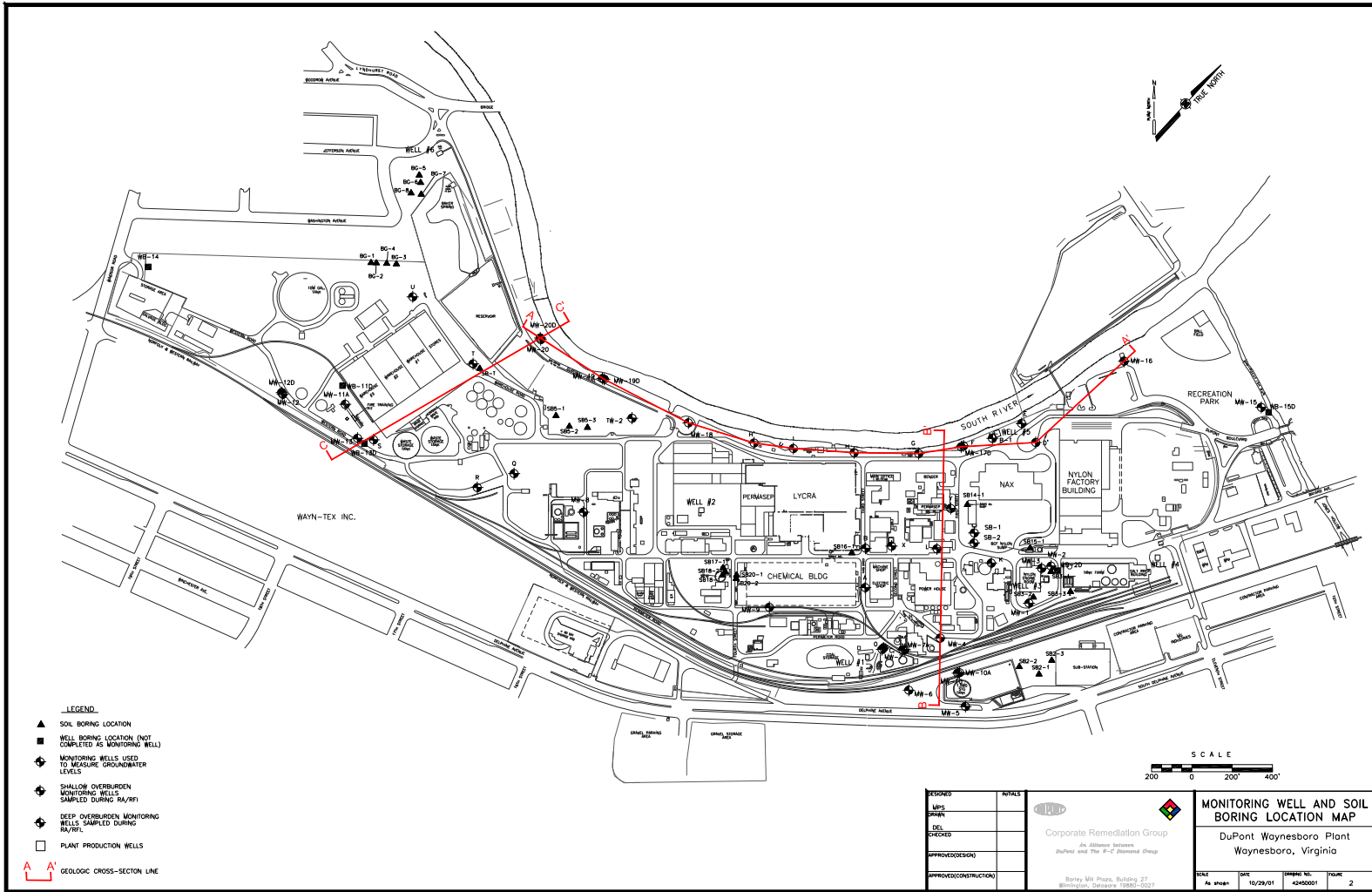
Overburden Sediments - Shallow Aquifer

-  Alluvial sand, gravel, silt, and clay overlying bedrock
-  Up to 18 feet thick across most of the site
-  > 60 ft thick in karst area (NE)
-  Absent in SW
-  Overlies weathered Waynesboro Formation

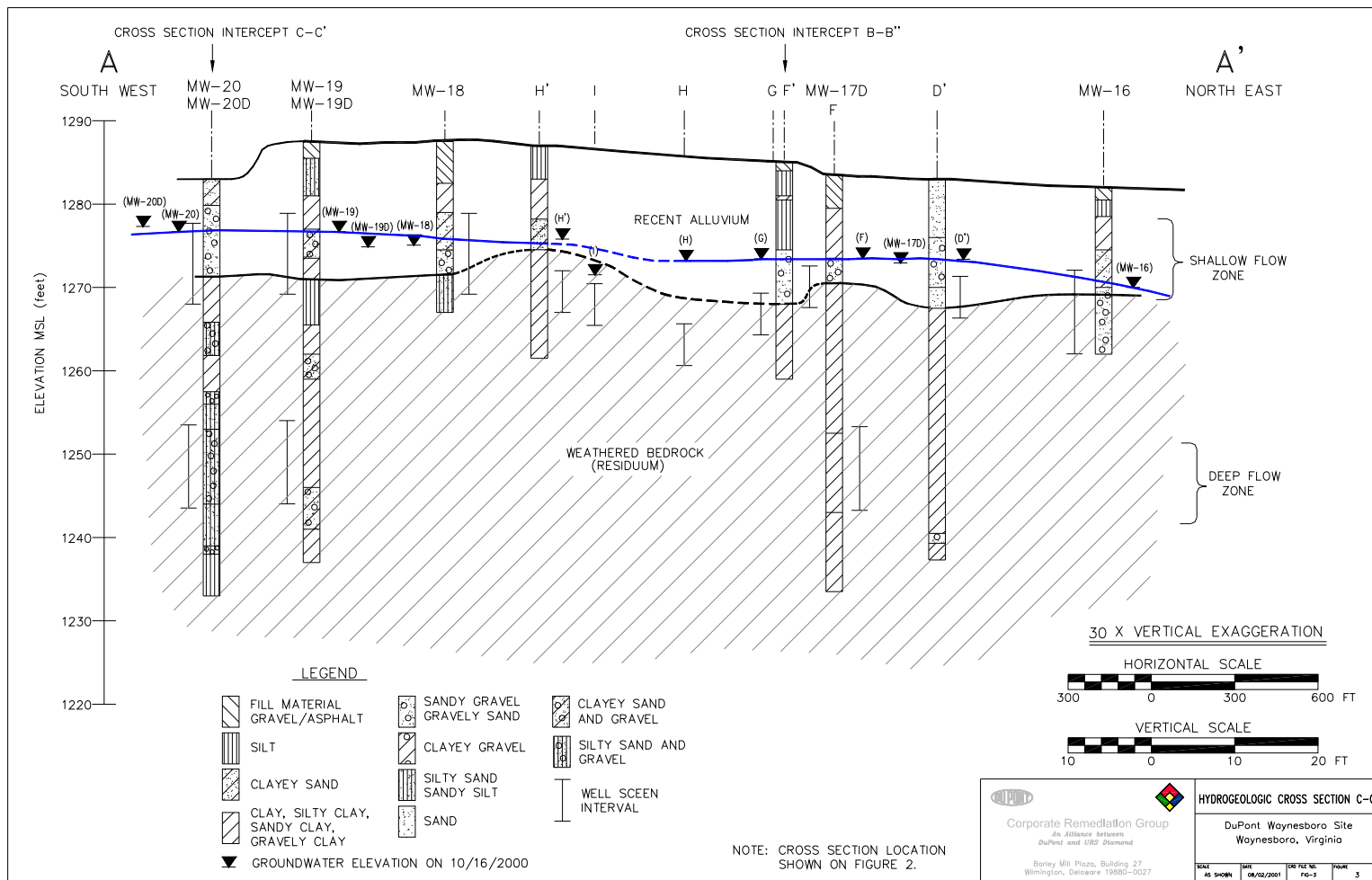
Bedrock

-  Waynesboro Formation - highly weathered mudstone, siltstone, argillite and phyllite (very stiff, silty clay, with shale, mudstone, siltstone) over limestone and sandstone
-  Shady Formation - dolomite, in NE portion of the site, subsurface only - inferred from karst features

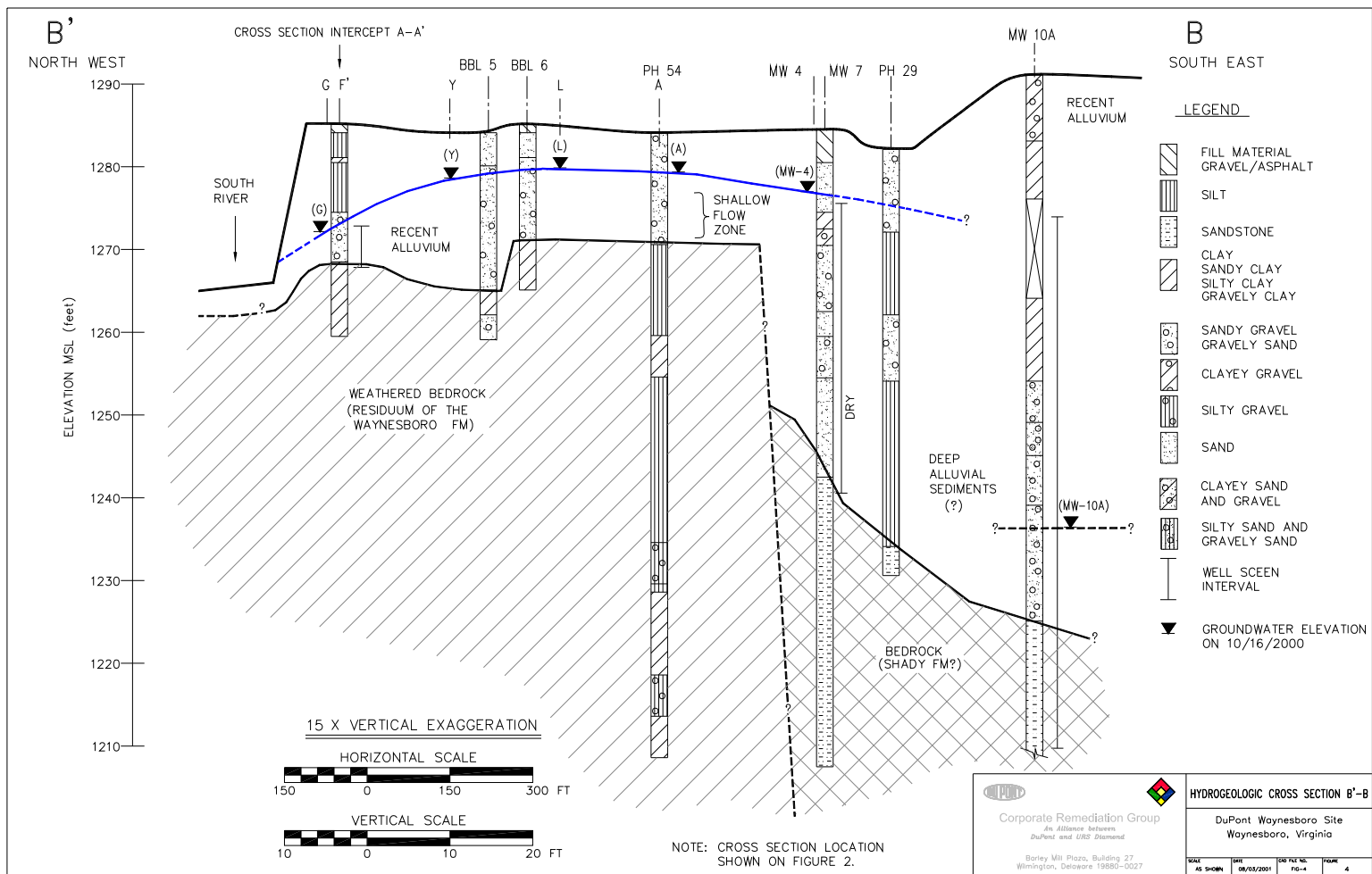
Site Geology - Cross Section Lines



Site Geology - Cross-Section A-A'



Site Geology - Cross-Section B-B'



Karst Area




- 📖 From Gathright 1977 - Geology of Waynesboro East and Waynesboro West Quadrangles
 - 📖 Karst area believed to be associated with the Shady Formation in sub-surface
 - 📖 Not exposed in the area
 - 📖 Known to be susceptible to karst weathering
 - 📖 Present to the north and south of Waynesboro
 - 📖 Borings drilled at western toe of Blue Ridge just northeast of Waynesboro - looking for Shady Formation
 - 📖 No carbonate identified up to 365 ft BGS
 - 📖 Theorized area is mature karst - most of the Carbonate removed/collapsed or is very deep
 - 📖 Alternate theories on the area
 - 📖 Brecciated zone associated with Blue Ridge thrust faulting

Site Hydrogeology







Shallow aquifer

-  Discharges to the South River to the NW and N
-  May discharge to karst area in NE

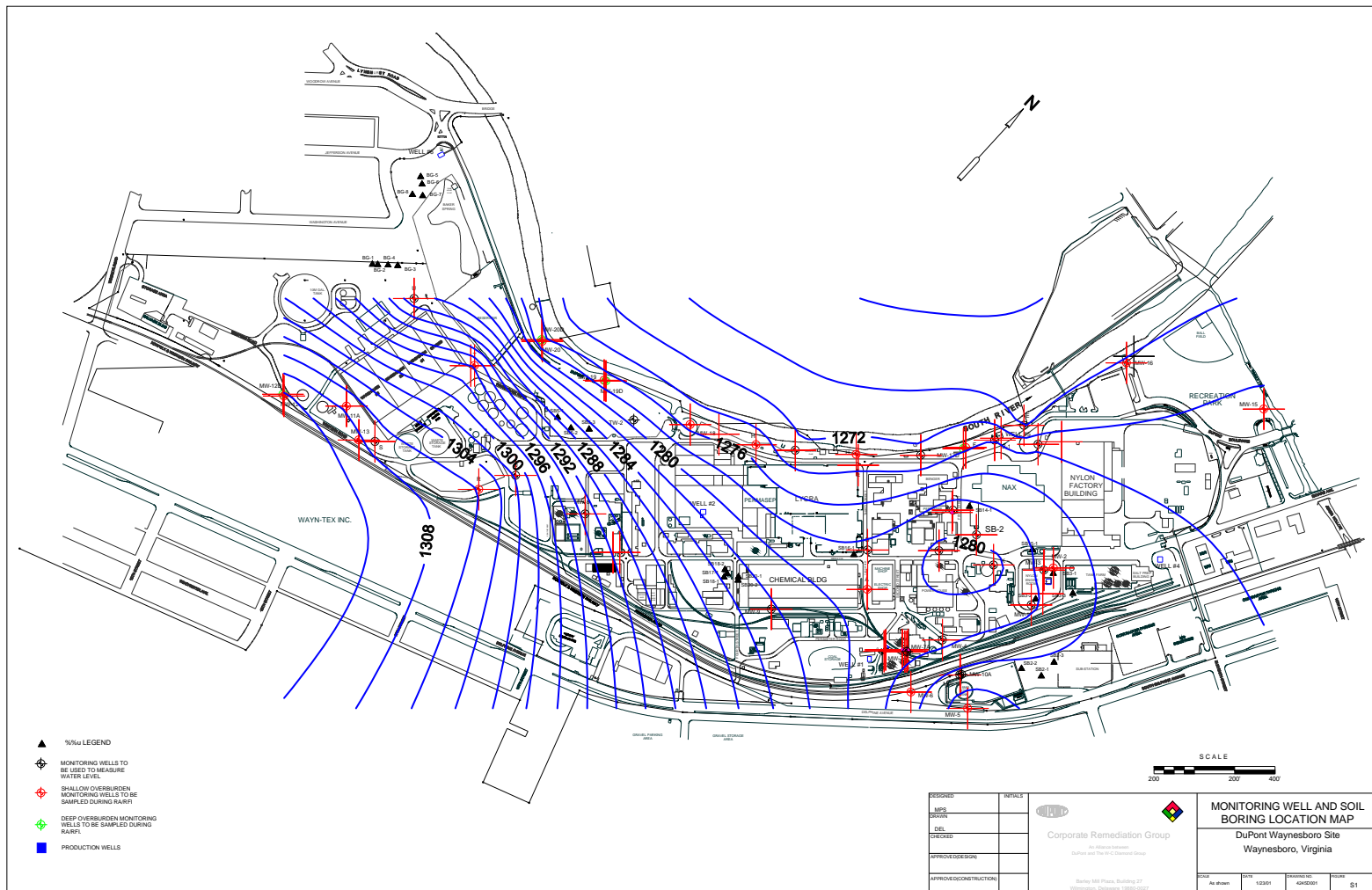
Deep bedrock aquifer

-  Groundwater source for plant
-  Discharge location unknown
-  Not a focus of the RFI

Karst area







-  Deep water table - shallow water table may also be present
-  May be in communication with bedrock aquifer
-  Unlikely to discharge to South River
 -  GW elevation at MW-10A = 1235 ft aMSL
 -  South River elevation ~ 1270 ft a MSL (at plant)
-  Captured by plant production wells?

Shallow Zone Groundwater Elevations - Aug-00





Summary of RFI Sampling Activities Completed



Soil Sampling

-  10 SWMUs
 -  SWMU 1 - Hg Recovery
 -  SWMU 4 - Incineration Area
-  Background sampling
-  86 soil samples + QA/QC
-  VOCs, SVOCs, metals, SPLP Hg, meHg, dioxins/furans, HMD, DMF, DMAC

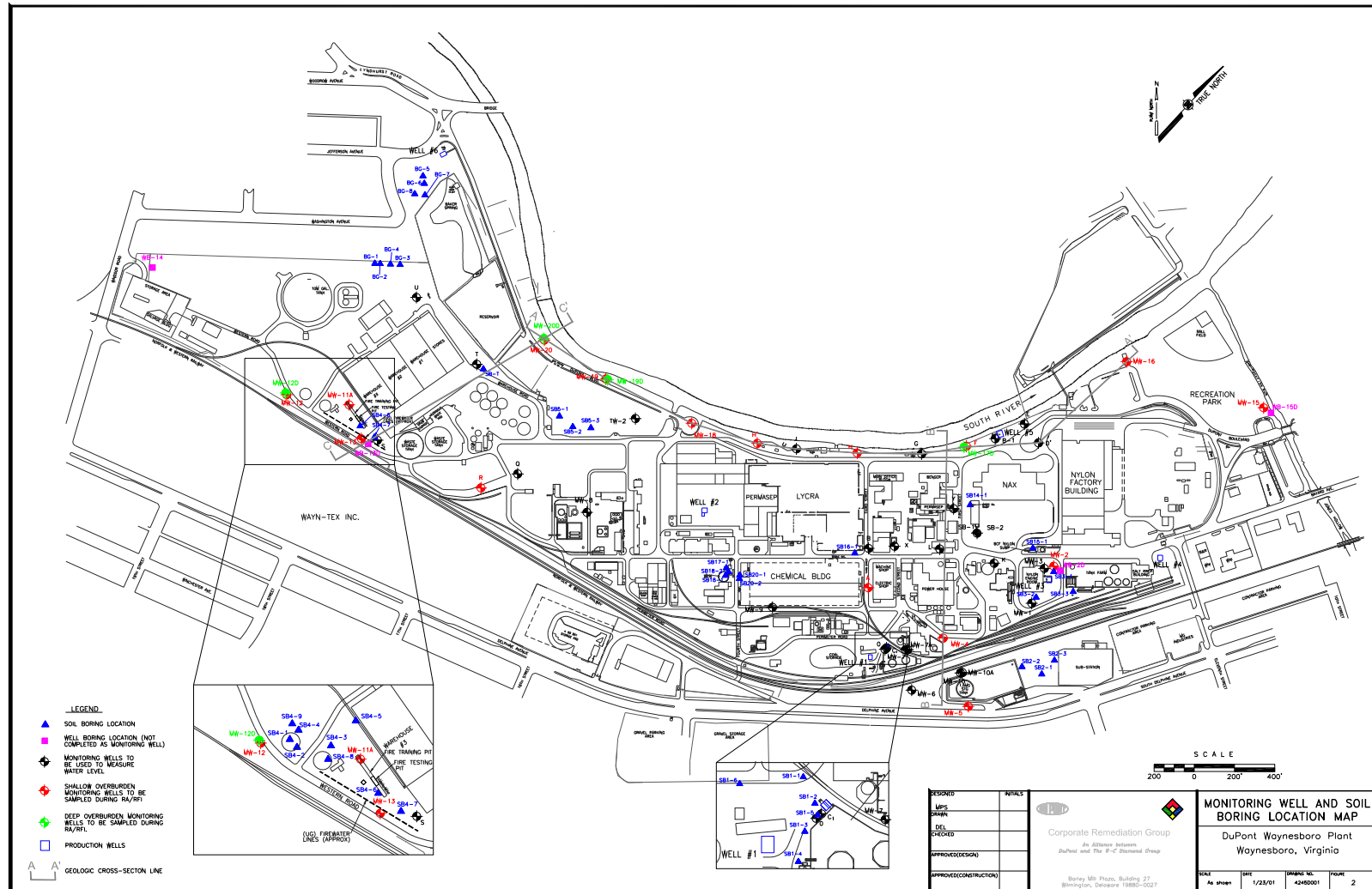
Groundwater Sampling

-  40 samples (20 Wells, 2 Rounds) + QA/QC
-  VOCs, SVOCs, metals, meHg, HMD, DMF, DMAC

Other Activities







-  Groundwater level measurements
-  Aquifer slug testing

Monitoring Well and Soil Boring Locations







Hg / meHg Results - Soil

Hg




-  Low ppm levels throughout plant area
 -  Up to 100 ppm in Hg Recovery Area (generally low ppm levels)
 -  Up to 300 ppm in Incineration Area
 -  Elemental Hg observed in buried burning pit accumulation layer (12 ft BGS) in Incineration Area
-  Good erosion control over the site - gravel or asphalt ground cover
-  Buried burning pit is within silt and clay - isolated from alluvial aquifer

meHg



-  Sampled soils for meHg at Hg Recovery and Incineration Areas only
-  Detected ppt levels across the site
-  Low ppb levels in 2 source areas
-  5.7 ppm at Incineration Area (associated with elemental Hg)

Hg / meHg Results - Groundwater

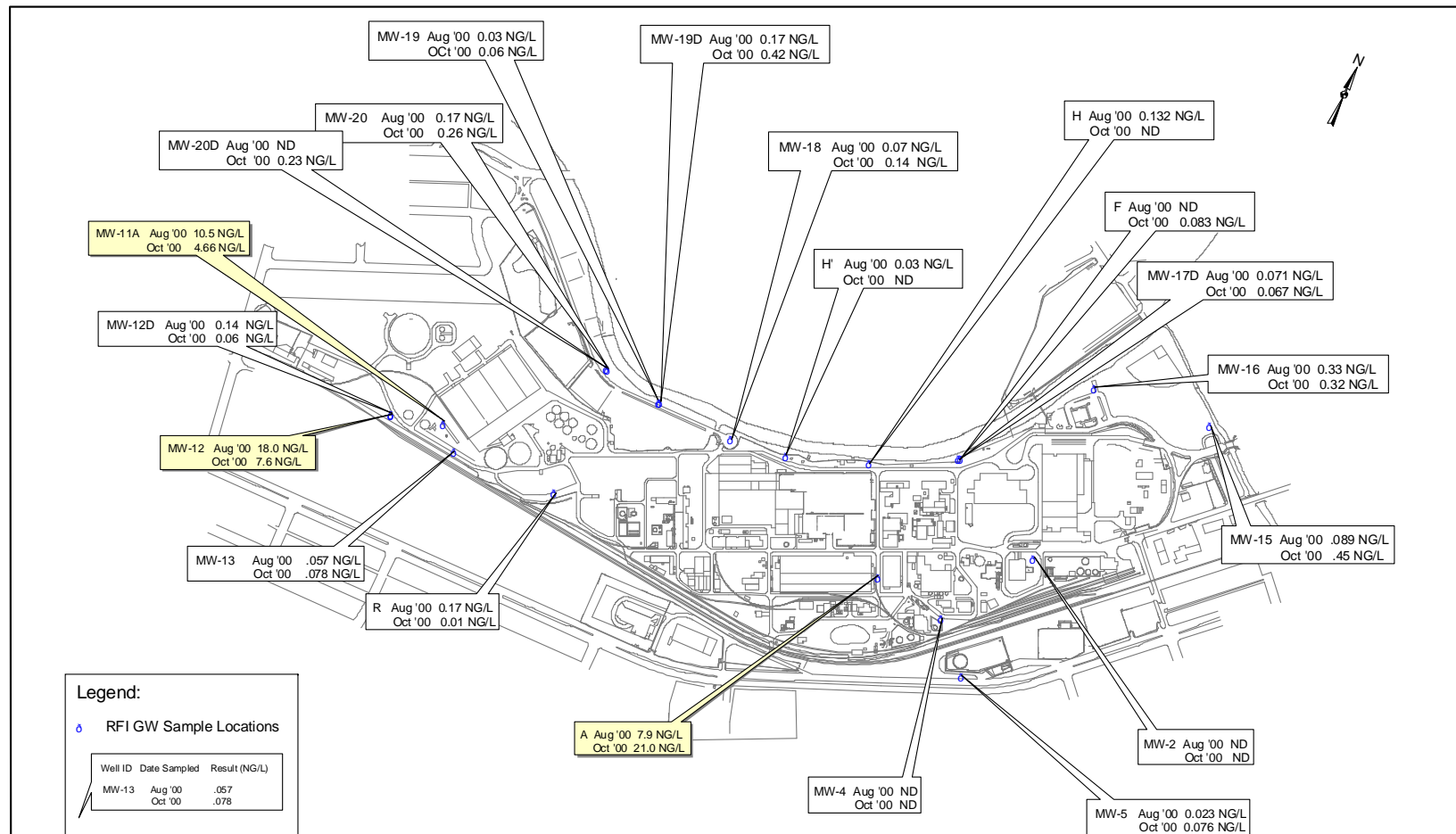
Hg (dissolved)

-  Plant area - MW-A (0.5 ppb)
-  Incineration Area - MW-11A (0.2 ppb), MW-12 (0.17 ppb)
-  Down-gradient boundary - All dissolved results ND (MDL=0.050 ug/L) except MW-20D (0.12 ppb, Oct. 2000)

meHg

-  Sub-ppt levels at all but 2 locations (0.03 to 0.45 ng/l along South River)
-  Ppt levels at 3 wells in sources areas (21.0 to 4.66 ng/l)

MeHg Results - Groundwater



Corporate Remediation Group
 An Alliance between
 DuPont and URS Diamond
 Barley Mill Plaza, Building 27
 Wilmington, Delaware 19805



TITLE:
 RFI Groundwater Sampling Results- Methyl Mercury (NG/L)
 DuPont Waynesboro Plant

0 400 800 Feet

DATE:	REV:	DATE:	REV:
7/5/01	0		

DESIGNER:	wayneri.apr
FIGURE NO.:	18B

MeHg Mass Flux to South River - Worst Case

☞ Volumetric groundwater flux (Q) to South River:

☞ = 5.13×10^5 l/d (94 gpm)

☞ Based on length of river boundary along plant and mean aquifer conductivity (K), gradient (i), and saturated thickness (t)

☞ Mass Flux of meHg to South River:

☞ = 232 ug/d

☞ Based on highest concentration detected in shallow wells along the river (0.45 ng/l; MW-15)

☞ Predicted increase in concentration (above background) down-stream of plant after mixing:

☞ = 5.5×10^{-3} ng/l

☞ Assumes WORST CASE - **lowest daily mean flow** in South River between 1953 and 1995 (17 ft³/s; Aug 8, 1966) and **highest concentration** detected along the river

Hg Mass Flux to South River - Worst Case

☞ Volumetric groundwater flux (Q) to South River:

☞ = 5.13×10^5 l/d (94 gpm)

☞ Based on length of river boundary along plant and mean aquifer conductivity (K), gradient (i), and saturated thickness (t)

☞ Mass Flux of Hg to South River:

☞ = 61.6 mg/d

☞ Based on highest concentration detected in shallow wells along the river (0.12 ng/l; MW-20D)

☞ Predicted increase in concentration (above background) down-stream of plant after mixing:

☞ = 1.5×10^{-3} ug/l

☞ Assumes WORST CASE - **lowest daily mean flow** in South River between 1953 and 1995 (17 ft³/s; Aug 8, 1966) and **highest concentration** detected along the river

Phase II RFI Objectives




- ☞ Confirm nature and extent of soil and groundwater impacts
 - ☞ mainly source areas
- ☞ Further characterize groundwater flow and quality in the northeast corner of the site
- ☞ Storm event surface-water discharge sampling
- ☞ Initiate annual groundwater monitoring program

Conclusions




Shallow overburden aquifer

-  Discharges to South River along plant boundary
-  Flows off-site to the Northeast

Karst area

-  Deep groundwater table not likely to be in communication with South River - perched water table may also be present
-  Depressed groundwater level suggests capture by plant production wells
-  Needs further evaluation - flow and GW quality

MeHg

-  Contribution to South River via shallow groundwater appears to be negligible
-  Sub-ppt levels detected in GW along South River
-  Ppt concentrations localized to source areas in plant interior