

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 -

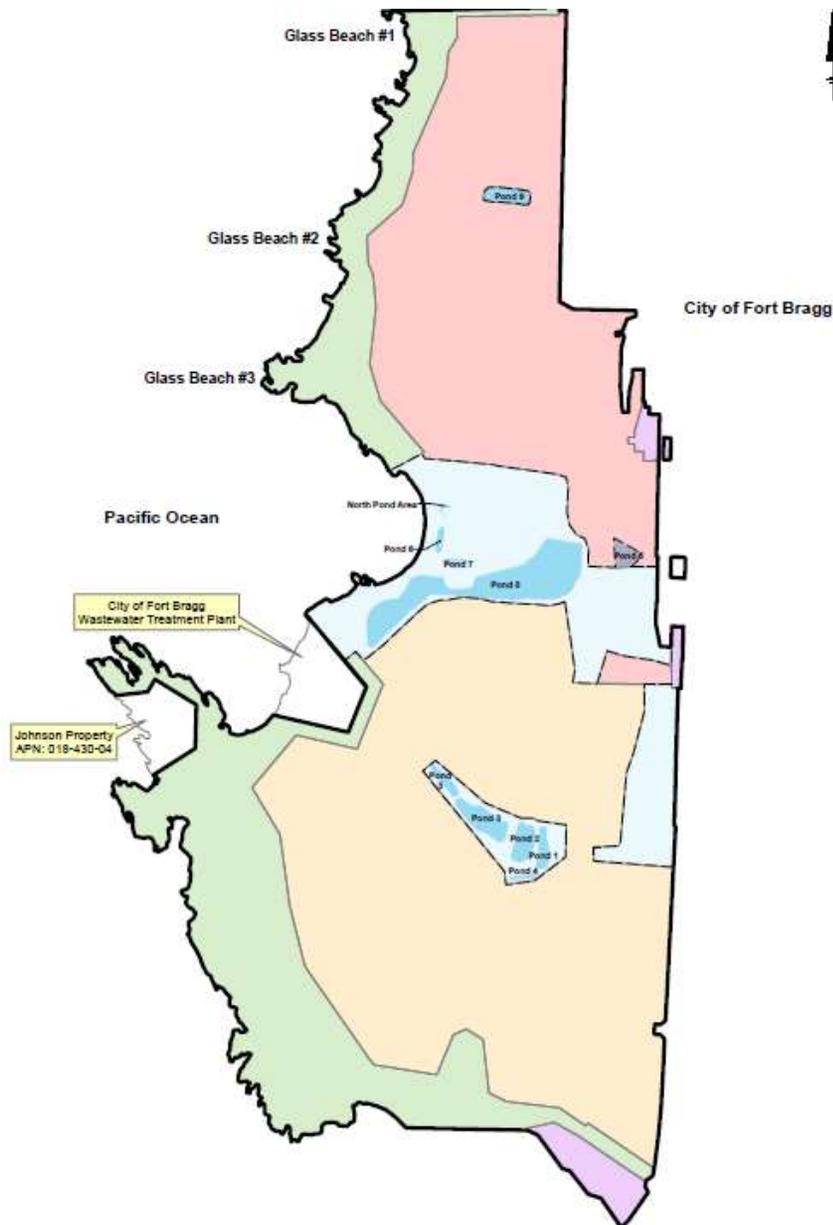
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DTSC Cleanup Process

- 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

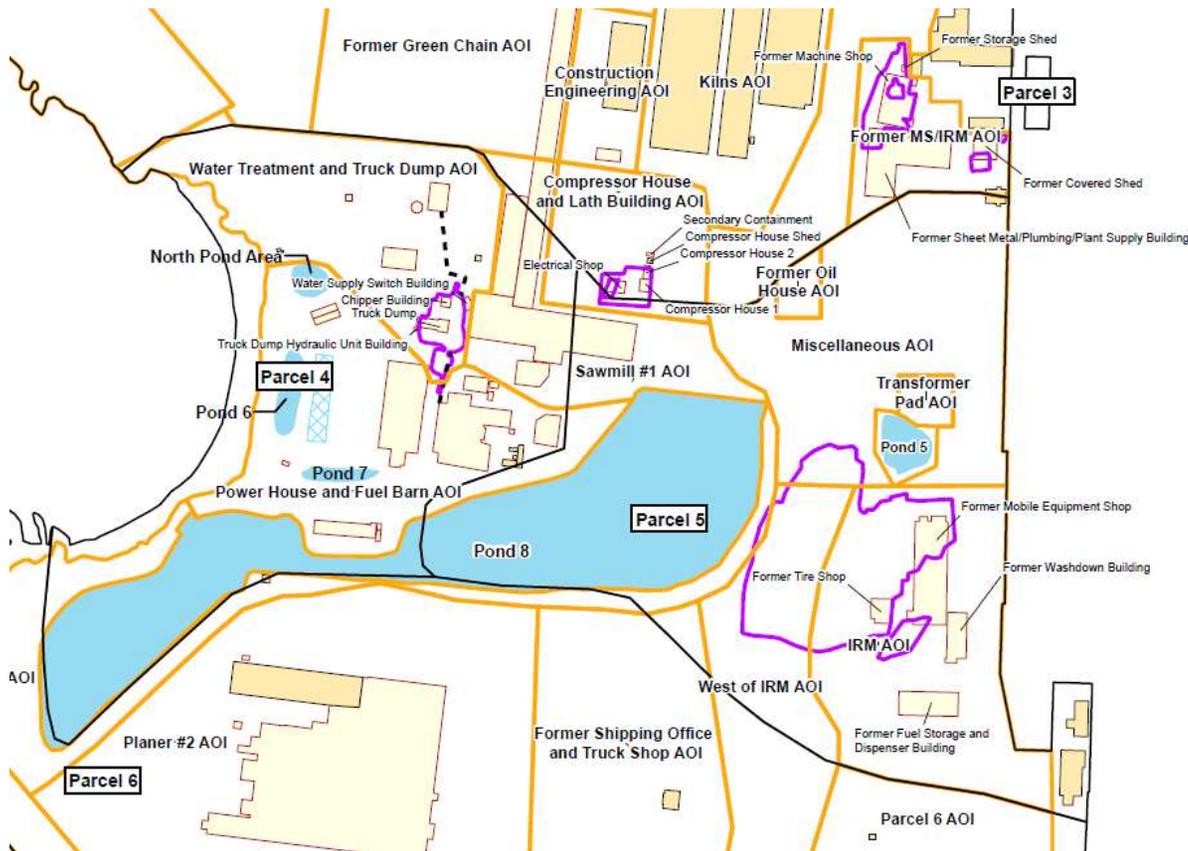


Cleanup Accomplishments

- 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



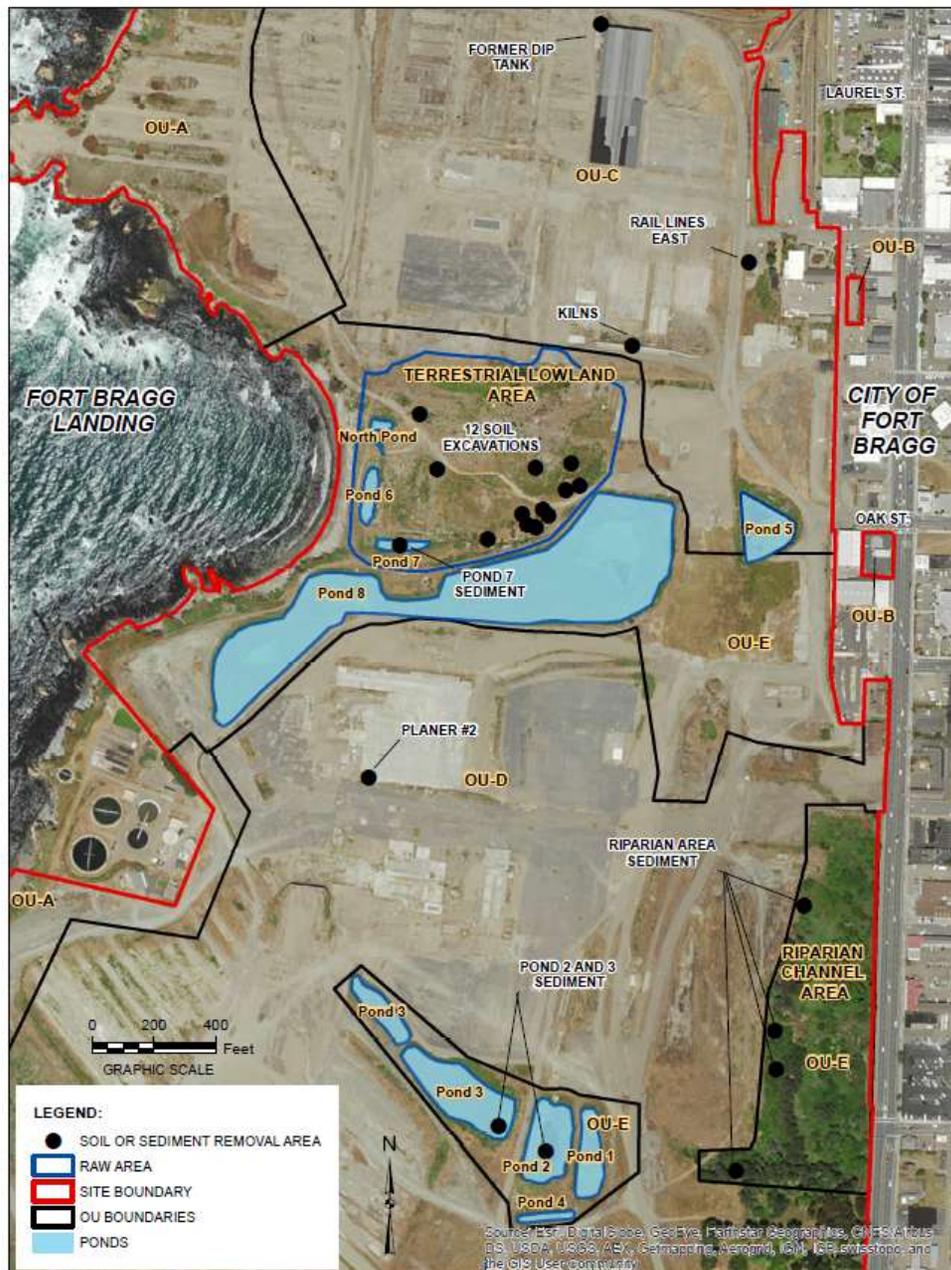
Cleanup Accomplishments

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

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

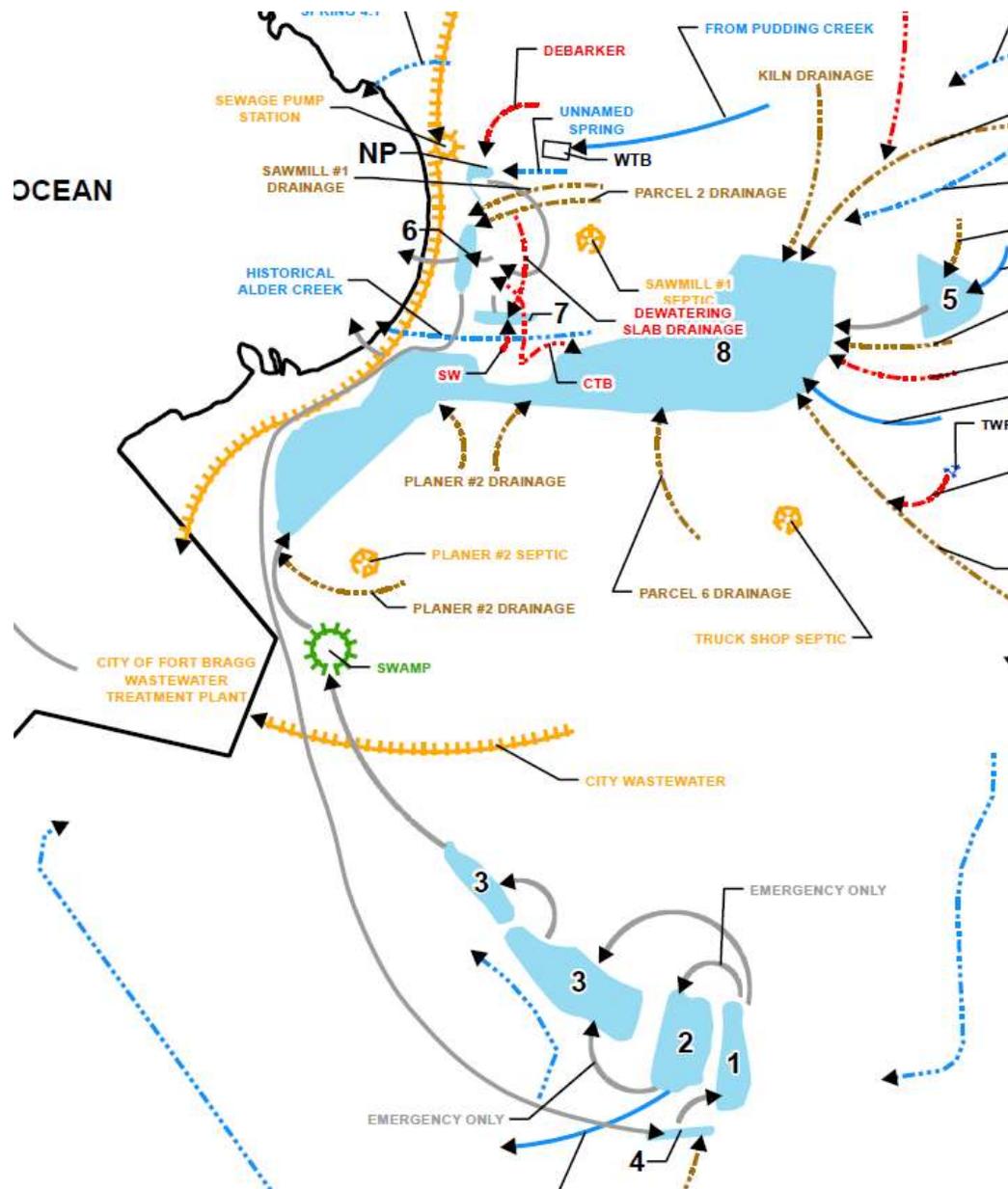
- Mill Pond (Pond 8) Geotechnical and Chemical Characterization Results, December 2012
- Operable Unit E Remedial Investigation – January 2013
- Baseline Human Health and Ecological Risk Assessment – July 2015 (additional pore water and sediment sampling)

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
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Conceptual Site Model - Waste Water Movement

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Conceptual Site Model - Waste Water Movement

1970s - 1986 & 1986 - 2002

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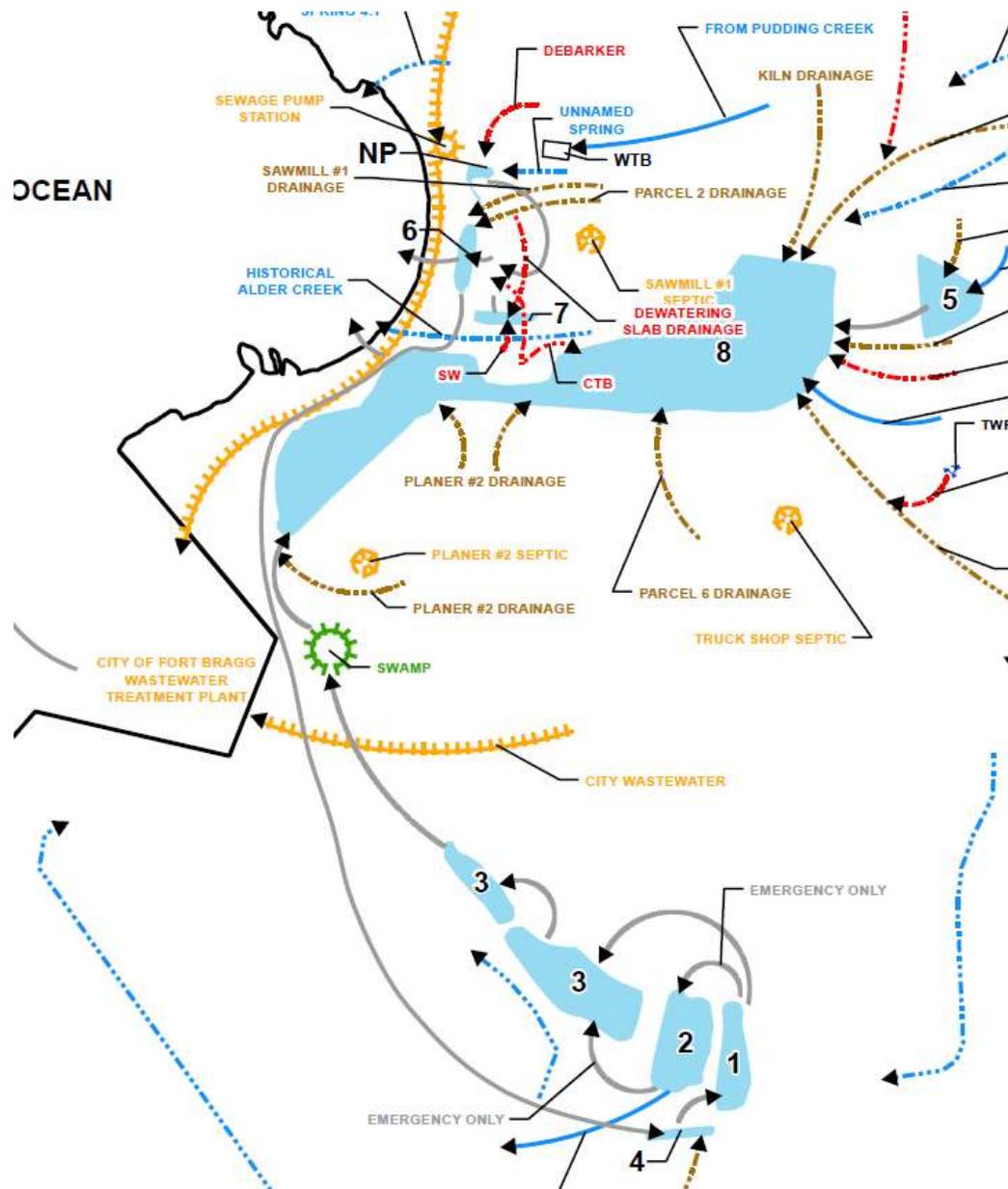


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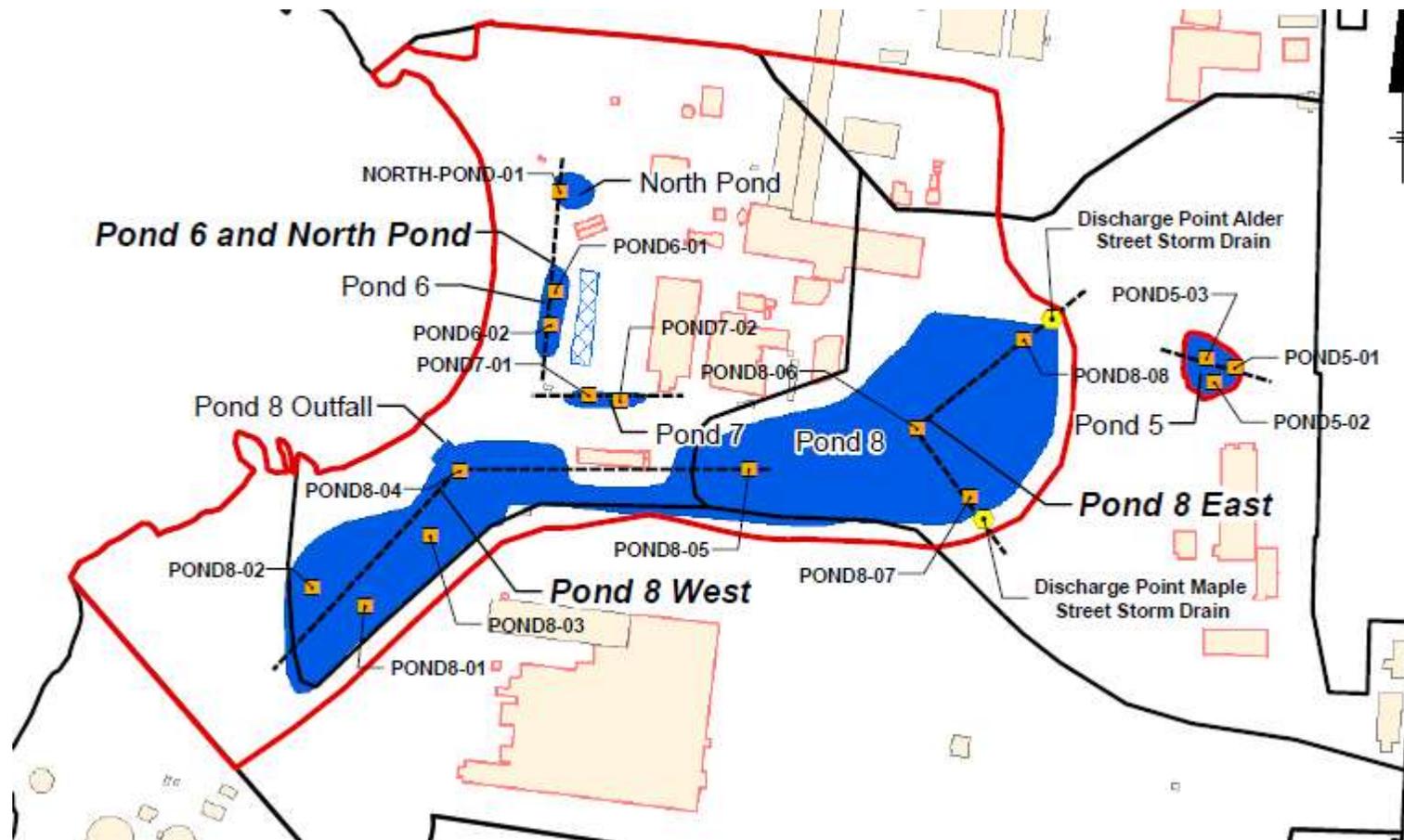
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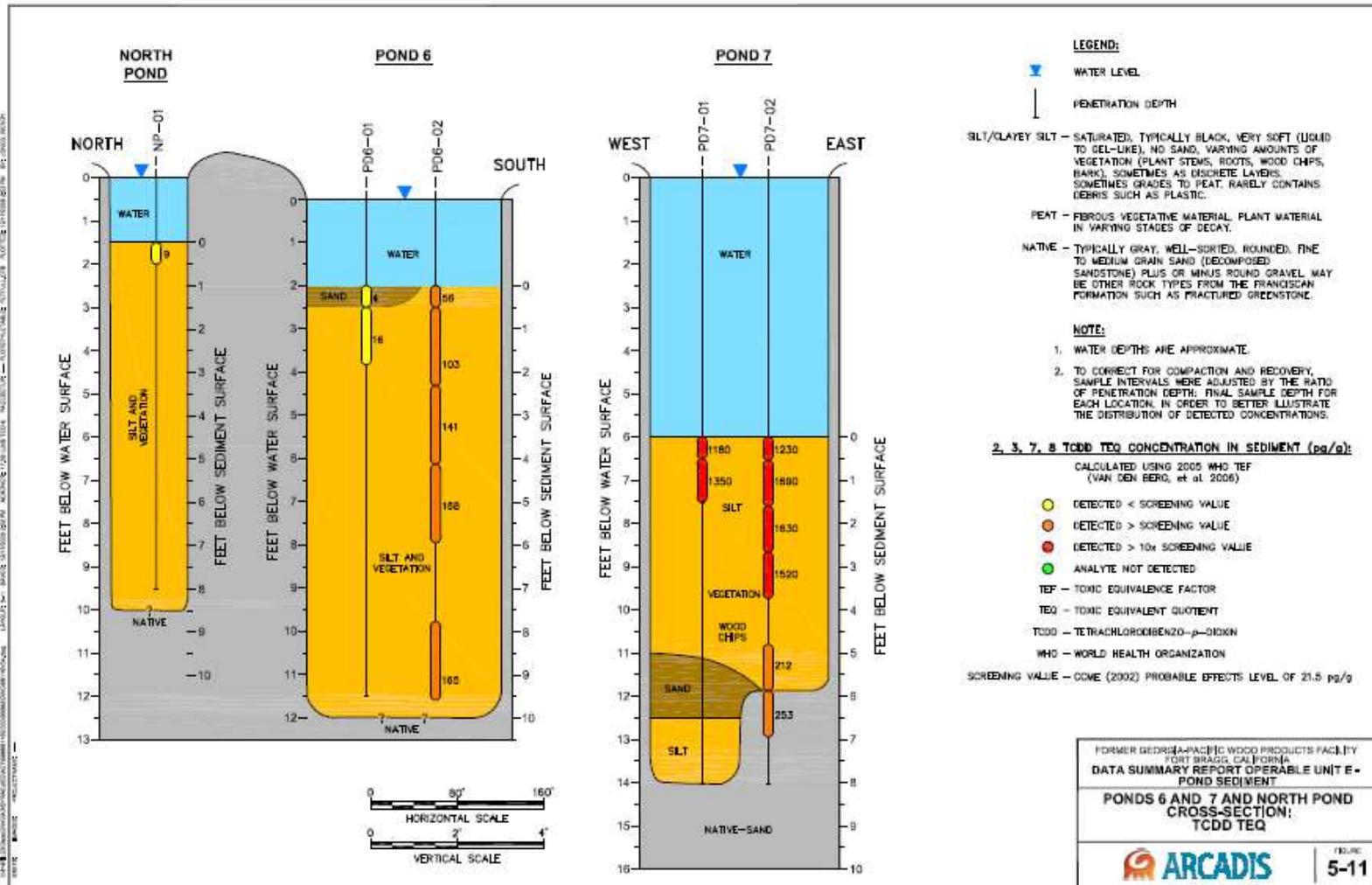
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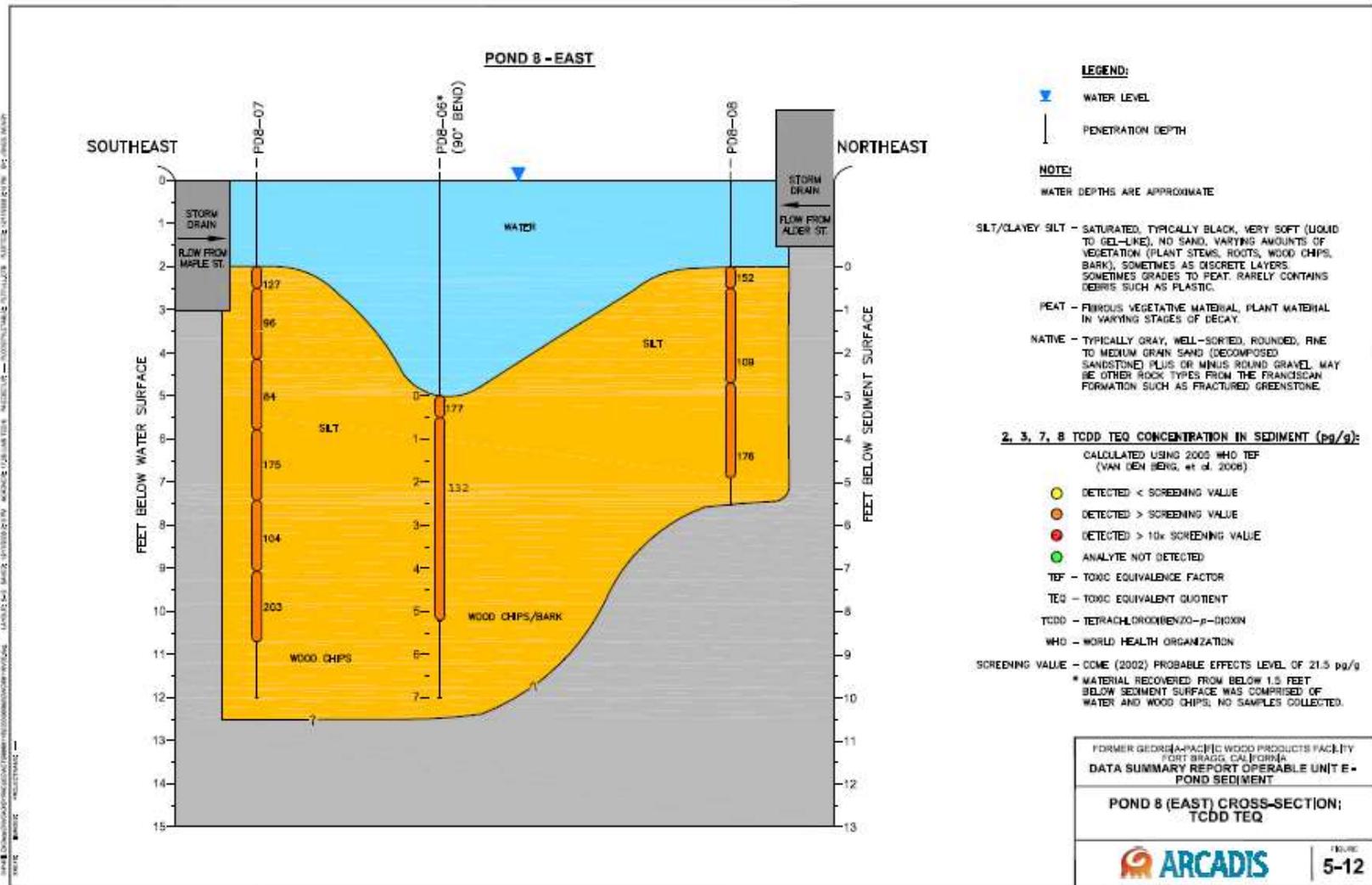
Data Summary Report Pond Sediment - 2009 - Locations of Cross Sections



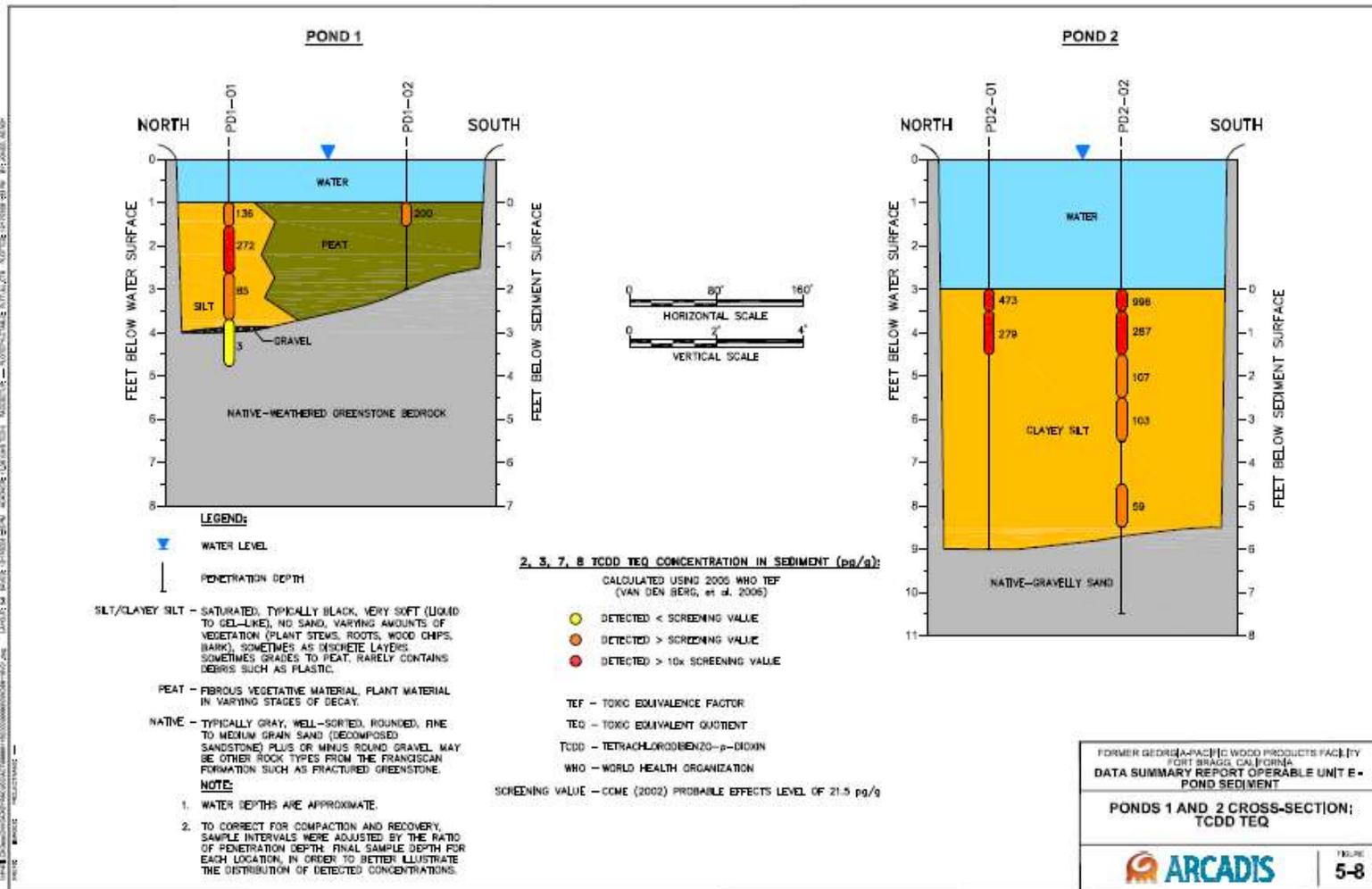
Dioxin Concentration - Ponds 6, 7 and North Pond



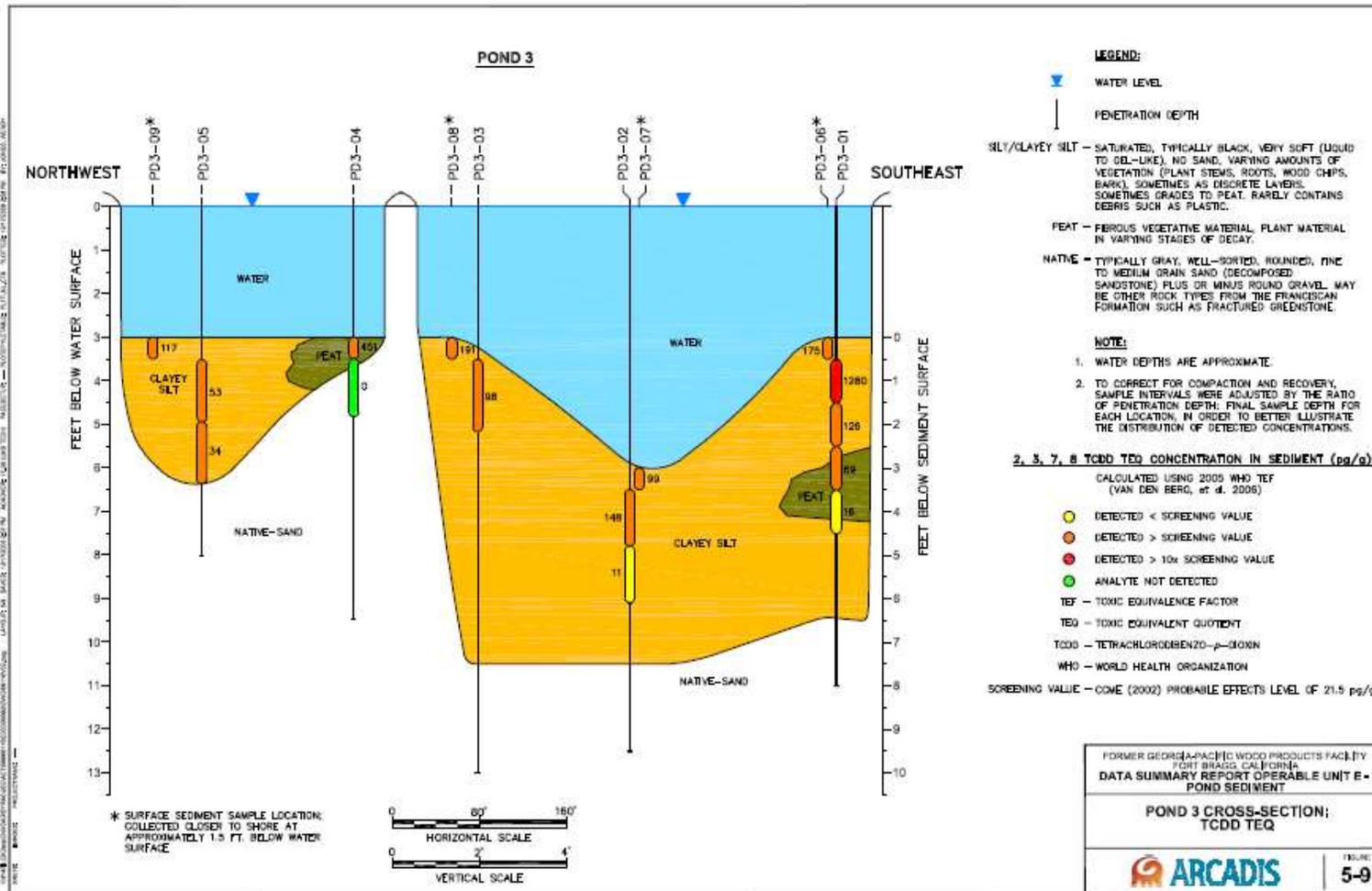
Dioxin Concentration - Pond 8 East



Dioxin Concentration - 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: 2×10^{-6}
 - 200 days/year: 4×10^{-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

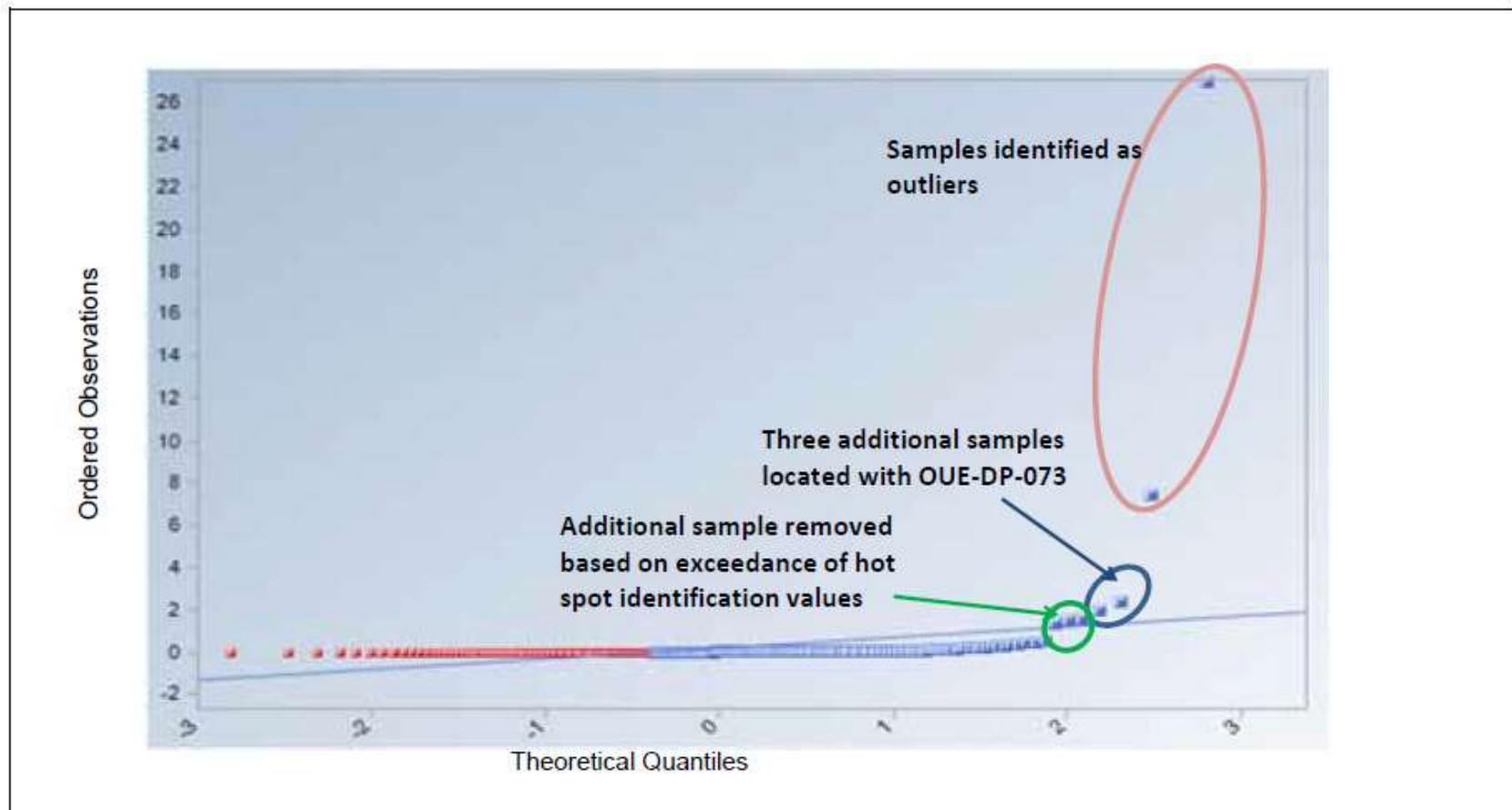
- Ecological Health Risk
 - How is risk measured?
 - Lowest Observed Adverse Effect Level
 - Remedial Goals = Safe soil level for Ecological Receptors
 - Dioxin = 1,920 pg/g
 - Lead = 127 mg/kg

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

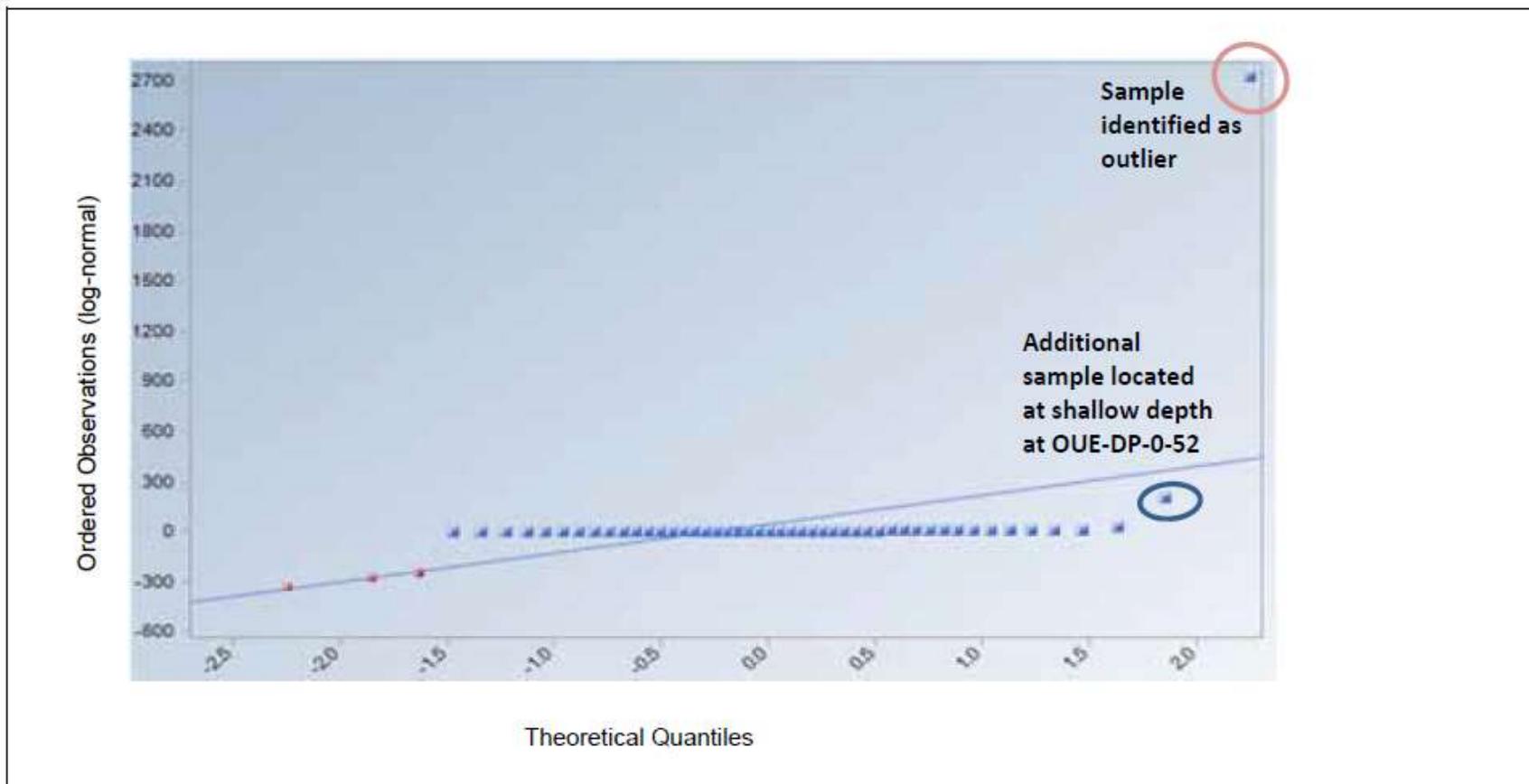
- Ecological Health Risk
 - How is risk measured?
 - Relevant Ecological Screening Levels
 - Other information
 - Chemistry of contaminant
 - Bioavailability
 - Porewater
 - Background Concentration
 - Overall Health of the Environment

Contaminant Distribution Plots - Soil

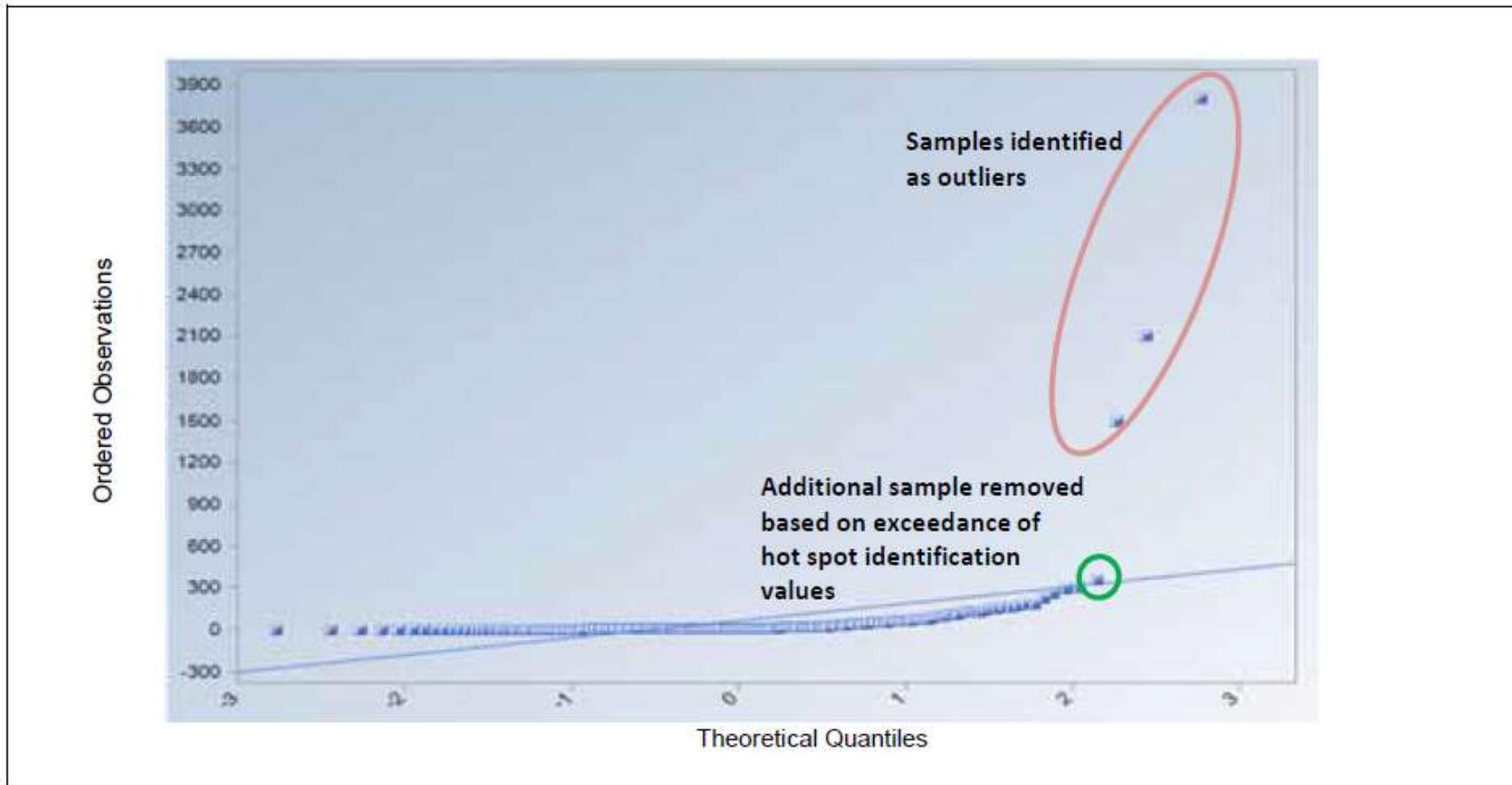
Benzo(A)Pyrene soil distribution



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

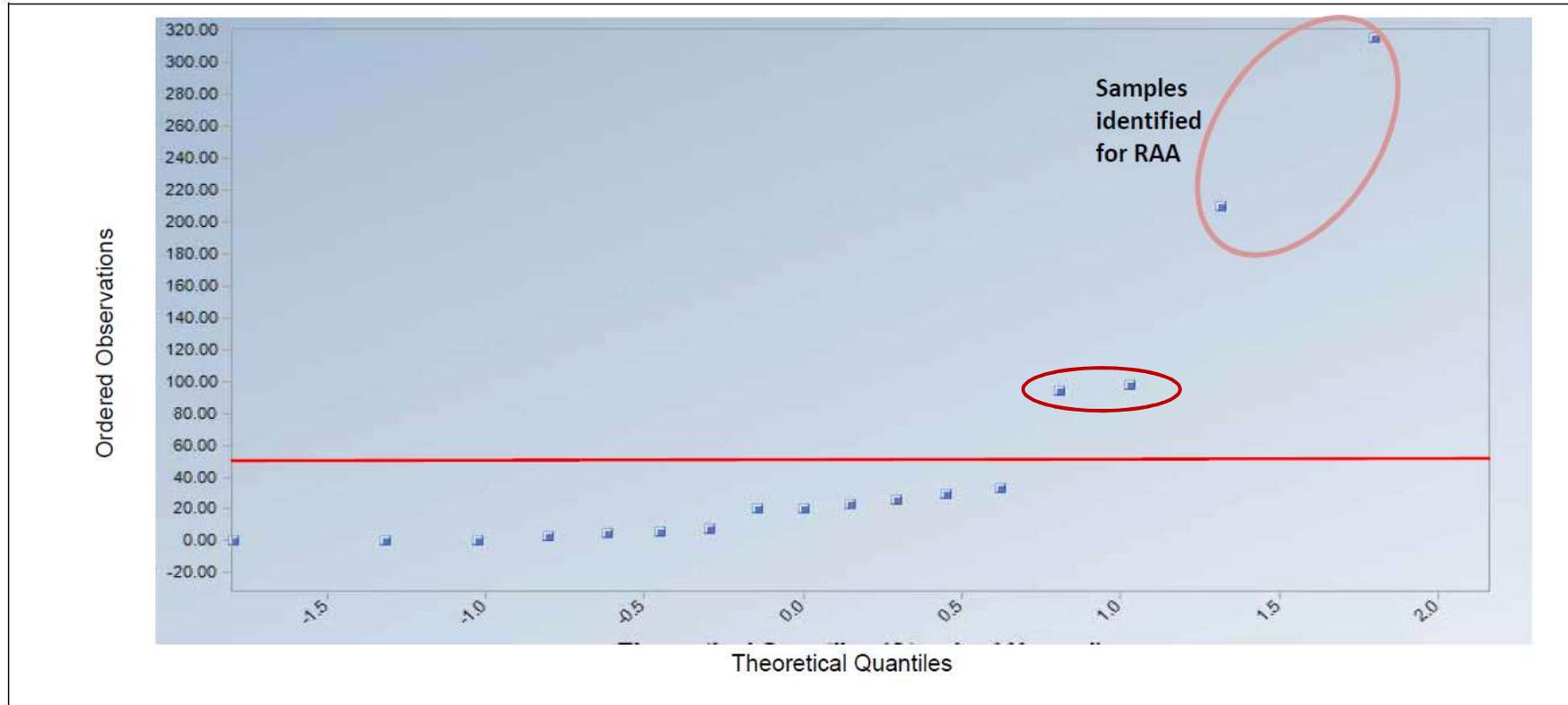
BHHERA - Aquatic (Sediment) Human Health Risks

- Recreational visitor – 12 and 50 days/year
 - Exposure to surface sediment
- Chemicals of concern – dioxins, arsenic
- 1×10^{-6} = one excess cancer risk in 1 million people
- Human Health Risk to pond sediment

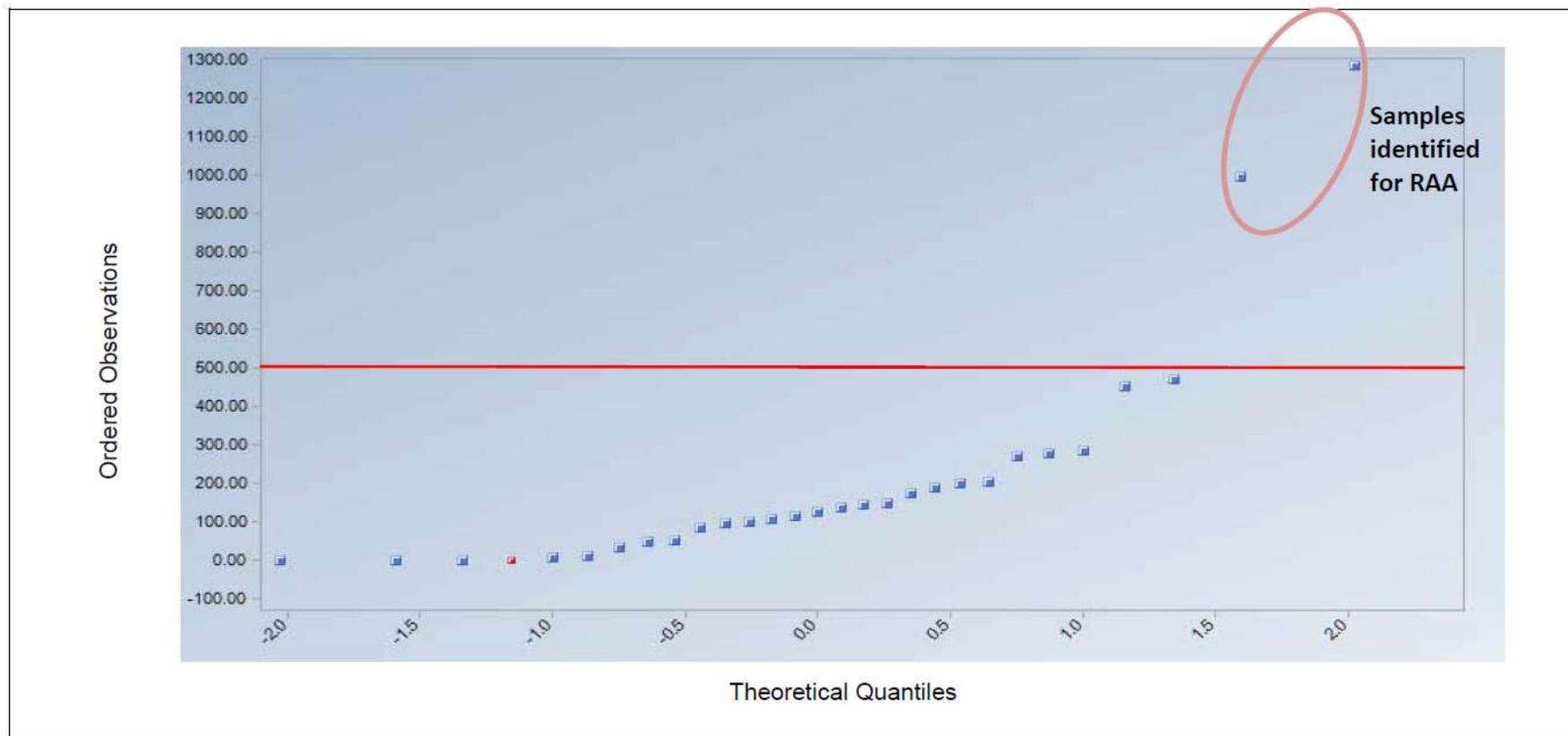
Pond(s)	12 days/year	50 days/year
Ponds 1-4	2×10^{-6}	8×10^{-6}
Pond 7	about 5×10^{-6}	2×10^{-5}
Pond 8	about 5×10^{-7}	2×10^{-6}

Contaminant Distribution Plots - Sediment

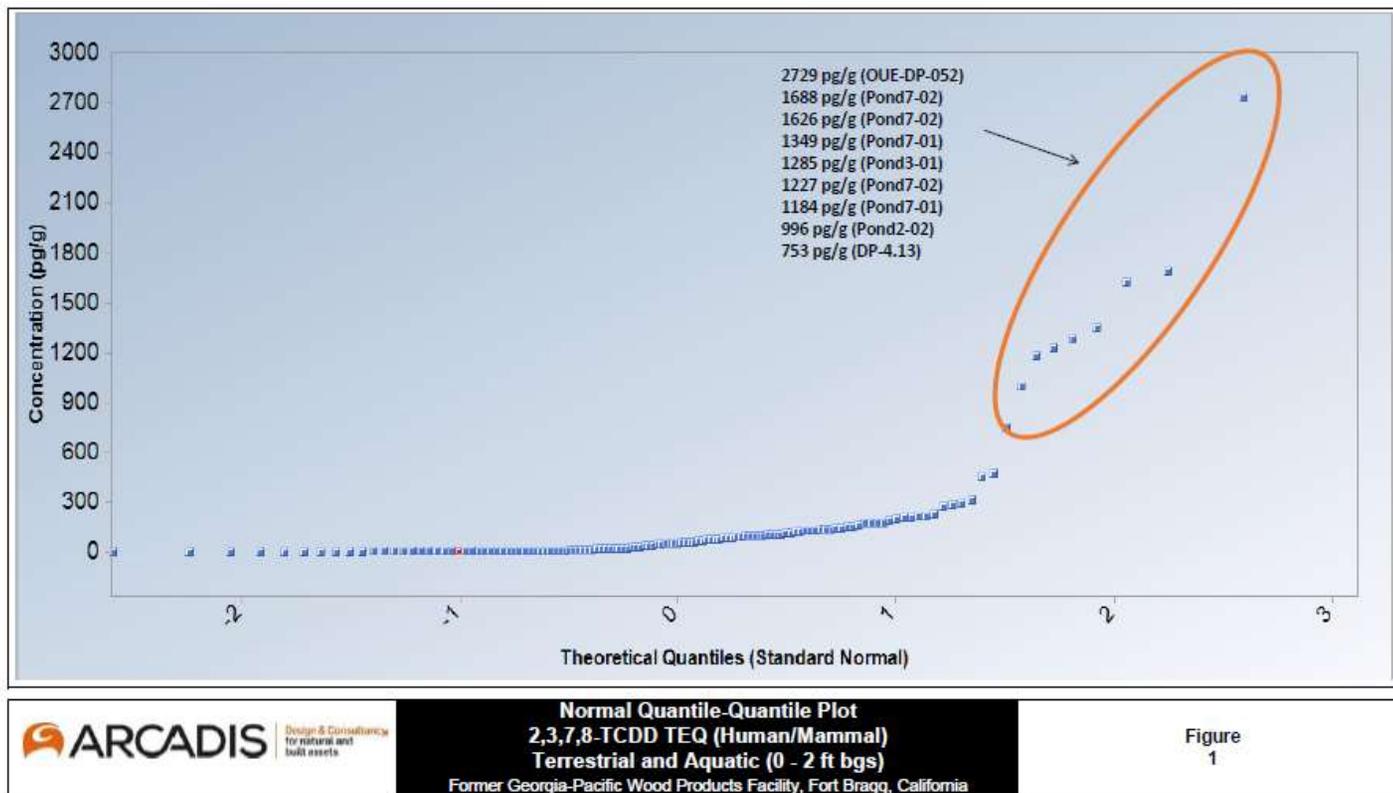
Riparian Area - dioxin concentrations



Ponds 1 - 4 dioxin concentrations



Dioxin Data Sediment and Soil



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 = picogram(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?

