INDIANA HARBOR CANAL PILOT PROJECT

EAST CHICAGO, INDIANA

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Map of East Chicago Canals ⇑ North

Overview of Canal System

BACKGROUND

- Man-made waterway.
- Shoreline usage oil storage, refining and transfer.
- Home to oil industry for over 100 years.
- Environmental concerns relatively new.
- Historic practices responsible for floating oil on groundwater, saturated sediments and releases from groundwater and sediment to surface water.

GOAL OF PROJECT

- Reduce oil in and on the Indiana Harbor Canal
- Create a “portable process” that can be duplicated in other areas of similar environmental damage

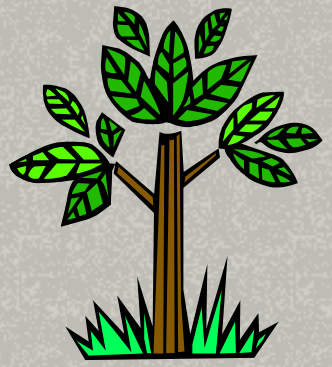
PARTNERS

- U.S. Coast Guard
- State of Indiana
- City of East Chicago
- U.S. Fish & Wildlife Services
- U.S. Army Corps of Engineers
- Office of Pipeline Safety
- U.S. Forest Service
- Purdue University
- Industry

Historical and Current Actions

- 1995 Memorandum of Cooperation with Five Facilities
- Numerous Studies
- Army Corps of Engineers Dredging Project
- Natural Resource Damage Assessment
- Inspections and Enforcement Actions
- Removals

Reasons for Cleaning up the Canal



Second Largest Flyway in the Continental U.S.

- Many migratory birds use the area as a rest and refueling stop
- Some migratory birds nest and raise their young in the wetlands around the canal

Great White Egret Pair on Bank of IHC

Oiled Great White Egret IHC

Oiled Turtle, IHC

Oiled Seagull on Shore of IHC

Dead Carp, Heavy Sheen on Oiled Canal Bank

The Challenge

- Maintaining focus - there are many competing interests and several other projects in the area - including two multi-million projects

Current Activities

- Inspect canal regularly by boat and land to identify and prevent illegal discharges.
- Take enforcement actions as needed.
- Perform removals including removal of abandoned pipes.
- Continuing involvement with USACE and other parties on CDF and dredging project.

Current Activities (con't)

- Pursue alternative methods of clean-up such as bioremediation, phytoremediation, and filterpress technology and apply to appropriate areas.

Cleanup Option Problems

Standard technology has limited effect and is very expensive due to:

- Seiche effect
- Wind
- Overwhelming volume of contaminated sediment/shoreline

Sheen on Federal IHC facing east

Boom west of Indianapolis Street Bridge

Oil content is as high as 27%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BIOREMEDIATION

- Project with U.S. EPA Office of Research and Development
- Shoreline sampled summer of 2001
- Oil content at 27%
- Looking at ways to reduce oil levels and increase oxygen – peroxide?

Phytoremediation

- Trees such as willows and poplars act as “extraction wells”, sucking up large amounts of contaminated groundwater.
- Action can prevent off-site migration of contaminated groundwater as well as absorbing the contamination.
- Trees can be left in place or harvested at a later date.
- Smaller plants also absorb contaminants and sometimes detoxify them.

Phytoremediation (con't)

- Team of experts developed work plan
  - USEPA ORD, U.S. Forest Service, U.S. Fish and Wildlife
  - Purdue University
  - Industry (BP/Amoco)
- Selected and sampled plot
- Soil taken to greenhouse, planted with selected species of trees and plants.
- Species which do well will be planted in plot next spring.
- Plants include poplars and willows, broadleaf arrowhead, and redroot cyperus

Filterpress Technology

- Used by oil industry
- Squeezes oil out of soil mechanically
- Can reduce percent of oil to 10% or less
- Could be used to prepare soil for phyto- or bioremediation, or
- Soil can be left in place

Abandoned Pipelines

- Pipelines may be leaking product
- Pipelines act as conduits
- As part of the clean up, we are draining, cleaning, plugging, and removing abandoned pipelines


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Great White Egret Next to Pipelines

Pipeline Removal #1

- Lake George Canal, ARCO/ECI
- Boom used to delineate areas of heavy sheen
- 12 pipelines under 150 foot wide canal
- 7 in bulkhead

Process

- Pipes excavated, cut, and drained;
- Pipe sections removed to break conduit between GW and canal;
- Section under canal jet-washed;
- Open ends plugged and capped.

ECI/ARCO Site Pipes

Black Sludge From Cut Pipes

Removing Cut Pipe

Results:

- Most pipes contained product
- Removed 7500 gallons of flammable liquid
- Removed 800 feet of pipe
- Pipes appeared to be leaking in canal
- Appears to be less sheen on canal

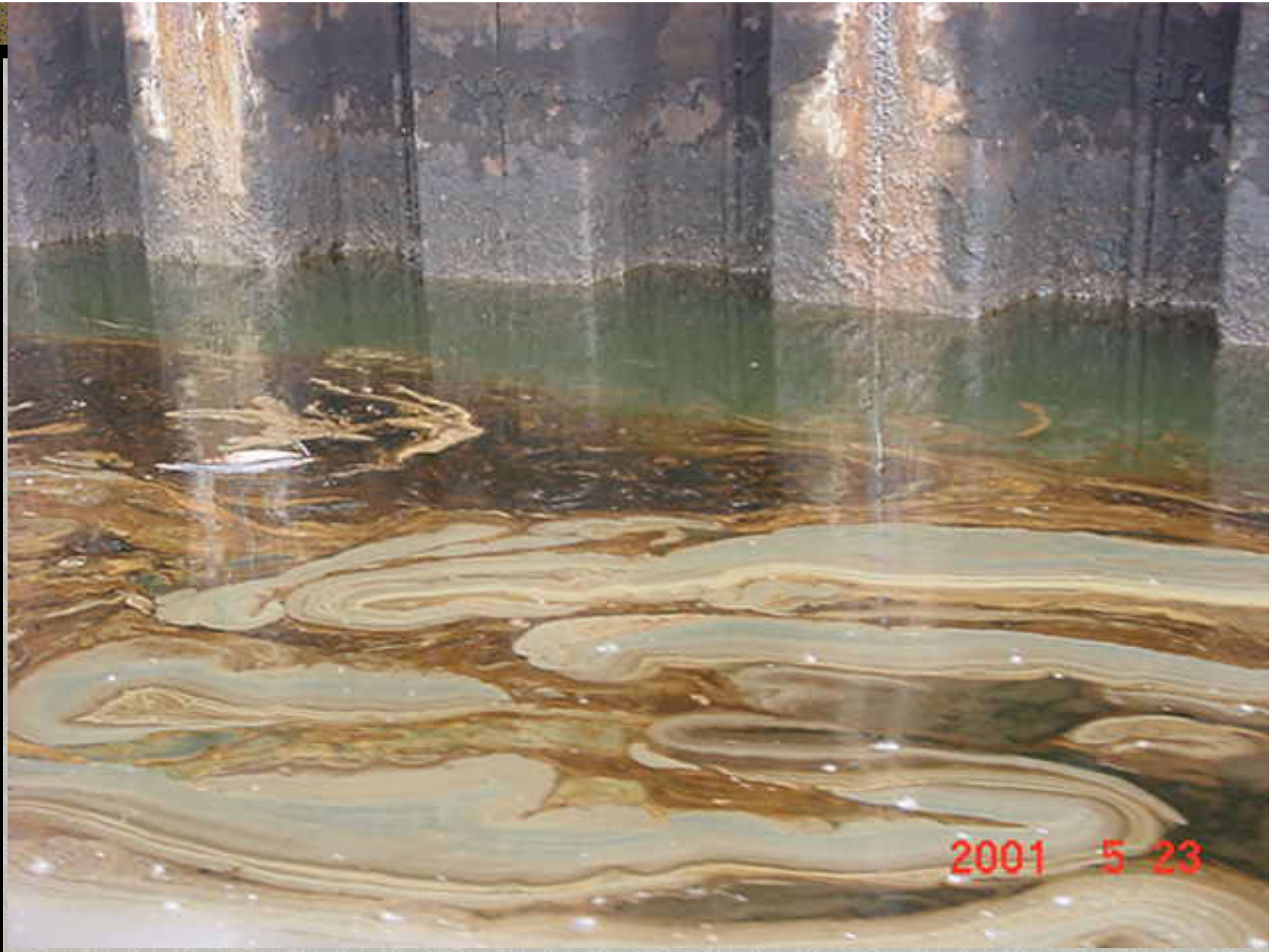
And Groundwater

Because - despite a number of active free-product collection and treatment systems at Facilities adjacent to the canal…… *there is still substantial product discharging to the canal from groundwater*

Free-product releases through holes in sheet piling along canal at site of future CDF

More sheet piling

Sheet Piling with Oil Slick



Oil Mousse on Lake George Branch

And – Unaccounted for Oil

- Sediments?
- Re-oiling?
- Illegal discharges?
- Storm drains?
- Unpermitted discharges - NPDES permit project

NPDES Permit Project

- Began summer 2001
- Identified and documented all discharge points along the canal
- Currently matching discharge points with NPDES permits
- 122 discharge points identified; matched up with 8 permits
- Follow up on unpermitted discharges

Looking Ahead

- Resume boat inspections in spring
- Continue oversight of ExxonMobil and ARCO site assessments and removals
- Begin Columbus Bridge pipe removal
- Continue Phyto-, Bio-, and Filterpress projects
- ***And more voluntary compliance and enforcement actions***