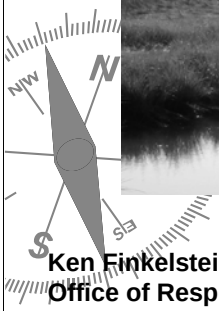
The Atlas Tack Superfund Site: an Example of Ecological Enhancement



Ken Finkelstein, NOAA
Office of Response and Rest.
Boston, MA

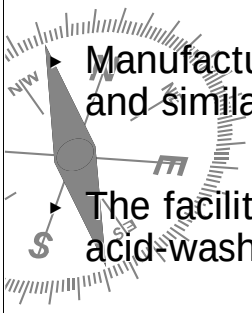
Elaine Stanley
EPA Region 1
Boston, MA

A-1


A-2

Site Background

- Atlas Tack Corporation operated from 1901 to 1985
- Site is comprised of approx. 48 acres
- Manufactured wire tacks, steel nails, rivets, bolts, and similar items
- The facility's operations included electroplating, acid-washing, enameling and painting



A-3

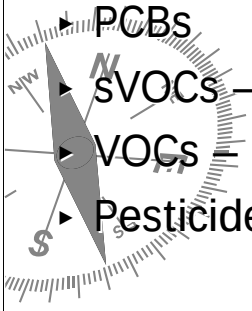
Site Background (con't)

- From 1940 to 1980, wastewater was discharged into floor drains, on-site lagoon and adjacent wetland
- Solid and liquid wastes were disposed of on-site and also filled in a portion of the wetland

A-4

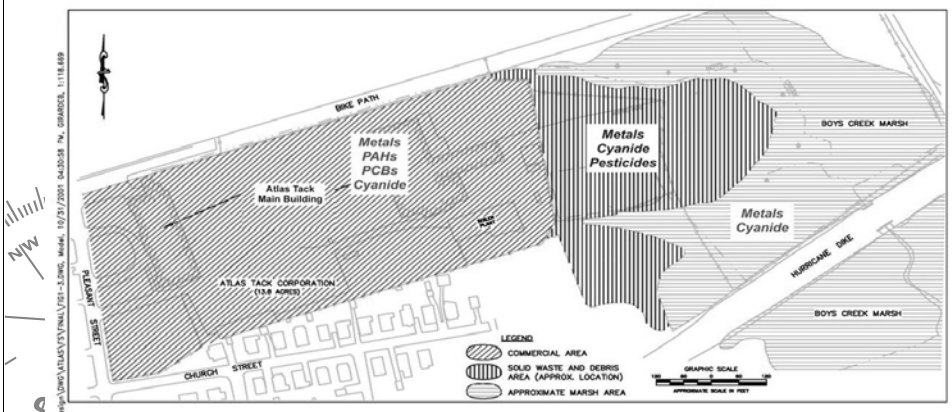
Contaminants of Concern

- Metals:
  - arsenic, cadmium, nickel, zinc, antimony and lead
- Cyanide
- PCBs
- sVOCs – mainly PAHs
- VOCs – mainly toluene
- Pesticides



A-5

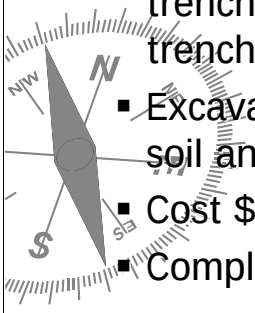
Site & Contaminant Map



A-6

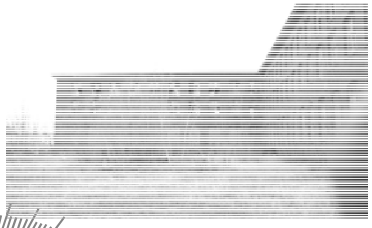
SELECTED REMEDY
Phase I: Commercial Area - 10 acres

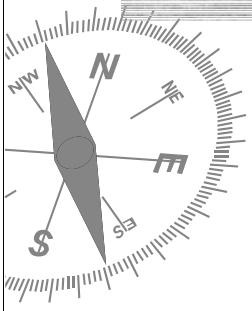
- Demolish former one-story building slab, three-story rear building, power plant and two smaller sheds
- Excavate and remove plating pit, pickling trench, underground waste conveyance trenches and dispose off-site
- Excavate 775 cubic yards (cy) contaminated soil and sludge and dispose off-site
- Cost $2,300,000
- Completed September 2006



A-7

Phase I: Specific Buildings

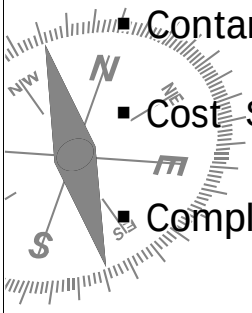




A-8

Phase II: Solid Waste and Disposal Area – 9 acres

- Excavation and off-site disposal of approx. 38,000 cubic yards of contaminated soil and debris in the Solid Waste and Disposal Area
- Contaminated soil and debris disposed off-site
- Cost $14,000,000
- Completed April 2007

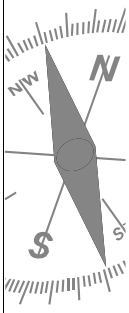


A-9


A-10

Phase III: Marsh Area – 5.4 acres

- Excavation of 20,000 cy contaminated marsh soil and creek bed sediment
- Restoration of the marsh
- Cost $5,000,000



A-11


A-12

Phase III (continued)

- Marsh excavation scheduled completion May 2007
- Marsh Restoration begins May 2007
- Total Site restoration scheduled completion September 2007 (construction complete)

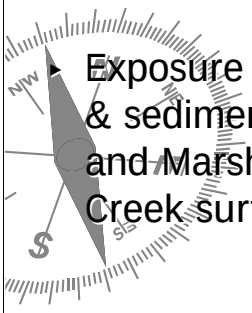
A-13


A-14


A-15

Environmental Risks

- Movement of contamination to groundwater, surface water and creek sediment from Commercial Area, Solid Waste & Disposal Area, and marsh surface soil

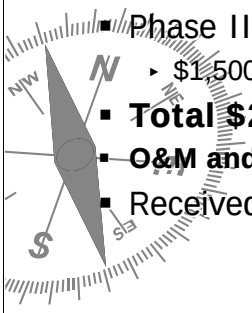


- Exposure of biota to contaminated surface soil & sediment in Solid Waste & Disposal Area and Marsh Area and to contaminated Boys Creek surface water & sediment.

A-16

Funding

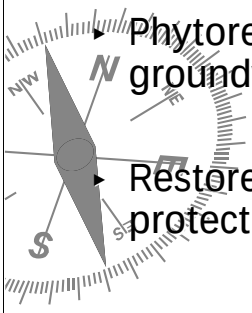
- Phase I - $2,300,000
  - $552,000 from Hathaway-Braley settlement
  - $750,000 from MA DEP
  - $1,000,000 from EPA HQ
- Phase II - $14,000,000 – from EPA HQ
- Phase III - $5,000,000
  - $1,500,000 planned April 2007
- **Total $20,300,000**
- **O&M and LTRA total costs approx. $800,000**
- Received approx. $1,000,000 to date from Atlas Tack



A-17

Groundwater & Restored Wetlands Monitoring

- Groundwater monitoring is proposed to begin at the start of the cleanup and continue for at least 10 years
- Phytoremediation (planted trees help remove groundwater contamination)
- Restored wetlands will be monitored to ensure protection and habitat viability

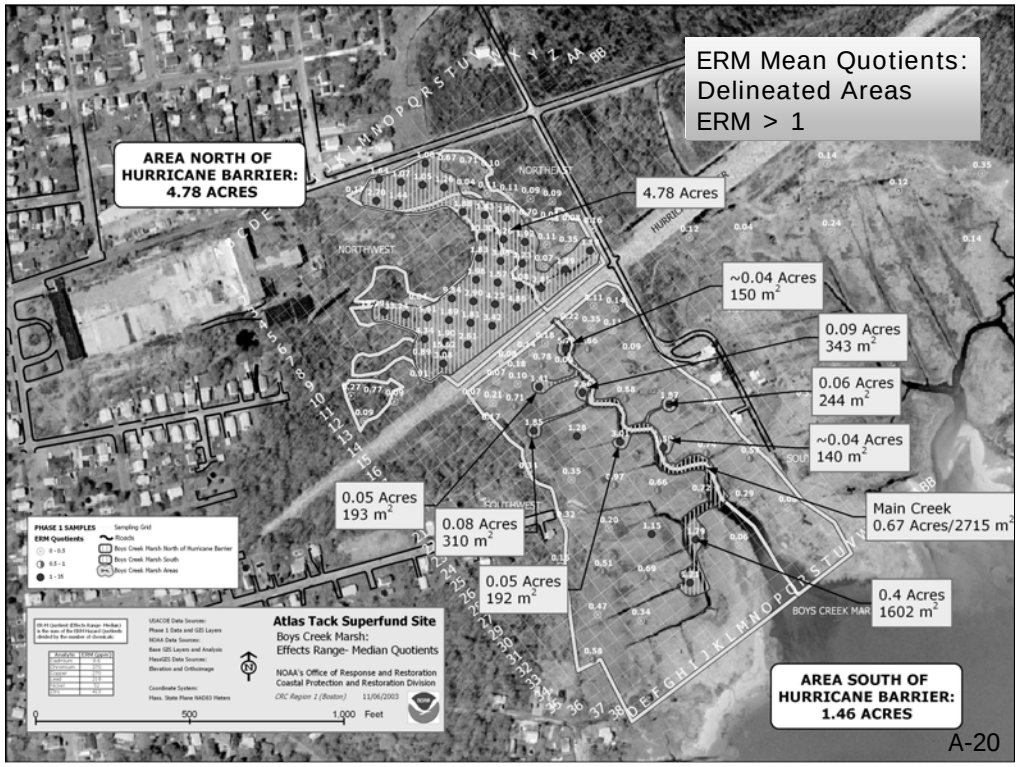


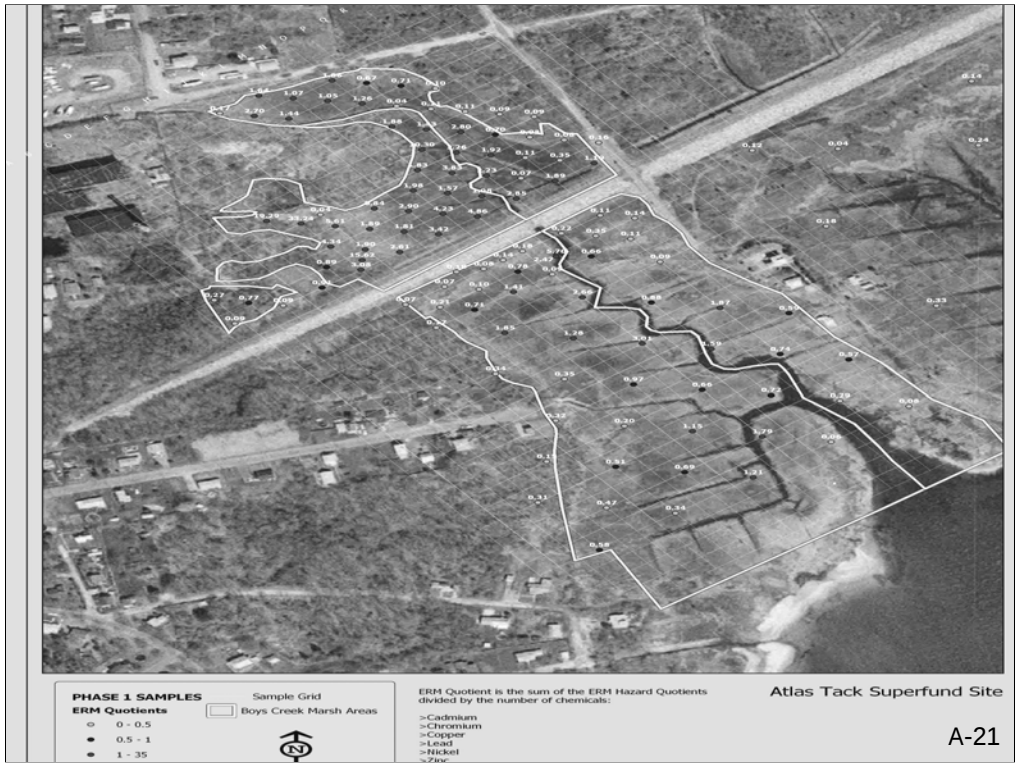
A-18

Extent of marsh cleanup based on results from Pre-remedial Design study

(aka: Bioavailability study)

A-19


ERM Mean Quotients:
Delineated Areas
ERM > 1
AREA NORTH OF HURRICANE BARRIER: 4.78 ACRES
4.78 Acres
~0.04 Acres 150 m2
0.09 Acres 343 m2
0.06 Acres 244 m2
~0.04 Acres 140 m2
0.05 Acres 193 m2
0.08 Acres 310 m2
0.05 Acres 192 m2
Main Creek 0.67 Acres/2715 m2
0.4 Acres 1602 m2
AREA SOUTH OF HURRICANE BARRIER: 1.46 ACRES
Atlas Tack Superfund Site
Boys Creek Marsh:
Effects Range- Median Quotients
NOAA's Office of Response and Restoration
Coastal Protection and Restoration Division
0
500
1,000 Feet
A-20

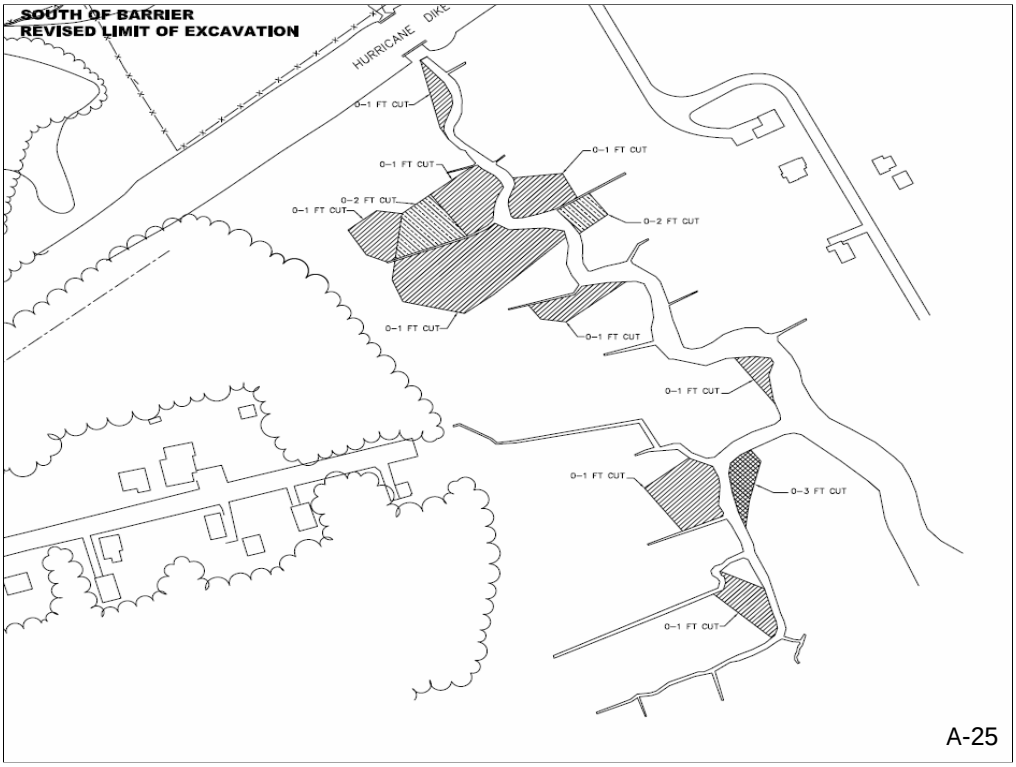

PHASE 1 SAMPLES
ERM Quotients
0 - 0.5
0.5 - 1
1 - 35
Sample Grid
Boys Creek Marsh Areas
ERM Quotient is the sum of the ERM Hazard Quotients divided by the number of chemicals:
>Cadmium
>Chromium
>Copper
>Lead
>Nickel
>Zinc
Atlas Tack Superfund Site
A-21

Marsh Remediation

A-22


A-23


A-24


SOUTH OF BARRIER
REVISED LIMIT OF EXCAVATION
HURRICANE DIKE
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-2 FT CUT
0-1 FT CUT
0-2 FT CUT
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-1 FT CUT
0-3 FT CUT
0-1 FT CUT
A-25


A-26


A-27

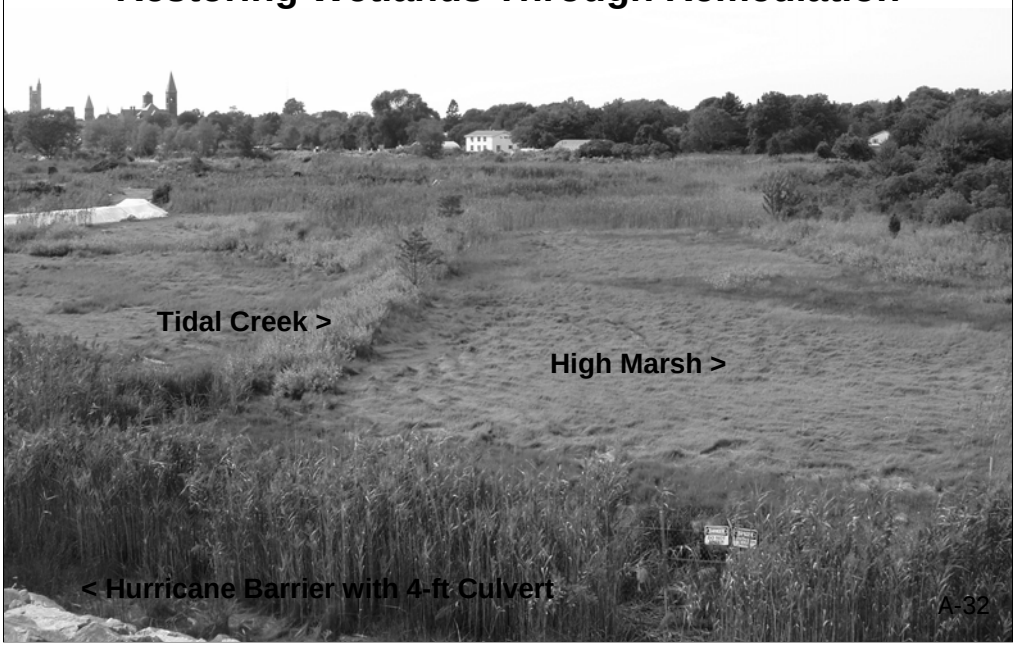

A-28

A-29


A-30

A-31

Atlas Tack – Fairhaven, MA
Restoring Wetlands Through Remediation



A-32


Restoring Ecological Functions
with Out-of-Kind Restoration
< Remediation Control Berm
<Tidal *Phragmites*
(to be excavated)
Spartina marsh >
(excavated)
A-33

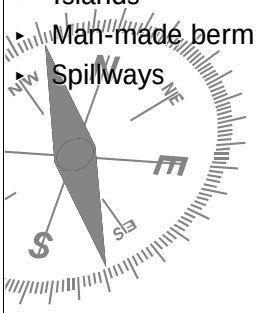

A-34

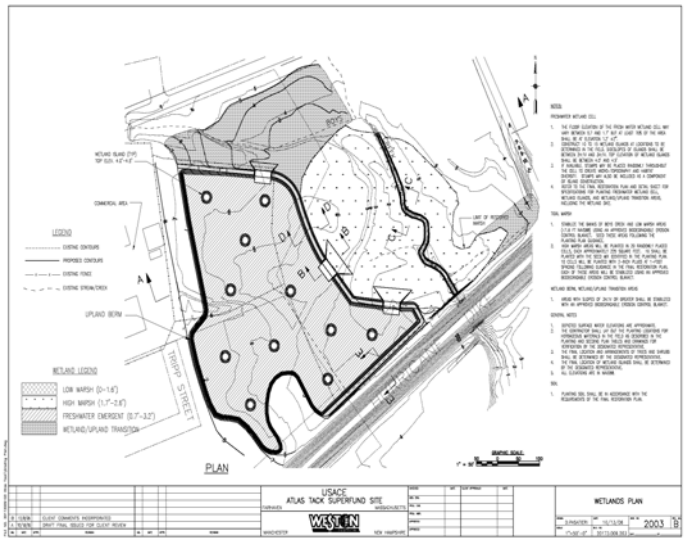

A-35


Ongoing Remediation – September 2006
< Excavated Contaminated Fill Soils
< Exposed Native Glacial Outwash Soils and Groundwater Table
A-36

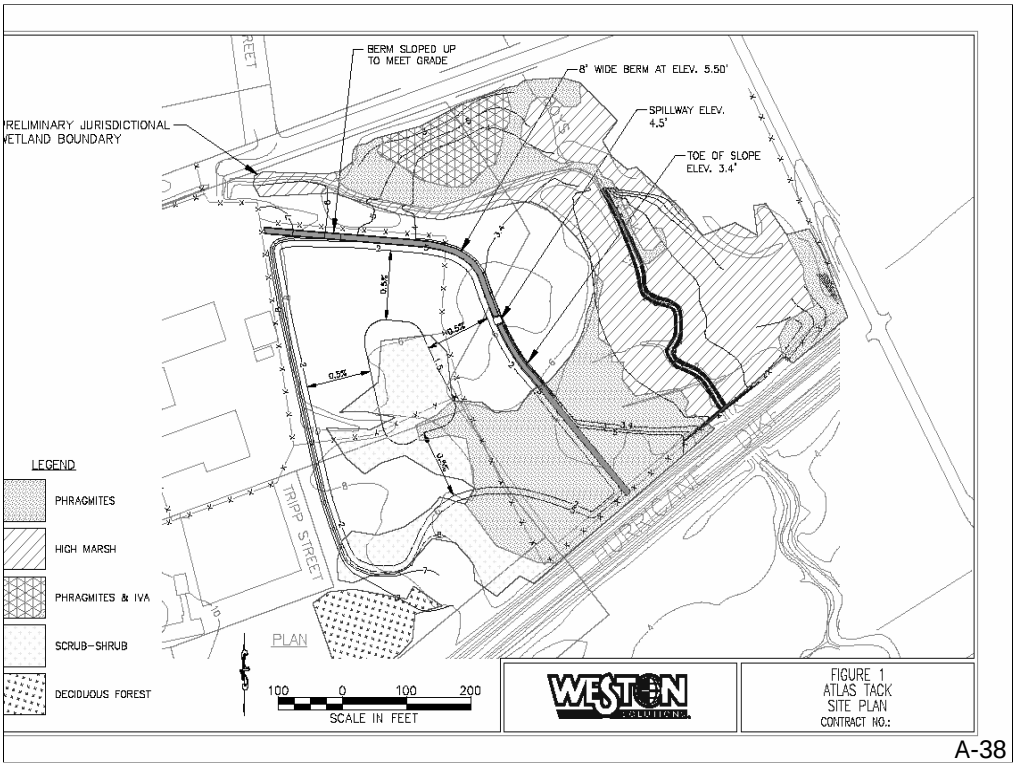
Restoration Plan

- Fresh water wetland
- Salt water wetland
- Phragmites control
- Islands
- Man-made berm
- Spillways





A-37


BERM SLOPED UP TO MEET GRADE
8' WIDE BERM AT ELEV. 5.50'
SPILLWAY ELEV. 4.5'
TOE OF SLOPE ELEV. 3.4'
PRELIMINARY JURISDICTIONAL WETLAND BOUNDARY
TRIPP STREET
HURRICANE DIKE
LEGEND
PHRAGMITES
HIGH MARSH
PHRAGMITES & IVA
SCRUB-SHRUB
DECIDUOUS FOREST
PLAN
100 0 100 200
SCALE IN FEET
WESTON SOLUTIONS
FIGURE 1
ATLAS TACK
SITE PLAN
CONTRACT NO.:

A-38

A-39


CHAKTER
A-40


A-41


A-42


A-43


A-44

Atlas Tack
June Planting

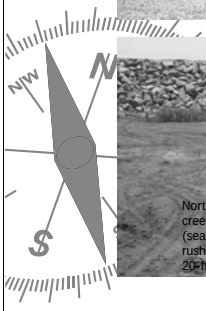
Upland transition area, north of the barrier, east of the creek

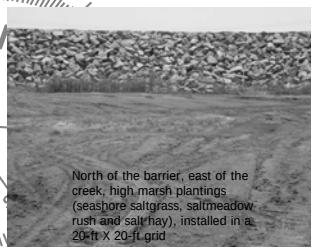
Northwest tributary shaped, seeded with Southern Tier Consulting Mix # 1 and # 4, and stabilized with erosion control blankets

A-45

Atlas Tack
June Planting

Boys Creek, seeded and stabilized with erosion control blankets





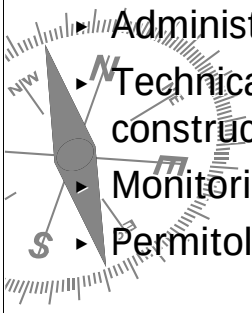
North of the barrier, east of the creek, high marsh plantings (seashore saltgrass, saltmeadow rush and salt hay), installed in a 20-ft X 20-ft grid

North of the barrier, east of the creek, high marsh plantings (seashore saltgrass, saltmeadow rush and salt hay), installed in a 20-ft X 20-ft grid

A-46

NOAA Restoration Center
What do we do?

- Project identification and development
- Partnership development
- Funding
- Administrative support
- Technical assistance on feasibility, design and construction details
- Monitoring
- Permitology



A-47

Integrating Remediation and Restoration – Some Examples

- Working with EPA and DOD on design assistance on remedial sites to combine remediation and restoration
- Working jointly with EPA and PRPs to achieve cooperative settlement and capture restoration through NRD –i.e. global settlements
- Enhancing or extending restoration above and beyond remediation with other NOAA funds (Community Restoration Program)

A-48

Project Types

Fish passage

Oyster planting

Remove river blockages

Restore oiled wetlands

Construct oyster reefs & shellfish habitat

Acquire, restore & protect waterfowl habitat

Enhance Public Access

Dam removal

A-49

4. Northeast Upland Native Warm Season Grass Mix

Code: STCMX-3

$17.20 Per Pound

1 pound will cover 2,200 sq. ft. @ 150 seeds per sq. ft.

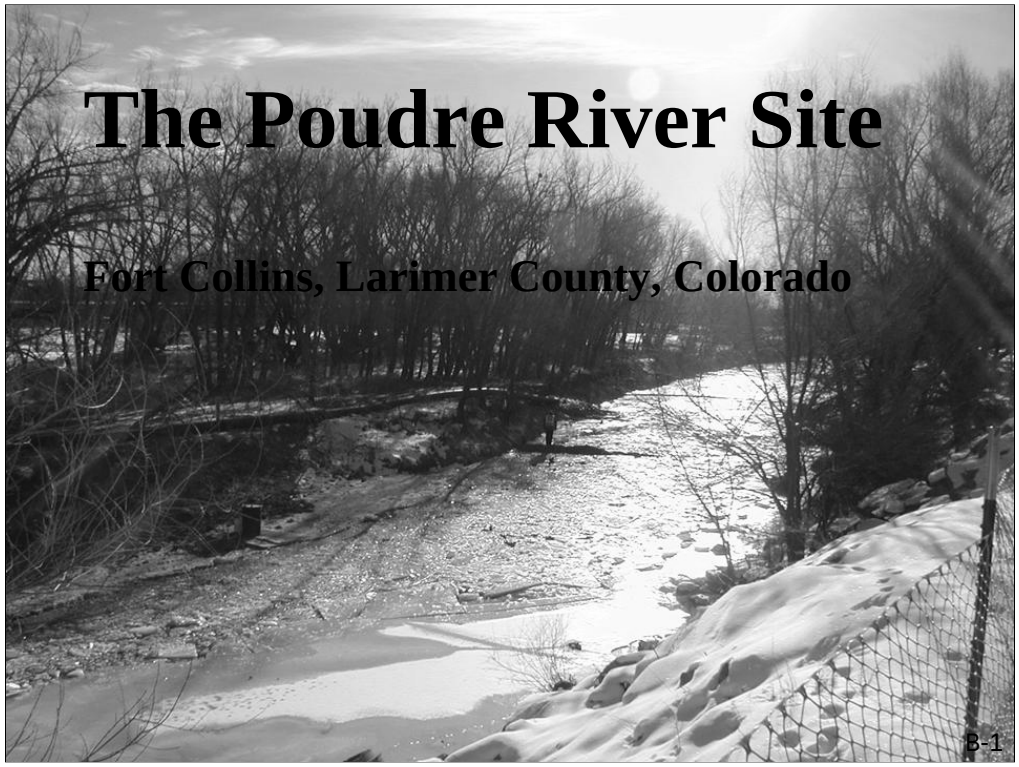
This mix is appropriate in areas where warm season grasses are adapted by virtue of habitat and range of the component species. We do not recommend seeding this mix in areas where the component species are not native. The mix can be modified to be consistent with local floristic requirements. We recommend a seeding rate of 20 pounds per acre.

Percent by No. of seeds (not weight)		Scientific Name	Common Name
49.9%	N	Panicum clandestinum	Deertongue
46.5%	N	Panicum virgatum	Switchgrass
3.6%	N	Andropogon virginicus	Broom Sedge

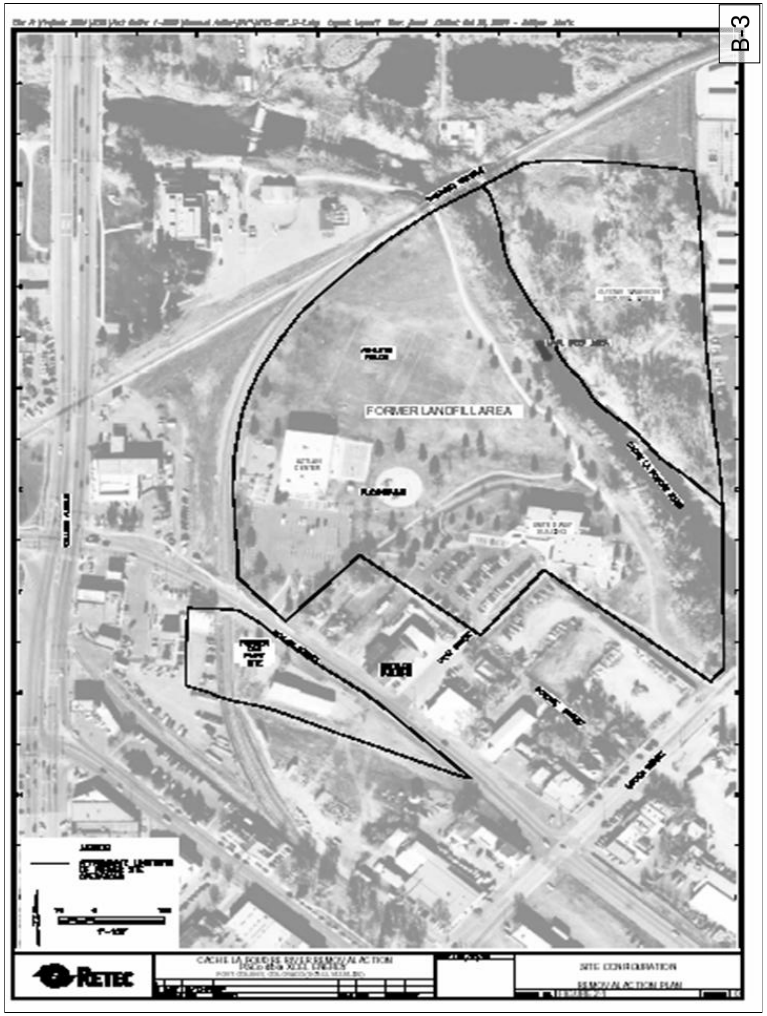
Source: http://www.southerntierconsulting.com/seedmix.htm

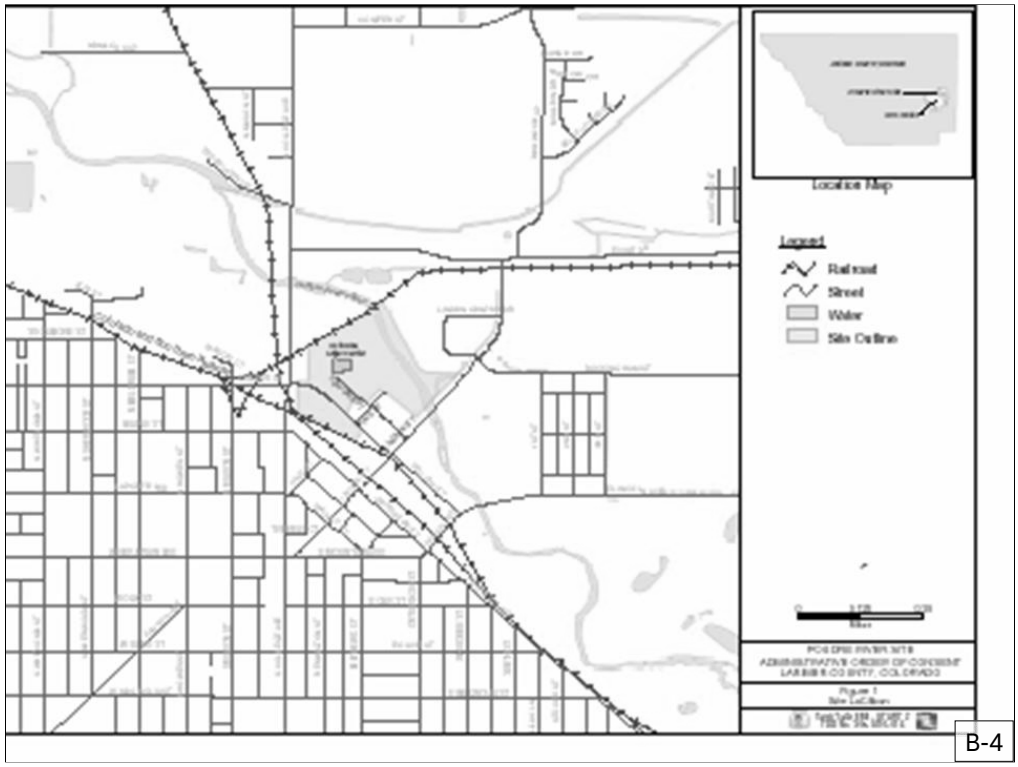
A-50


A-51


The Poudre River Site
Fort Collins, Larimer County, Colorado
B-1


B-2


B-3
FORMER LANDFILL AREA
RETEC

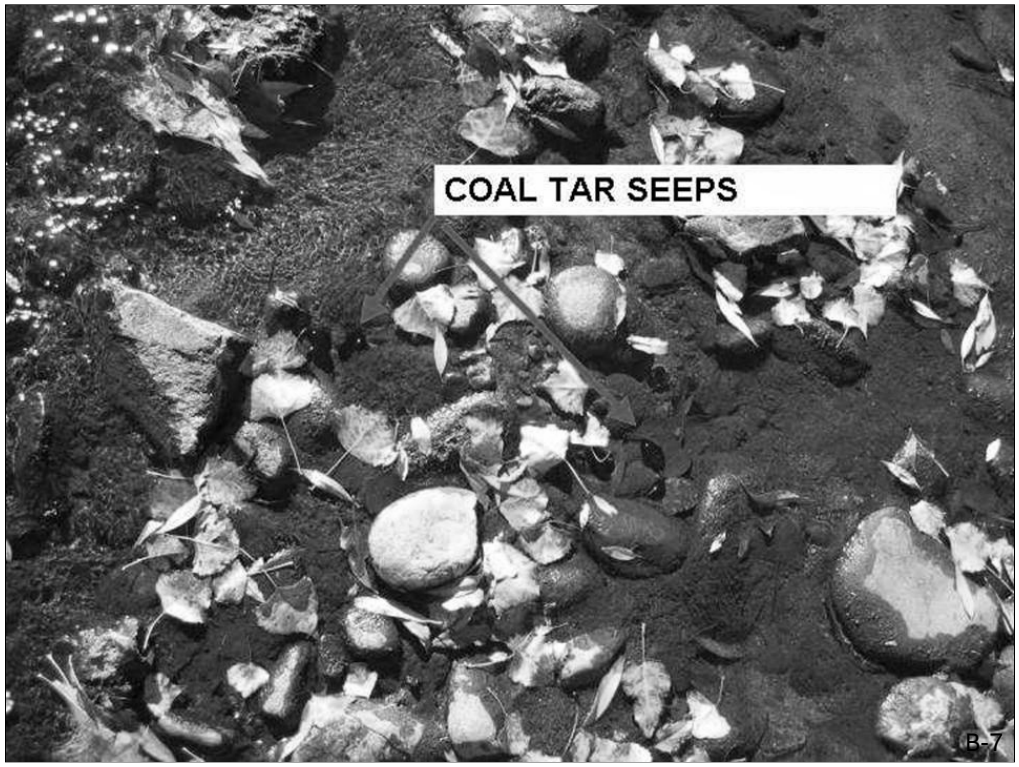

Location Map
Legend
Railroad
Street
Water
Site Outline
B-4

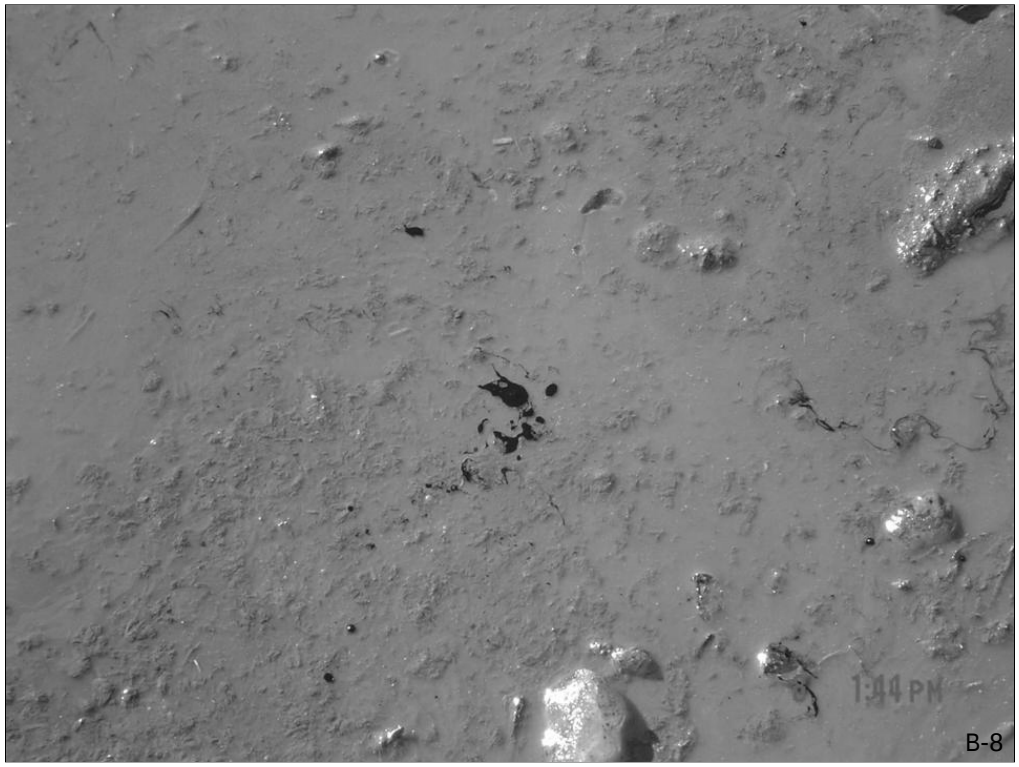
The Problem

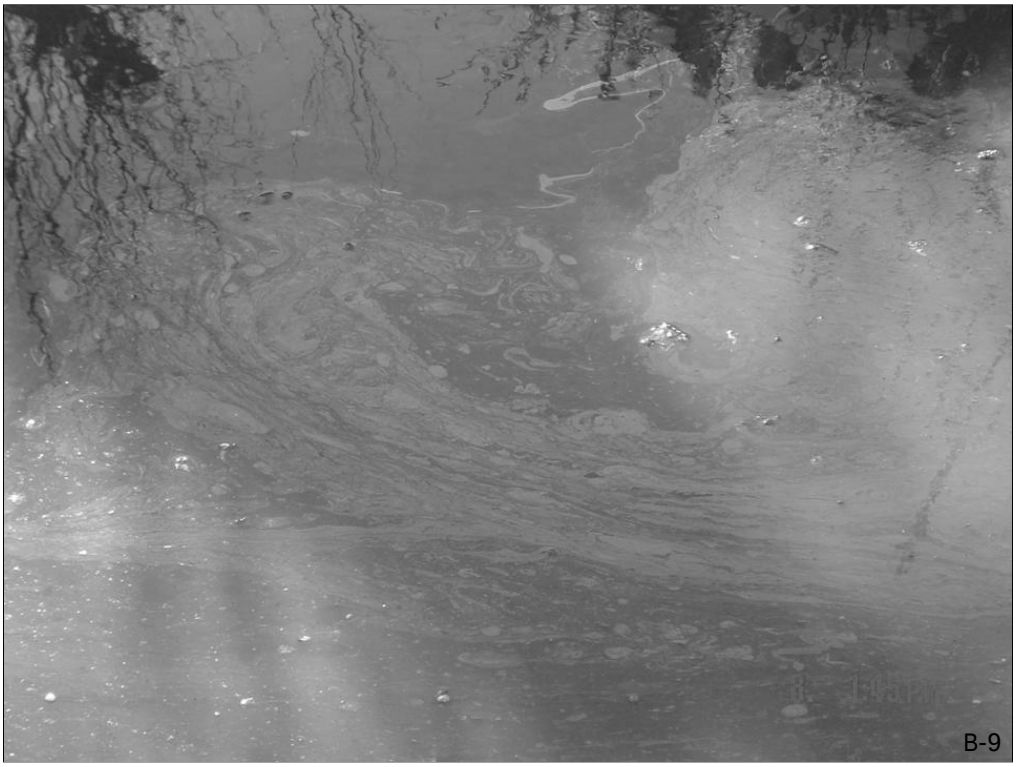
- A Viscous, Oily Liquid (gooey stuff) Was Discovered Emerging from the River Sediments Along a Short Stretch of the Cache La Poudre River

B-5


28 3:29 PM
B-6


COAL TAR SEEPS
B-7


1:44 PM
B-8


B-9

B-10

Site History and Background

B-11

Starting Somewhere In The Middle...

- City of Fort Collins Was Awarded a Brownfields Grant in 2001
- Fort Collins Wanted to Expand an Existing Community Center Over an Old City Landfill
- City Initiated an Investigation Targeting the Potential Impacts of the Landfill and the Surrounding Area on Indoor Air Quality of the Proposed Building

B-12

Brownfields Investigation

- Landfill Operated From the Early 1900 until 1963
- A Manufactured Gas Plant Operated From 1904 until 1927 Immediately Across the Street
- Post 1927 a Gasoline Distribution Business (Including a Gas Station) Operated on the MGP Parcel
- A Machine Shop Operated to the Immediate Southwest of the Landfill

B-13

And Hence in the Groundwater Beneath the Landfill There Was...

- A BTX, MTBE Plume
- A PAH Plume
- A Chlorinated Solvent Plume

B-14

But This Was Alright

- Nobody Used the Groundwater
- The Potential for Vapor Intrusion Could Be Mitigated
- It Did Not Appear That the Groundwater Plume(s) Had a Significant Impact on the Poudre River…Except

B-15

However, The Best Laid Plans...

- In October 2002 a Non-Aqueous Phase Liquid (Previously Not Observed On-Site) Was Discovered In the River
- Subsequent (and Deeper) Investigation By the Brownfields Program Indicated the Problem to Be Fairly Substantial
- The Site Was Referred to the Removal Program in October 2003

B-16

So We Rounded Up Some PRPs

- Public Service Company of Colorado (dba Xcel Energy)
- Schrader Oil Company
- Not the City of Fort Collins (Determined to Be a Contiguous Property Owner Under the Recent Brownfields Amendments)

B-17

And Did A Joint Investigation

- Exploratory Trenches in the River
- Soil Gas Sampling Over the Entire Landfill and River Bank
- Soil Borings and Groundwater Well Installation
  - Landfill
  - Schrader (former MGP) Property

B-18

And We Found

- The NAPL Is Coal Tar, Likely Mixed with Gasoline and Diesel Components
- NAPL Sinks down Through the Alluvium to the Top of Area Bedrock and Traverses Toward the River
- Near the Landfill the NAPL Moves Entirely Into Fractures in the Bedrock, Eventually Accumulating Underneath the River

B-19


B-20

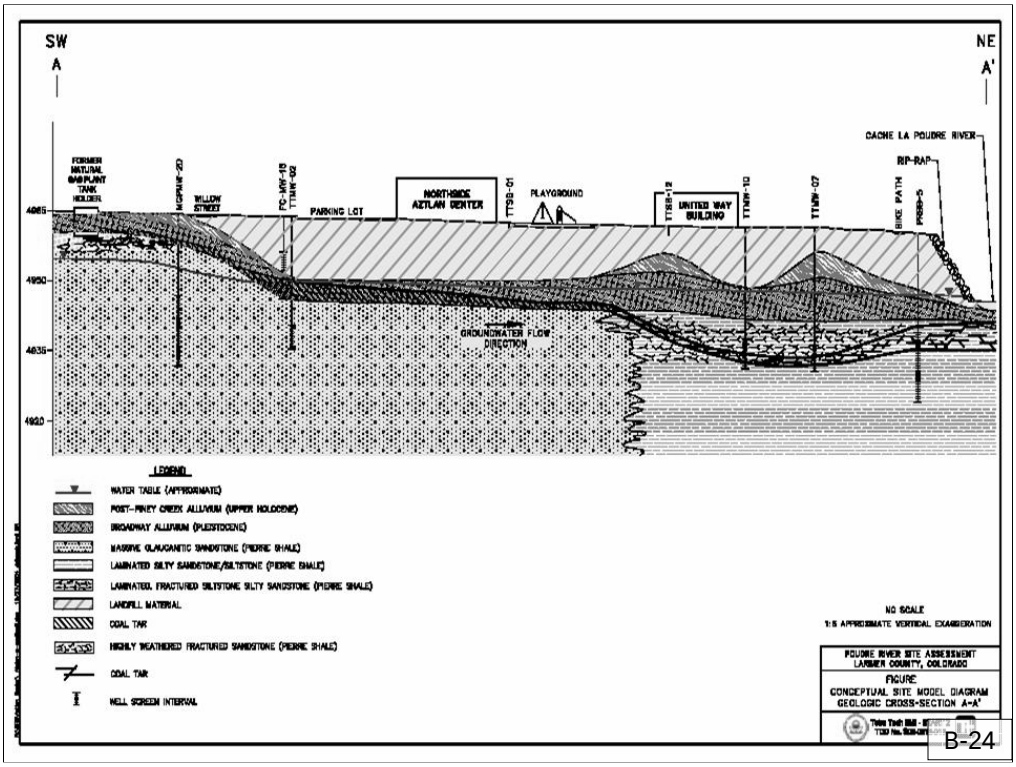

B-21


B-22

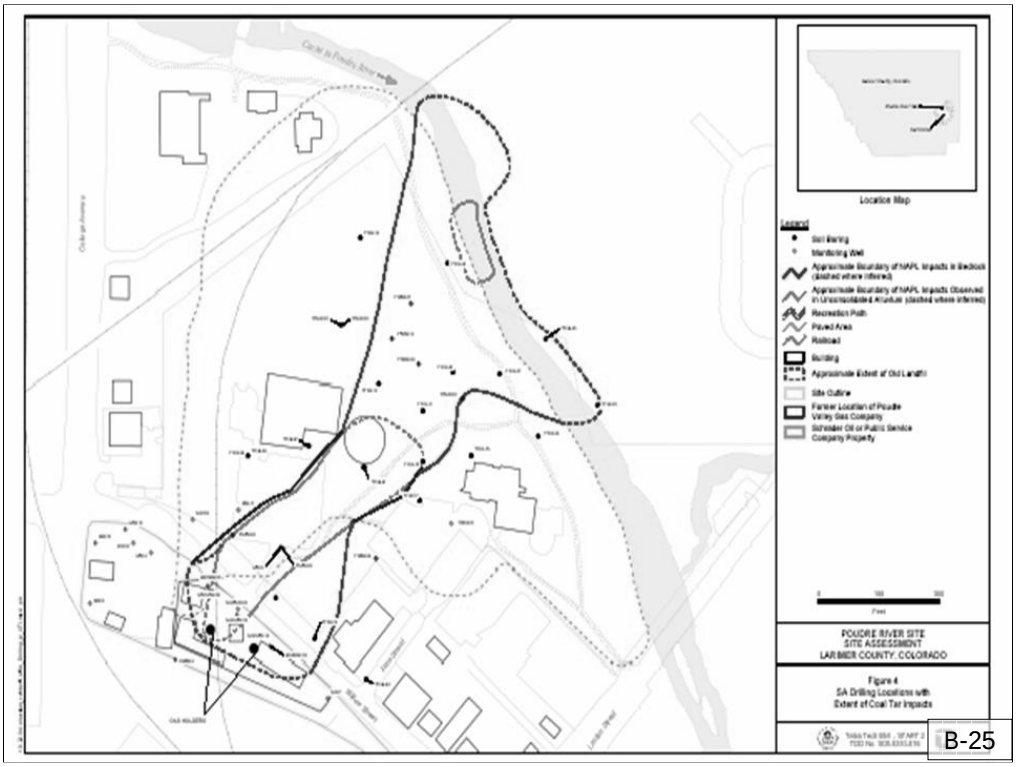
We Also Found

- NAPL in The River Sediments Over a 300’ Stretch
- Underneath the River In the Bedrock Over a 600’ Stretch
- NAPL Has Migrated Slightly Past the River in Deep Bedrock (20-25’ bgs) Fractures

B-23


SW
A
NE
A'
CACHE LA POUDRE RIVER
RIP-RAP
FORMER NATURAL GAS PLANT TANK HOLDER
WILLOW STREET
PARKING LOT
NORTHSIDE AZTLAN CENTER
PLAYGROUND
UNITED WAY BUILDING
BIKE PATH
4965
4950
4935
4920
GROUNDWATER FLOW DIRECTION
LEGEND
WATER TABLE (APPROXIMATE)
POST-PINEY CREEK ALLUVIUM (UPPER HOLOCENE)
BROADWAY ALLUVIUM (PLEISTOCENE)
MASSIVE GLAUCANITIC SANDSTONE (PIERRE SHALE)
LAMINATED SILTY SANDSTONE/SILTSTONE (PIERRE SHALE)
LAMINATED, FRACTURED SILTSTONE SILTY SANDSTONE (PIERRE SHALE)
LANDFILL MATERIAL
COAL TAR
HIGHLY WEATHERED FRACTURED SANDSTONE (PIERRE SHALE)
COAL TAR
WELL SCREEN INTERVAL
NO SCALE
1:5 APPROXIMATE VERTICAL EXAGGERATION
POUDRE RIVER SITE ASSESSMENT
LARIMER COUNTY, COLORADO
FIGURE
CONCEPTUAL SITE MODEL DIAGRAM
GEOLOGIC CROSS-SECTION A-A'

B-24

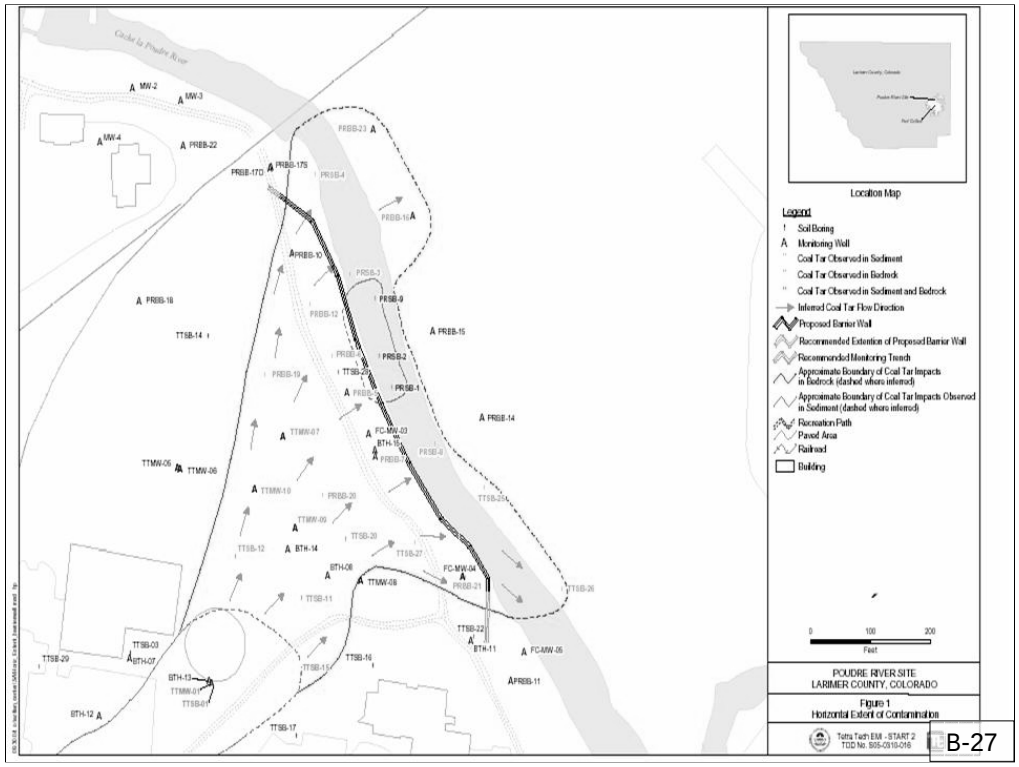

Location Map
Legend
Soil Boring
Monitoring Well
Recreation Path
Paved Area
Railroad
Building
Site Outline
POUDRE RIVER SITE
SITE ASSESSMENT
LARIMER COUNTY, COLORADO
Figure 4
SA Drilling Locations with
Extent of Coal Tar Impacts

B-25

So… After Some Friendly Negotiations We Decided To:

- Excavate the Contaminated Sediments and Bedrock In and Underneath the River
- Install a Vertical Sheet Pile Barrier with Hydraulic Controls to Intercept the NAPL
- Provide for Long-term Water Treatment
- Not Try to Dig Up the Source Area

B-26


Location Map
Legend
Soil Boring
Monitoring Well
Coal Tar Observed in Sediment
Coal Tar Observed in Bedrock
Coal Tar Observed in Sediment and Bedrock
Inferred Coal Tar Flow Direction
Proposed Barrier Wall
Recommended Extention of Proposed Barrier Wall
Recommended Monitoring Trench
Approximate Boundary of Coal Tar Impacts in Bedrock (dashed where inferred)
Approximate Boundary of Coal Tar Impacts Observed in Sediment (dashed where inferred)
Recreation Path
Paved Area
Railroad
Building
0
100
200
Feet
POUDRE RIVER SITE
LARIMER COUNTY, COLORADO
Figure 1
Horizontal Extent of Contamination
Tetra Tech EMI - START 2
TDD No. 805-0916-016
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KOMATSU
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Site Restoration Goals

- Protect and Hide Remedy
- Stabilize the Streambed and Bank
- Replace Invasive Flora with Native Flora
- Provide Appropriate Habitat
- Allow Public Access
  - River
  - Bike Path
  - Nature Area

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Hide and Stabilize

- Design Slope and Bank to Bury Wall and Pump system
- Properly Size and Compact Sub-grade of Streambed
- Restore Original Stream Elevations
- Discretely Armor and Key in Banks to Bed

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Example of Use of Native Species

- Bad
  - Russian Olives
  - Thistle Brush
- Good
  - Coyote Willows
  - Colorado Sedges

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Examples of Habitat Concerns

- Fish Ledges
- Proper Large Trees
- Use of Snags
- Boulders

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Public Access

- Varied Slope
- Flat Bank Along Water
- “Natural” Entry Points to Bank and Trails

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Other Issues

- Establish Acceptable Survivability Up Front, Plan on Some Die Offs
- Warrantee All Plantings
- Watch Out for Beavers!
- Do Plan for Noxious Weed Control
- Final Restoration Will Take a Couple of Years

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Thank You

After viewing the links to additional resources, please complete our online feedback form.