

Tittabawassee River, Saginaw River & Bay Site

Segment 1 Background and Status

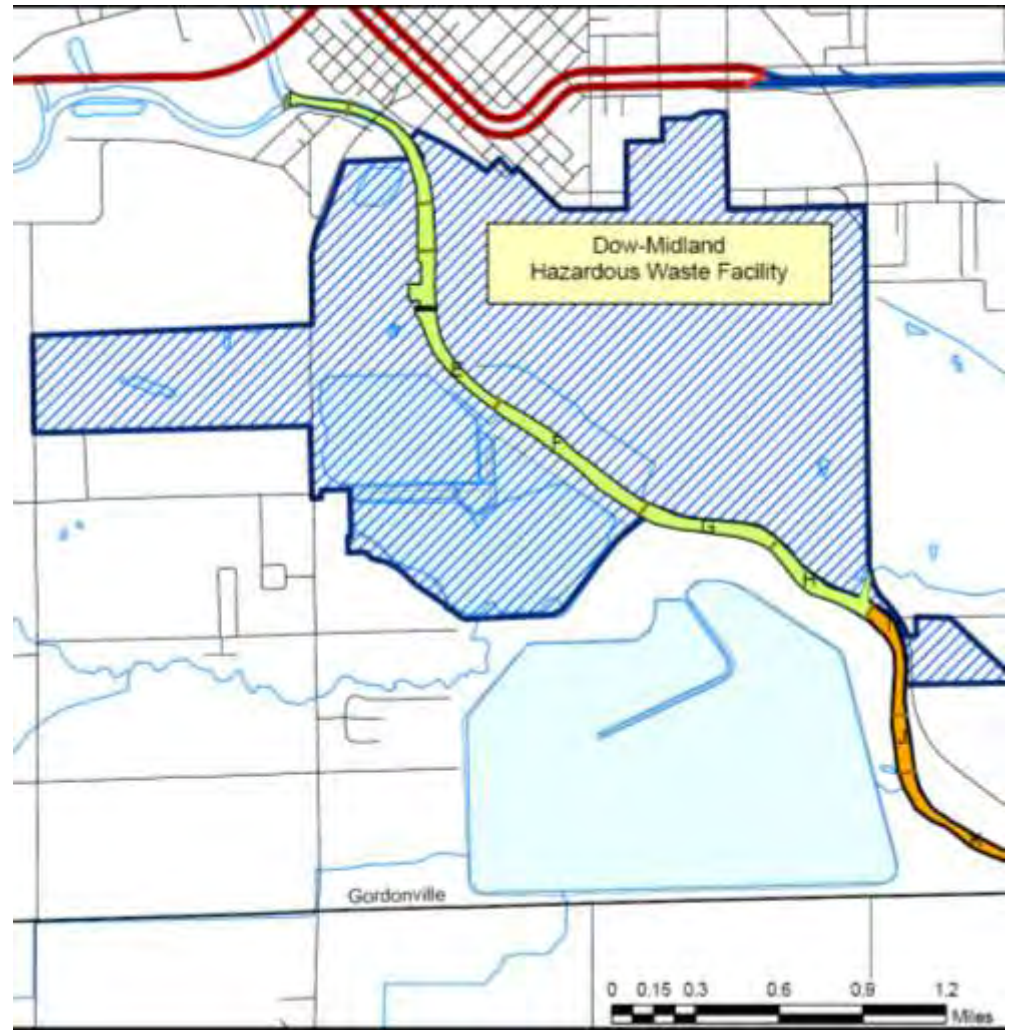
CAG Meeting March 21, 2011

Agenda

- Summary of Segment 1 Conditions
 - Site history and source control
 - Completed actions in Segment 1
 - Investigation activities
 - Preliminary findings
- Sediment Cleanup Options
- Schedule and CAG Involvement

Segment 1 Overview

- Three miles next to Dow's Midland plant
- Some cleanup has already occurred
- Unique conditions in this segment
- Proposed cleanup options expected in 2011
- Cleanup expected to begin in 2012

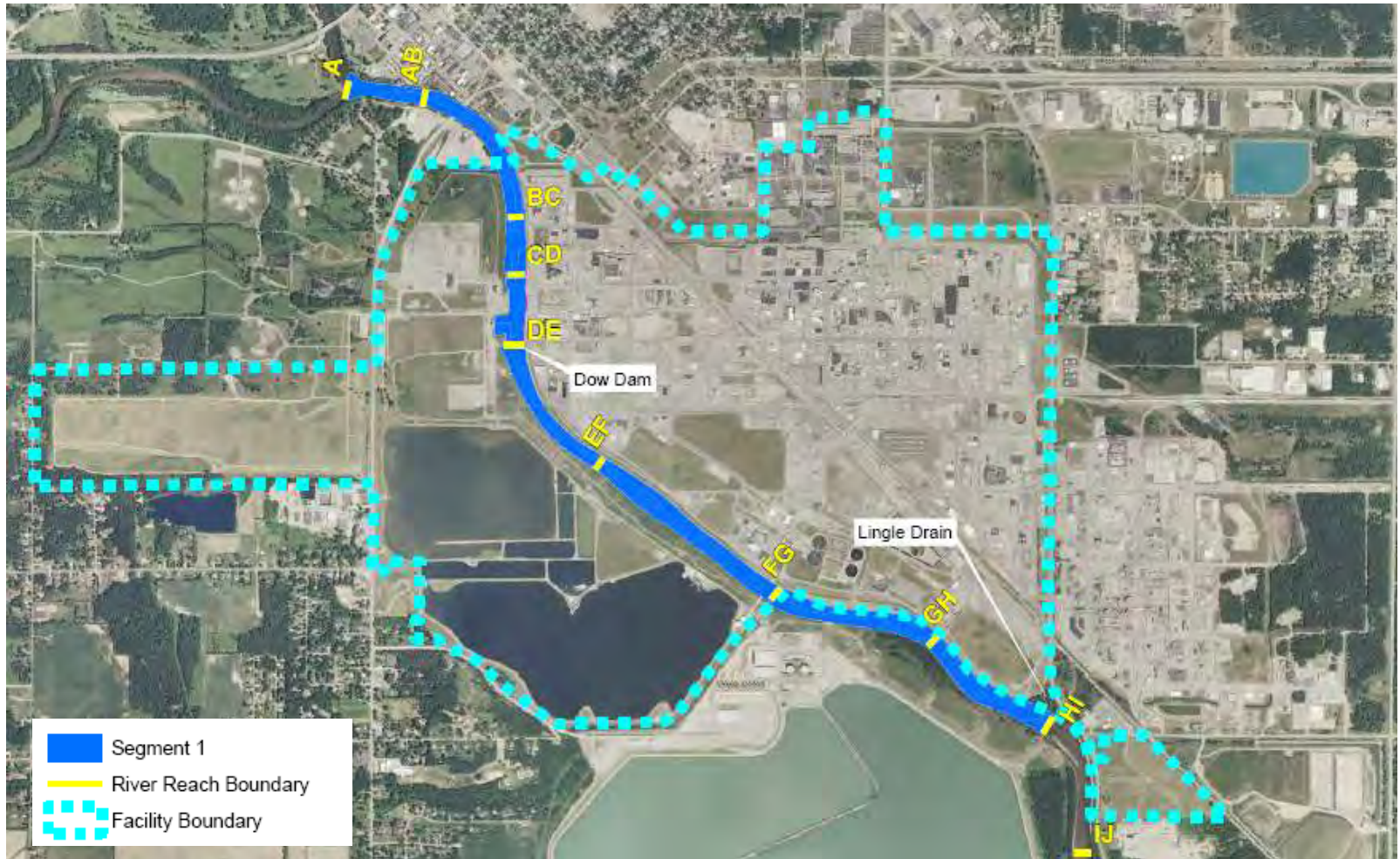


SUMMARY OF SEGMENT 1 CONDITIONS

Introduction to Segment 1

- Includes ~ 3.1 miles – Reaches A through H
- Characterized by:
 - Relatively little floodplain
 - Man-made modifications to the banks
 - Relatively narrow river valley
 - Dow Dam
- Industrial uses on both sides of the river
 - Dow and Consumers Energy own most of the property along Segment 1

Segment 1 Boundary

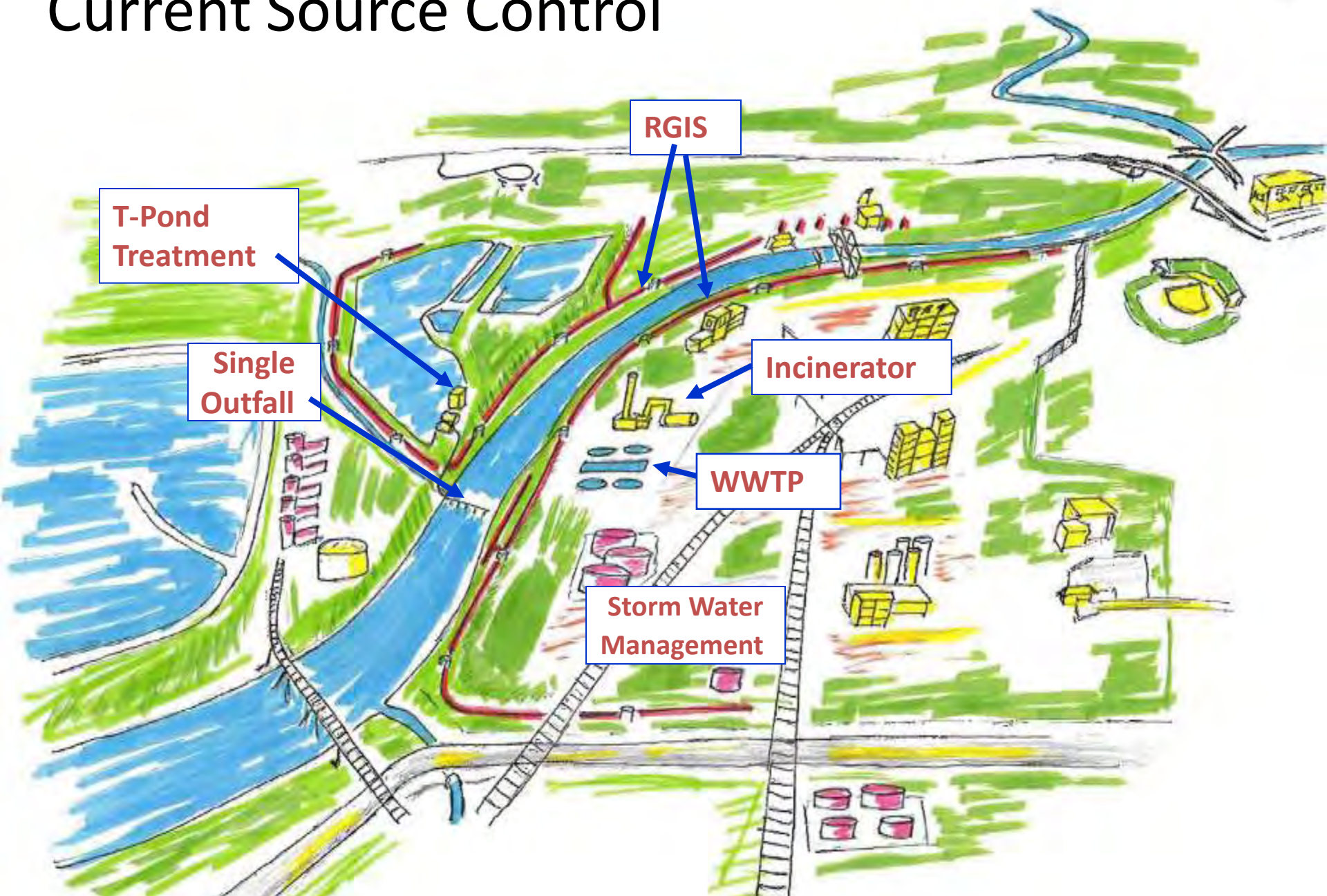


Summary of Segment Conditions

Site History & Source Control

- Manufacturing operations have occurred nearby since the 1890s
- Contaminated sediment deposits due to historic releases
 - Discharge to the river – direct, holding ponds, outfalls
 - Surface water runoff
 - Groundwater
- Waste management systems and source controls now protect the river

Current Source Control



Groundwater Controls

- Plant groundwater is controlled by a system called the Revetment Groundwater Intercept System (RGIS)
- First section of RGIS was installed in the late 1970's
- RGIS exists along the entire east side of the River and along portions of the west side of the River



Dow Dam

RGIS

Basin Pond Number 6

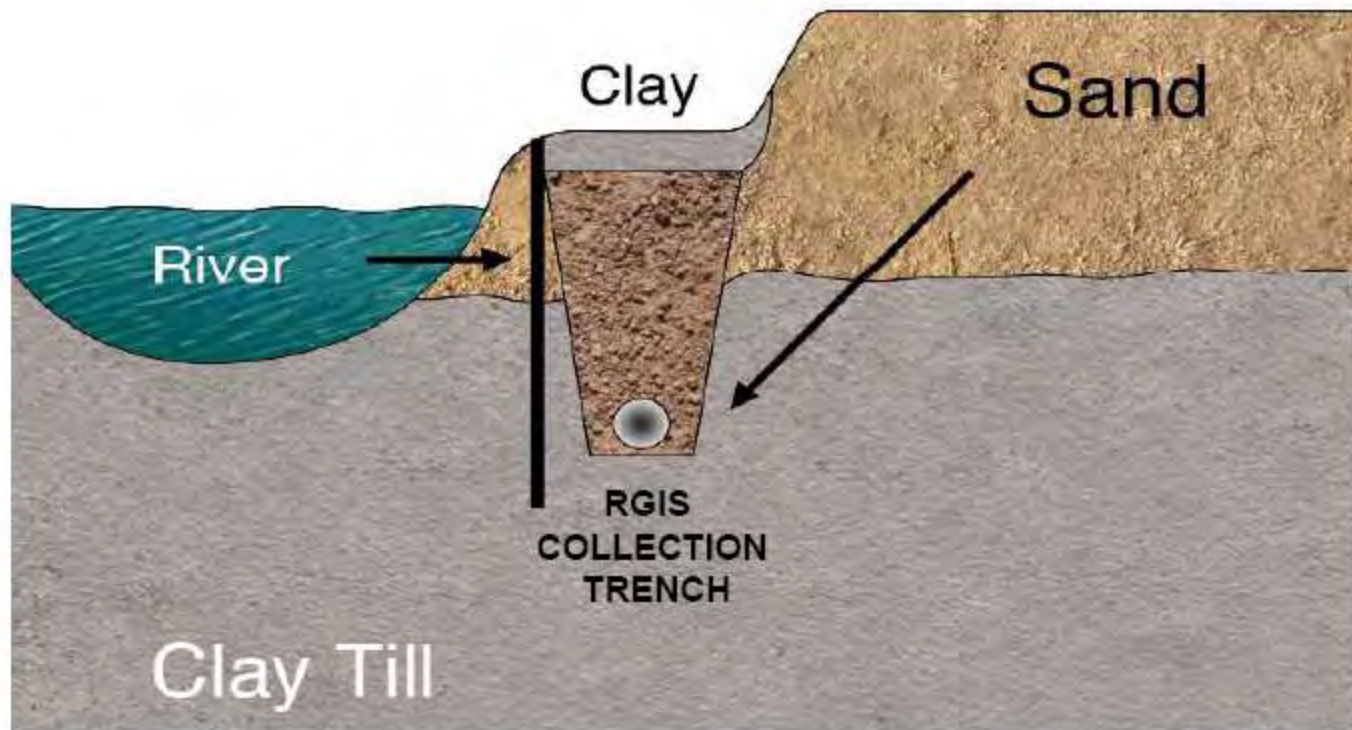
Basin Pond

Lingle D

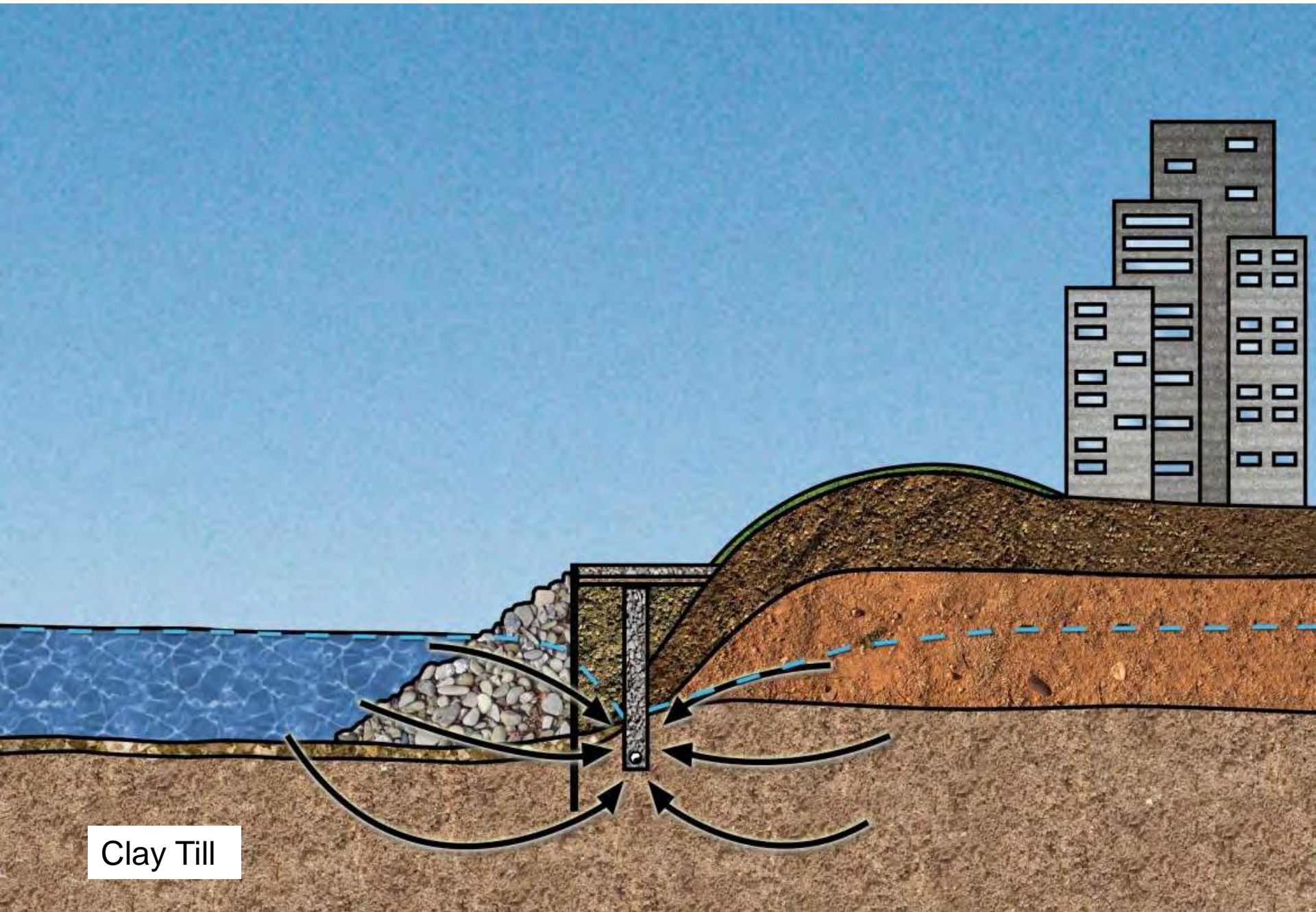
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How RGIS Works

- RGIS intercepts groundwater that would otherwise go to the River
 - Utilizes a collection trench, tile and pumping stations
 - Collects about 1,500,000 gallons of groundwater per day that is pumped to the Dow WWTP
- Performance is continually monitored with instruments along the entire length of RGIS
 - Ensures that the system is always functioning correctly
 - Maintenance and upgrades, as needed



 **WATER FLOW**



Clay Till

RGIS Upgrade Construction



Segment 1 Conditions

Near-Plant Actions Completed:

- Significant cleanups completed in Segment 1
 - Address furans/dioxins and other chemicals
 - These previous actions help inform future actions in Segment 1
- Includes:
 - Reach B – Removal and capping
 - Reach D – Dredging, capping and monitored natural recovery (MNR)
 - Reach G Sand Bar – Groundwater capture and treatment

Previous Near-Plant Response Actions

Reach B – 2008 to 2009

- Bank debris and soil removal
- In-river debris removal
- About 19,000 cubic yards removed and disposed
- Sediment cap ~700 ft in length

Reach B – Bank Debris Before Removal



Reach B Capping



Previous Near-Plant Response Actions

Reach D 2007 – 2009

- Sheet piling installed in 2007 for turbidity control
 - Caused erosion of nearby sediments
 - Monitored Natural Recovery – ongoing in this area
- Hydraulic and mechanical dredging 2007 – 2008, ~ 19,000 cubic yards removed and disposed
- Geotube[®] dewatering
- Debris created dredging challenges
- Dredging residuals required sediment cap – placed in 2009, ~ 1,500 ft in length

Reach D Removal





08/10/2007

Geotube Dewatering



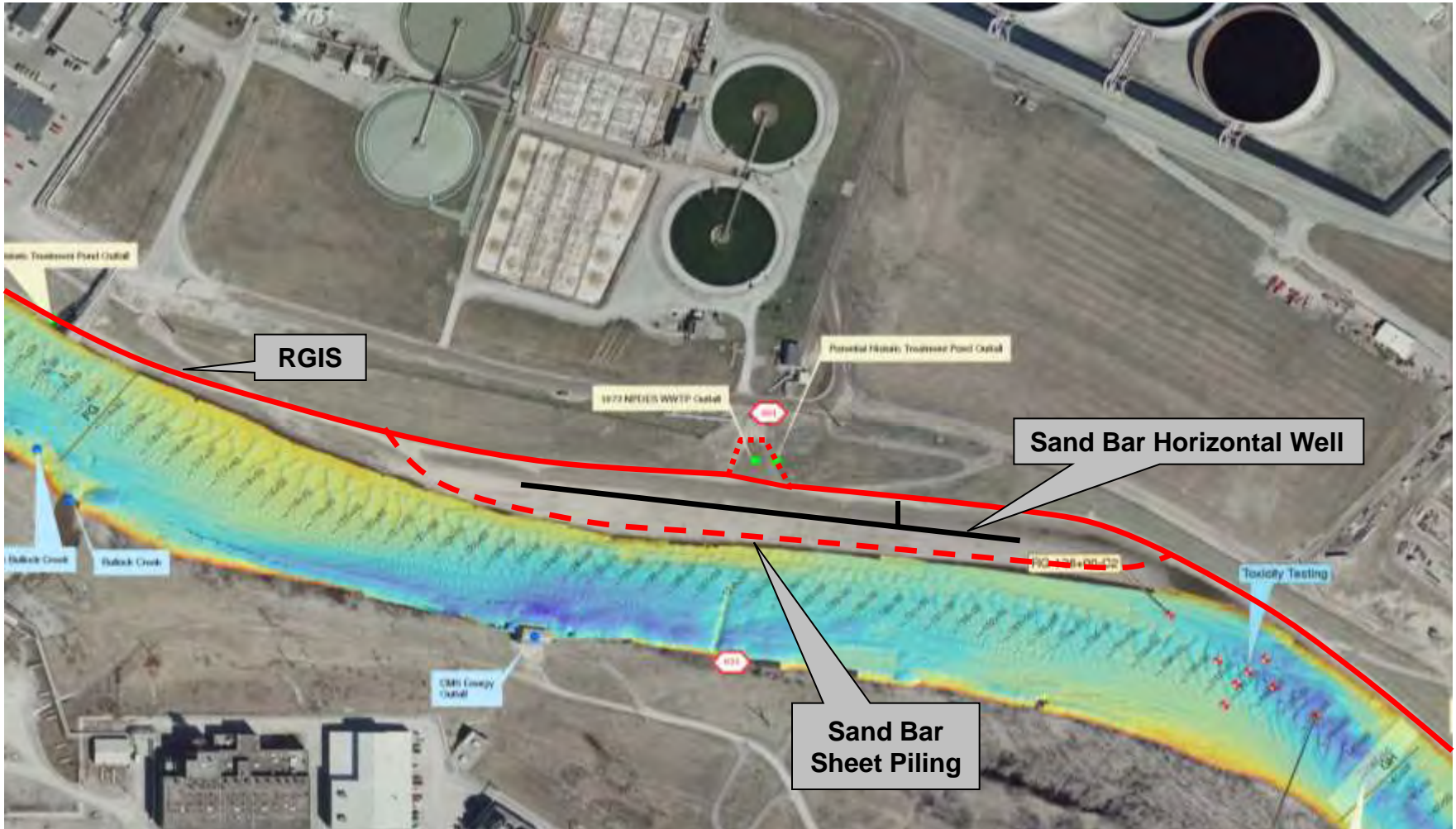
Reach D Capping



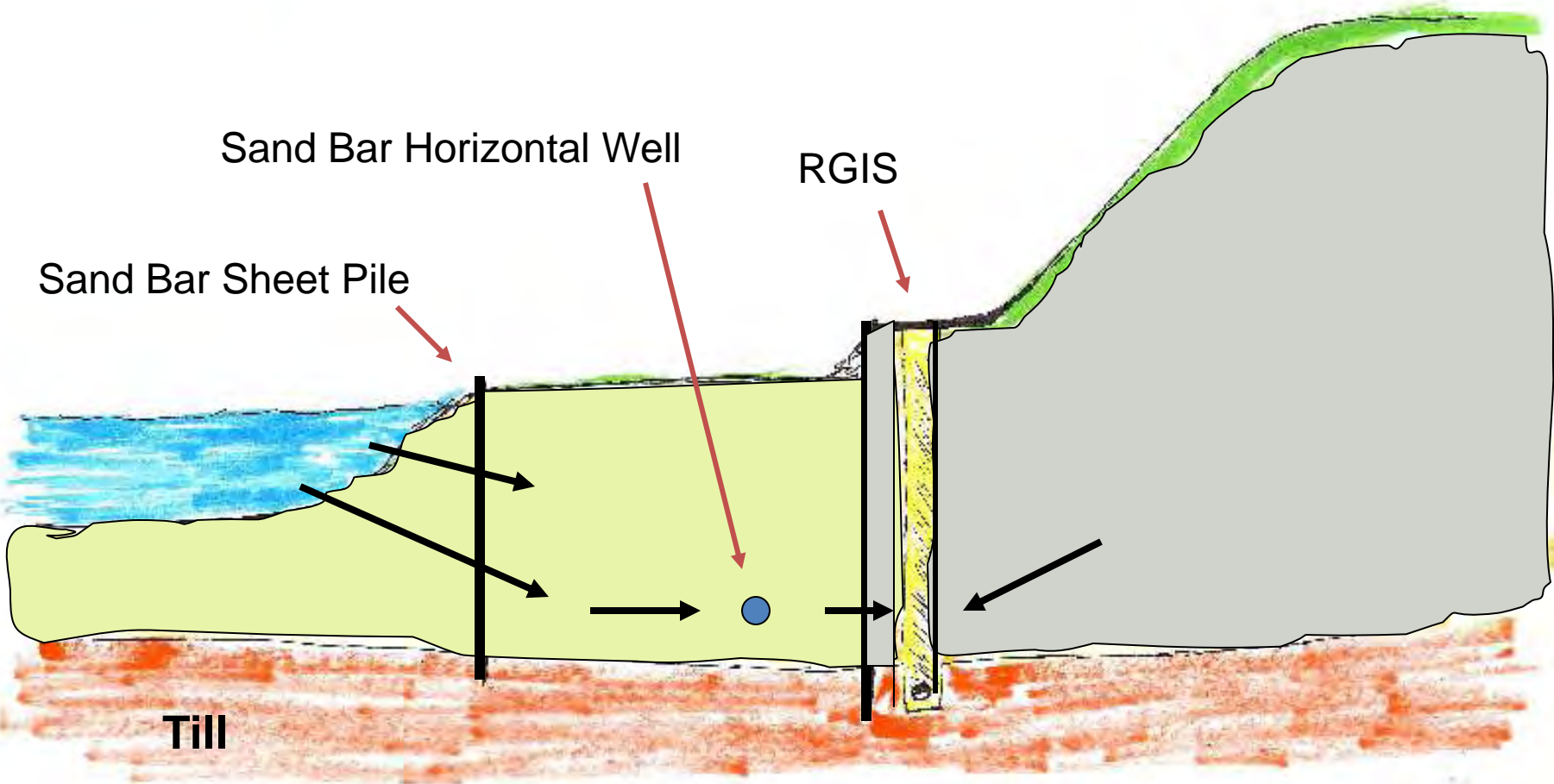
Sand Bar Source Control

- Dense Non-Aqueous Phase Liquid (DNAPL) discovered adjacent to a historic outfall on the inside of sand bar – 1997
- Lateral hydraulic barrier/containment (sheet piling) was installed in 1998
- Single horizontal well for hydraulic control installed 12 feet below ground surface within the sand bar

Sand Bar Area



Sand Bar Area



Summary of Segment 1 Conditions

Investigation Activities

- Extensive environmental investigations since 2006
- Sediment sampling and analysis
 - ~ 270 core locations
 - ~ 1,100 samples analyzed for furans/dioxins
 - ~ 900 samples analyzed for other chemicals



Summary of Segment 1 Conditions

Core Locations



NOTES:
Imagery Source: ATS 2006



Segment 1 Sampling Locations
Tittabawassee/Saginaw Segment 1 Response Proposal

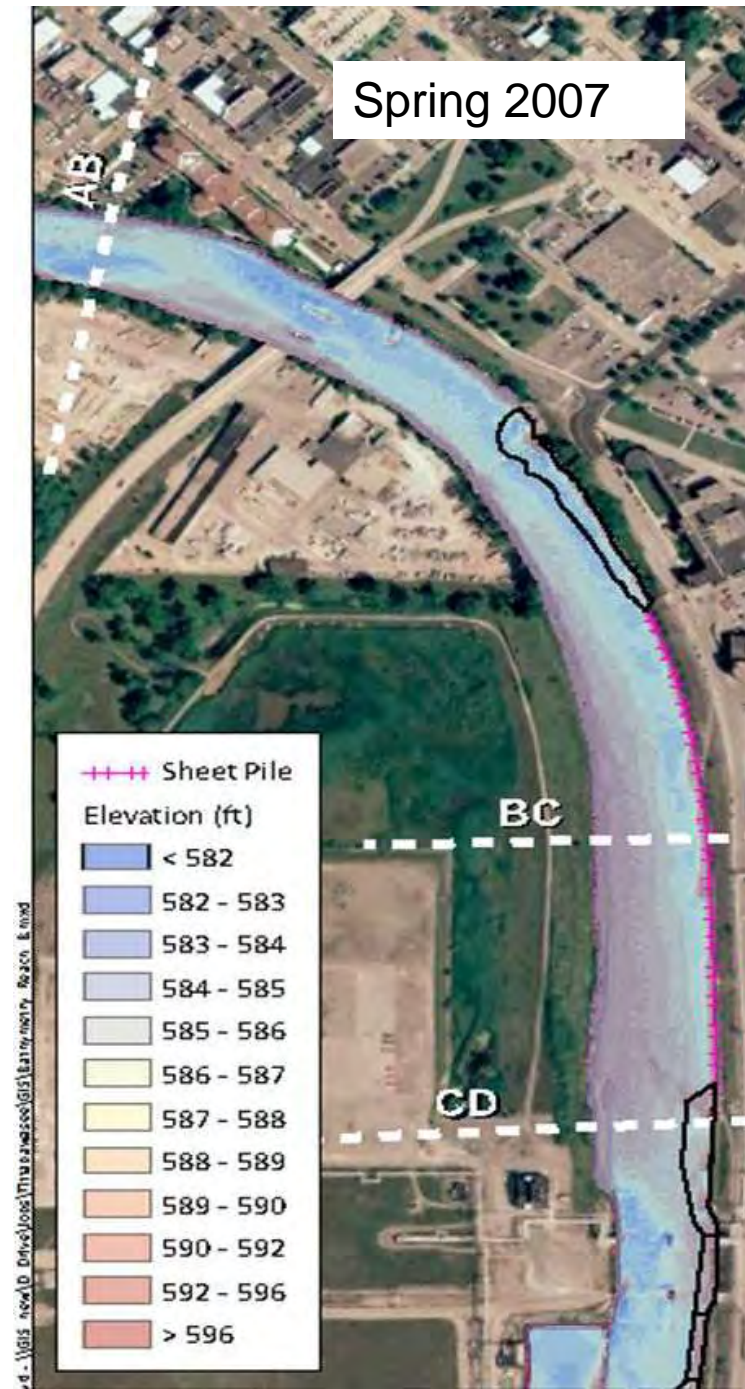
Historic Outfall Locations



Summary of Segment 1 Conditions

Investigation Activities (cont.)

- Sediment stability evaluations
 - Bathymetric surveys
 - Focused monitoring (e.g., bed pins)
 - Hydrodynamic and sediment transport modeling



Summary of Segment 1 Conditions

Investigation Activities (cont.)

Biological evaluations

- Small invertebrates (“bugs”) that live on the river bottom
 - Harm to bugs
 - Community survey
- Bioaccumulation
 - Wild fish
 - Caged fish
 - Passive samplers



Summary of Segment 1 Conditions

Investigation Activities (cont.)



DNAPL/product investigation

- Chemical analysis
- Core log/retain evaluation
- Product recovery testing

Summary of Segment 1 Conditions

Preliminary Findings

- Six chemicals/chemical groups identified as key drivers for Segment 1
 - Chlorobenzenes
 - Chlorophenols
 - Polynuclear Aromatic Hydrocarbons (PAHs)
 - Arsenic
 - Ethyl parathion
 - Ortho-phenylphenol
- These chemicals are not found everywhere and are not always found together

Summary of Segment 1 Conditions

Preliminary Findings (cont.)

- DNAPL/recoverable product found in some locations
- Dioxin and furans in Segment 1 were largely addressed by the actions in Reaches B and D
- Specific areas have been identified that will need cleanup options
 - Called “Sediment Management Areas” or “SMAs”
 - Evaluations are ongoing

Summary of Segment 1 Conditions

Preliminary Findings (cont.)

- Surface contamination concerns
 - Harm to small invertebrates that live on the river bottom
 - Potential bioaccumulation
- Non-surface contamination concerns
 - Potential erosion of cleaner surface that exposes buried contamination
 - Potential downstream movement of contaminants

Segment 1 Sediment Management Areas



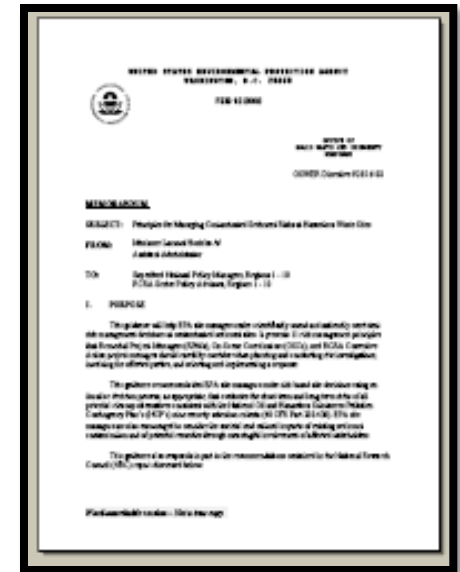
SEDIMENT CLEANUP OPTIONS

EPA's Superfund Sediment Guidance

- Directive (2002):
 - Principles for managing contaminated sediment risks



- Guidance (2005):
 - Contaminated Sediment Remediation Guidance for Hazardous Waste Sites



All available at:

www.epa.gov/superfund/health/conmedia/sediment

EPA Policy Statements on Remedy Selection... (2005 Guidance)

- There is **no presumptive remedy** for any contaminated sediment site, regardless of the contaminant or level of risk
- Generally, should evaluate dredging, capping and monitored natural recovery (MNR) at every site – or a combination of approaches
 - These are all being evaluated for Segment 1

EPA Policy Statements on Remedy Selection... (cont.)

- Both in-place and removal approaches may reach acceptable levels of effectiveness and permanence, depending on site conditions
- Must consider **risk reduction**:
 - Associated with reduced exposure to contaminants
 - Must consider risks introduced by implementing alternatives
 - Mass removal does not necessarily equate to risk reduction

Segment 1 Potential Options

- Cleanup options will be developed for each Sediment Management Area in Segment 1
- Cleanup options being developed include:
 - Monitored Natural Recovery (MNR)
 - Removal via dredging
 - In-place isolation/containment (e.g., capping)
 - Treatment (see next slide)
 - A combination of these

Specialized Options for Segment 1

- Hydraulic containment – isolate area and remove and treat contaminated water through RGIS
- Product recovery – DNAPL would be removed and treated
- Specialty caps
 - Low permeability
 - Reactive caps that provide some treatment (e.g., organoclay, activated granular carbon)

Setting Goals and Expectations

- Need to maintain focus on risk reduction as the goal for Segment 1 actions
 - Consider both short- and long-term risks
 - Carefully evaluate site-specific factors that affect outcome
- Meeting site goals will take time
 - Segment 1 is a small piece of the site
- Some goals may not be attainable with any technology
 - Technologies are limited

SCHEDULE AND CAG INVOLVEMENT

Process and Timing

- Dow preparing a Segment 1 Response Proposal that will:
 - Summarize investigation activities and site conditions
 - Identify technologies that are effective, implementable, and cost-effective for addressing areas of concern
 - Provide an analysis of the alternative cleanup options

– Currently being prepared
- EPA, working with DEQ, will issue a proposed preferred option for public comment
 - Information to CAG over next few months
 - CAG input on proposed options

– Target date – Late Spring 2011

Process and Timing (cont.)

- EPA, working with DEQ, will consider and respond to all comments and will select the cleanup option
 - Summer 2011
- Dow designs the selected option
 - CAG input may be important on issues of concern to communities (e.g., transportation routes, noise, etc.)
 - Starting Fall 2011
- Selected cleanup option built
 - Starting in 2012

Upcoming CAG Topics – Segment 1

Over the next few months, we would like to discuss:

- The environmental conditions that best suit cleanup options, and how Segment 1 SMAs do or do not meet these conditions
- Advantages and limitations of cleanup options
- Processes that can affect exposure levels, trends over time, and site risk
- The role of monitoring to ensure protective remedies

QUESTIONS?