



Kennedy Jenks

303 Second Street, Suite 300 South
San Francisco, California 94107
415-243-2150

Pond 6, North Pond, and
Pond 8
Sediment Sampling Work
Plan

25 June 2019

Prepared for

Georgia Pacific LLC
133 Peachtree Street NE
Atlanta, Georgia 30303

© Georgia-Pacific LLC 2015
KJ Project No. 1665018*19

Table of Contents

<i>List of Tables</i>	<i>ii</i>
<i>List of Figures</i>	<i>ii</i>
<i>List of Appendices</i>	<i>ii</i>
Section 1: Introduction	1
1.1 Operational History of Pond 6, North Pond, and Pond 8.....	1
1.2 Previous Sediment Investigations	2
1.2.1 Phase I Environmental Site Assessment	2
1.2.2 Phase II Environmental Site Assessment	2
1.2.3 2005 Additional Site Assessment.....	2
1.2.4 Other Data.....	3
1.2.5 2008 Pond Sediment Investigations.....	3
1.2.6 2009 Mill Pond (Pond 8) Additional Sediment Investigation	4
1.2.7 2012 Mill Pond (Pond 8) Geotechnical and Chemical Investigation	4
1.2.8 2013 Baseline Human Health and Ecological Risk Assessment Porewater Investigation	5
1.3 Background Metals Report.....	5
1.4 Purpose and Objectives	5
1.5 Approach	5
Section 2: Data Gaps and Proposed Sampling Approach	7
2.1 Data Gaps	7
2.2 Proposed Sampling Approach.....	7
Section 3: Sampling and Analysis Methodologies	9
3.1 Sediment Sampling Methodology.....	9
3.2 Sample Analysis.....	9
3.2.1 Equipment Blanks	10
3.2.2 Analytical Methods	10
3.2.3 Sample Labeling, Packaging, Shipment	11
3.3 Cleaning Procedures.....	11
3.4 Investigation Derived Waste.....	11
3.5 Surveying	12
Section 4: Measures to Avoid Impacts on Federally Listed Species and Cultural Resources	13

Table of Contents (cont'd)

Section 5: Schedule and Reporting	14
<i>References</i>	15

List of Tables

- 1 Arsenic and Dioxin Sediment Data
- 2 Proposed Sample Locations

List of Figures

- 1 Site Location Map
- 2 Arsenic Concentrations in Sediment – Pond 6, 8, and North Pond
- 3 Dioxin (2,3,7,8-TCDD) TEQ Concentrations in Sediment – Pond 6, 8, and North Pond
- 4 Proposed Sample Locations
- 5 Pond 8 Sediment Probe Transect Overview
- 6 Pond 8 Sediment Probe Transect, Arsenic Results: Sheet 1
- 7 Pond 8 Sediment Probe Transect, Dioxin Results: Sheet 1
- 8 Pond 8 Sediment Probe Transect, Arsenic Results: Sheet 2
- 9 Pond 8 Sediment Probe Transect, Dioxin Results: Sheet 2
- 10 Pond 8 Sediment Probe Transect, Arsenic Results: Sheet 3
- 11 Pond 8 Sediment Probe Transect, Dioxin Results: Sheet 3
- 12 Pond 8 Sediment Thickness and Proposed Sediment Sampling Locations

List of Appendices

- A Product Sheets

Section 1: Introduction

This work plan was prepared by Kennedy Jenks on behalf of Georgia-Pacific LLC (Georgia-Pacific) for the former Georgia-Pacific Wood Products Facility (site) located at 90 West Redwood Avenue in Fort Bragg, Mendocino County, California, as shown on Figure 1. This work plan presents an approach for collecting additional pond sediment data to address data gaps in Pond 6, North Pond, and Pond 8.

The California Department of Toxic Substances Control (DTSC) requested collection of additional pond sediment data in a letter dated 24 August 2018 (DTSC 2018). Subsequently, DTSC responded to a letter sent by Georgia-Pacific (GP 2018) in a letter dated 21 February 2019 that refined the scope of the requested sampling (DTSC 2019a). The scope of this effort was refined further in a meeting with DTSC on 14 May 2019 and in a DTSC letter dated 12 June 2019 (DTSC 2019b). This work plan has been developed as a result and is in general accordance with the results of the meeting with DTSC held on 14 May 2019. Sample collection efforts proposed herein are focused on resolving data gaps in Pond 6, North Pond, and Pond 8 sediment, which are located in Operable Unit E (OU-E).

1.1 Operational History of Pond 6, North Pond, and Pond 8

Pond 6 (0.17 acre), also known as the Collection Pond, is a low-lying area just south of the North Pond that collects stormwater runoff during winter storm events (BBL 2006). Pond 6 also receives discharge from the North Pond via a culvert and drainage water from surrounding sheet flow. When the plant was operational, water from Pond 6 was pumped via Pond 7 to the aeration ponds (Ponds 1 through 4) when full. Pond 6 has an outfall to Fort Bragg Landing.

The North Pond (0.10 acre), also known as the North Settling Pond and present on the site since the early 1970s, was formerly used as a settling basin for water used during the operation of the hydraulic debarker. Water from surrounding areas currently enters the North Pond and discharges to Pond 6 via a culvert.

Pond 8 (7.29 acres), also known as the Log Pond and Mill Pond, was created in the late 1800s by the damming of Alder Creek, which naturally drained through this area. The pond once extended further to the northeast and southwest from the current configuration. The pond was historically used as a log pond and more recently as a source of cooling water for the powerhouse. The pond was also used as part of the treatment process of “scrubber” effluent. The scrubber effluent was discharged into Pond 8 after passing through a series of settling ponds (Ponds 1 through 4) in Parcel 7. Pond 8 currently receives approximately 40 percent of the City of Fort Bragg’s (City’s) stormwater runoff, as well as overflow from Pond 5. The northeastern and southwestern portions of Pond 8 were filled in the early 1970s using native material from Parcel 1. Water from the Overflow Pond (Pond 3) flowed to Pond 8 through an underground pipeline. It also discharges to Fort Bragg Landing via the dam spillway.

The City completed construction of a trail that borders the southern side of Pond 8 and runs north of the North Pond. Drainage described above may have changed based on this nearby construction.

1.2 Previous Sediment Investigations

Several investigations have been conducted at the site for the purpose of characterizing site conditions. Those containing information about ponds in OU-E include:

- Phase I Environmental Site Assessment (Phase I ESA; TRC 2004a)
- Phase II Environmental Site Assessment (Phase II ESA; TRC 2004b)
- Additional site assessments (AME 2005, AME 2006a, AME 2006b)
- Current Conditions Report (BBL 2006)
- Data Summary Report, Operable Unit E Pond Sediment (Arcadis 2009)
- Data Summary Report – Additional Investigation Pond 8 Sediment (Arcadis 2011)
- Geotechnical and Chemical Characterization Results (Arcadis 2012)
- Baseline Human Health and Ecological Risk Assessment (BHHERA; Arcadis 2015).

A brief summary of each of the studies and relevant sampling is provided below. A summary of the sediment samples collected and analyzed for arsenic and dioxins from Pond 6, North Pond, and Pond 8 during previous evaluations is presented in Table 1. Sample locations are shown on Figure 2 and Figure 3.

1.2.1 Phase I Environmental Site Assessment

The Phase I Environmental Site Assessment (ESA; TRC 2004a) was conducted between August and November 2002, pursuant to the requirements set forth in ASTM E 1527-2000. There was no sampling conducted during this investigation.

1.2.2 Phase II Environmental Site Assessment

The purpose of the Phase II ESA was to characterize site soils and groundwater in those areas of interest identified in the Phase I report and refine the understanding of the nature and extent of possible impacts (TRC 2004b). Preliminary Phase II activities were conducted in March and April 2003. Supplemental Phase II activities were conducted in December 2003 and January 2004.

1.2.3 2005 Additional Site Assessment

In 2005 and 2006, Acton•Mickelson•Environmental, Inc. (AME) conducted site assessment work that included sediment sampling, among other investigation activities. Activities were conducted in general accordance with the *Work Plan for Additional Site Assessment* (AME 2005). Objectives included evaluating the extent of impacts of chemicals of potential concern (COPCs) in site sediments, investigating additional areas of concern identified subsequent to previous site investigation activities, and characterizing the site and providing representative

concentration data for COPCs in sediments to support a risk-screening assessment and subsequent risk assessment work that considers both human health and ecological resources of concern.

Borings advanced in Pond 6, North Pond, and Pond 8 included: DP-4.8 through DP-4.10 (Pond 6); DP-4.7 (North Pond); and DP- 4.14, DP-4.15, and DP-5.60 through DP-5.63 (Pond 8). Borings were continuously sampled until native material was encountered. Sediment samples were analyzed for total petroleum hydrocarbons as diesel (TPHd), total petroleum hydrocarbons as motor oil (TPHmo), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), hexavalent chromium, and California Title 22 metals. The samples from Pond 6, North Pond, and Pond 8 were selectively sampled for total petroleum hydrocarbons as gasoline (TPHg). From each pond, samples from varying depths were selected for polychlorinated biphenyls (PCB) and/or polychlorinated dibenzo-p-dioxin (dioxins) and polychlorinated dibenzofuran (furans) analysis. Analytical data were reported in the *Dioxin Sampling and Analysis Report* (AME 2006a) and the *Data Transmittal Report* (AME 2006b).

Since reporting the results from the 2005 Additional Site Assessment, the reference point for sediment samples collected at the site and the dioxin toxic equivalent factor (TEF) values have changed. Sample depths for samples collected as part of the 2005 Additional Site Assessment were measured with reference to the “pond water and plant debris” surface. Subsequent investigations measured sample depths with reference to the sediment surface. To discuss the results together in associated reports, sample depths for samples collected as part of the 2005 Additional Site Assessment were adjusted by the depths reported for the “pond water and plant debris” depth presented in Appendix D of the *Dioxin Sampling and Analysis Report*. Additionally, the dioxin toxicity equivalency quotient (TEQ) values reported in the *Dioxin Sampling and Analysis Report* were calculated using the 1997 International Toxic Equivalent Factors (ITEF), as noted in Table 2 of the *Dioxin Sampling and Analysis Report*. However, the World Health Organization (WHO) published new TEF values in 2005, which have since been adopted by the Federal Environmental Protection Agency (EPA), California EPA, and DTSC (see HERO HHRA Note Number: 2; DTSC HERO, 2017), as well as this project. Therefore, dioxin TEQ values presented in the *Dioxin Sampling and Analysis Report* were recalculated using the 2005 WHO TEF values; the revised values were presented in subsequent reports. Note that the recalculated dioxin TEQ values did not increase or decrease by a consistent value due to variation in dioxin congener TEF values and dioxin congener concentrations.

1.2.4 Other Data

AME collected surface sediment samples at the point of discharge from the City’s stormwater outfalls into Pond 8 (SD-5.1 and SD-5.2; AME 2006b). All samples were analyzed for metals, TPH, PAHs, and VOCs.

1.2.5 2008 Pond Sediment Investigations

Arcadis conducted pond sediment sampling activities in March 2008, as described in the *Data Summary Report, Operable Unit E Pond Sediment* (Arcadis 2009). These activities were performed in general accordance with the *Preliminary Site Investigation Work Plan Operable Unit E – Onsite Ponds* (Arcadis BBL 2007a). Sediment samples were collected from 26 locations in Ponds 1 through 9 and the North Pond. Sediment samples were collected from

the intervals of 0 to 0.5 foot below sediment surface (ft bss) and 0.5 to 1.5 ft bss and analyzed for constituents of interest (COIs) for which a data gap had been identified: metals, TPHd, TPHmo, PAHs, PCBs, and dioxins/furans. In some locations, samples were also collected at depths up to 9.5 ft bss. Samples were identified as “Pond X-YY,” where X is the pond number and Y is the two-digit location number. Sample locations were selected to characterize areas not previously addressed during historical investigations and/or to fill data gaps related to the spatial and vertical distribution of specific COIs.

1.2.6 2009 Mill Pond (Pond 8) Additional Sediment Investigation

An additional sediment sampling event was conducted in June 2009 to understand the magnitude and spatial extent of the COIs in Pond 8, to provide samples for sediment bioassay and bioaccumulation studies, and to provide paired data for estimation of site-specific bioaccumulation factors. Sample methods and results are described in full in the *Data Summary Report – Additional Investigation Pond 8 Sediment* (Arcadis 2011).

Because surface sediment (0 to 0.5 ft bss) was identified as the primary exposure media for Pond 8 (Arcadis BBL 2007 and Arcadis 2009), the investigation focused on surface sediment only. For this investigation, nine sediment samples were collected from Pond 8 and one sample was collected from Pond 9 to provide a basis for comparison for the Pond 8 sediment results, as Pond 9 has no known associated sources of site-related contaminants. Samples were analyzed for metals, TPHd, TPHmo, and dioxins/furans, as well as bioassay and bioaccumulation testing (Arcadis 2011). Samples were identified as “Pond X-YY,” where X is the pond number and Y is the two-digit location number.

1.2.7 2012 Mill Pond (Pond 8) Geotechnical and Chemical Investigation

In February and March 2012, Arcadis conducted a sediment volume survey, and geotechnical and chemical investigation of Pond 8 sediments to further evaluate cleanup and restoration options. To further characterize sediment volume, the surface area of the pond was manually probed at recorded coordinates, and later integrated over the surface area of the pond to estimate a total of 106,000 cubic yards (cy) of sediment in the pond (Arcadis 2012). Sediment samples were collected and analyzed for metals and dioxins and furans. Samples were identified as “XYZ,” where X and Y are grid identifiers based on the survey grid and Z is the location number.

Samples were also collected for geotechnical characterization. Results indicated that Pond 8 sediment is generally classified as silty sand with an organic content between 20 and 50 percent and a hydraulic conductivity ranging from 1×10^{-7} to 4×10^{-7} centimeters per second, which is lower than what is typically observed for silty sand. Additionally, the total porosity is higher than what is typically observed for silty sands, suggesting that the sediment also has many clayey characteristics (Arcadis 2012).

The distribution of sediment thickness across Pond 8 and a cross-section of Pond 8, including both water and sediment depth and COI concentrations, is presented on Figure 5 through

Figure 12. The maximum concentration of dioxin TEQ in Pond 8 is 247 picograms per gram (pg/g)¹.

1.2.8 2013 Baseline Human Health and Ecological Risk Assessment Porewater Investigation

Additional sampling activities completed in 2013 followed methods presented in the OU-E BHHRA Work Plan (Arcadis 2013b). The purpose of the OU-E BHHRA sampling activities was to evaluate the bioaccessible fraction of arsenic in OU-E sediment for potential human health receptors and to measure partitioning of metals and PAHs in OU-E and Riparian area of interest (AOI) sediment to porewater. Data collection activities included the collection of surface sediment samples for analysis for arsenic speciation and total arsenic, alkylated PAHs (bulk sediment and porewater), total organic carbon (TOC), black carbon, and pH and the collection of porewater samples for analysis for metals, major cations and anions, and alkalinity. Samples were identified as "Pond X-YY," where X is the pond number and Y is the two-digit location number.

Sediment data were used, along with historical site data sets, in the evaluation of human health and ecological risk in the human health risk assessment (HHRA). Porewater data were used in the ecological risk assessment (ERA) to assess potential risk to benthic invertebrates exposed to metals partitioning from sediment to porewater. Results of these investigations are presented in the BHHRA (ARCADIS 2015).

1.3 Background Metals Report

A site-specific background metals evaluation was completed to identify background concentrations of metals in site soil. As presented in the Background Metals Report, background concentrations of arsenic in California soil range from 0.6 milligrams per kilogram (mg/kg) to 31 mg/kg (Arcadis BBL 2007b). While the evaluation was completed for soil, not sediment, it provides context for background arsenic concentrations at the site.

1.4 Purpose and Objectives

DTSC has requested additional sediment sample collection at Pond 6, North Pond, and Pond 8 to resolve data gaps in the characterization of arsenic and dioxin in pond sediment (DTSC 2018, DSTC 2019). The additional data will further support the proposed remedy and DTSC decision making for OU-E. The objective of this work plan is to collect sediment data to address data gaps identified by DTSC.

1.5 Approach

Available sediment data for Pond 6, North Pond, and Pond 8 was compiled and reviewed with respect to horizontal and vertical coverage to identify data gaps and proposed locations for additional sediment sample collection. Pond 6 sediment has been characterized at multiple

¹ Dioxin TEQ results for data collected in 2012 were re-calculated to prepare this report and an error was identified and corrected.

depths; however, a data gap was identified with respect to horizontal coverage. Therefore, proposed sampling focuses on supplementing horizontal coverage of the pond. Shallow sediment at the North Pond has been characterized; however, the highest concentration was detected in one sample collected at depth (19 feet). Therefore, proposed sampling at the North Pond focuses on improving the horizontal coverage of samples collected at depth. Pond 8 sediment at thickness of 0 to 6 feet is well characterized and does not require additional samples for remedy decision making. Deeper sediment (6 to 20 feet) sampling has not been as extensive; therefore, proposed sampling at Pond 8 focuses on sediment at depths greater than 6 ft bss. GP presented preliminary sample locations and sample depths to DTSC for discussion at a meeting on 14 May 2019 (Kennedy Jenks 2019). This work plan has been developed as a result and is in general accordance with the results of the meeting with DTSC.

Section 2: Data Gaps and Proposed Sampling Approach

2.1 Data Gaps

The constituents of concern (COCs) at Pond 6, North Pond, and Pond 8 are arsenic and dioxin. A summary of arsenic and dioxin samples previously collected at Pond 6, North Pond, and Pond 8 and identified data gaps are presented below:

- **Pond 6:** Sixteen (16) samples have been collected from five locations and analyzed for arsenic, and ten (10) samples have been collected from four locations and analyzed for dioxin. Additional sampling is recommended to supplement horizontal data coverage.
- **North Pond:** Two (2) samples have been collected from two locations and analyzed for arsenic, and four (4) samples have been collected from two locations and analyzed for dioxin. Additional sampling is recommended to supplement horizontal data coverage.
- **Pond 8:** Fifty-nine (59) samples have been collected from 31 locations and analyzed for arsenic, and fifty-one (51) samples have been collected from 31 locations and analyzed for dioxin. Approximately 60 percent of samples previously collected were collected from 0 to 6 ft bss. Additional sampling is recommended to supplement vertical data coverage.

2.2 Proposed Sampling Approach

A sampling plan was developed to address the data gaps identified in Section 2.1. Samples will be analyzed for dioxin and arsenic. Depth range categories presented below are consistent with previous investigations.

- **Pond 6:** One (1) additional sample location with samples collected from a shallow (0 to 2 ft bss) and intermediate (>2 to 10 ft bss) range is proposed to improve horizontal coverage at Pond 6. Based on previous investigation, pond sediment is estimated to be 7 feet thick. Pond thickness will be measured at the time of sampling and if sediment is found to be deeper than 7 feet, one additional sample may be collected.
- **North Pond:** One (1) additional sample location with samples collected from an intermediate (>2 to 10 ft bss) and deep (>10 ft bss) range is proposed to improve horizontal coverage at the North Pond. There is some uncertainty regarding sediment thickness at North Pond. Pond thickness will be measured at the time of sampling and if sediment is found to extend to 16 feet and/or 20 feet, up to two additional samples may be collected.
- **Pond 8:** Eight (8) additional sample locations with samples collected from an intermediate (>2 to 10 ft bss) and/or deep (>10 ft bss) range are proposed to improve horizontal coverage at Pond 8. Pond 8 sediment at 0 to 6 feet bss is well characterized and does not require additional samples for remedy decision making; therefore, samples will not be collected within 0 to 6 feet bss unless sediment is less than 6 feet thick at the sample location.

Proposed sample locations are presented on Figure 4, as well as Figure 5 through Figure 12. Proposed sediment sample locations and sample depths are presented in Table 2. The length of sediment core intervals are based on the volume of sediment required for dioxin and arsenic analysis and constraints of proposed sampling methodology, as discussed in Section 3. Samples will be collected as close to the proposed locations as possible; however, adjustments may be needed based on site conditions at the time of sampling.

Section 3: Sampling and Analysis Methodologies

3.1 Sediment Sampling Methodology

Sediment samples will be collected from a total of ten (10) locations at Pond 6, North Pond, and Pond 8. The proposed sample locations are shown on Figure 4.

Field sampling methods will conform to guidelines set forth in the site-specific Health and Safety Plan, the Quality Assurance Project Plan (QAPP; ARCADIS BBL, 2007c), and the ARCADIS BBL Standard Operating Procedures (SOPs) for Sediment Sampling (Appendix C), Soil Boring Installation, Soil Sampling, and Borehole Abandonment Procedures (ARCADIS BBL, 2007e), and for Sediment Sampling with Dewatering (ARCADIS BBL, 2007e).

Samples will be collected using hand tools. As discussed in the meeting with DTSC on 14 May 2019, the use of heavy machinery is not proposed. Samples will be collected using the most appropriate and/or effective method for site conditions and may include a hand corer sampler, the Sludge Judge®, or a chamber-type corer such as the Wildco Flag™ Sampler. Based on the hand tool used, 1 to 2 feet of sample will be required to collect adequate volume for sample analysis. Product sheets for the Sludge Judge and Flag™ Sampler are presented in Appendix A.

Decisions will be made in the field which sampling equipment will be used. However, if sample recovery is not adequate with one device, samples will be attempted to be collected using one of the other hand tools. If attempts to advance the sampler meet refusal, the location will be moved within the vicinity of the original location to attempt to locate the deeper areas of sediment or avoid obstructions. If a sample cannot be collected at the proposed depths with hand tools, sample collection will be attempted from a shallower depth. Reasonable efforts will be made to advance the sampling tools and recover adequate sample volumes. A maximum of three attempts with each tool will be made to collect a sample at each location. If that is not successful, sampling efforts from that location will be discontinued and the team will move onto the next location. GP will notify DTSC if a sample location will not be sampled so that alternatives can be evaluated. Sample locations will be recorded using global positioning system (GPS) equipment.

Samples are only proposed in pond sediment; samples will not be collected from soil beneath pond sediment. Pond sediment thickness and depth of overlying water, if any, will be measured at each sample location. Documentation will also be made of the color, texture, visual staining, odor, and organic matter content of each sample. Each sample will be transferred to a labeled plastic bag and kept in a cooler with ice until it is prepared for shipping to the laboratory, as described in Section 3.2.2.

3.2 Sample Analysis

Sediment samples will be collected and analyzed in accordance with procedures outlined in the site-specific QAPP. In accordance with the QAPP, quality assurance/quality control (QA/QC) samples will be collected in the field at the following frequency:

- Blind Field Duplicates: Not collected for solid matrices per the QAPP.
- Matrix Spikes/Matrix Spike Duplicates (MS/MSD): Collected at a rate of one sample per 20 samples collected for each analytical method. One MS/MSD sample is expected for this field effort. MS/MSD samples will be collected at locations where sample recovery is easier (i.e., shallower locations near shore).
- Trip Blanks: Included at a rate of one per sample delivery group.
- Equipment Blanks: Collected for each batch of equipment used for each sample delivery group when non-disposable equipment is used.
- Temperature Blanks: Included within each cooler shipped to the laboratory.

3.2.1 Equipment Blanks

Following the guidelines set forth in the QAPP (ARCADIS BBL 2007c) and the SOP contained therein, equipment blanks will be collected to test for cross-contamination among batches². Equipment blanks will be collected following decontamination procedures (see Section 3.3) by carefully pouring distilled water over or through the recently cleaned equipment and collecting this directly into an appropriate sample container held over a bucket. At a minimum, one equipment blank will be collected per sample delivery group (typically 20 samples). Equipment blanks will be analyzed using the same analytical methods used on the unique sediment samples (Section 3.2.2) and labeled and handled in the same manner as all other samples (Section 3.2.3).

3.2.2 Analytical Methods

Submitted sediment samples will be analyzed for arsenic and dioxins/furans by the following analytical methods:

- Metals by EPA Method 6020
- Dioxins/furans by EPA Method 8290A
- Moisture.

It is expected that 4 ounces of sediment will be required for each analysis, for a total of 8 ounces per sample. Samples will be analyzed on a standard turn-around time (14 business days).

² A batch of equipment is defined as the entire group of sampling equipment used for one type of sampling (Arcadis BBL 2007c).

3.2.3 Sample Labeling, Packaging, Shipment

Sample labeling, packaging, and shipment will be conducted according to the guidelines set out in the QAPP (ARCADIS BBL 2007c) and in ARCADIS BBL SOP Field Sample Handling, Packing and Shipping, included in the QAPP.

Prior to shipping to the laboratory, samples will be transferred to a clearly labeled, laboratory-provided wide-mouth glass jar. To identify and manage samples obtained in the field, a sample label will be affixed to each sample container. To clearly associate a sample with a pond and location, samples will be identified according to the sample location identification shown in Table 2. Samples collected from Pond 6 will start with the moniker "Pond6-", samples collected from the North Pond will start with the moniker "NorthPond-", and samples collected from Pond 8 will start with the moniker "Pond8-". This will be followed by a two-digit number corresponding to the location within the pond, as assigned in Table 2, which will increase incrementally as more locations are sampled within the pond. This will be appended with a dash and the top depth of the sample, then appended with a dash and the bottom depth of the sample. For example, a sediment sample collected from the 8 to 10 ft bss depth interval from the location Pond8-20 would be Pond8-20-8-10.

Following collection and labeling, samples will be immediately placed in a sample cooler with ice for temporary storage. A temperature blank will be included in each cooler sent to the analytical laboratory so that a representative measurement of the temperature of the enclosed samples can be obtained by the laboratory without disturbing the actual samples. Each cooler will be shipped under chain-of-custody, in accordance with the QAPP, and will be sealed with a self-adhesive custody seal.

3.3 Cleaning Procedures

To reduce the likelihood of carryover from one sample to another, all equipment that comes into contact with sediment or water will be cleaned according to the QAPP (ARCADIS BBL, 2007c) and the SOP for Field Sampling Equipment Decontamination contained therein. Disposable equipment intended for one-time use will not be cleaned, but will be packaged for appropriate disposal. As described in the QAPP (ARCADIS BBL, 2007c), cleaning will occur prior to and after each use of a piece of equipment. All sampling devices used will either be single-use and pre-cleaned or be cleaned using the following procedures:

- Non-phosphate detergent and tap water wash using a brush if necessary
- Tap water rinse
- Final deionized/distilled water rinse.

3.4 Investigation Derived Waste

In the process of collecting environmental samples during the proposed field sampling program, different types of investigation-derived waste (IDW) will be generated that include the following (ARCADIS BBL, 2007c):

- Used personal protective equipment (PPE)
- Disposable sampling equipment
- Sediment residue (minor amounts)
- Cleaning fluids.

Listed below are the procedures that will be followed for handling the IDW; additional detail is provided in the QAPP (ARCADIS BBL, 2007c) and in ARCADIS BBL SOP Investigation-Derived Waste Handling and Storage, included in the QAPP.

- Used PPE and disposable equipment will be double-bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. PPE and disposable equipment marked for disposal that can still be reused will be rendered inoperable before disposal in the refuse dumpster.
- Cleaning water will be placed in the onsite tank that holds groundwater purge water. The tank will be sampled and profiled during subsequent waste disposal events.

3.5 Surveying

All sample locations will be recorded using GPS. Photographs will be taken and logged in the field to document findings and site conditions.

Section 4: Measures to Avoid Impacts on Federally Listed Species and Cultural Resources

Permitting is not anticipated given the proposed use of hand tools and access to sampling areas will be on foot and with a raft or small boat. Motorized equipment will not be used within the ponds. However, impacts to federally listed species and cultural resources will be avoided and/or minimized to the extent practicable. The following precautionary measures will be taken:

General Measures:

- Personnel, equipment (e.g., boat), and tools coming in contact with target sediment will be cleaned of visual mud or sediment prior to leaving sampling areas.

Biological Resources:

- The typical nesting bird season is defined as occurring from 15 March to 31 July for most bird species. Therefore, a seasonal work window will be implemented outside of the typical nesting bird season for proposed activities. Work outside of the bird breeding season will avoid direct and indirect impacts to nesting special status avian species. Furthermore, direct impacts to adult special status birds is not anticipated, as they are expected to flush from work areas.

Cultural Resources:

- Target sediments are materials that have accumulated in the ponds during the period of recent industrial operation or subsequent accumulation from stormwater runoff in the less than 20 years since the mill closed. Prehistoric cultural resources are not expected within the sampling area. If observed, objects recovered in the sampling equipment that are not sediment collected for laboratory analysis will be returned to the pond near the location sampled.

Section 5: Schedule and Reporting

To avoid the primary bird nesting season, work in the ponds will be completed outside the typical bird nesting season (15 March through 31 July). We anticipate work to be completed late summer or early fall, before the rainy season commences. It is estimated the field effort can be completed in approximately 5 days. The results of the additional sediment sampling will be presented in the OU-E Remedial Action Plan (RAP).

References

- Acton•Mickelson•Environmental, Inc. (AME). 2005. Work Plan for Additional Site Assessment, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California. Prepared for Georgia-Pacific Corporation. Project No. 16017.07. Acton•Mickelson•Environmental, Inc. June.
- AME. 2006a. Dioxin Sampling and Analysis Report, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California. Prepared for Georgia-Pacific Corporation. Project No. 16017.08. Acton•Mickelson•Environmental, Inc. July.
- AME. 2006b. Data Transmittal Report, Georgia-Pacific California Wood Products Manufacturing Facility, 90 West Redwood Avenue, Fort Bragg, California. Prepared for Georgia-Pacific Corporation. Project No. 16017.08. Acton•Mickelson•Environmental, Inc. August 14.
- Arcadis. 2009. Data Summary Report, Operable Unit E Pond Sediment, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. May.
- Arcadis. 2011. Data Summary Report – Additional Investigation Pond 8 Sediment, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. Arcadis U.S., Inc. April. Revised February 2011.
- Arcadis. 2012. Mill Pond (Pond 8) Geotechnical and Chemical Characterization Results, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. December.
- Arcadis. 2013a. Final Remedial Investigation Report Operable Unit E (RI Report), Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. January.
- Arcadis. 2013b. Revised Baseline Human Health and Ecological Risk Assessment (BHHERA) Work Plan – Operable Unit E (OU-E) Addendum, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. February.
- Arcadis. 2015. Baseline Human Health and Ecological Risk Assessment – Operable Unit E, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. August.
- Arcadis BBL. 2007a. Preliminary Site Investigation Work Plan Operable Unit E – Onsite Ponds, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific, LLC. December. Revised May 2008.
- Arcadis BBL. 2007b. Background Metals Report. Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. Arcadis BBL, an Arcadis company. August.

ARCADIS BBL. 2007c. Quality Assurance Project Plan. Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific, LLC. September.

Arcadis BBL 2009. *Data Summary Report Operable Unit E Pond Sediment*. May 2009. Former Georgia-Pacific Wood Products Facility, Fort Bragg California. Prepared for Georgia-Pacific, LLC.

BBL. 2006. Current Conditions Report. Former Georgia-Pacific Wood Products Manufacturing Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. Blasland, Bouck & Lee, Inc., an ARCADIS company. December.

Department of Toxic Substances Control (DTSC). 2018. Letter from Mr. Thomas P. Lanphar, to Mr. David G. Massengill, Senior Director, Georgia-Pacific LLC, re: Operable Unit E Draft Feasibility Study, Dated April 13, 2018, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. August 24.

DTSC. 2019a. Letter from Vivian S. Murai, Senior Attorney, DTSC, to Mr. J. Michael Davis, Assistant General Counsel-Environmental, Georgia-Pacific LLC, re: Operable Unit E Feasibility Study Issues: Former Georgia-Pacific Wood Products Facility, Fort Bragg, California (Site Code (200402)). February 21.

DTSC. 2019b. Letter from Mr. Thomas P. Lanphar, to Mr. David G. Massengill, Senior Director, Georgia-Pacific LLC, re: Georgia-Pacific Response to Comments, Operable Unit E Feasibility Study, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. June 12.

Kennedy Jenks. 2019. Email from Jeremie Maehr, Kennedy Jenks, to Tom Lanphar, DTSC; Dave Massengill, Georgia-Pacific; Rachel Morgan, Kennedy Jenks; Deonne Knill, Kennedy Jenks; Michael Davis, Georgia-Pacific; Vivian Murai, DTSC; and Jerry Aarons, DTSC, Re: finalizing OUE FS and sediment sampling. May 8.

Georgia-Pacific LLC (GP). 2018. Letter from Mr. J. Michael Davis, Assistant General Counsel-Environmental, Georgia-Pacific LLC, to Vivian S. Murai, Senior Attorney, DTSC, re: Fort Bragg. December 20.

TRC. 2004a. Phase I Environmental Site Assessment, Georgia-Pacific California Wood Products Manufacturing Division, 90 West Redwood Avenue, Fort Bragg, California. Prepared for Georgia-Pacific Corporation, 133 Peachtree Street, NE, Atlanta, Georgia. Project No. 41-041901. TRC Companies, Inc. March.

TRC. 2004b. Phase II Environmental Site Assessment, Georgia-Pacific, 90 West Redwood Avenue, Fort Bragg, California 95437. Prepared for Georgia-Pacific, 133 Peachtree Street, NE, Atlanta, Georgia. Project No. 41-041908. TRC Companies, Inc. May.

Tables

Table 1: Arsenic and Dioxin Sediment Data

Pond	Sample Location	Sample Date	Sample Depth	Arsenic	2,3,7,8-TCDD TEQ
			Units	mg/kg	(Human/Mammal)
			Screening Value	10	53
North Pond					
North Pond	DP-4.7	4/17/2006	0-0.5 ft	1.5	6.28
North Pond	DP-4.7	4/17/2006	8-8.5 ft	1.4	--
North Pond	DP-4.7	4/17/2006	14-14.5 ft	3.8	0.045
North Pond	DP-4.7	4/17/2006	19-19.5 ft	3.5	89.5
North Pond	North Pond-01	3/19/2008	0-0.5 ft	32.7	8.52
Pond 6					
Pond 6	DP-4.10	4/18/2006	0-0.5 ft	12	175
Pond 6	DP-4.10	4/18/2006	5-5.5 ft	1.8	0.023
Pond 6	DP-4.10	4/18/2006	10-10.5 ft	3.7	--
Pond 6	DP-4.10	4/18/2006	14.5-15 ft	3.9	--
Pond 6	DP-4.8	4/26/2006	0-0.5 ft	0.61	--
Pond 6	DP-4.8	4/26/2006	13-13.5 ft	0.33	--
Pond 6	DP-4.8	4/26/2006	18-18.5 ft	0.46	--
Pond 6	DP-4.8	4/26/2006	23-23.5 ft	0.53 [0.31]	--
Pond 6	DP-4.8	4/26/2006	28-28.5 ft	8.8	--
Pond 6	DP-4.8	4/26/2006	33-33.5 ft	9.8	--
Pond 6	DP-4.9	4/25/2006	0.5-1 ft	2.2	2.1
Pond 6	DP-4.9	4/25/2006	6-6.5 ft	5.3	0.28
Pond 6	DP-4.9	4/25/2006	11-11.5 ft	2.5 [1.9]	--
Pond 6	DP-4.9	4/25/2006	16-16.5 ft	1.1	--
Pond 6	DP-4.9	4/25/2006	21-21.5 ft	1.5	--
Pond 6	DP-4.9	4/25/2006	26-26.5 ft	3	--
Pond 6	DP-4.9	4/25/2006	31-31.5 ft	3.6	--
Pond 6	Pond6-01	3/18/2008	0-0.5 ft	12.3	3.7
Pond 6	Pond6-01	3/11/2008	0.5-1.5 ft	29.2 /J	15.5
Pond 6	Pond6-02	3/18/2008	0-0.5 ft	14	56.4
Pond 6	Pond6-02	3/12/2008	0.5-1.5 ft	30.2	103
Pond 6	Pond6-02	3/12/2008	1.5-2.5 ft	--	141
Pond 6	Pond6-02	3/12/2008	2.5-3.5 ft	--	168
Pond 6	Pond6-02	3/12/2008	4.5-5.5 ft	27.8	165
Pond 8 West					
Pond 8	DP-4.14	4/24/2006	0-0.5 ft	1.7	20.5
Pond 8	DP-4.14	4/24/2006	4-4.5 ft	1.5	--
Pond 8	DP-4.14	4/24/2006	7.5-8 ft	4.4	--
Pond 8	DP-4.15	4/20/2006	0-0.5 ft	4.2	--
Pond 8	DP-4.15	4/20/2006	2-2.5 ft	2.8	35.6
Pond 8	DP-4.15	4/20/2006	7-7.5 ft	0.58	0.000285
Pond 8	DP-4.15	4/20/2006	11.5-12 ft	1.1	--
Pond 8	Pond8-01	3/17/2008	0-0.5 ft	14.4	33.5
Pond 8	Pond8-01	3/18/2008	0.5-1.5 ft	12.5	77.2
Pond 8	Pond8-01	3/18/2008	1.5-2.5 ft	6.81	65.8
Pond 8	Pond8-02	3/17/2008	0-0.5 ft	8.6	22.5
Pond 8	Pond8-02	3/18/2008	0.5-1.5 ft	5.6	46.4
Pond 8	Pond8-03	3/17/2008	0-0.5 ft	16.3	49.3
Pond 8	Pond8-03	3/18/2008	0.5-1.5 ft	9.5	78.7
Pond 8	Pond8-04	3/17/2008	0-0.5 ft	27.6	52.5
Pond 8	Pond8-04	3/12/2008	0.5-1.5 ft	14.3	44.4
Pond 8(2013)	Pond8-04	4/8/2013	0-0.5 ft	13.6	--
Pond 8	Pond8-04	3/12/2008	1.5-2.5 ft	9.05	131
Pond 8	Pond8-04	3/12/2008	3.5-4.5 ft	--	12.7
Pond 8	Pond8-04	3/12/2008	4.5-5.5 ft	1.82	0.035
Pond 8	Pond8-09	6/18/2009	0-0.5 ft	17	105
Pond 8	Pond8-10	6/18/2009	0-0.5 ft	16.3	58
Pond 8	Pond8-11	6/18/2009	0-0.5 ft	13.6	91.7
Pond 8	Pond8-12	6/18/2009	0-0.5 ft	19.3	70.8
Pond 8	T5-02	3/13/2012	6-8 ft	--	55.3
Pond 8	T5-04	3/13/2012	6-8 ft	8.8	67.1

Table 1: Arsenic and Dioxin Sediment Data

Pond	Sample Location	Sample Date	Sample Depth	Arsenic	2,3,7,8-TCDD TEQ
			Units	mg/kg	(Human/Mammal)
			Screening Value	10	53
Pond 8 East					
Pond 8(4/8/2013)	Pond8-05	4/8/2013	0-0.5 ft	13.3 [10.6]	--
Pond 8(4/11/2013)	Pond8-05	4/11/2013	0-0.5 ft	12.6	--
Pond 8	Pond8-05	3/17/2008	0.5-1.5 ft	10.8	123
Pond 8	Pond8-05	3/17/2008	1.5-2.5 ft	6.11	60
Pond 8	Pond8-05	3/17/2008	2.5-3.5 ft	5.52	87
Pond 8	Pond8-06	3/17/2008	0-0.5 ft	8.3	177
Pond 8	Pond8-06	3/18/2008	0.5-1.5 ft	6.9	132
Pond 8	Pond8-07	3/17/2008	0-0.5 ft	8.7	127
Pond 8	Pond8-07	3/17/2008	0.5-1.5 ft	9.4	96.2
Pond 8	Pond8-07	3/17/2008	1.5-2.5 ft	--	83.5
Pond 8	Pond8-07	3/17/2008	2.5-3.5 ft	5.19	175
Pond 8	Pond8-07	3/17/2008	3.5-4.5 ft	--	104
Pond 8	Pond8-07	3/17/2008	4.5-5.5 ft	6.44	203
Pond 8	Pond8-08	3/17/2008	0-0.5 ft	7.2	152
Pond 8	Pond8-08	3/17/2008	0.5-1.5 ft	5.5	109
Pond 8	Pond8-08	3/17/2008	1.5-2.5 ft	9.2	176
Pond 8	Pond8-14	6/17/2009	0-0.5 ft	14.8	85.7
Pond 8	Pond8-15	6/17/2009	0-0.5 ft	4.88	4
Pond 8	Pond8-16	6/17/2009	0-0.5 ft	12.8	155
Pond 8	Pond8-17	6/17/2009	0-0.5 ft	11.1	231
Pond 8	Pond8-18	6/17/2009	0-0.5 ft	10.2	215
Pond 8	DP-5.61	4/19/2006	0-0.5 ft	3.4	134
Pond 8	DP-5.61	4/19/2006	5-5.5 ft	2.3	--
Pond 8	DP-5.61	4/19/2006	10-10.5 ft	1.1	0.003
Pond 8	DP-5.61	4/19/2006	15-15.5 ft	1.4	--
Pond 8	DP-5.61	4/19/2006	20-20.5 ft	1.5	--
Pond 8	DP-5.61	4/19/2006	25-25.5 ft	6.4	--
Pond 8	DP-5.62	4/24/2006	0-0.5 ft	3.9	68.6
Pond 8	DP-5.62	4/24/2006	5-5.5 ft	3.5	56.5
Pond 8	DP-5.62	4/24/2006	10-10.5 ft	2.2 [2.3]	1.03
Pond 8	DP-5.62	4/24/2006	15-15.5 ft	7.1	--
Pond 8	DP-5.62	4/24/2006	20-20.5 ft	26	--
Pond 8	DP-5.60	4/20/2006	3-3.5 ft	11 [12]	0.88
Pond 8	DP-5.60	4/20/2006	8-8.5 ft	16	0.66
Pond 8	DP-5.60	4/20/2006	12-12.5 ft	13	--
Pond 8	DP-5.60	4/20/2006	16.5-17 ft	20	--
Pond 8	SD-5.1	4/5/2006	1.5-2 ft	3.6	--
Pond 8	SD-5.2	4/5/2006	1.5-2 ft	4.3	--
Pond 8	K-13	3/14/2012	6-8 ft	6.1	--
Pond 8	EE-11	3/14/2012	9-11 ft	9.6	247
Pond 8	A18	3/13/2012	6-8 ft	--	35.7
Pond 8	AA-06	3/14/2012	9-11 ft	--	111.3
Pond 8	M20	3/14/2012	6-8 ft	--	57.5

Notes:

= Sample depth of greater than 6 feet

bold = Concentration is greater than screening criteria

Table 2: Proposed Sample Locations

Pond	Proposed Number of Sample Locations	Proposed Additional Samples	Sample Location ID	Proposed Depth Intervals (ft, bss)	Intent of Sample	Analytical Analysis
Pond 6	1	3 (a)	Pond6-03	0 – 0.5	Provide additional horizontal coverage	Arsenic, Dioxin
				1.5 – 2.5		
				5 – 5.5		
North Pond	1	4	NorthPond-02	5 – 5.5	Provide additional horizontal coverage	
				9 – 9.5		
				14 – 16 (b)		
				18 – 20 (b)		
Pond 8	8	12	Pond8-19	4 – 6	Provide additional horizontal coverage	
			Pond8-20	8 – 10	Provide additional data at depth	
			Pond8-21	8 – 10	Provide additional data at depth	
				16 – 18		
			Pond8-22	8 – 10	Provide additional data at depth	
				16 – 18		
			Pond8-23	8 – 10	Provide additional data at depth	
				13 – 15		
				18 – 20		
			Pond8-24	4 – 6	Provide additional data at depth	
			Pond8-25	8 – 10	Provide additional data at depth and additional horizontal coverage	
			Pond8-26	8 – 10	Provide additional data at depth	

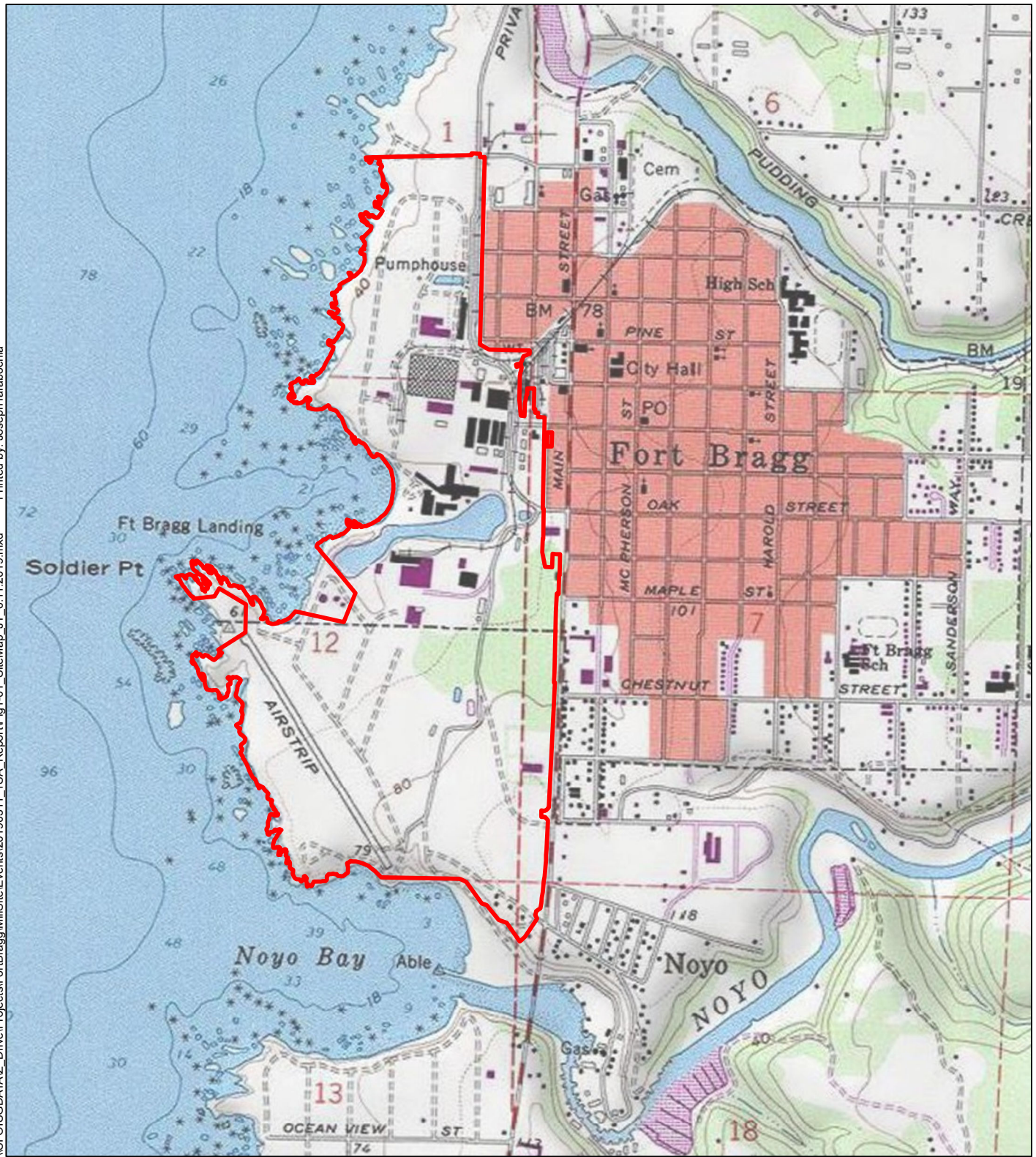
Notes:

ft, bss = feet below sediment surface

(a) If sediment is found to be deeper than 7 feet, one additional sample may be collected.

(b) Sediment thickness at the North Pond is uncertain. Samples will only be collected in pond sediment (not in soil beneath the pond). If sediment thickness is confirmed to be 14 to 20 feet, these sediment samples will be collected. However, if they are found to be in soil beneath the pond, these samples will not be collected.

Figures



Source: Copyright: © 2013 National Geographic Society, i-cubed

Legend

 Site Boundary

N

0 750 1,500
Scale: Feet

Kennedy/Jenks Consultants

Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Site Location Map

1665018*19
June 2019

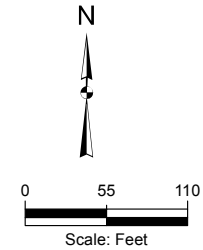
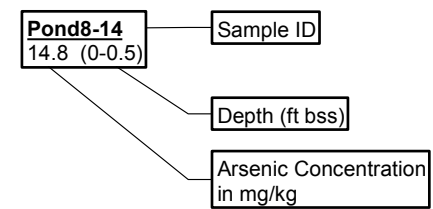
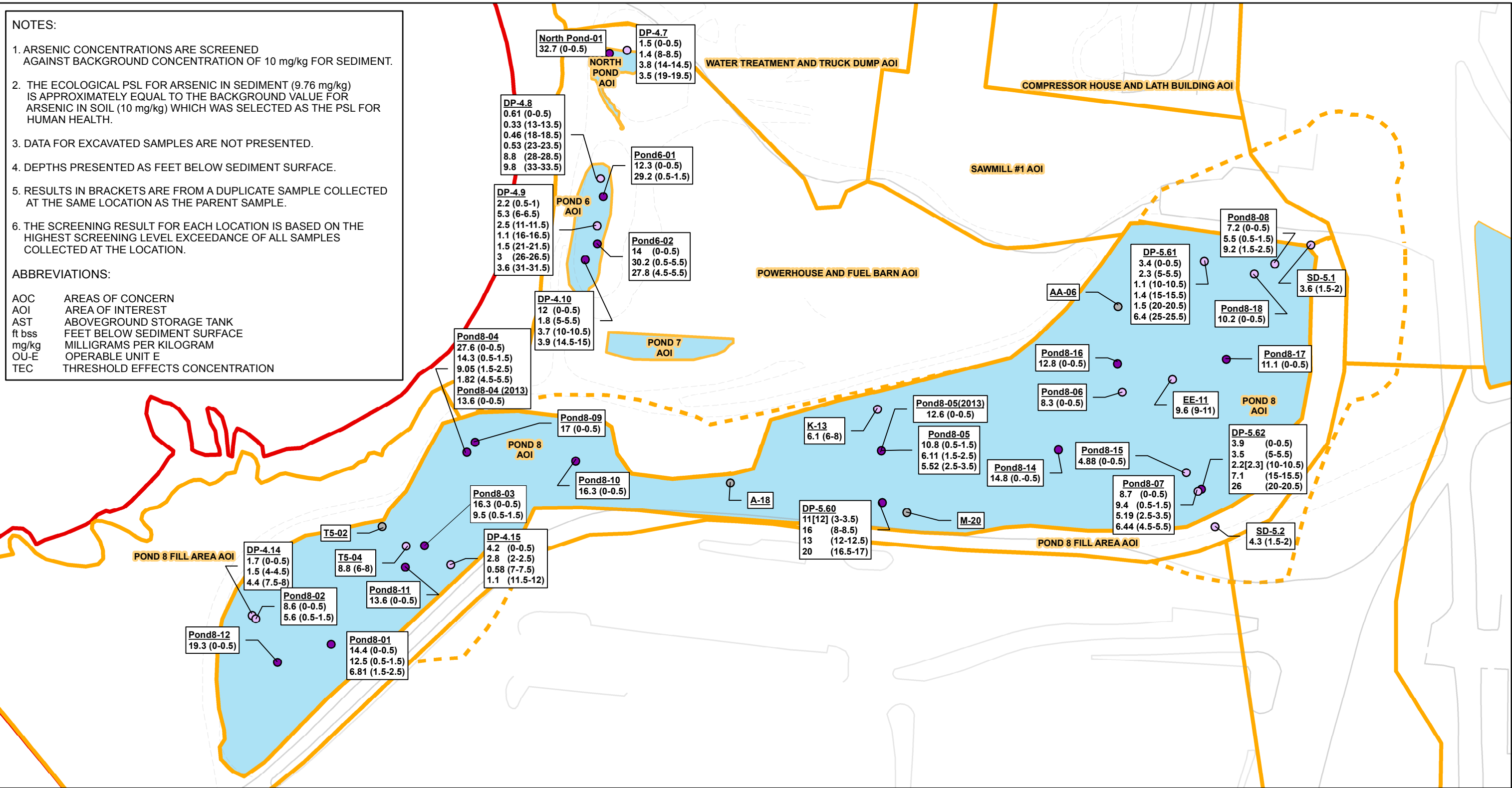
Figure 1

NOTES:

1. ARSENIC CONCENTRATIONS ARE SCREENED AGAINST BACKGROUND CONCENTRATION OF 10 mg/kg FOR SEDIMENT.
2. THE ECOLOGICAL PSL FOR ARSENIC IN SEDIMENT (9.76 mg/kg) IS APPROXIMATELY EQUAL TO THE BACKGROUND VALUE FOR ARSENIC IN SOIL (10 mg/kg) WHICH WAS SELECTED AS THE PSL FOR HUMAN HEALTH.
3. DATA FOR EXCAVATED SAMPLES ARE NOT PRESENTED.
4. DEPTHS PRESENTED AS FEET BELOW SEDIMENT SURFACE.
5. RESULTS IN BRACKETS ARE FROM A DUPLICATE SAMPLE COLLECTED AT THE SAME LOCATION AS THE PARENT SAMPLE.
6. THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION.

ABBREVIATIONS:

AOC	AREAS OF CONCERN
AOI	AREA OF INTEREST
AST	ABOVEGROUND STORAGE TANK
ft bss	FEET BELOW SEDIMENT SURFACE
mg/kg	MILLIGRAMS PER KILOGRAM
OU-E	OPERABLE UNIT E
TEC	THRESHOLD EFFECTS CONCENTRATION



Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

**Arsenic Concentrations in Sediment –
Ponds 6, 8 and North Pond**

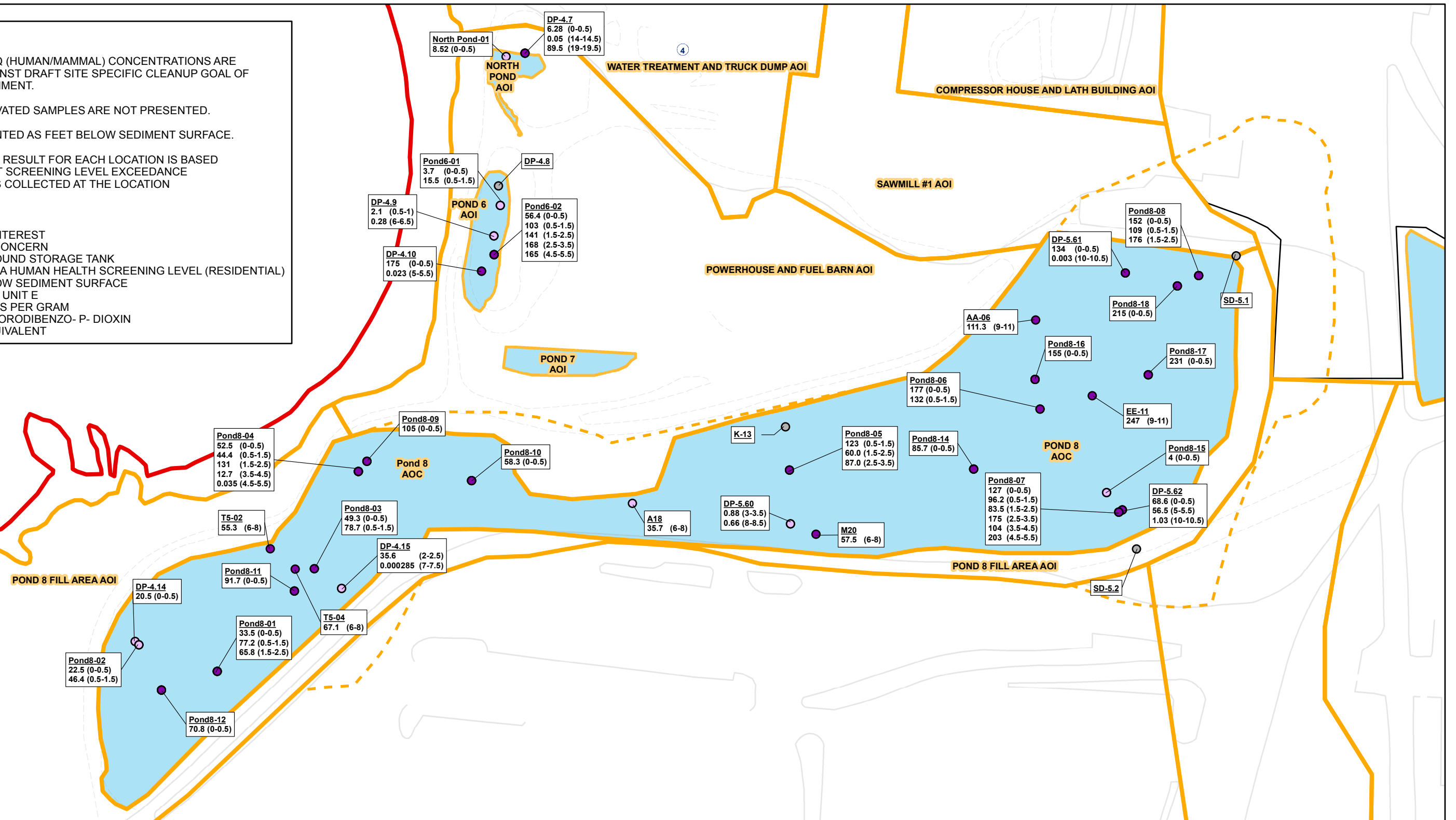
Z:\Projects\FortBragg\MillSite\Events\20190612_SedimentSampling\WP\MXD\Fig3_DioxinTEQSediment.mxd Printed by: AliceRobinson

NOTES:

- 2,3,7,8-TCDD TEQ (HUMAN/MAMMAL) CONCENTRATIONS ARE SCREENED AGAINST DRAFT SITE SPECIFIC CLEANUP GOAL OF 53 pg/g FOR SEDIMENT.
- DATA FOR EXCAVATED SAMPLES ARE NOT PRESENTED.
- DEPTHS PRESENTED AS FEET BELOW SEDIMENT SURFACE.
- THE SCREENING RESULT FOR EACH LOCATION IS BASED ON THE HIGHEST SCREENING LEVEL EXCEEDANCE OF ALL SAMPLES COLLECTED AT THE LOCATION

ABBREVIATIONS:

AOI	AREA OF INTEREST
AOC	AREA OF CONCERN
AST	ABOVEGROUND STORAGE TANK
CHHSL	CALIFORNIA HUMAN HEALTH SCREENING LEVEL (RESIDENTIAL)
ft bss	FEET BELOW SEDIMENT SURFACE
OU-E	OPERABLE UNIT E
pg/g	PICOGRAMS PER GRAM
TCDD	TETRACHLORODIBENZO- P- DIOXIN
TEQ	TOXIC EQUIVALENT



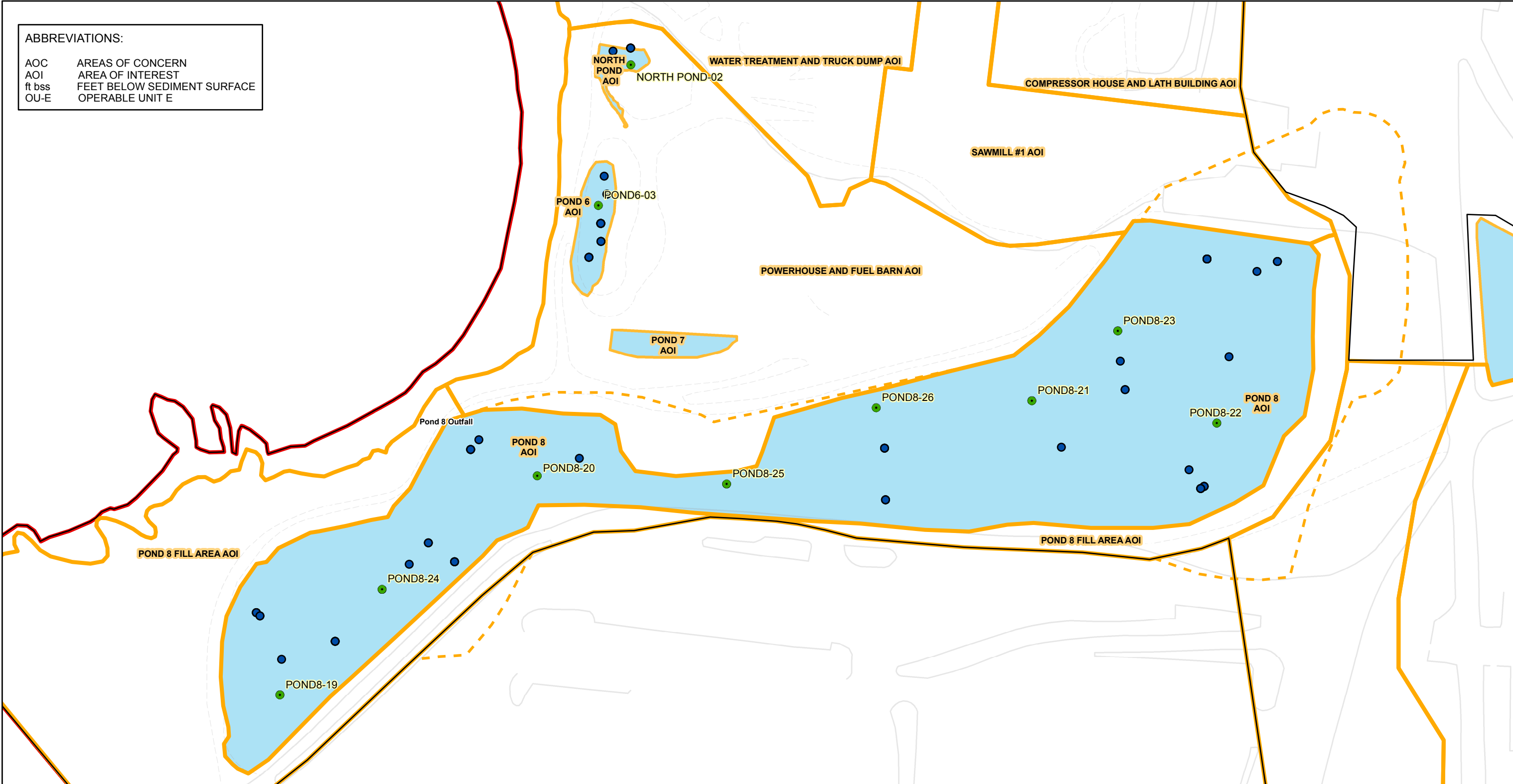
Kennedy/Jenks Consultants

Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Dioxin (2,3,7,8-TCDD) TEQ Concentrations in Sediment – Ponds 6, 8 and North Pond

1665018*19

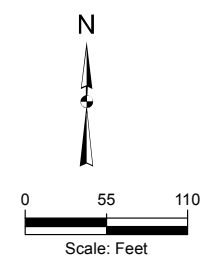
Figure 3



ABBREVIATIONS:

AOC	AREAS OF CONCERN
AOI	AREA OF INTEREST
ft bss	FEET BELOW SEDIMENT SURFACE
OU-E	OPERABLE UNIT E

- Legend
- Previously Collected Samples
 - Proposed Sample Location
 - Site Boundary
 - OUE Boundary
 - AOI Boundary
 - Newly Identified Pond 8 Fill Area AOIs
 - Pond
 - Unpaved Roadway
 - Paved Roadway

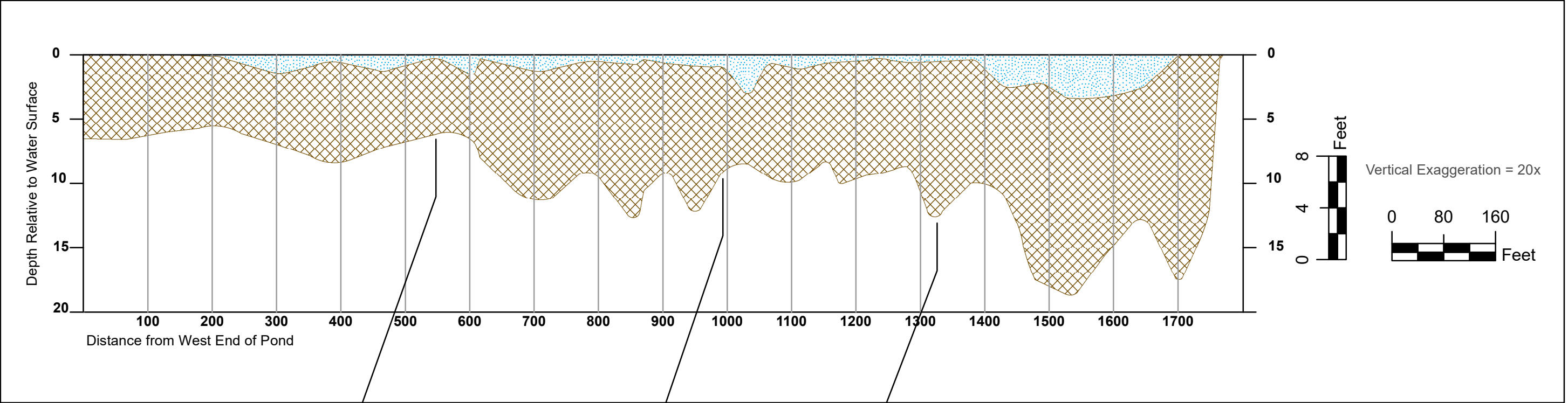


Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Proposed Sample Locations

1665018*19

Figure 4



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



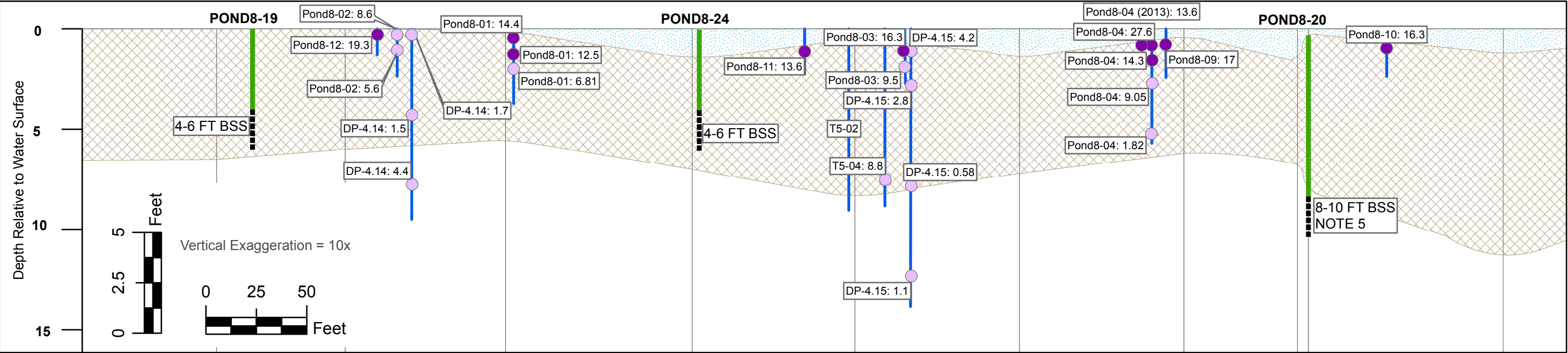
Legend

- Transect Locaton
- Approximate Pond 8 Extent
- Water
- Sediment

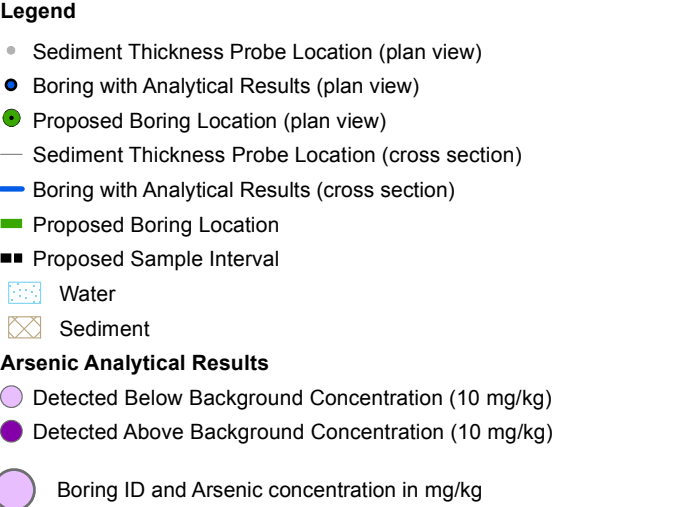
- Notes:
1. A total of eight (8) new sample locations are proposed.
A total of twelve (12) samples will be collected.
 2. Assumed 2 feet of sample is required per sample based on hand tool collection quantity.
 3. Locations shown on plan view and cross-section are approximate.

Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

**Pond 8 Sediment Probe Transect
Overview**



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar
Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS
User Community

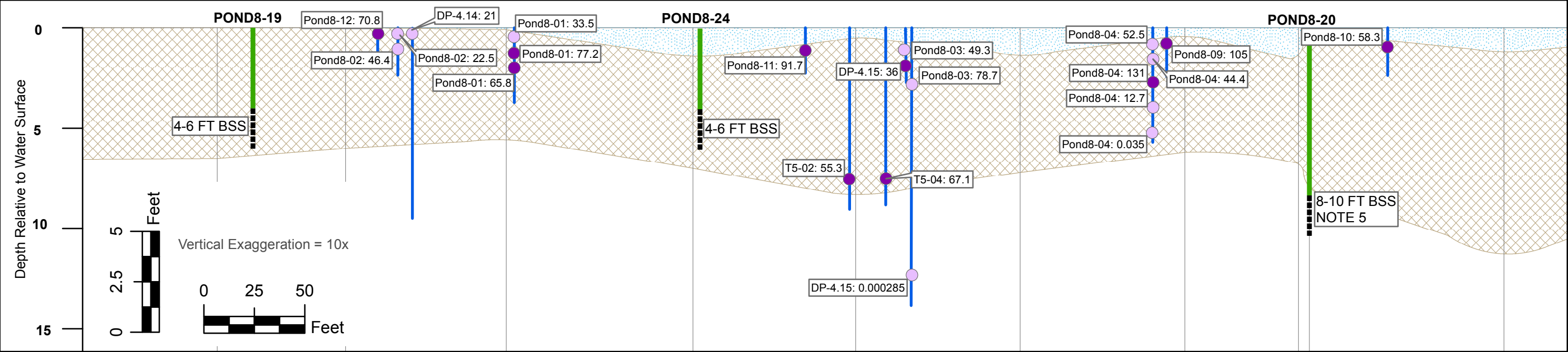


Notes:

- A total of eight (8) new sample locations are proposed.
- A total of twelve (12) samples will be collected.
- Assumed 2 feet of sample is required per sample based on hand tool collection quantity.
- Locations shown on plan view and cross-section are approximate.
- BSS = Below Sediment Surface
- Pond sediment thickness was projected to the cross section and may not reflect sediment thickness at each sample location shown. Samples are only proposed in pond sediment.

Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Pond 8 Sediment Probe Transect
Arsenic Results: Sheet 1



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

- Sediment Thickness Probe Location (plan view)
- Boring with Analytical Results (plan view)
- Proposed Boring Location (plan view)
- Sediment Probe Location
- Boring with Analytical Results
- Proposed Boring Location
- Proposed Sample Interval
- Water
- Sediment
- Dioxin Analytical Results**
- Detected Below Draft Site-Specific Cleanup Goal (53 pg/g)
- Detected Above Draft Site-Specific Cleanup Goal (53 pg/g)

Pond8-04: 52.5

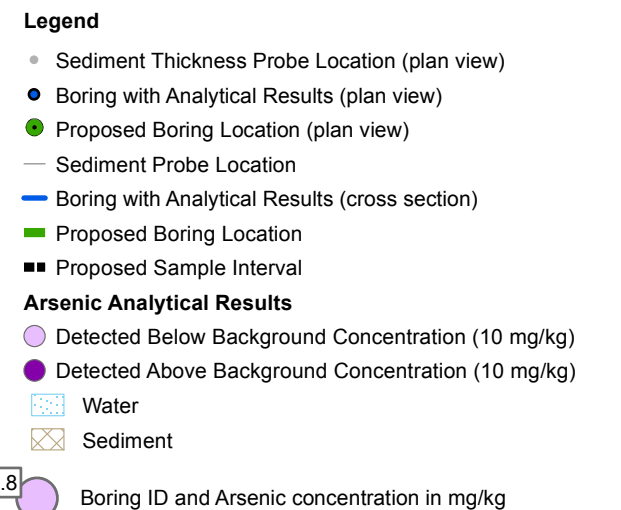
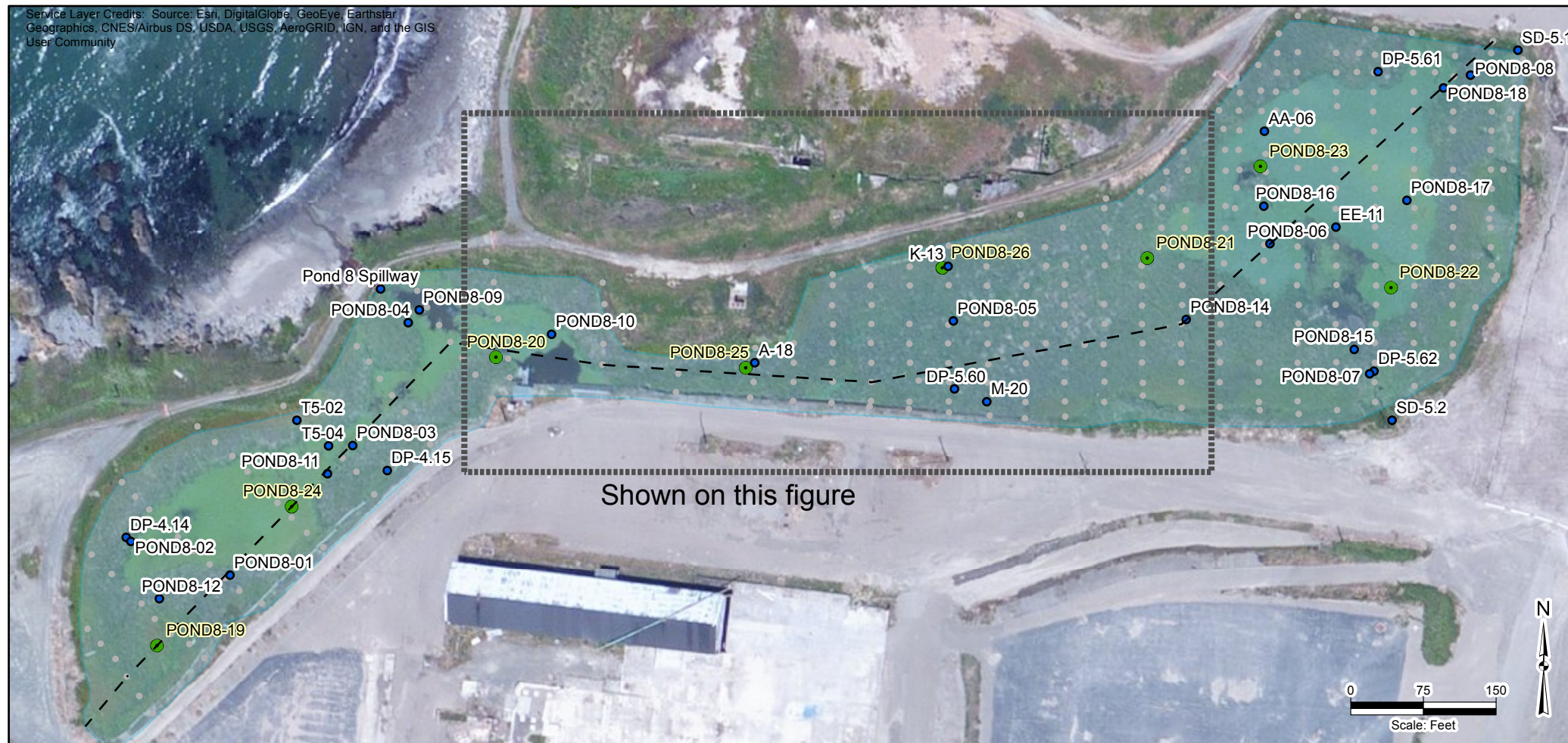
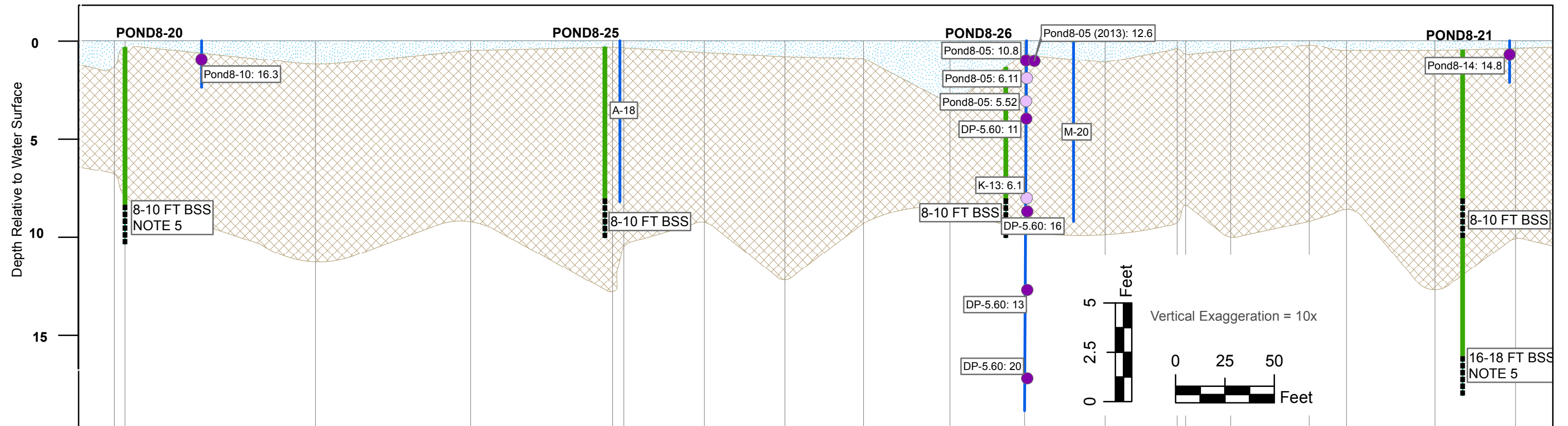
Boring ID and dioxin concentration in pg/g

- Notes:
- A total of eight (8) new sample locations are proposed.
 - A total of twelve (12) samples will be collected.
 - Assumed 2 feet of sample is required per sample based on hand tool collection quantity.
 - Locations shown on plan view and cross section are approximate.
 - BSS = Below Sediment Surface
 - Pond sediment thickness was projected to the cross section and may not reflect sediment thickness at each sample location shown. Samples are only proposed in pond sediment.

Kennedy/Jenks Consultants

Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Pond 8 Sediment Probe Transect Dioxin Results: Sheet 1

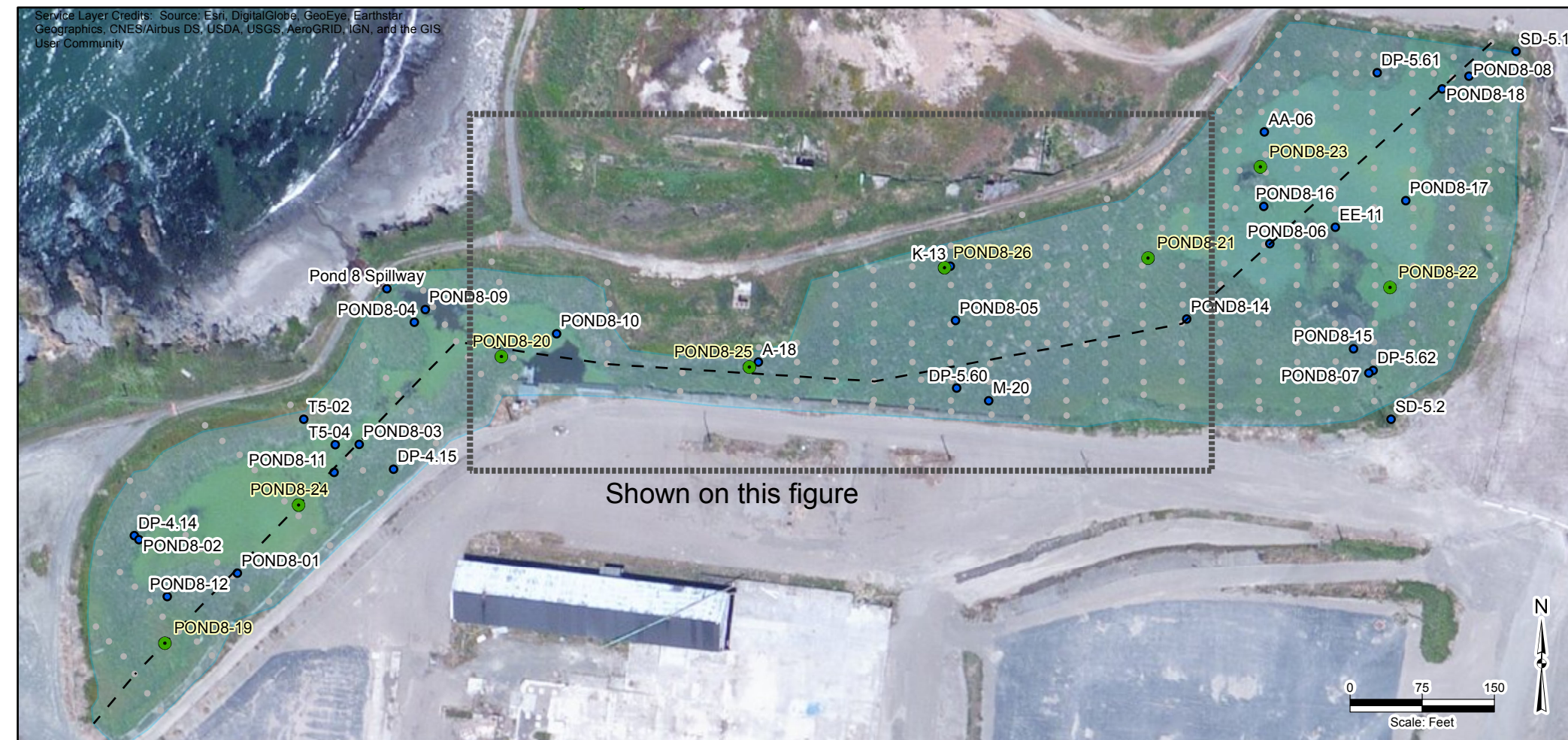
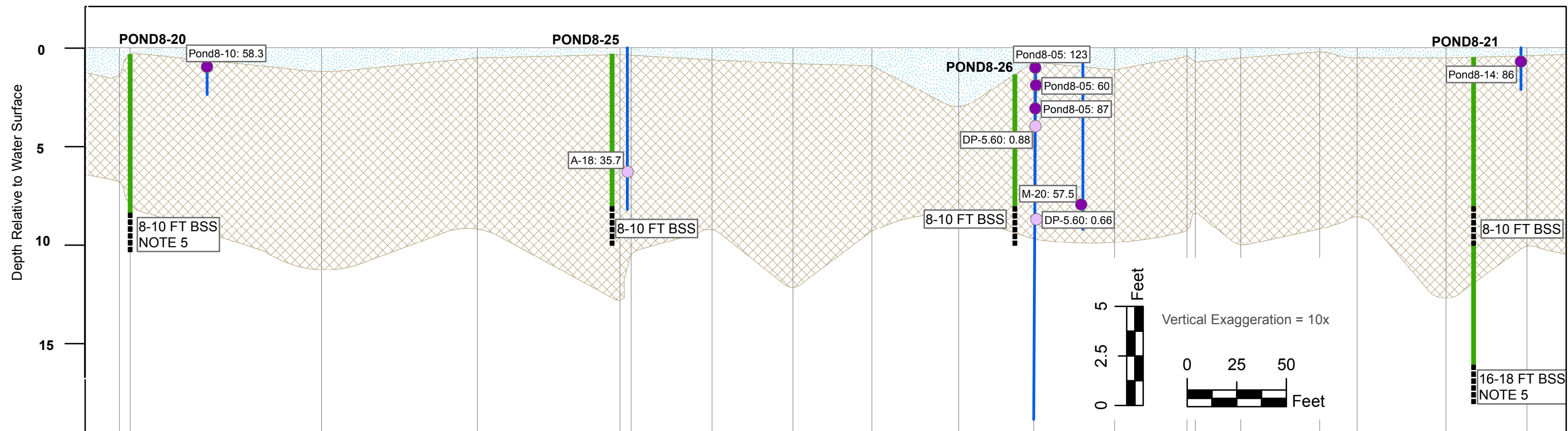


Notes:

- A total of eight (8) new sample locations are proposed.
- A total of twelve (12) samples will be collected.
- Assumed 2 feet of sample is required per sample based on hand tool collection quantity.
- Locations shown on plan view and cross-section are approximate.
- BSS = Below Sediment Surface
- Pond sediment thickness was projected to the cross section and may not reflect sediment thickness at each sample location shown. Samples are only proposed in pond sediment.

Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

**Pond 8 Sediment Probe Transect
Arsenic Results: Sheet 2**



Legend

- Sediment Thickness Probe Location (plan view)
 - Boring with Analytical Results (plan view)
 - Proposed Boring Location (plan view)
 - Sediment Thickness Probe Location (cross section)
 - Boring with Analytical Results (cross section)
 - Proposed Boring Location
 - Proposed Sample Interval
 - Water
 - Sediment
- Dioxin Analytical Results**
- Detected Below Draft Site-Specific Cleanup Goal (53 pg/g)
 - Detected Above Draft Site-Specific Cleanup Goal (53 pg/g)

Boring ID and dioxin concentration in pg/g

Pond8-04: 52.5

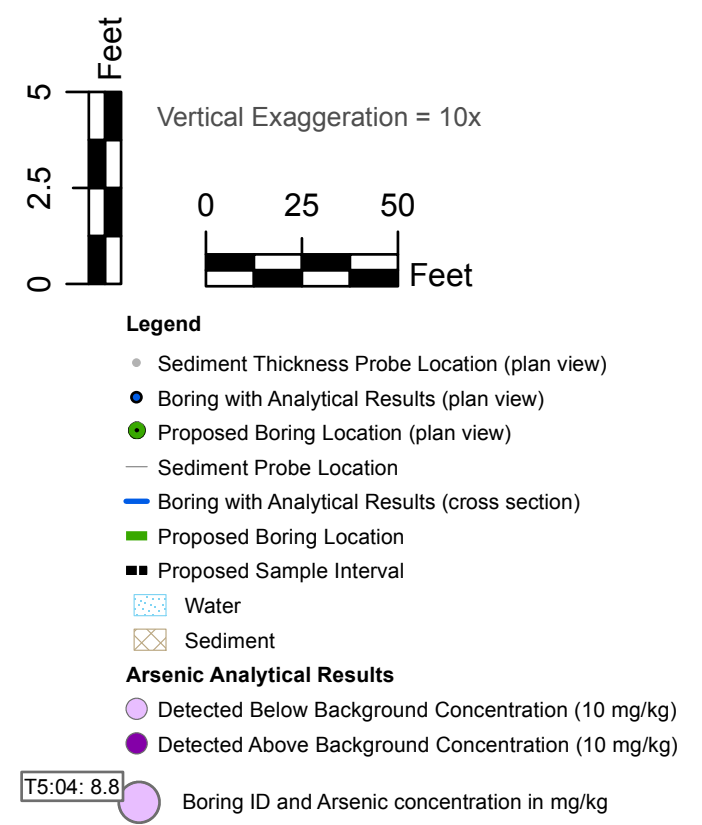
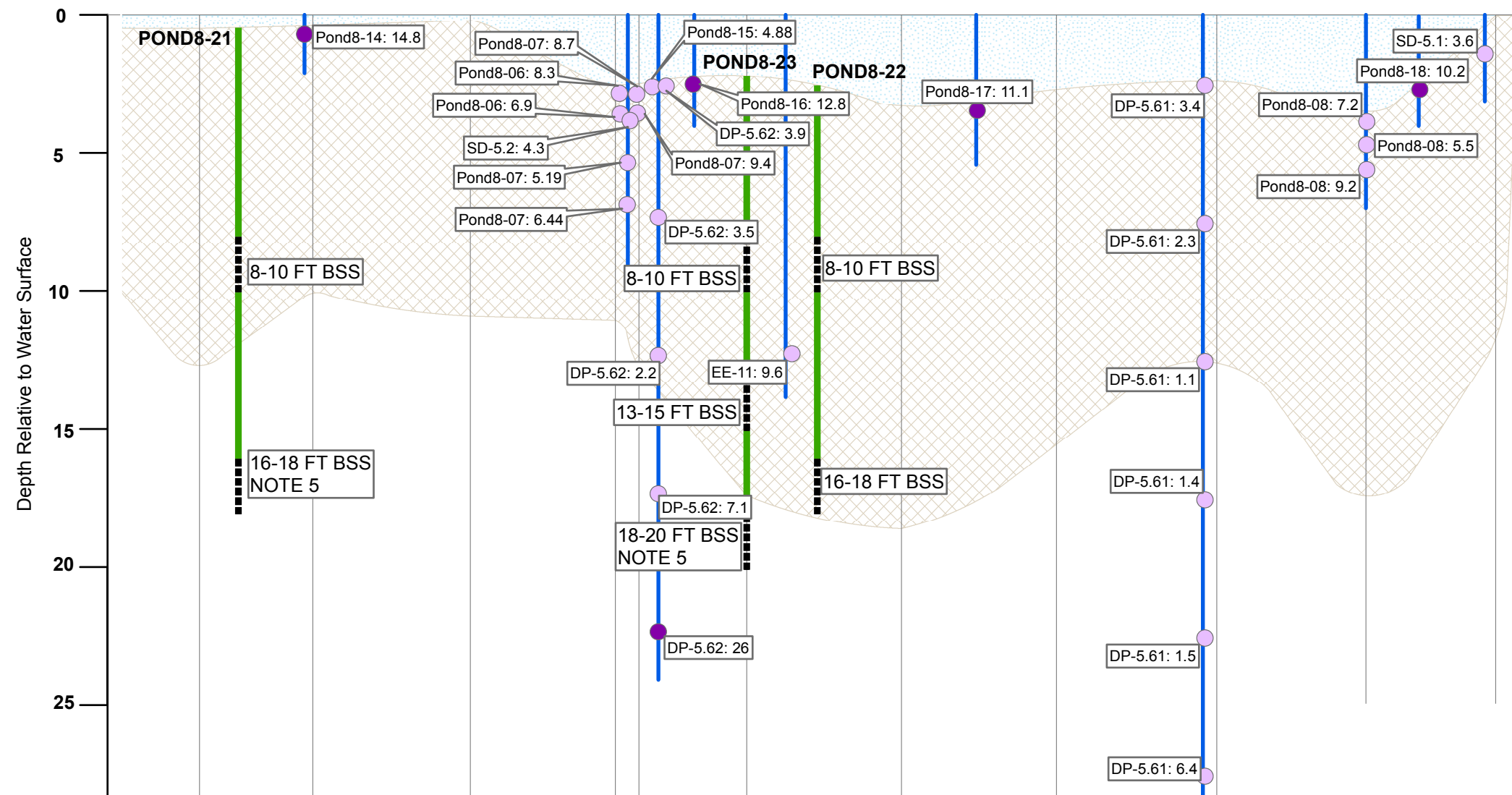
Notes:

- A total of eight (8) new sample locations are proposed.
- A total of twelve (12) samples will be collected.
- Locations shown on plan view and cross-section are approximate.
- BSS = Below Sediment Surface
- Pond sediment thickness was projected to the cross section and may not reflect sediment thickness at each sample location shown. Samples are only proposed in pond sediment.

Kennedy/Jenks Consultants

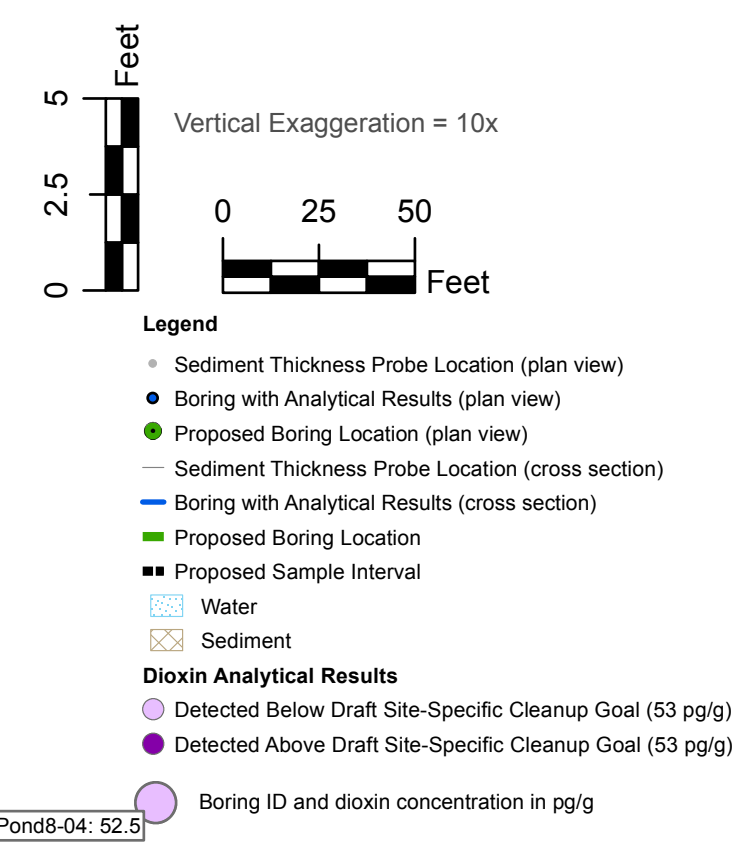
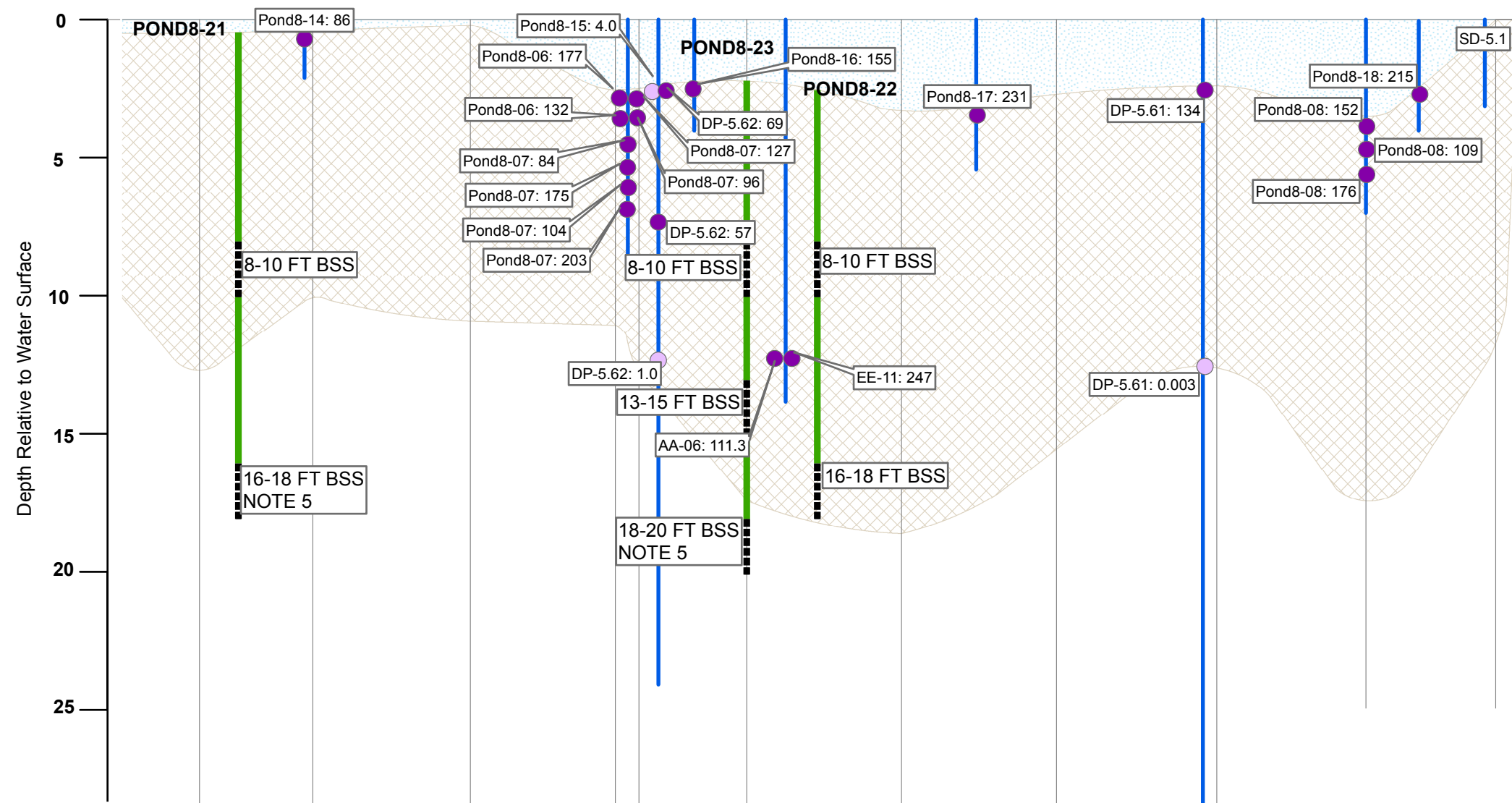
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Pond 8 Sediment Probe Transect Dioxin Results: Sheet 2



Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

**Pond 8 Sediment Probe Transect
Arsenic Results: Sheet 3**



- Notes:**
- A total of eight (8) new sample locations are proposed.
A total of twelve (12) samples will be collected.
 - Assumed 2 feet of sample is required per sample based on hand tool collection quantity.
 - Locations shown on plan view and cross-section are approximate.
 - BSS = Below Sediment Surface
 - Pond sediment thickness was projected to the cross section and may not reflect sediment thickness at each sample location shown. Samples are only proposed in pond sediment.



Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

**Pond 8 Sediment Probe Transect
Dioxin Results: Sheet 3**

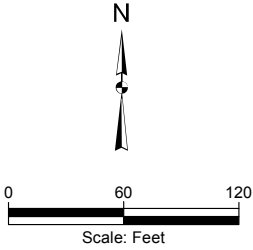


Legend

● Proposed Boring Location

Sediment Thickness (feet)

- 2 - 5
- 5 - 10
- 10 - 12
- 12 - 15
- 15 - 20
- 20 - 27



Kennedy/Jenks Consultants
Former Georgia-Pacific Wood Products Facility
Fort Bragg, California

Pond 8
Sediment Thickness and
Proposed Sediment Sampling Locations

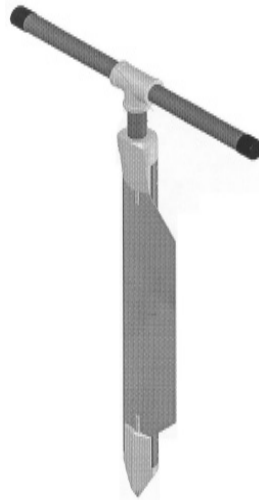
Appendix A

Product Sheets

2460-F20 Flag™ Sampler (Russian Peat Borer)

Warranty and Parts:

We replace all missing or defective parts free of charge. For additional parts, use part numbers above. We accept Mastercard, Visa, American Express, checks, institutional P.O.'s. All products guaranteed free from defect for 90 days. This guarantee does not include accident, misuse, or normal wear and tear.

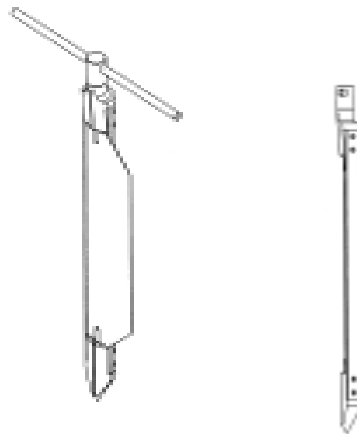


If you want to do this:

Collect uncompressed cores in soft sediments such as woody peat, loamy sand, silt, or clay; or in shallow wetlands and estuaries where dense roots and dead organic matter are present. Collect samples below the groundwater level or from below the surface water.

You also need this:

Optional **2427-E12** extension handle



Uses include:

- Environmental studies
- Visual interpretation of a soil layer
- Paleontological analysis of bog and salt marsh sediments

P/N 24-2460

© Wildlife Supply Co. Wildco® and Wildlife Supply Co are registered trademarks of Morris & Lee Inc. All rights reserved.

Introduction:

Also known in the literature as the *Russian Peat Borer*, this chambered-type corer with a sharp cutting edge is new from Wildlife Supply®. Unlike samples taken with end-filling core samplers, you can collect full-length, undistorted samples.

Borer contains: stainless steel corer head; stainless steel and PVC plastic construction; two 161 cm (24") extension rods; turning handle and carry case. Longer extension

handles are available.

The Flag™ Sampler is intended to take samples from reasonably coherent to coherent material, such as *clay or loamy sand containing substantial undecayed material*. Please note that, due to the massive core, you may encounter substantial penetration resistance. In very soft yet fibrous soils, the sharp edge of the chamber may not sufficiently cut the fibers, resulting in possible sample loss or contamination with upper layers.

Specifications:

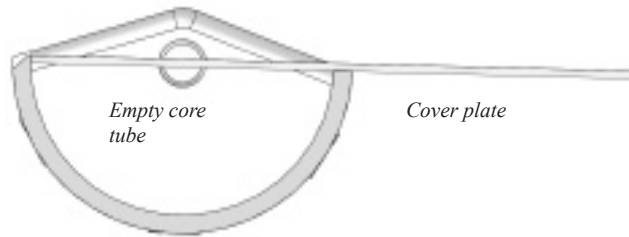
- 5 cm diameter, 50 cm in length
- Sample volume of 10 mL/cm
- Includes two 61 cm (24") extension rods

Advantages:

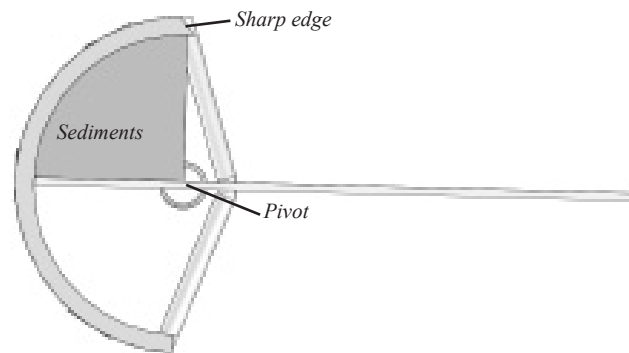
- Obtain an undisturbed sample, unlike end-filling corers
- Obtain a sample at almost any depth with 50 cm length
- Sample beneath ground or surface waters

How to Use:

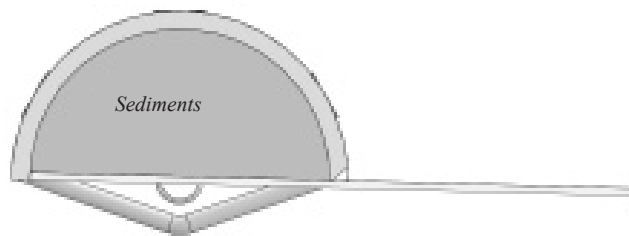
1. While in the closed position, with the blunt edge of the core tube turned against the cover flap to prevent sediments from entering the tube during penetration, push corer manually to any point in the sediment profile.
2. Turn the handle 180° clockwise to start sampling.
3. As the corer rotates, the sharp edge of the chamber cuts a sediment core around a stationary "flag" with the sample held in place by the cover plate.
4. To retrieve, simply rotate the corer counterclockwise to extrude the undisturbed sample.
5. Because the "flag" closes the half cylinder precisely, it is possible to take samples from very soft and flabby soils - in fact, it is possible to take samples from below the surface or ground water level.



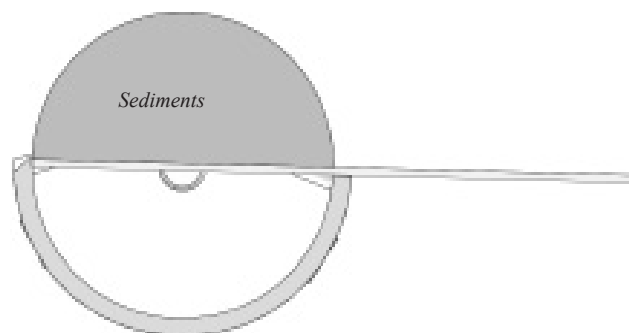
Start position - Borer inserted with blunt edge of tube turned against cover flap.



Boring position - Tube is turned clockwise to cut through sediments.



Closed position - Tube is turned until sharp edge contacts cover flap.



Extruding position - Tube is turned counterclockwise to expose core sample on cover plate.

SLDG Sludge Judge®

Sampler for Accurate Readings of Settled Solids



Description

The SLDG Sludge Judge® sampler is designed to take accurate readings of settled solids that are 5% or less in a variety of liquids at any depth. The SLDG is ideal for applications in non-caustic materials where accurate sample levels of settled solids are needed, including sewage treatment plants, chemical plants, and food processing facilities. The sludge sampler holds approximately 3 oz. per foot (89 ml per 0.31 m) and comes in 5 ft (1.53 m) sections of 3/4" (1.90 cm) plastic pipe with screw-type connectors. The top section of the unit includes a nylon rope for raising and lowering the sampler. Individual sections can be combined as required to achieve the length needed. Among the sampler's accessories are a convenient canvas carrying case that holds up to four sections, a cleaning brush, a cleaning rod, and cotton strips. Please note, do not use the standard Sludge Judge® in liquids over 165°F (74°C). The Sludge Judge® is not autoclavable.

For maximum strength and rigidity, we recommend the Sludge Judge® Ultra, which is constructed of extremely strong polycarbonate and treated with an ultraviolet stabilizer to help reduce deterioration from the sun's harmful rays. The material is very rigid, minimizing bending when the sampler is full of water or other liquids. The Sludge Judge® Ultra is also durable in cold temperatures and can withstand heats up to 280°F (138°C) (with careful handling). The sampler's 3/4" (1.9 cm) diameter tubing is marked with blue tape to designate 1 ft (0.31 m) measurements. The unit is made up of three 5 ft (1.53 m) sections (top, extension, bottom), and individual sections can be combined as required. The carrying case and cleaning brush for the original Sludge Judge® may be used with this unit. Please note, the Sludge Judge® Ultra is not autoclavable.

Features

- Take accurate readings of settled solids
- Combine sections to achieve the sampling length needed
- Ideal for sewage treatment plants, chemical plants, and food processing facilities

Applications

Ideal for sampling settled solids in sewage treatment plants, chemical plants, and food processing facilities.

Ordering & Options

Original Sludge Judge®

Order No.	Description	Length
CY0000	Sludge Judge	15'
CY0010	Top Section with Rope	5'
CY0020	Bottom Section with Valve	5'
CY0030	Extension Sections	5'

Sludge Judge® Ultra

Order No.	Description	Length
CY0100	Sludge Judge Ultra	15'
CY0110	Top Section with Rope	5'
CY0120	Bottom Section with Valve	5'
CY0130	Extension Sections	5'

Accessories

Order No.	Description
CYA000	Canvas Carry Bag
CYA010	Cleaning Brush, 6 ft
CYA020	2-Piece Aluminum Cleaning Rod, 6 ft
CYA030	Cotton Cleaning Strips, Bag of 50



In the U.S. call toll free
at 1-800-876-1172
International: 1-979-690-5560
Fax: 1-979-690-0440
Email: globalw@globalw.com

Visit our online catalog at:
www.globalw.com
Our Address:
11390 Amalgam Way
Gold River, CA 95670