Georgia-Pacific Mill Site DTSC Cleanup Update

Special City Council Meeting

February 2, 2017 Town Hall, Fort Bragg, CA

Tonight's Agenda

- Presentation to the City Council - DTSC
  - Background - who we are, what we do
  - Work Completed Thus Far
  - OU C and D RAP and OUE RAW Implementation
  - OUE with focus on Mill Pond
    - Past Investigation
    - Human and Ecological Risk Assessment
    - OUE Feasibility Study and RAP
- Q&A with City Council
- Q&A with Community Members

Department of Toxic Substances Control -

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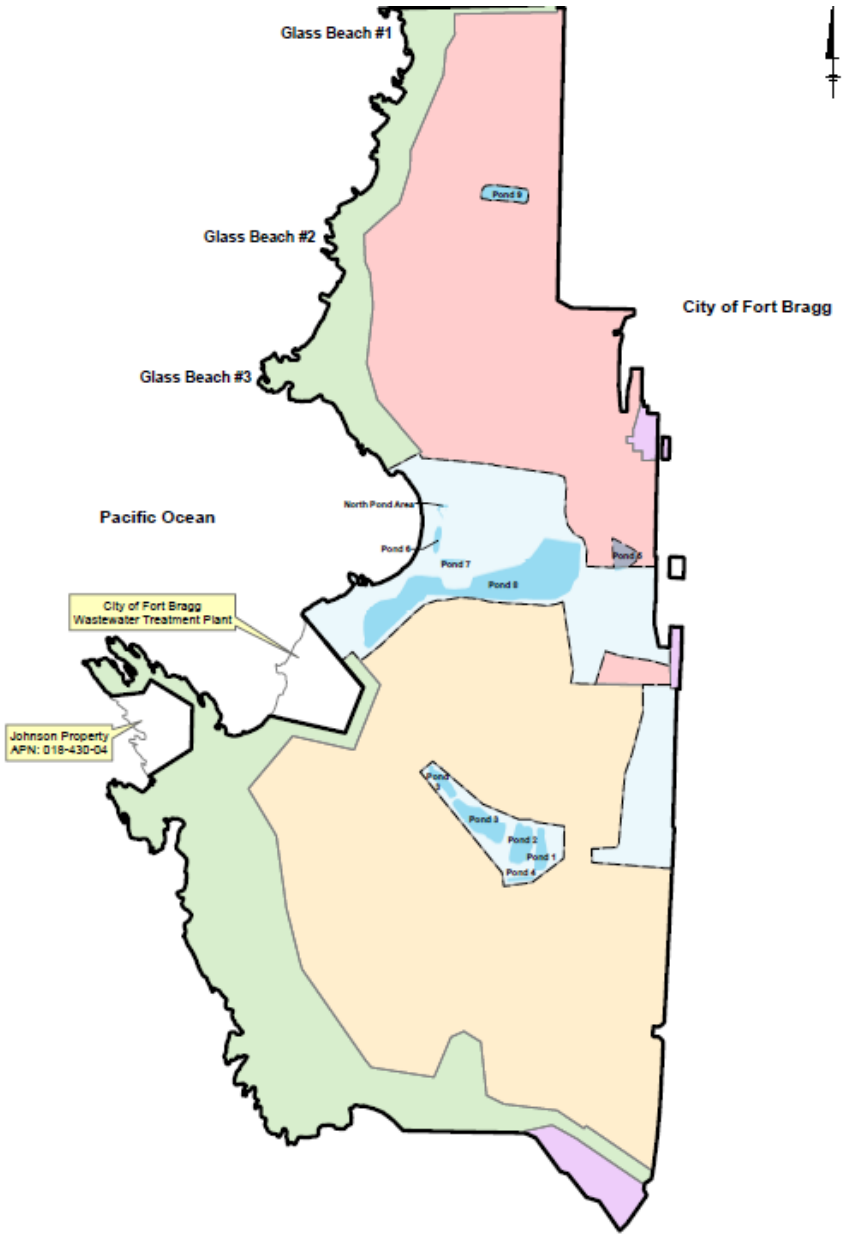
DTSC Cleanup Process

- Site Discovery – Site Assessment
- Remedial Investigation – RI
  - Ecological and Human Health Risk Assessment
- Feasibility Study - FS
- Cleanup Actions
  - Interim Remedial Action Plan - IRAP
  - Removal Action Workplan - RAW
  - Remedial Action Plan - RAP
- Implementation
  - Workplan – Remedial Design and Implementation Plan - RDIP
  - Completion Report
- Certification

DTSC Oversight of GP Mill Site Cleanup

- 2006 DTSC becomes lead on cleanup oversight
- 2007 DTSC issues Site Investigation and Remediation Order
- 2007 DTSC and City of Fort Bragg partner Environmental Oversight Agreement
  - DTSC provides consultation services
  - Provides Immunity Protection
  - City Fort Bragg Concurs on Cleanup Decisions
  - Extended March 2014



Former Georgia-Pacific Mill Site Operable Units (OU)

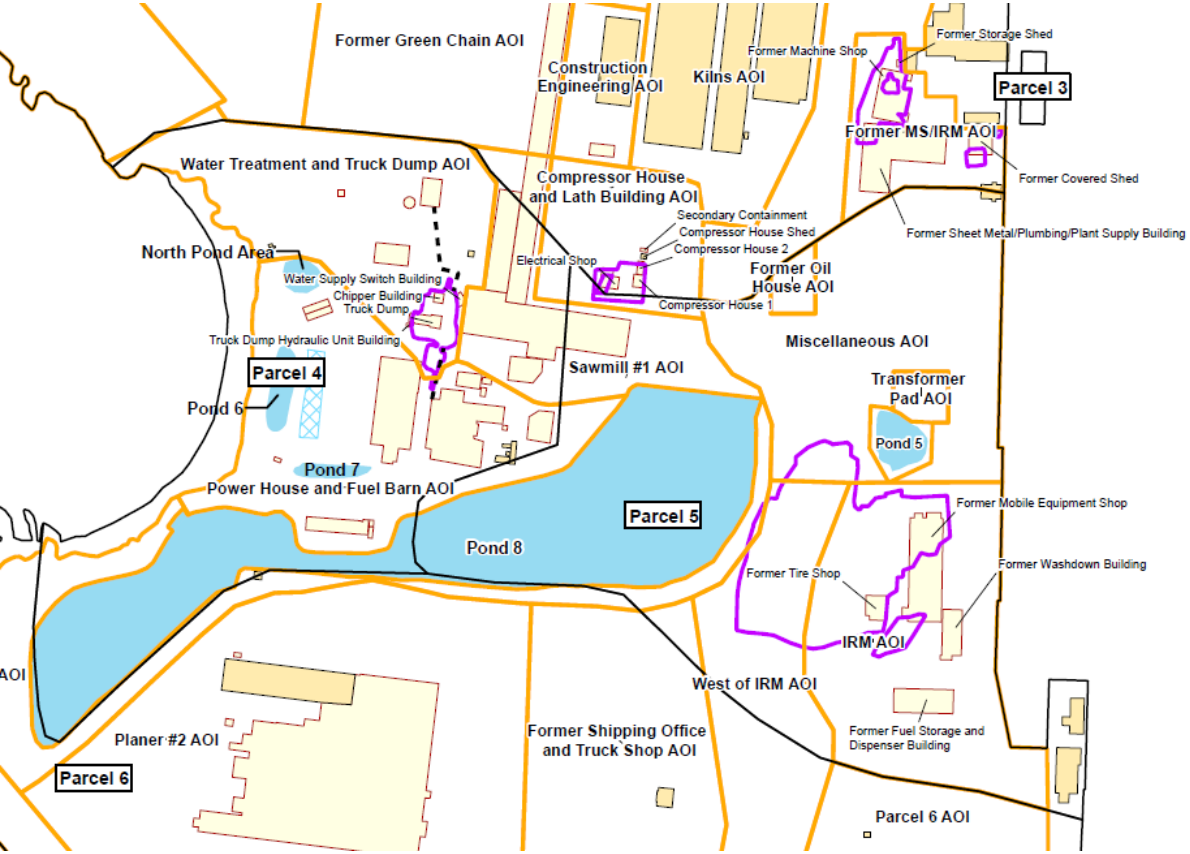
- OU-A: Coastal Trail – 87 acres
- OU-B – Non-Industrial Sites – 9 acres
  - No Further Action July 2008
- OU-C: Northern Industrial Area – 105 acres
- OU-D: Southern Industrial Area – 159 acres
- OU-E:
  - Terrestrial - 45 acres
  - Ponds - 12 acres

Work Completed Thus Far

Cleanup Accomplishments

- OU-A – Coastal Trail
  - Remedial Action Plan 2009
  - Cleanup Certified 2011
  - Trail Opens 2014 and 2015
- Contaminants – soil removed and disposed off-site
  - 13,000 cubic yards of dioxin contaminated soil
  - 990 cubic yards of PCB contaminated soil
  - 140 cubic yards of lead contaminated soil

Cleanup Accomplishments



- Fuel Oil Pipeline & Soil Removal 2007
- Interim Remedial Measures 2009

Cleanup Accomplishments
Interim Remedial Actions OUs D and E

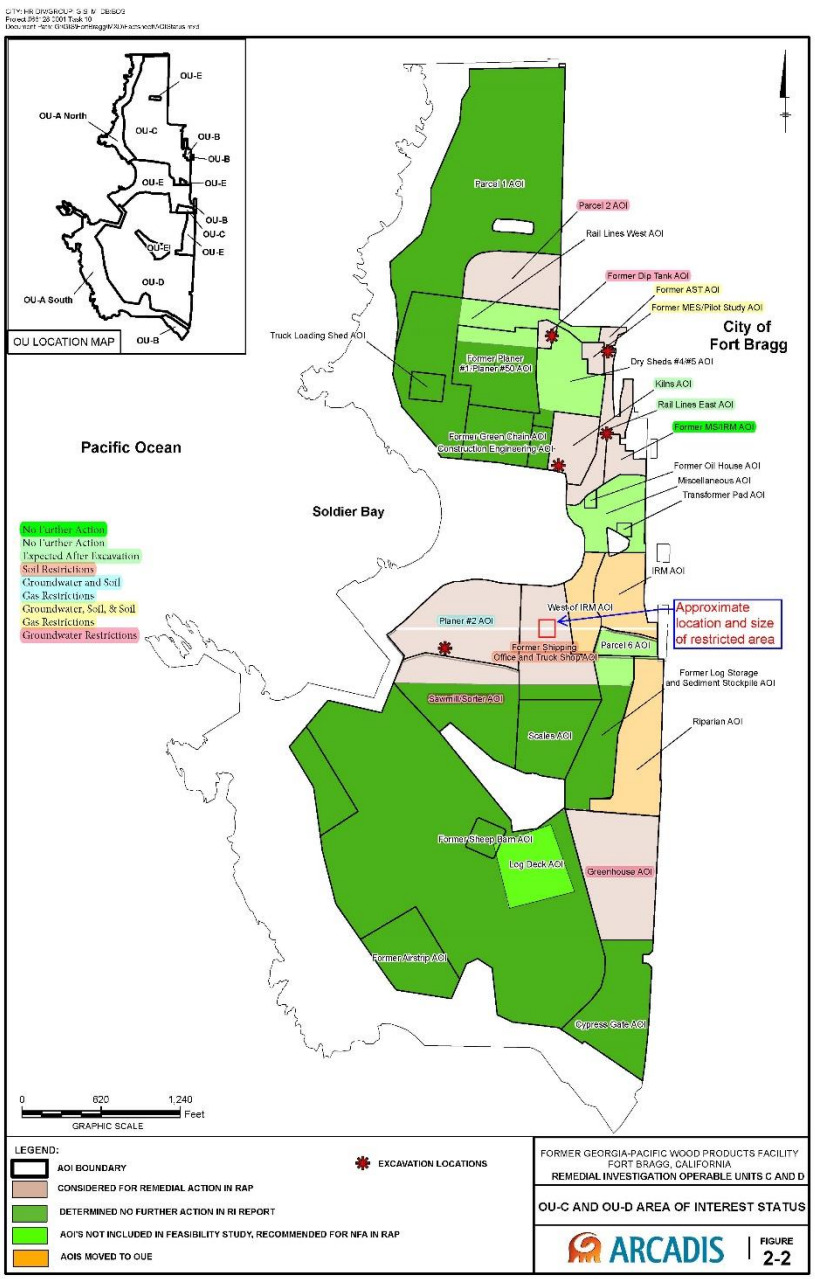
- Petroleum Excavation and on-site treatment
- Off-Site Disposal of 1,100 cubic yards of PCB and lead contaminated soil

Cleanup Accomplishments
Interim Remedial Actions OUs D and E

- On-Site Bio-remediation of approximately 44,000 cubic yards of petroleum contaminated soil

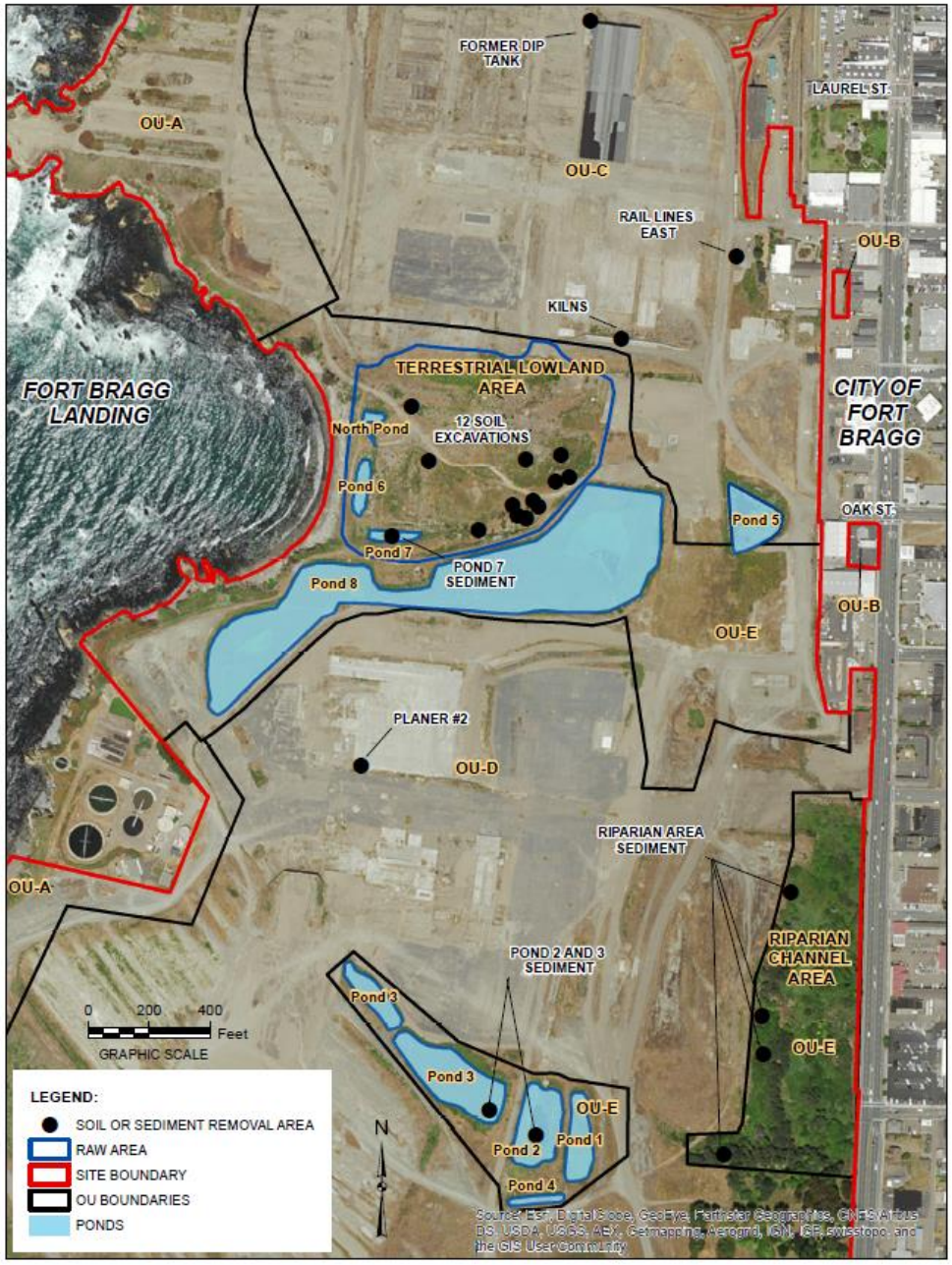
Cleanup Accomplishments
No Further Action (NFA) – OUs C and D

- OU C and D – 264 total acres
- OU C and D Remedial Investigation = 190 Acres
- OU C and D Remedial Action Plan = 30 Acres
- Additional NFA expected after OUs C and D RAP Implementation
- Less than 10 acres is expected to need Land Use Restrictions after completion of cleanup


OU-E
OU-A North
OU-C
OU-B
OU-B
OU-E
OU-E
OU-B
OU-C
OU-E
OU-D
OU-A South
OU-B
OU LOCATION MAP
Parcel 1 AOI
Parcel 2 AOI
Rail Lines West AOI
Former Dip Tank AOI
Former AST AOI
Former MES/Pilot Study AOI
City of Fort Bragg
Truck Loading Shed AOI
Former Planer #1 Planer #50 AOI
Dry Sheds #4/#5 AOI
Kilns AOI
Rail Lines East AOI
Former MS/IRM AOI
Former Green Chain AOI
Construction Engineering AOI
Former Oil House AOI
Miscellaneous AOI
Transformer Pad AOI
Pacific Ocean
Soldier Bay
IRM AOI
West of IRM AOI
Approximate location and size of restricted area
Planer #2 AOI
Former Shipping Office and Truck Shop AOI
Parcel 6 AOI
Former Log Storage and Sediment Stockpile AOI
Gavmill/Sorter AOI
Riparian AOI
Scales AOI
Former Sheep Barn AOI
Log Deck AOI
Greenhouse AOI
Former Airstrip AOI
Cypress Gate AOI
No Further Action
No Further Action Expected After Excavation
Soil Restrictions
Groundwater and Soil Gas Restrictions
Groundwater, Soil, & Soil Gas Restrictions
Groundwater Restrictions
0
620
1,240
Feet
GRAPHIC SCALE
LEGEND:
AOI BOUNDARY
CONSIDERED FOR REMEDIAL ACTION IN RAP
DETERMINED NO FURTHER ACTION IN RI REPORT
AOI'S NOT INCLUDED IN FEASIBILITY STUDY, RECOMMENDED FOR NFA IN RAP
AOIS MOVED TO OUE
EXCAVATION LOCATIONS
FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
REMEDIAL INVESTIGATION OPERABLE UNITS C AND D
OU-C AND OU-D AREA OF INTEREST STATUS
ARCADIS
FIGURE 2-2

OUs C, D and E - Cleanup 2017

Remedial Action Plan Implementation
Removal Action Workplan Implementation



OUs C, D and E Excavations - 2017

- Total of 3,200 cubic yards of soil and sediment
- 160 truck loads
- 5 – 6 Weeks
- Mobilization to begin on or about August 15, 2017
- Delay because of Army Corps of Engineers Permit - wetlands

OUs C and D RAP - Phase I Excavations 360 cubic yards of soil

- Former Dip Tank AOI
  - Dioxin and Pentachlorophenol (PCP)
  - NFA expected for soil (groundwater still an issue)
- Kilns AOI
  - Petroleum and B(a)P
  - NFA expected for soil, no other issues
- Planer #2 AOI
  - Petroleum and B(a)P
  - NFA expected for soil (soil gas and groundwater still issues)
- Rail Lines East
  - Lead
  - NFA expected for soil, no other issues

OUs C and D RAP – Phase II Excavations

- Former Aboveground Storage Tank , Mobile Equipment Shop/Pilot Study AOIs
  - Not yet scheduled
  - Comingled with Cal Western Railroad contamination
  - Petroleum contaminated soil (also soil gas, and groundwater)

OU-E Removal Action Workplan

- Purpose: to address Hot Spots – areas of higher contamination in soil and sediment
- Locations Identified through Risk Assessment and Hot Spot Analysis

OU-E Removal Action Workplan

- California Environmental Quality Act
  - Addendum to the Subsequent EIR for the Phase II Coastal Trail and Restoration Project
    - City of Fort Bragg Lead Agency
    - DTSC Responsible Agency
  - Consultation with the Sherwood Valley Band of Pomo Indians
- Approved by DTSC August 2016
- Implementation Plan – draft final February 2017

OU-E Removal Action Workplan – Soil Removal

- Terrestrial Lowland - Twelve Areas
  - 7 Lead
  - 1 Dioxin
  - 3 Benzo(a)Pyrene
  - 1 Petroleum
- 1,510 cubic yards of soil excavated and disposed of off-site

OU-E Removal Action Workplan Sediment Removal

- Pond 7
  - Dioxin
  - 1,200 cubic yards
- Ponds 2 & 3
  - Dioxin
  - Arsenic
  - 474 cubic yards
- Riparian Area
  - Dioxin
  - 16 cubic yards

Operable Unit-E

Pond and Soil Investigations

OU-E Investigations

- Dioxin Sampling and Analysis Report, July 2006
- Data Summary Report Pond Sediment, May 2009
- Data Summary Report – Additional Investigation Pond 8 Sediment, February 2011

OU-E Investigations

- Site Investigation Sampling Summary Report, March 2011
  - Terrestrial Area soil

OU-E Investigations

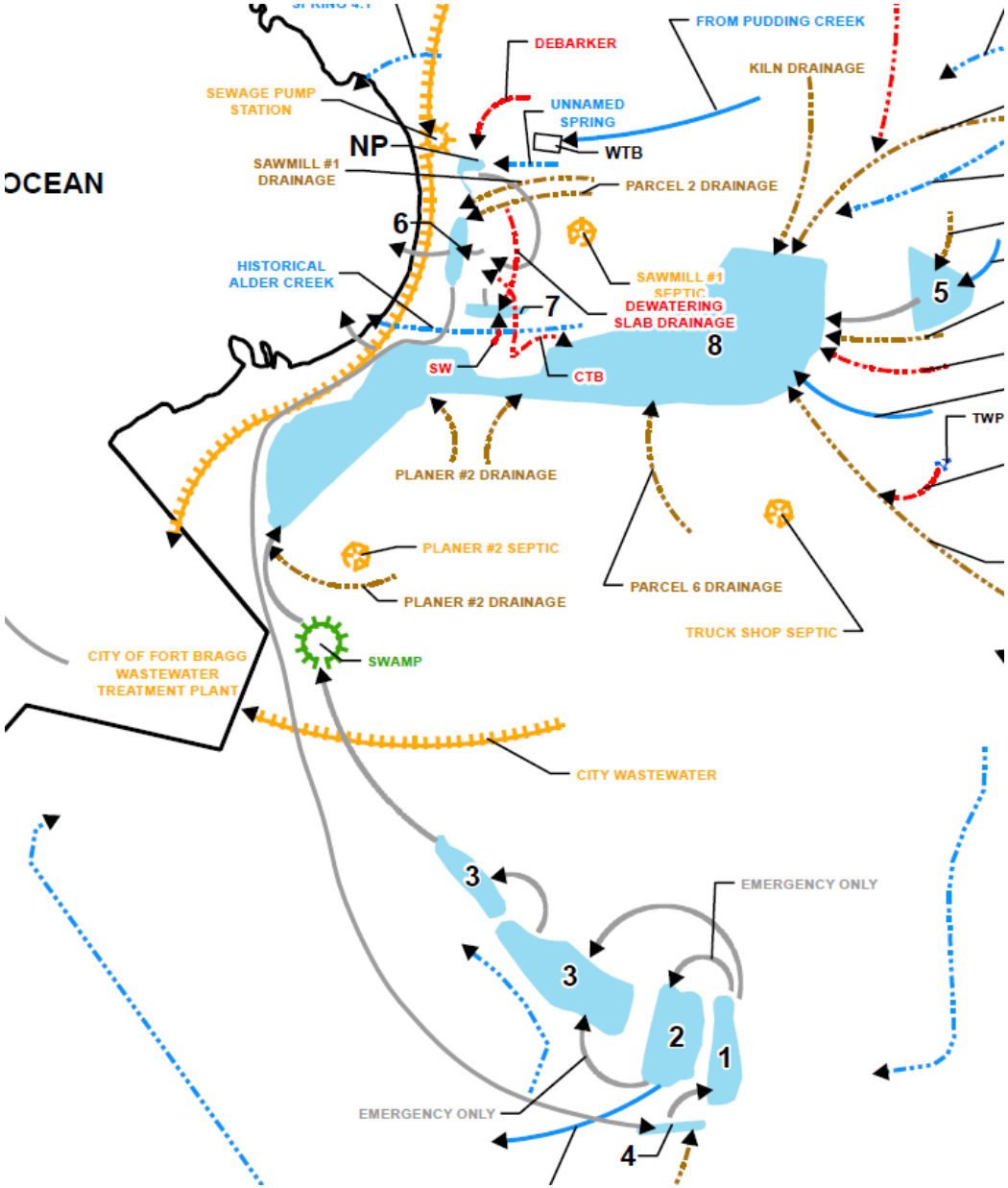
- Mill Pond (Pond 8) Geotechnical and Chemical Characterization Results, December 2012
- Operable Unit E Remedial Investigation – January 2013
- Baseline Human Health and Ecological Risk Assessment – July 2015 (additional pore water and sediment sampling)

OU-E Soil Contamination Sources

- Terrestrial Upland Area – some source areas
  - Sawmill #1
  - Powerhouse and associated fuel lines
  - Open Refuse Fire Area – location of dioxin
  - Compressor House and Lath Building

OU-E Sediment Contamination Sources

- Management of Wastewater and Fly Ash from Powerhouse



Conceptual Site Model - Waste Water Movement

1970s to 1986

- Scrubber water, with fly ash from boilers placed on dewatering pad
- Water from dewatering pad flowed to Pond 7,
- Pumped to Pond 4
- Flowed to aeration ponds 1 and 2; to pond 3 and then pond 8

1996 to 2002

- Eliminated dewatering pads
- Boiler water conveyed to Pond 7
- Pumped to Pond 4
- Flowed to aeration ponds 1 and 2; to pond 3 and then pond 8

Conceptual Site Model - Waste Water Movement

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Conceptual Site Model - Waste Water Movement

1970s - 1986 & 1986 - 2002

- Water pumped from Pond 7 to Pond 4

Conceptual Site Model - Waste Water Movement

1970s - 1986 & 1986 - 2002

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Conceptual Site Model - Waste Water Movement

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Conceptual Site Model - Waste Water Movement

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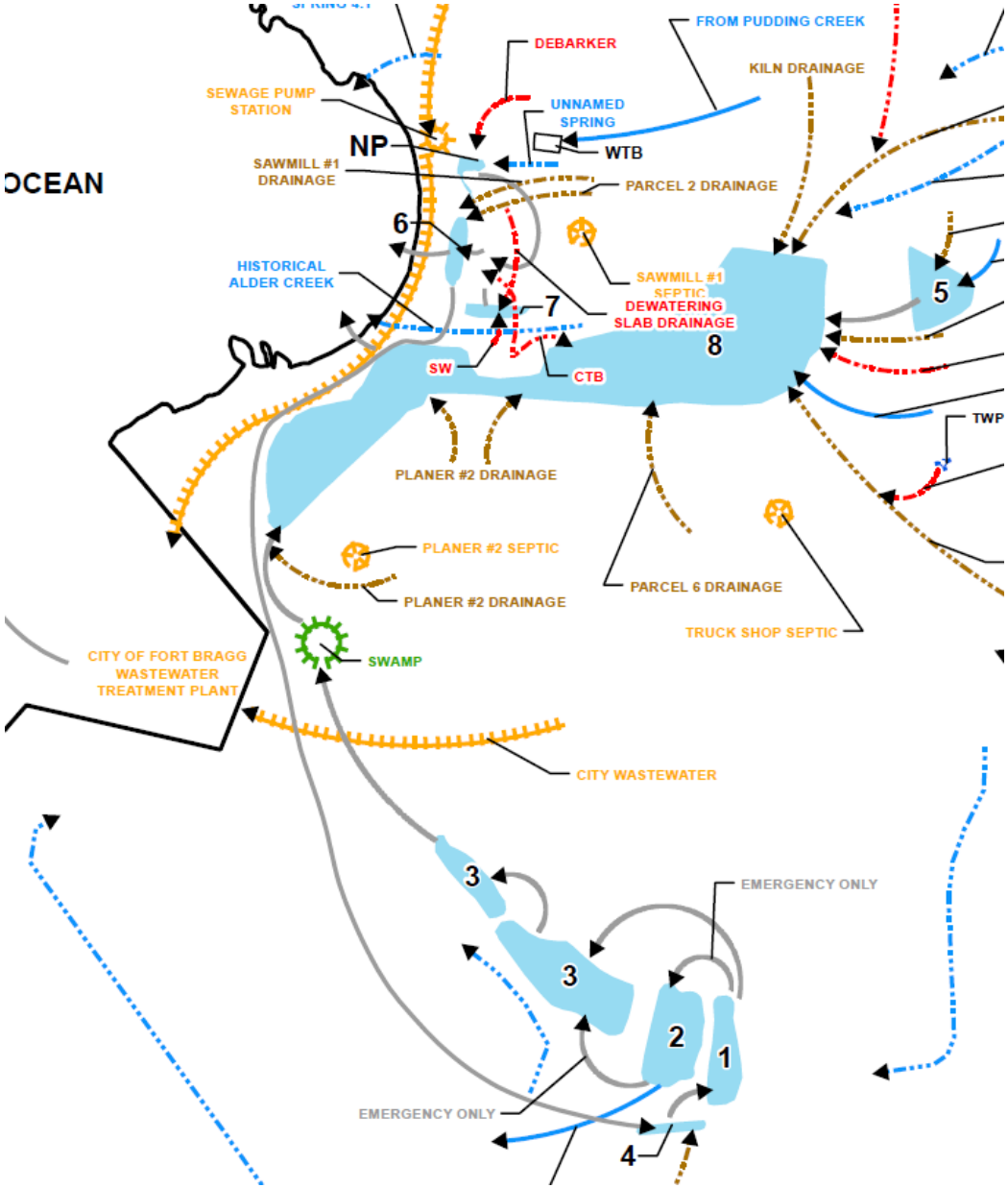

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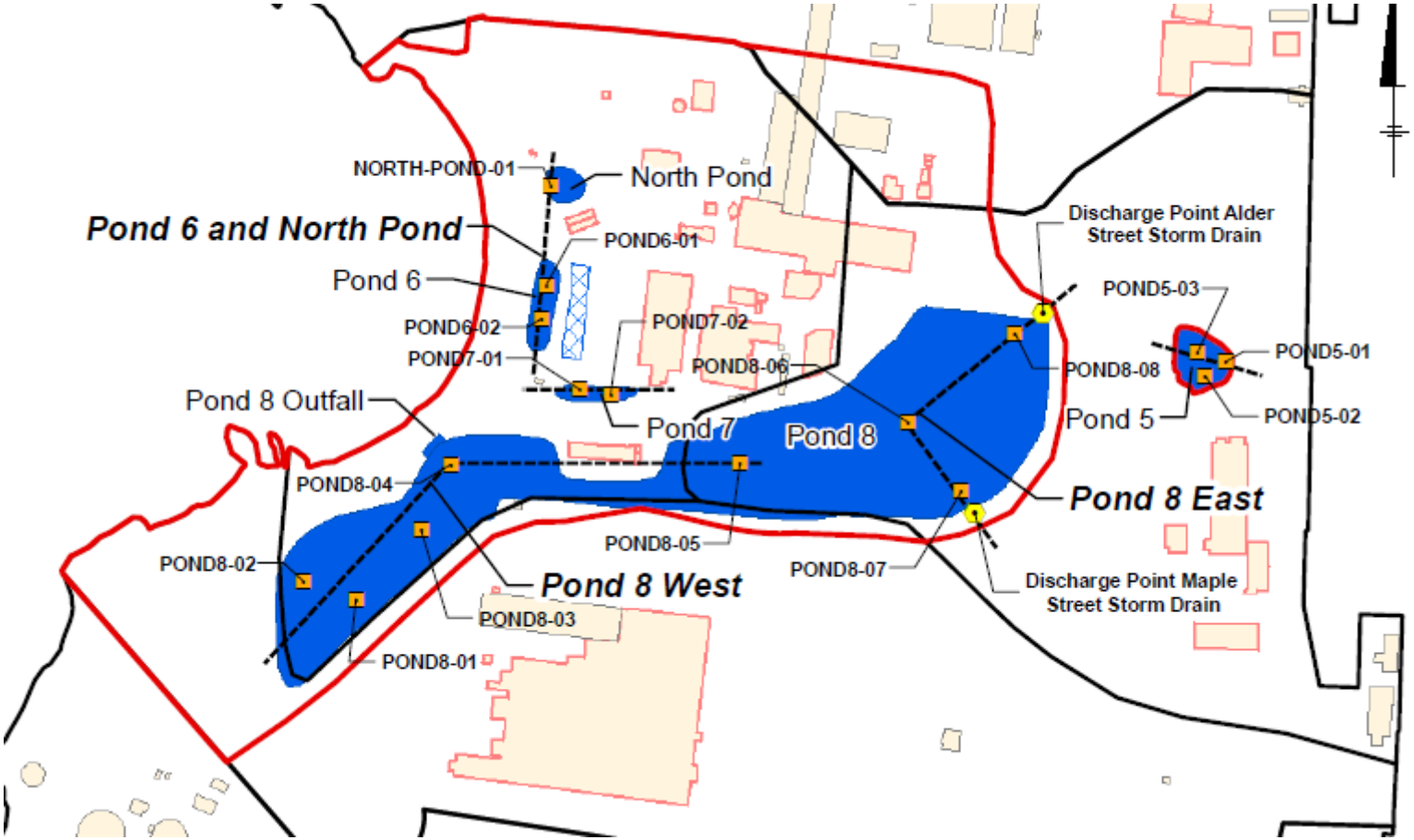
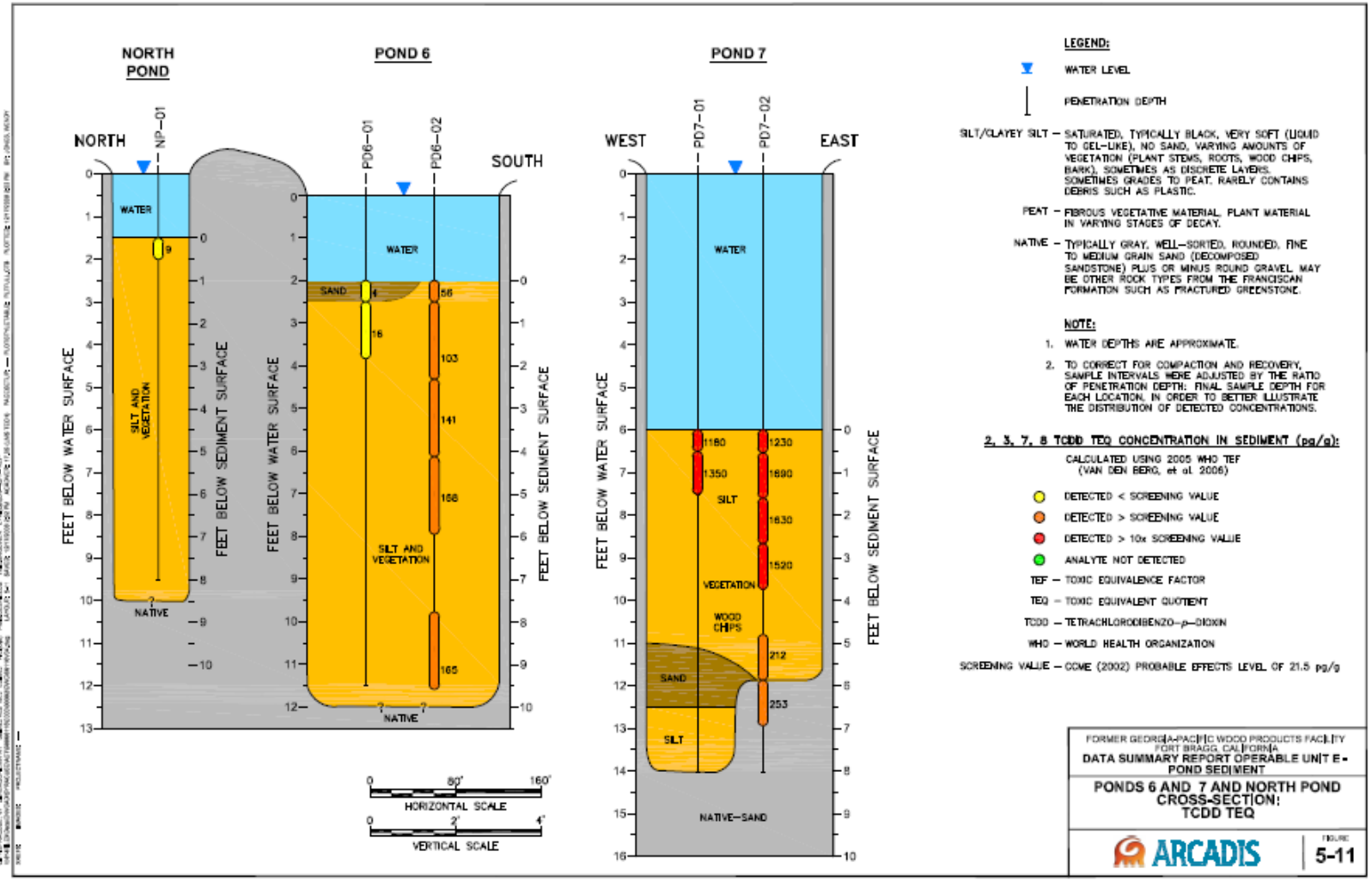
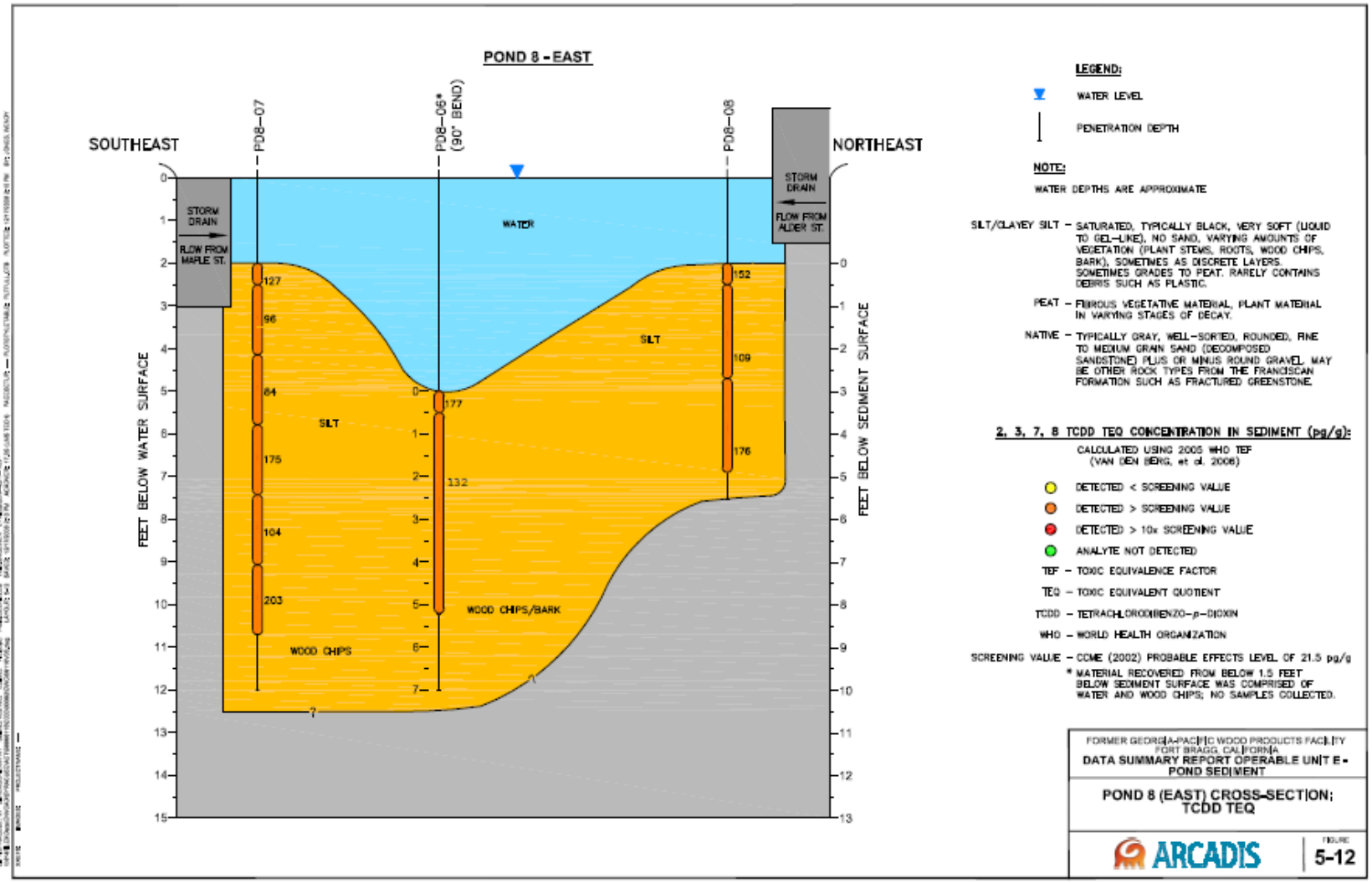
Data Summary Report Pond Sediment – 2009 – Locations of Cross Sections



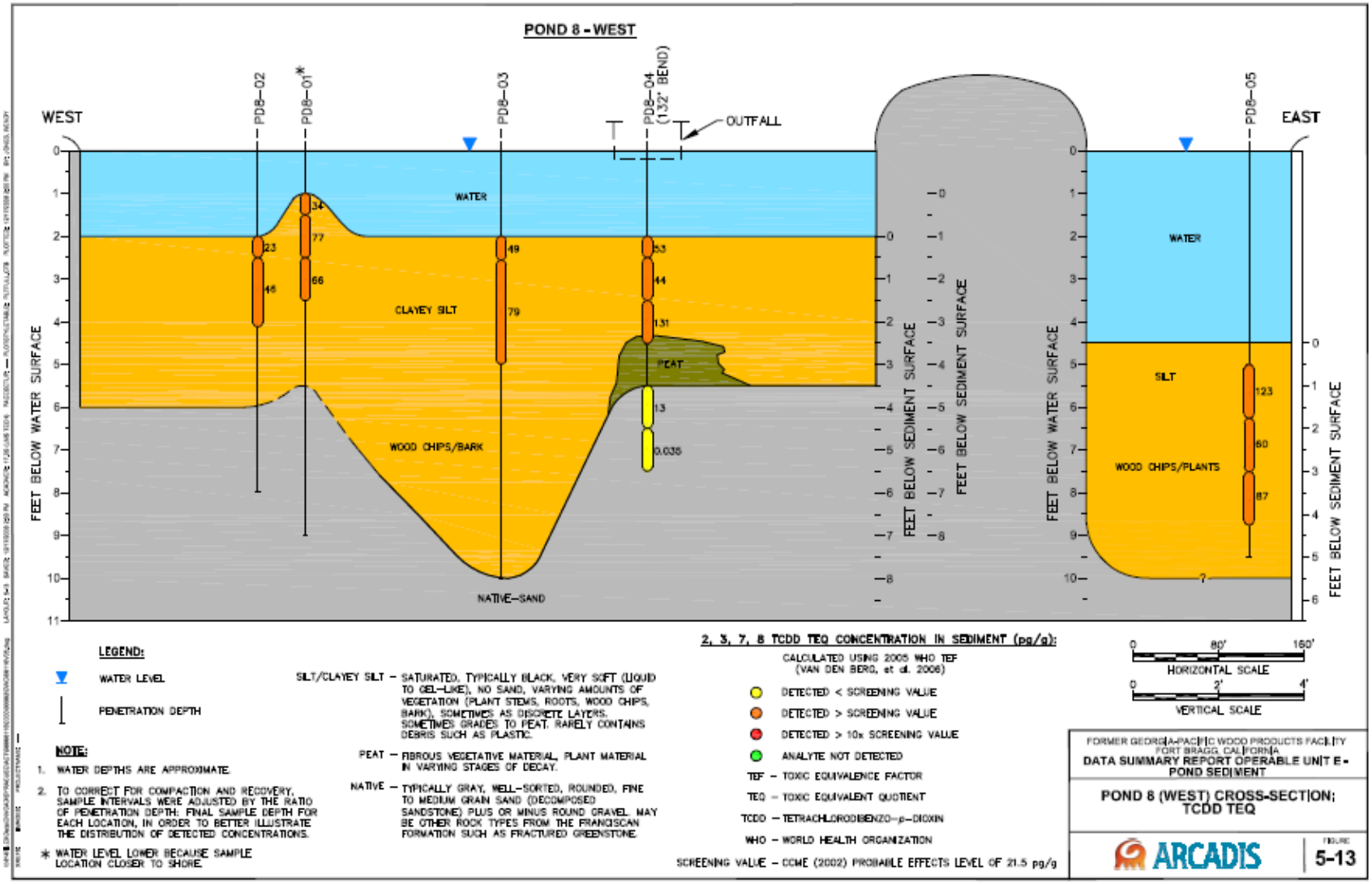
Dioxin Concentration – Ponds 6, 7 and North Pond



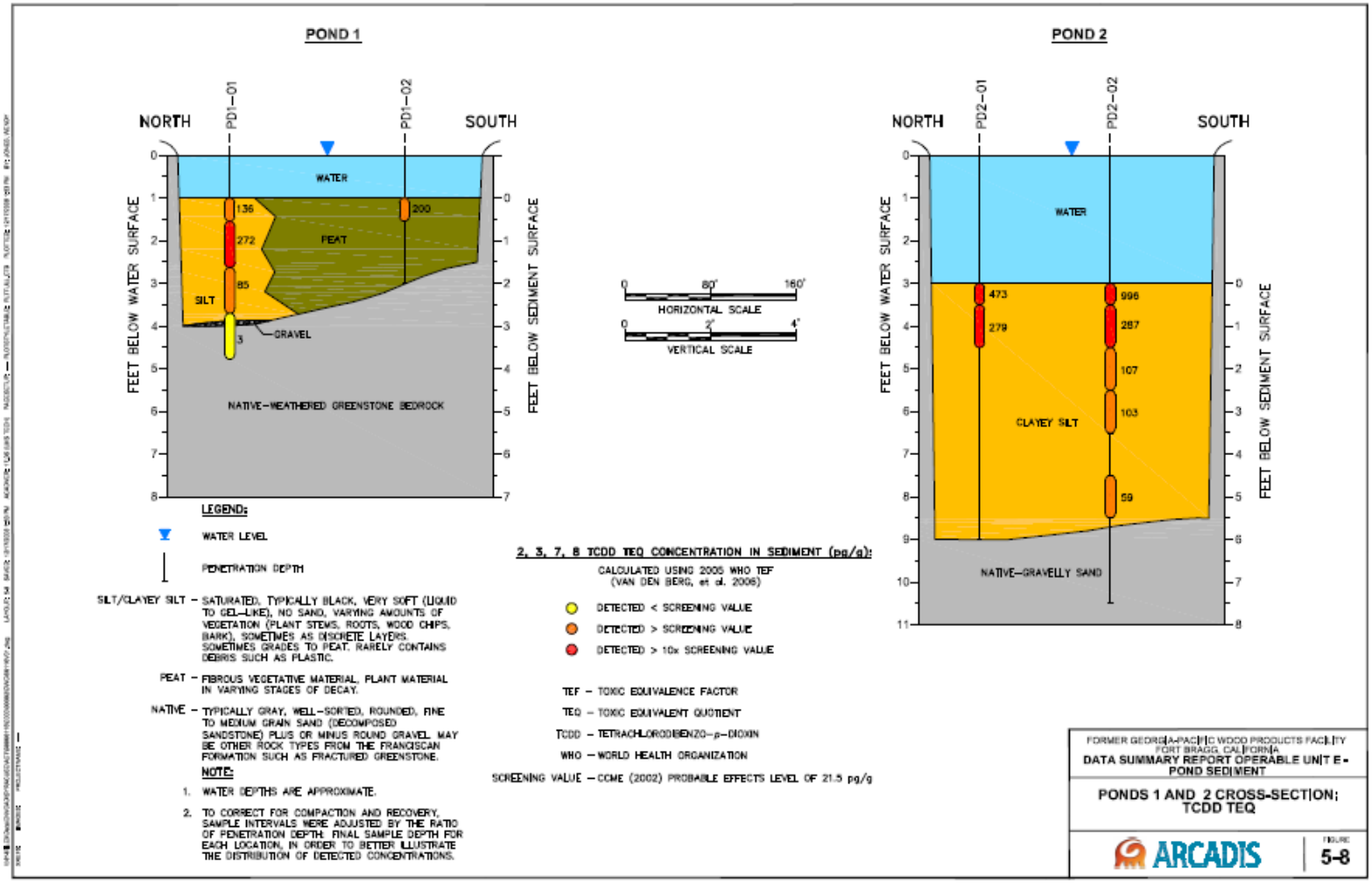
Dioxin Concentration – Pond 8 East



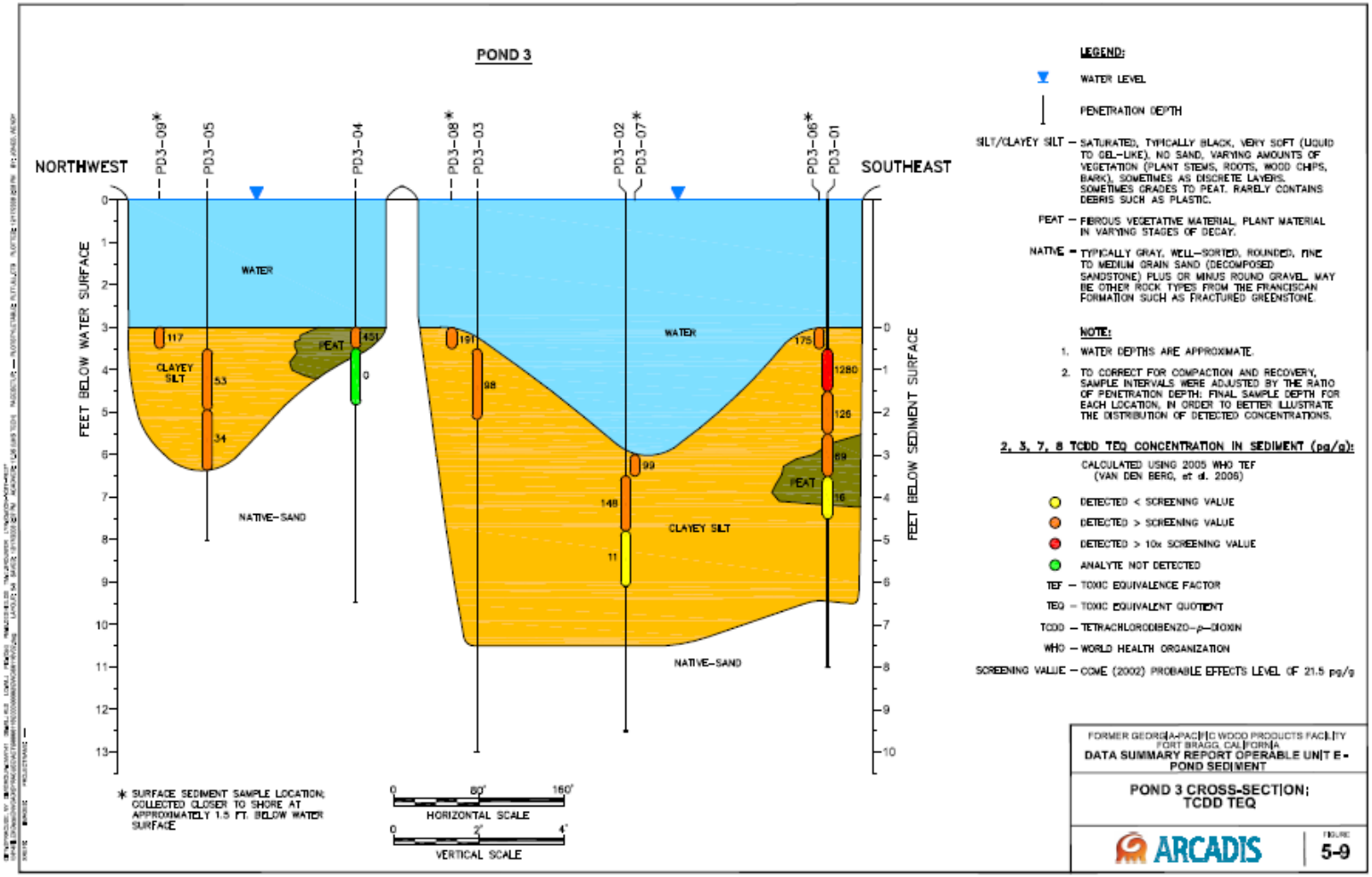
Dioxin Concentration – Pond 8 West



Dioxin Concentration – Ponds 1 & 2



Dioxin Concentration – Pond 3



Dioxin Sediment Investigation Results – from all investigations

- Dioxin
  - Highest in Pond 7, 2 and 3
  - Pond 8
    - Dioxin range from less than 1 picogram/gram (pg/g) to 231 pg/g
  - Pond 6
    - Dioxin range from less than 1 pg/g to 175 pg/g
- Arsenic and Lead also in pond sediments
  - Collocated with high levels of dioxin

Operable Unit E

Baseline Human Health and Ecological Risk Assessment

Exposure Point Concentration & Hot Spot Evaluation

- 95 Upper Confidence Level
  - Statistical Distribution
  - Average Concentration
- Hot Spot
  - Geographical Distribution
  - Area of high contamination
  - Could be hidden in statistical analysis
  - Statistical Outlier

Baseline Human Health and Ecological Risk Assessment (BHHERA)- Soil

- Human Health Risk (current levels of contamination)
  - Recreational visitor – 50 days & 200 days/year
    - Exposure to surface soil
  - Chemicals of concern – Arsenic, dioxins, lead, benzo(a)pyrene, & petroleum
  - Human health cancer risk
    - 50 days/year: 2 x 10-6
    - 200 days/year: 4 x 10-6

Baseline Human Health and Ecological Risk Assessment – Ecological Receptors

- Terrestrial - soil
  - Plants
  - Invertebrates
  - Avian
  - Mammalian
- Aquatic – sediment, pore water, surface water
  - Plants
  - Invertebrates
  - Avian
  - Mammalian

Baseline Human Health and Ecological Risk Assessment (BHHERA)- Soil

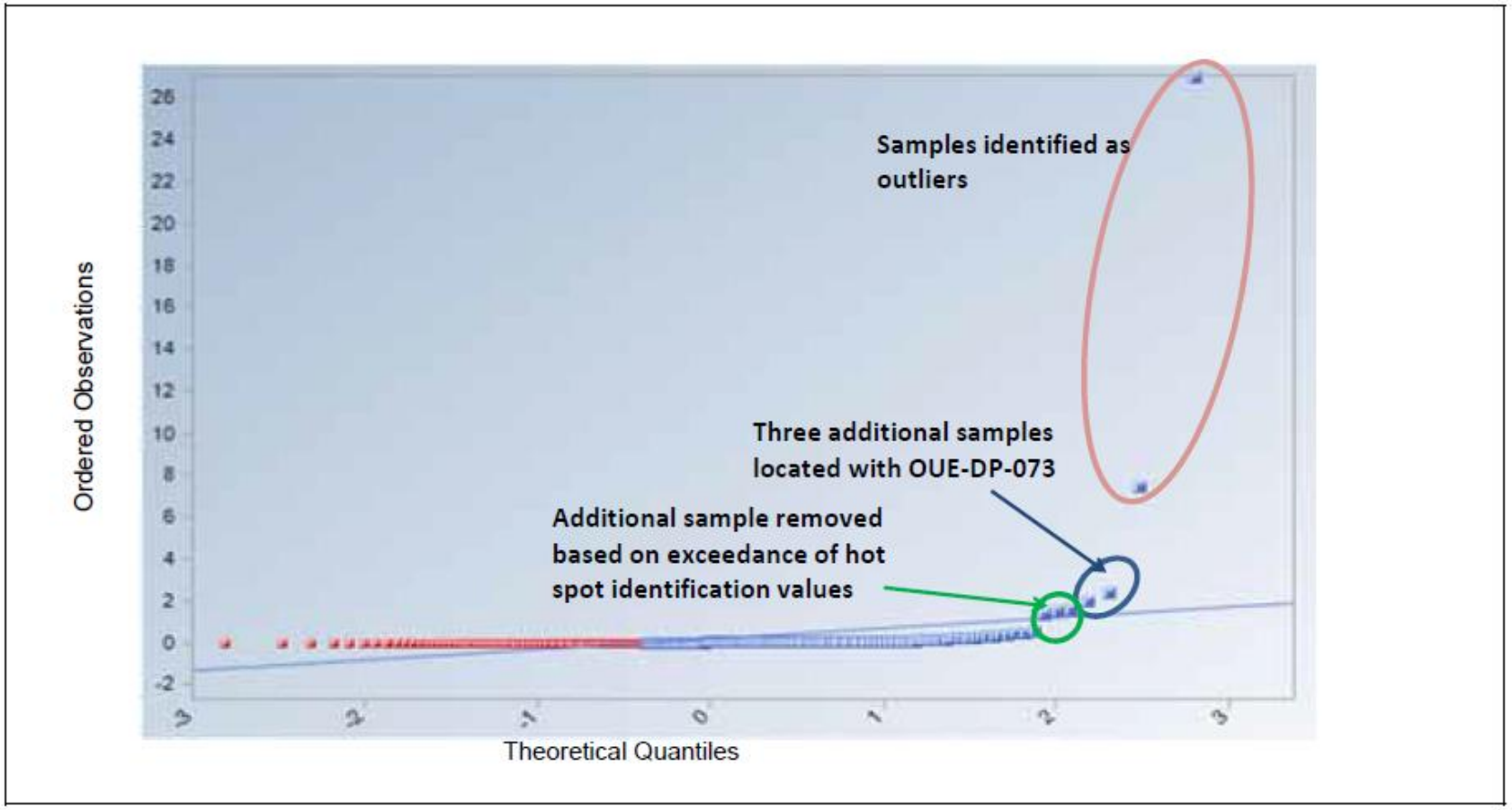
- Ecological Health Risk
  - How is risk measured?
    - Lowest Observed Adverse Effect Level
  - Remedial Goals = Safe soil level for Ecological Receptors
    - Dioxin = 1,920 pg/g
    - Lead = 127 mg/kg

Baseline Human Health and Ecological Risk Assessment (BHHERA)- Aquatic

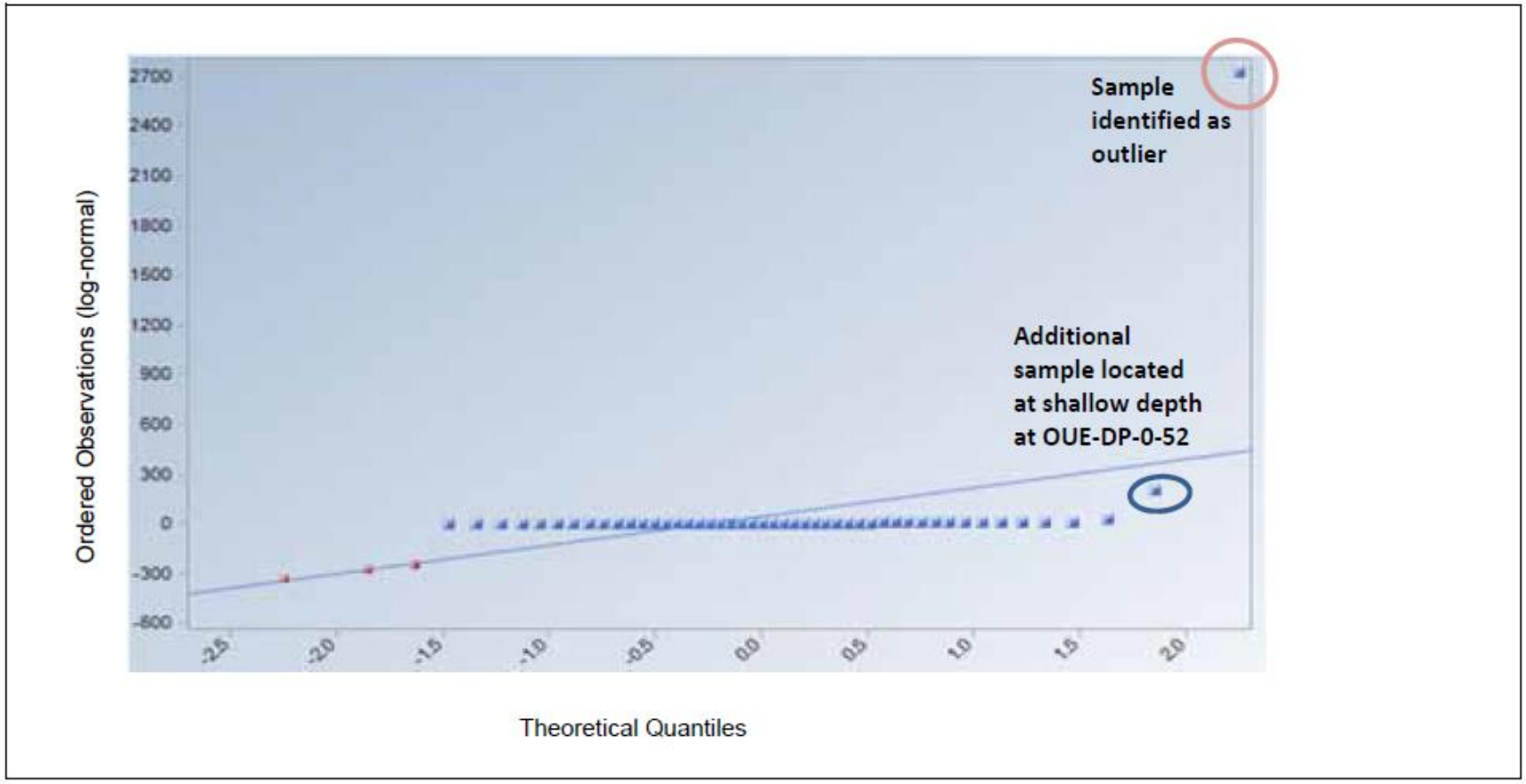
- Ecological Health Risk
  - How is risk measured?
    - Relevant Ecological Screening Levels
    - Other information
      - Chemistry of contaminant
      - Bioavailability
        - Porewater
      - Background Concentration
      - Overall Health of the Environment

Contaminant Distribution Plots - Soil

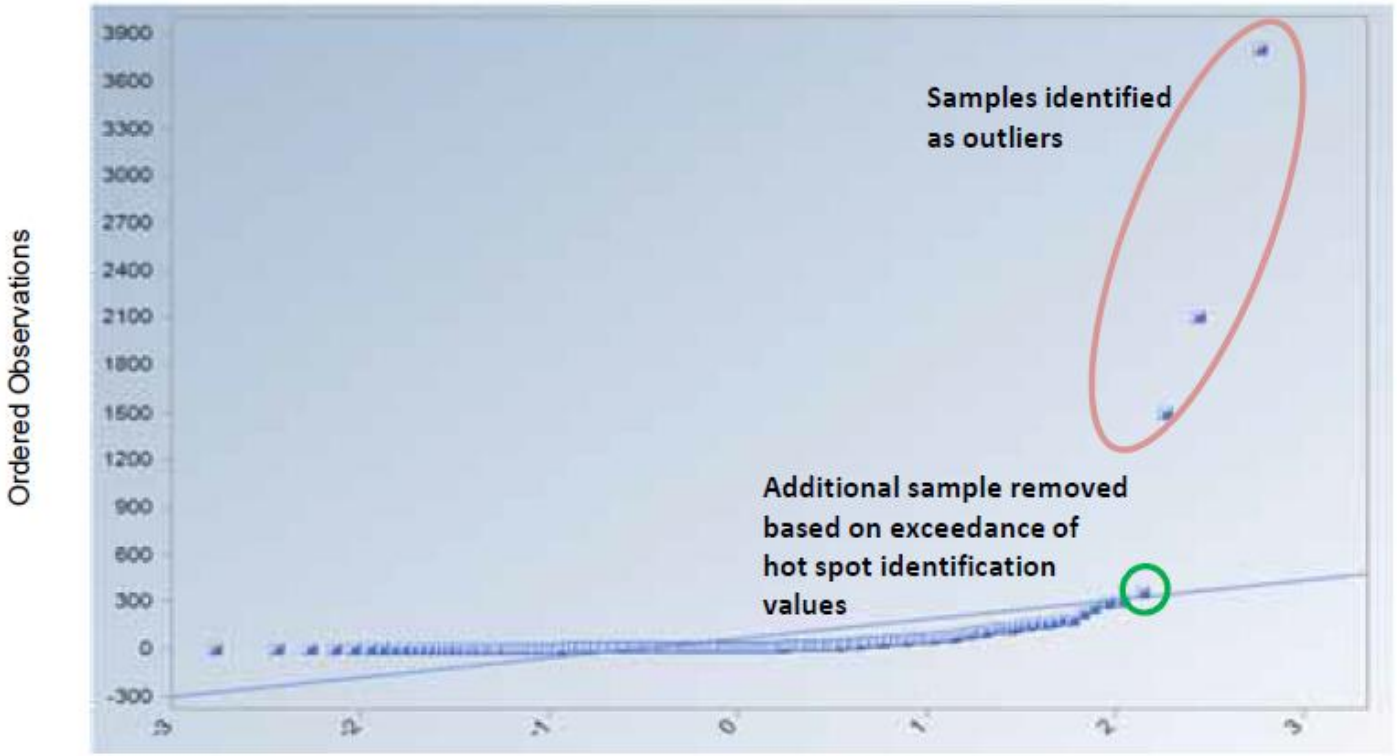
Benzo(A)Pyrene soil distribution



Dioxin (TEQ) soil distribution



Lead soil distribution



Terrestrial Lowland Soil Removal Action Workplan Goals

Constituent	Recreational Human Health RBTL	Ecological RBTL	Selected RBTL	Not-To-Exceed Value
B(a)P TEQ	0.3 mg/kg	Not applicable	0.3 mg/kg	0.9 mg/kg
Dioxin TEQ	53 pg/g	1,920 pg/g	53 pg/g	160 pg/g
Lead	320 mg/kg	127 mg/kg	127 mg/kg	320 mg/kg

Expected Results - Soil Exposure Point Concentrations

Constituent	Depth Interval				Residential Screening Levels
	0-0.5 ft bgs	0-2 ft bgs	0-6 ft bgs	0-10 ft bgs	
B(a)P TEQ (mg/kg)	0.04	0.08	0.06	0.06	0.3 mg/kg
Dioxin TEQ (pg/g)	6.31	4.85	7.15	8.52	50 pg/g
Lead (mg/kg)	49.50	39.54	48.65	44.97	80 mg/kg

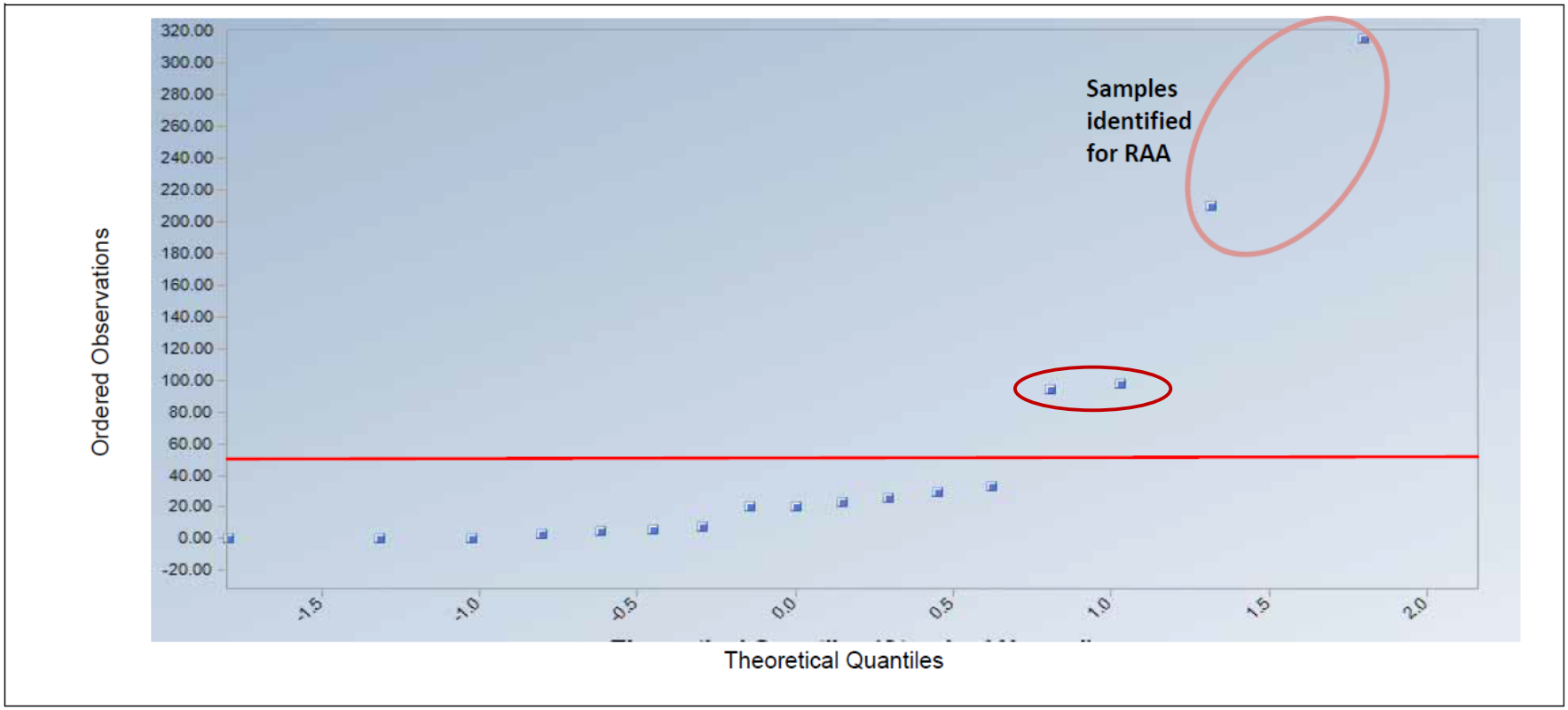
BHHERA – Aquatic (Sediment) Human Health Risks

- Recreational visitor – 12 and 50 days/year
  - Exposure to surface sediment
- Chemicals of concern – dioxins, arsenic
- 1x10-6 = one excess cancer risk in 1 million people
- Human Health Risk to pond sediment

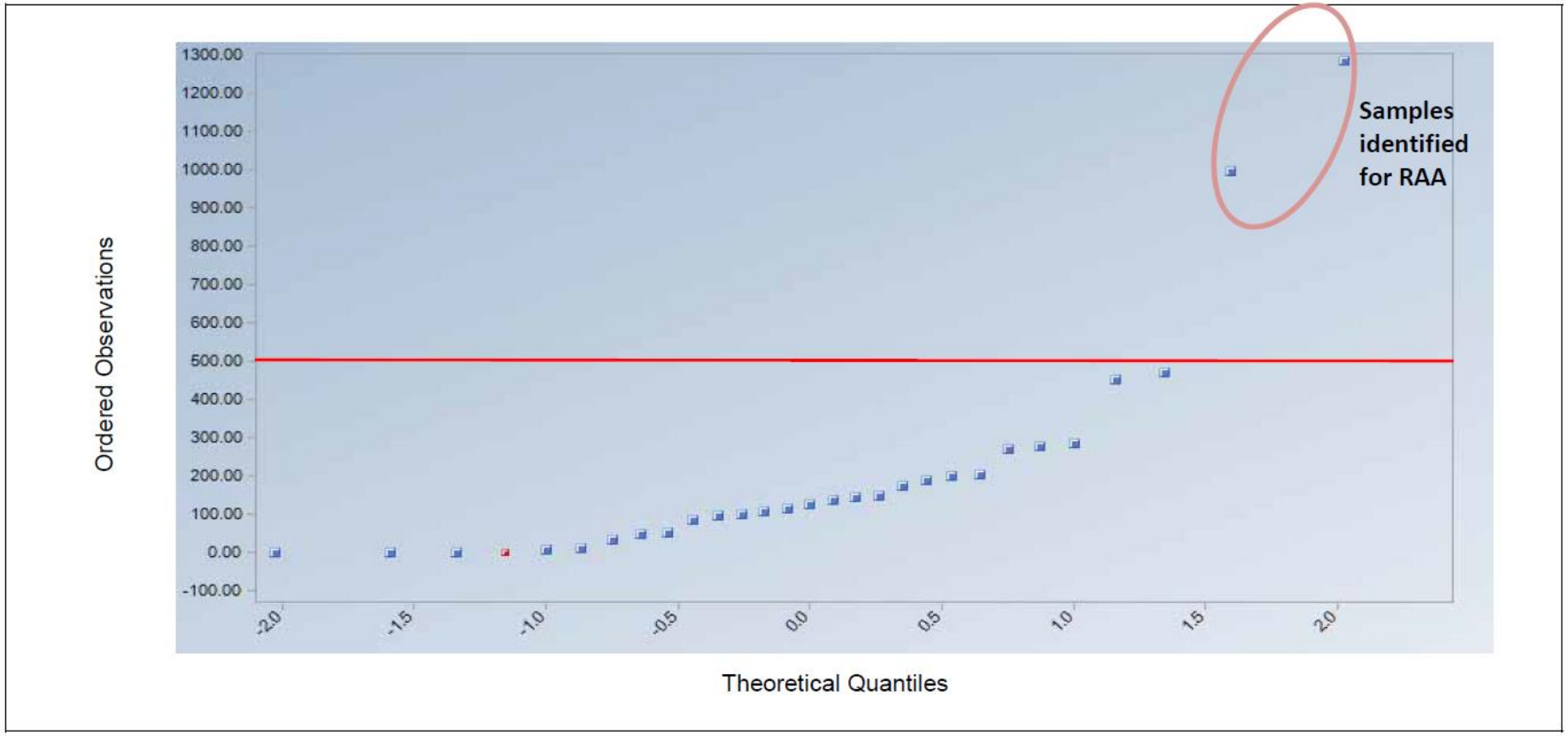
Pond(s)	12 days/year	50 days/year
Ponds 1-4	2 x 10-6	8 x 10-6
Pond 7	about 5 x 10-6	2 x 10-5
Pond 8	about 5 x 10-7	2 x 10-6

Contaminant Distribution Plots - Sediment

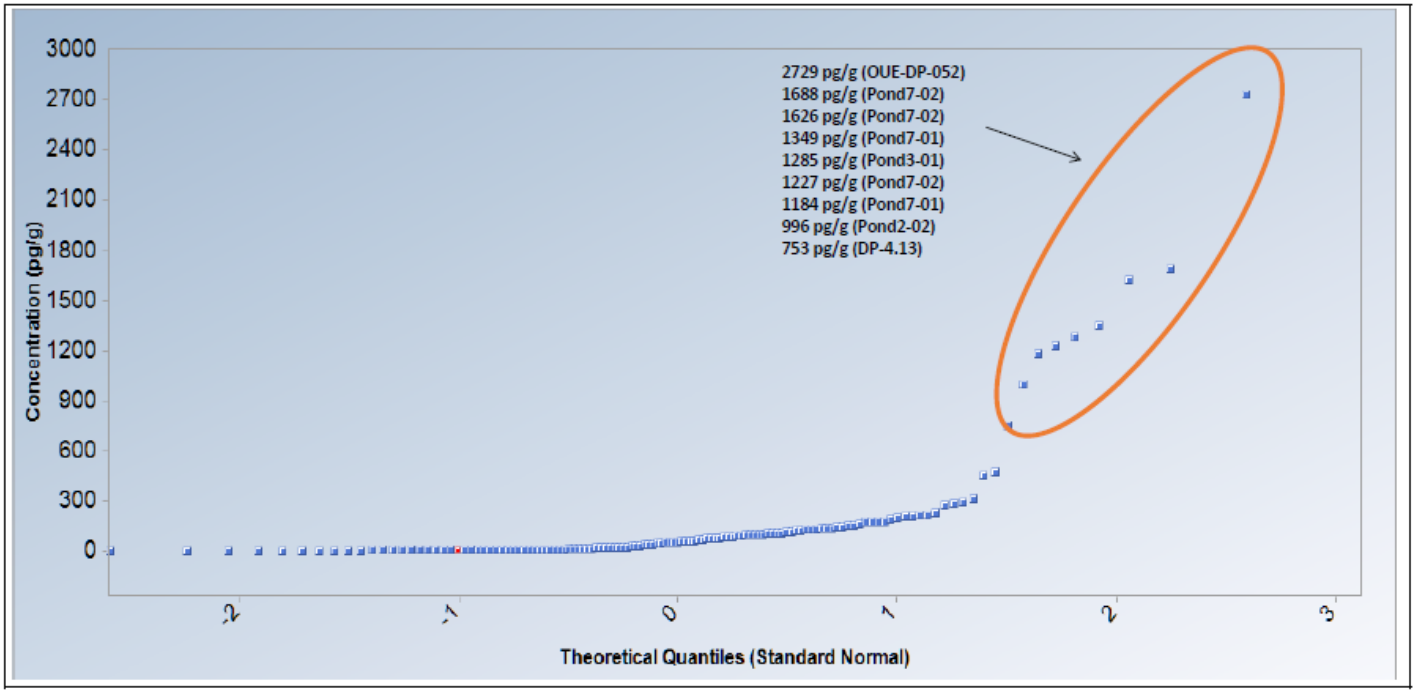
Riparian Area – dioxin concentrations



Ponds 1 – 4 dioxin concentrations



Dioxin Data Sediment and Soil



ARCADIS Design & Consultancy for natural and built assets

Normal Quantile-Quantile Plot
2,3,7,8-TCDD TEQ (Human/Mammal)
Terrestrial and Aquatic (0 - 2 ft bgs)
Former Georgia-Pacific Wood Products Facility, Fort Bragg, California

Figure 1

Notes:

Sample identified as remedial action area
Normal Q-Q plot generated using ProUCL version 5.0. Reporting limit used for non-detects
2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
ft bgs = feet below ground surface
pg/g = picrogram(s) per gram
TEQ = toxic equivalent

Expected Results - Sediment Exposure Point Concentrations

Constituent	Exposure Point Concentration		Residential Screening Levels	Recreational Screening Levels (1x10-6)
	Ponds 1-4	Riparian Area		
Pre-excavation Dioxin TEQ (pg/g)	441.9	127.1	50 pg/g	501 pg/g (12 days)
Post-Excavation Dioxin TEQ (pg/g)	390	19		120 pg/g (50 days)

Ecological Risk Summary

- Terrestrial – soil
  - Established dioxin and lead goals
  - Dioxin and lead will be removed through the Removal Action Workplan implementation.

Ecological Risk Summary

- Aquatic – sediment, pore water, surface water
  - Importance of Pore Water
    - Much better toxicity reference values
    - Biologically available fraction in sediments
    - Better predictor of potential toxicity
  - No Unacceptable Risk to Ecological Receptors
    - With the Exception of Pond 7
    - Pond 7 will be removed through the Removal Action Workplan implementation.

What's next for OU-E

- Feasibility Study – Spring 2017
  - Focus on Sites not included in RAW
  - Identify contingency action for RAW locations
    - Recreational and open space use

What's next for OU-E

- Scoping Alternatives for Pond 8
  - No Action Alternative
  - Land Use Controls
    - Recreational & Open Space Use
    - Access Controls
    - Sediment Management
  - Excavation and Disposal
  - Sediment Stabilization

What's next for OU-E

- Removal Action Workplan Completion Report – Late 2017
  - Could Identify No Further Action sites

What's next for OU-E

- Remedial Action Plan – 2018
  - Evaluates final cleanup options for OUE
    - Areas in the RAW not meeting unrestricted use criteria
    - Sediment Ponds 6, 8, and North Pond
    - Groundwater and Soil
      - Interim Remedial Action Area of Interest
      - West of Interim Remedial Action Area of Interest

Questions?