Beazer

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May 15, 2015

Brenda R. Jones
U.S. Environmental Protection Agency
Great Lakes National Program Office
77 West Jackson Blvd (G17J)
Chicago, IL 60604

Re: Comments on *Final Site Characterization Report – Assessment of Contaminated Sediments in the Crawford Creek/Nemadji River near Superior, Wisconsin, St. Louis River and Bay Area of Concern*

Dear Ms. Jones:

As we discussed at an April 7, 2015 meeting between Beazer East, Inc. (Beazer), the United States Environmental Protection Agency (USEPA), and the Wisconsin Department of Natural Resources (WDNR) at USEPA's offices in Chicago, enclosed please find Beazer's comments on the above-referenced report.

Please feel free to contact me at 412-208-8813 with any questions.

Sincerely,

Jane Patarcity
Sr. Environmental Manager

Enclosure

cc: Marc Tuchman, USEPA
Scott Cieniawski, USEPA
Steve Galarneau, WDNR
John Robinson, WDNR
Chris Saari, WDNR
Joe Graham, WDNR
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Writer's Direct Dial: 412/208-8813

Comments on *Final Site Characterization Report – Assessment of Contaminated Sediments in the Crawford Creek/Nemadji River near Superior, Wisconsin, St. Louis River and Bay Area of Concern* (CH2M HILL 2014)

May 15, 2015

1. Introduction

This document presents Beazer East, Inc.'s (Beazer's) comments on the December 2014 *Final Site Characterization Report – Assessment of Contaminated Sediments in the Crawford Creek/Nemadji River near Superior, Wisconsin, St. Louis River and Bay Area of Concern* (2014 GLNPO Report; CH2M HILL 2014), which was prepared on behalf of the United States Environmental Protection Agency (USEPA) Great Lakes National Program Office (GLNPO). Beazer has five main comments on the 2014 GLNPO Report:

- The 2014 GLNPO analytical data are compared to very conservative screening values. While this in and of itself is not inappropriate for a characterization report, Beazer requests that the following statement be added to the document to emphasize the purpose of the data screening: "Note that the screening values used in this report are not to be interpreted as final cleanup goals for this site; rather, these values are being used for comparison purposes only."

- Related to the previous bullet, Beazer is requesting that the report be revised to exclude discussions of volumes of "potentially impacted sediment" (i.e., sediment with concentrations above the specified screening values), which could be construed by a reader to imply that these sediment volumes need to be removed or otherwise remediated.

- The data assessment presented in the document lacks a comparison to prior investigation data collected by Beazer. While we are not requesting that the report be revised to include such a comparison, we are providing a comparison herein for GLNPO's consideration, and for the public record, to help add context regarding the nature of impacts in the investigation areas, consistency with the prior conceptual site model, and temporal trends observed between the 2014 GLNPO and prior Beazer data sets.

- There are discrepancies between visual observations documented in various locations within the 2014 GLNPO Report. More critically, there are significant differences between GLNPO and Beazer approaches used for classifying visible impacts, and as a consequence, the two visible observation data sets cannot be directly compared. Therefore, Beazer requests that the following statement be added to the document: "Note that, due to differences in the visual classification approaches, visual observations/classifications described in this report are not directly comparable to visual observations/classifications for samples collected by Beazer during prior investigations."

- Beazer believes that the existing data set is sufficient to evaluate the need for and scope of corrective actions for the downstream study area, and that additional studies are not warranted at this time. Specific to the Nemadji River, Beazer believes that the sediment and fish data collected by GLNPO in 2014 demonstrate that any influence of the Site on the Nemadji River does not pose unacceptable risks to potential human or ecological receptors, and therefore the Nemadji River does not warrant inclusion in future discussions regarding potential corrective actions for the Site.

Additional discussion is provided below regarding each of these five main comments, along with a few other more minor comments.

2. Main Comment #1 – Screening Values

2014 GLNPO Report references associated with this comment:

- Pgs 11-16, Section 3.4 (Analytical Results Summary)
- Pgs 20-23, Section 4.1 (Assessment of Sediment and Floodplain Soil Contamination)
- Table 6 (Analytical Results and Exceedance of Metals, PAHs, and PCP in Floodplain Samples)
- Table 7 (Analytical Results, TEC and PEC Exceedances for Crawford Creek and Nemadji River Samples)
- Table 8 (Toxicity Equivalence Summary Statistics for Crawford Creek and Nemadji River Samples)
- Table 9 (Toxicity Equivalence Summary Statistics for Floodplain Samples)
- Table 14 (Summary of Fish Sampling Results – Dioxins/Furans and PCPs)

The 2014 GLNPO analytical data are compared to very conservative screening values. While this in and of itself is not inappropriate for a characterization report such as the 2014 GLNPO Report, the conservativeness of the screening values results in a large number of samples with exceedances, which overestimates the number of samples that could actually pose a risk to human or ecological receptors. **Therefore, Beazer requests that the following statement be added to the document (end of the first paragraph in Section 3.4 [Analytical Results Summary, Pg 11], the end of the first paragraph in Section 4.1 [Assessment of Sediment and Floodplain Soil Contamination; Pg 20], and as notes on Tables 6, 7, 8, 9, 10, 14 and Figures 4 through 12), to emphasize the purpose of the data screening: "Note that the screening values used in this report are not to be interpreted as final cleanup goals for this site; rather, these values are being used for comparison purposes only."** This statement is consistent with the intent of these screening values, as indicated by the following statements from the screening value sources:

- The *Consensus-Based Sediment Quality Guidelines* (CBSQGs; Wisconsin Department of Natural Resources [WDNR] 2003) states that "The CBSQGs should not be used on a stand-alone basis to establish cleanup levels or for sediment management decision making."

- USEPA Region 5's Ecological Screening Level (ESL) website (http://www.epa.gov/region5/waste/cars/esl.htm) states that "The ESLs (previously known as ecological data quality levels or EDQLs) are not intended to serve as cleanup levels."

- USEPA's Ecological soil Screening Level (Eco-SSL) website (http://www.epa.gov/ecotox/ecossl/) states that "It is emphasized that the Eco-SSLs are soil screening numbers, and as such are not appropriate for use as cleanup levels. Screening ecotoxicity values are derived to avoid underestimating risk. Requiring a cleanup based solely on Eco-SSL values would not be technically defensible."

The conservative nature and applicability of the various screening values used in the 2014 GLNPO Report is further described below.

2.1 Dioxins/Furans in Crawford Creek/Nemadji River Channel Sediment Samples

The 2014 GLNPO Report compares calculated 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) toxicity equivalency quotients (TCDD-TEQ) concentrations for each sediment sample to sediment screening benchmarks for 2,3,7,8-TCDD. Specifically, as presented in Table 8 of the 2014 GLNPO Report, mammalian and avian TCDD-TEQ concentrations are compared to the USEPA Region 5 ESL (USEPA 2003) sediment benchmark for 2,3,7,8-TCDD of 0.12 ng/kg, while the 1% TOC-normalized fish TCDD-TEQ concentrations are compared to the Threshold Effects Concentrations (TEC; 0.85 ng/kg) and Probable Effects Concentration (PEC, 21.5 ng/kg) identified in the CBSQGs (WDNR 2003). Some of the 2014 GLNPO sediment samples exceeded these selected benchmarks; however, as outlined in the following paragraphs, because of the conservative nature of these benchmarks, exceedances do not necessarily correlate to unacceptable risk.

The Sediment ESL for 2,3,7,8-TCDD (0.12 ng/kg) was derived using an equilibrium partitioning (EqP) approach from the surface water ESL. While the assumptions used in the EqP approach are generally sound, the underlying surface water ESL is highly conservative and its derivation could not be verified. The surface water ESL (3×10^{-9} micrograms per liter [ug/L]) is based on the Michigan Water Quality Standards Wildlife Value (Michigan Department of Environmental Quality [MDEQ] 2003, updated in 2006). While most of the wildlife values are calculated using a replicable dietary exposure model, the value for 2,3,7,8-TCDD is simply listed as part of the Water Quality Standards Rule 57. The surface water ESL is orders of magnitude lower than other risk-based water quality thresholds for protection of human health and ecological receptors. For example, the Oregon derived NOAEL-based surface water screening level for 2,3,7,8- TCDD for protection of birds is 1×10^{-1} ug/L and for protection of mammals is 7.6×10^{-3} ug/L. The federal MCL for drinking water is 3×10^{-5} ug/L and the California Public Health Goal is 5×10^{-8} ug/L. Using these alternate water values, the sediment ESL calculated using the EqP approach would be 17 to 33,000,000 times greater than the USEPA Region 5 Sediment ESL.

The Wisconsin TEC and PEC for TCDD-TEQ in sediment (0.85 ng/kg and 21.5 ng/kg, respectively) are based on sediment screening values from the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life* (Canadian Council of Ministers of the Environment [CCME] 2002). For TCDD-TEQ, the TEC is based on the sediment concentration where the incidence of adverse effects in benthic toxicity tests is 22%, and the PEC is the sediment concentrations associated with an adverse effects incidence of 46%. An uncertainty factor of 10 was applied in the derivation of both the TEC and PEC. The listed TEC and PEC are actually associated with a much lower incidence of adverse effects (approximately <10% and 25%, respectively). Other assumptions in the derivation of TECs and PECs, such as not accounting for the confounding effect of other compounds that may be present in the tested sediments, also result in a conservative screening level that overestimates actual risk. Furthermore, these TCDD TEQ benchmarks are inconsistent with the general recognition that invertebrates lack specific biochemical receptors essential to produce dioxin related toxicity (Céspedes et al. 2010; Hahn 2002; West et al. 1997). Specifically, invertebrates lack the aryl hydrocarbon (Ah) receptor, and Ah receptor homologues identified in invertebrates have been shown to not bind dioxin compounds.

In addition to the conservative nature of the dioxin/furan screening values used for sediments, Beazer notes that these screening values are typically only applied to the biologically active zone in sediments, where benthic macroinvertebrates are most likely to be present (the biologically active zone is typically assumed to be 6 inches to coincide with surface sediment sampling intervals, but is often less than 6 inches). Comparison of these screening values to deeper samples is generally not applicable and not biologically relevant.

2.2 PAHs in Crawford Creek/Nemadji River Channel Sediment Samples

In Sections 3.1 and 4.3, Table 7, and Figures 4, 5, and 11 of the 2014 GLNPO Report, PAH concentrations in sediment samples are compared to Wisconsin TECs and PECs. The Wisconsin TECs and PECs are derived from toxicity results that included PAHs from multiple sources. However, comparison to benchmarks based upon wood treating-derived PAHs suggest the absence of wood treating-related PAH toxicity at the majority of the sediment sampling locations. As presented in Appendix G of the *Human Health and Ecological Risk Assessment, Off-Site Portion of Koppers Inc. Facility, Superior, Wisconsin* (HHERA; AMEC Earth & Environmental [AMEC] 2009), Beazer has investigated and summarized the toxicity of wood treating-derived PAHs to benthic macroinvertebrates at five other sites. Based upon observations from these other sites, Total PAH concentrations of less than 100 mg/kg and organic carbon (OC)-adjusted Total PAH concentrations of less than 10,000 mg/kg OC do not pose an adverse effect to benthic macroinvertebrates. The table below summarizes the number of exceedances for the 2014 GLNPO sediment samples when compared to the Wisconsin TEC and PEC values used in the 2014 GLNPO Report, and the wood-treating specific PAH benchmarks discussed above.

Table 1. Summary of Total PAH Sediment Screening Value Exceedance Frequencies

Screening Value	Crawford Creek Samples		Nemadji River Samples	
	Surface (0-0.5')	Subsurface (>0.5')	Surface (0-0.5')	Subsurface (>0.5')
WDNR Consensus Based Sediment Quality Guidelines				
TEC: 1.61 mg/kg @ 1% OC	18/29 (62%)	13/35 (37%)	1/10 (10%)	6/20 (30%)
PEC: 22.8 mg/kg @ 1% OC	7/29 (24%)	4/35 (11%)	0/10 (0%)	2/20 (10%)
Wood-Treating Specific PAH Benchmarks				
100 mg/kg	2/29 (7%)	4/35 (11%)	0/10 (0%)	0/20 (0%)
10,000 mg/kg @ 1% OC	0/29 (0%)	0/35 (0%)	0/10 (0%)	0/20 (0%)

These comparisons indicate that when PAH benchmarks specific to wood treating are used, PAH concentrations in approximately 90% of the Crawford Creek sediment samples and in 100% the Nemadji River samples are unlikely to pose a risk to the benthic macroinvertebrate community.

In addition, as discussed for dioxins/furans in Section 2.1, Beazer notes that these screening values are typically only applied to the biologically active zone in sediments, where benthic macroinvertebrates are most likely to be present (the biologically active zone is typically assumed to be 6 inches). Comparison of these screening values to deeper samples is generally not applicable and not biologically relevant. It is also important to note that, as shown in Table 1 above, only one Nemadji River surface sediment sample had a

Total PAH concentration greater than the TEC, while none of the Nemadji River surface samples had a Total PAH concentration greater the PEC.

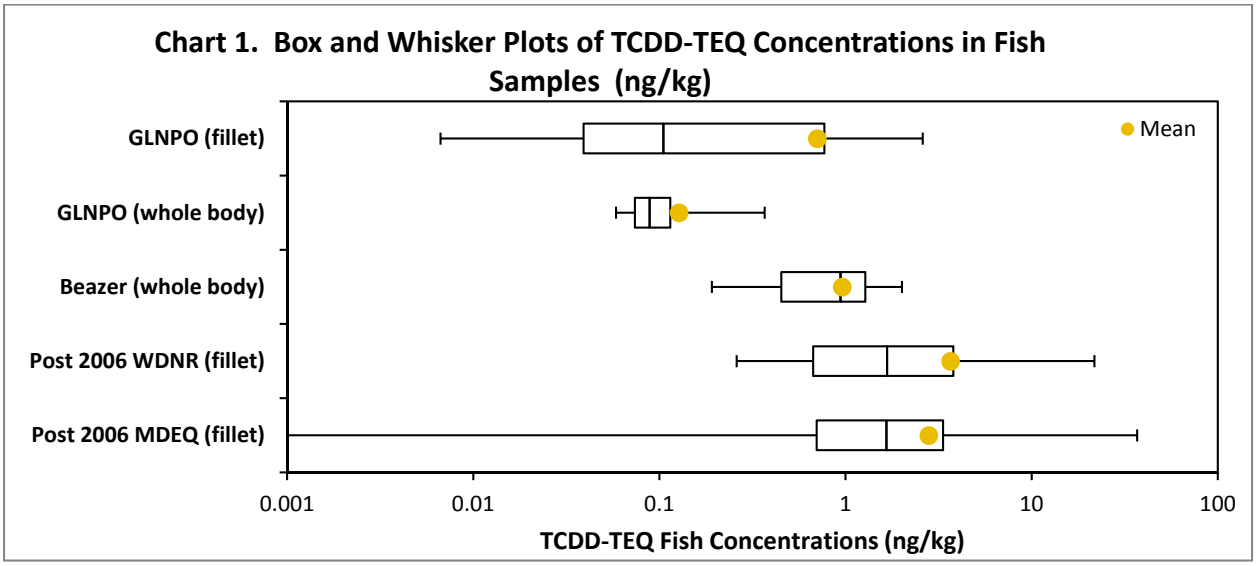
2.3 Pentachlorophenol and Dioxins/Furans in Crawford Creek/Nemadji River Fish Samples

In Sections 3.6.4 and 4.1.7, and Table 14 of the 2014 GLNPO Report, concentrations of pentachlorophenol and dioxins/furans in fish collected in Crawford Creek and within a 1-mile segment of the Nemadji River were compared to USEPA Region 3 Human Health Fish Tissue Screening Levels at the $1x10^{-6}$ excess lifetime cancer risk level. All four fillet samples (two from Crawford Creek and two from the Nemadji River) had pentachlorophenol concentrations below the Region 3 Screening Level, while three of the four fillet samples exceeded the Region 3 Screening Level for TCDD-TEQ. By comparison, TCDD-TEQ concentrations in all fish samples collected from Crawford Creek and the Nemadji River (both 2014 GLNPO and 2005 Beazer) are well below the Wisconsin Fish Consumption Advisory Level of 10 ng/kg (WDNR 2011). In fact, the average TCDD-TEQ concentration in the four edible tissue samples collected by GLNPO in 2014 was 0.7 ng/kg, which is 14 times lower than the Wisconsin advisory level, and indicates that a potentially unacceptable human health risk associated with fish consumption is not present.

Further, dioxin/furan concentrations detected in Crawford Creek and Nemadji River fish samples are consistent with or lower than regional concentrations. WDNR and the Michigan Department of Environmental Quality (MDEQ) collect and analyze samples of edible fish tissue for dioxin/furans from inland waters and the Great Lakes as part of the Wisconsin Fish Consumption Advisory Program and Michigan Fish Contaminant Monitoring Program. Dioxin/furan congener fish data were obtained from WDNR and MDEQ to determine typical TCDD-TEQ concentrations detected in the region subsequent to 2006[1]. TCDD-TEQ concentrations in fish were estimated from these databases using WHO 2005 toxic equivalency factors (TEFs) and assuming non-detects were equal to zero. Yellow pins on Figure 1 below depict the water bodies from which the post 2006 WDNR fish samples were collected and red pins depict the water bodies from which the post 2006 MDEQ fish samples were collected. These regional datasets are compared to 2014 GLNPO and 2005 Beazer TEQs in Chart 1 below.

[1] One other comparison to regional data can be made using the TCDD-TEQ concentrations reported in a study of Lake Superior fish by the Great Lakes Indian Fish and Wildlife Commission (GLIFWC 2005). Unfortunately, the TCDD-TEQ concentrations presented in GLIFWC 2005 are based on incorrect TEFs and the paper does not present congener data so recalculating TCDD-TEQ using current TEFs is not possible. However, when TCDD-TEQ concentrations are calculated for the Beazer and GLNPO data sets using the incorrect TEFs used in GLIFWC 2005, the TCDD-TEQ concentrations in Crawford Creek and Nemadji River fish are lower than the comparable TCDD-TEQ concentrations in regional fish reported in the GLIFWC 2005 paper (comparison not shown herein).

Figure 1. WDNR and MDEQ Post-2006 Fish Sample Locations



As shown in Chart 1, the average TCDD-TEQ concentrations in fish samples collected by GLNPO in 2014 (0.70 ng/kg fillet samples, 0.13 ng/kg whole body samples) and by Beazer in 2005 (0.96 ng/kg), are lower than the average TCDD-TEQ concentration calculated from post-2006 fish tissue data from regional inland waters and the Great Lakes collected by WDNR (3.7 ng/kg) and by MDEQ (2.8 ng/kg). This comparison demonstrates the ubiquitous presence of dioxin and furan congeners in freshwater fish region wide.

Even if the fish consumption advisory levels developed by WDNR were not available and regional TCDD-TEQ fish levels were not considered, the Region 3 screening levels are not appropriate for use when evaluating the concentrations of pentachlorophenol and TCDD-TEQ in fish from Crawford Creek. These screening levels are based on an ingestion rate of 54 grams per day (approximately two 8-ounce servings per week). This ingestion rate is derived from a 3-day study of people who ate finfish (marine and freshwater) from any source other than canned, dried or raw (from Pao et al. 1982), including commercial store bought fish. The application of this single fish consumption study conducted elsewhere to fish collected in the Crawford Creek is not reasonable, as productivity, size, and local angler water body preferences influence fish consumption. For example, based on the fact that no edible size fish were collected from Crawford Creek during the 1999 Beazer fish survey and 2005 Beazer fish sampling event, and only eight edible size fish were collected from Crawford Creek during the 2014 GLNPO investigation, the application of a 54 gram per day fish consumption rate appears inappropriate for Crawford Creek. Investigation of consumption rates representative of small local waters instead of the defaults employed in the conservative screening levels, may likely indicate that concentrations in Crawford Creek would have been found to be acceptable. Although the Nemadji River may be able to produce a greater quantity of edible fish than Crawford Creek, the fact that TCDD-TEQ concentrations in all of the Nemadji River fish samples were well below the Wisconsin Fish Consumption Advisory Level of 10 ng/kg demonstrates that there are no adverse human health risks associated with consumption of Nemadji River fish.

Appropriately so, based on the available data for the Nemadji River, the State of Wisconsin has no fish consumption advisory specifically identified for the Nemadji, other than the “all other waters” advisory for Douglas County associated with mercury levels in fish. This same advisory applies to most inland waters in Wisconsin due to atmospheric sources of mercury. Thus there is no fish consumption advisory Beneficial Use Impairment (BUI) removal opportunity that would warrant any further consideration of the Nemadji under the Great Lakes Areas of Concern program.

Based on the above considerations, Beazer disagrees with the following statement in the 2014 GLNPO Report (Section 4.1.7): “*Fish in Crawford Creek and the Nemadji River are accumulating levels of dioxins and furans that may limit their consumption by area anglers.”* Beazer requests that this statement be removed from the report. All fish had TCDD-TEQ concentrations well below the Wisconsin Fish Consumption Advisory Level of 10 ng/kg and are consistent with or lower than regional concentrations, indicating, contrary to the statement in the report, that fish are not accumulating levels of dioxins and furans that may limit their consumption.

To assess potential ecological risks associated the 2014 GLNPO fish sample data, lipid normalized TCDD-TEQ concentrations in fish samples were calculated and compared to ranges of allowable mean body burden concentrations developed by Steevens et al. (2005) for protection of egg and embryo development, a sensitive reproductive endpoint. Lipid-normalized TCDD-TEQ concentrations in the 2014 GLNPO fish samples ranged from 0.6 to 28 ng TCDD-TEQ/kg lipid in fish. When these concentrations are compared to ranges of allowable mean body burden concentrations developed by Steevens et al. (2005) for protection of egg and embryo development, more than 99% of potentially exposed fish are predicted to not be adversely effected (99% mean benchmark value = 57 ng TCDD-TEQ/kg lipid in fish). Even if the lower confidence limit of the allowable body burden concentrations is used (i.e., the most stringent range of allowable body burden concentrations), more than 97.5% of exposed fish are expected to have no adverse effect from TCDD-TEQ

at all sampling locations (97.5% LCL benchmark value = 57 ng TCDD-TEQ/kg lipid in fish). These results provide a strong line of evidence showing that TCDD-TEQ concentrations in fish in Crawford Creek and the Nemadji River do not pose a potential ecological risk to the fish.

In addition to the above considerations, discussion is provided below in Section 4.3 related to chemical composition evaluations that indicate dioxins/furans in fish, particularly larger fish caught in the portion of Crawford Creek downstream of the railroad embankment and those caught in the Nemadji River, are attributable to sources other than Crawford Creek sediments.

2.4 PAHs and Dioxins/Furans in Crawford Creek Floodplain Samples

For Crawford Creek floodplain samples, the 2014 GLNPO Report compares calculated Total Low Molecular Weight (LMW) PAHs and Total High Molecular Weight (HMW) PAHs to USEPA Eco-SSLs of 29 mg/kg and 18 mg/kg, respectively (USEPA 2007), while calculated mammalian and avian TCDD TEQ concentrations are compared to the 2,3,7,8-TCDD Soil ESL of 0.199 ng/kg. The conservative nature of the 2,3,7,8-TCDD ESLs, based on their derivation from conservative water ESLs, is described above in Section 2.1.

As discussed in Section 3.4.1 of the 2014 GLNPO Report, 1 of 35 floodplain samples (3%) exceeded the LMW PAH Eco-SSL, and four of 35 floodplain samples (11%) exceeded the HMW PAH Eco-SSL. As discussed in Section 3.4.4 of the 2014 GLNPO Report, all 35 of the floodplain samples exceeded the Soil ESL for 2,3,7,8-TCDD (for both mammalian and avian TEQ concentrations). However, these screening level exceedances do not necessarily equate to unacceptable risk. This is supported by the fact that, as discussed further below in Section 4.1, total PAH and TCDD-TEQ concentrations in surficial floodplain samples collected downstream of the railroad embankment by GLNPO in 2014 are, on average, slightly lower than the concentrations in samples collected upstream of the railroad embankment by Beazer in 2005. And, as discussed in the HHERA and the *Responses to Agency Comments on the Off-Property Human Health and Ecological Risk Assessment* (Appendix A of the Off-Property Focused Corrective Measures Study [Off-Property FCMS; ARCADIS 2014]), the most likely and expected current and future human uses within the Crawford Creek and its associated floodplain (from the confluence with the tributary to Crawford Creek to the Nemadji River) do not pose an unacceptable potential non-cancer or cancer risk. In addition, as discussed in the 2009 HHERA and further supported in the Off-Property FCMS, potential risks to populations of upper trophic receptors are unlikely within Crawford Creek and its associated floodplain. Given that the 2014 GLNPO floodplain data are consistent with the previously collected data, the 2014 data support the earlier conclusion of the lack of an unacceptable risk.

3. Main Comment #2 – Impacted Sediment Volumes

2014 GLNPO Report references associated with this comment:

- Pgs 16-17, Section 3.5 (Sediment Volumes)
- Pg 18, Exhibit 5 (Summary of Impacted Volume Distribution within the Study Area)
- Pg 24, Section 4.2 (Opportunities to Address Beneficial Use Impairments)

While we understand that an objective of the investigation was to "…determine sediment distribution and volume in Crawford Creek and the Nemadji River" (as stated in Section 2.1 of the 2014 GLNPO Report), we do not feel that it is appropriate for this document to report volumes of "potentially impacted sediment" (i.e., sediment with concentrations above the specified screening values). As noted above, the screening values are not final cleanup goals for this site, and should therefore not be utilized to calculate volumes of impacted sediment that could be construed by a reader to imply that these volumes need to be removed or otherwise remediated. **Beazer requests that all discussions and calculations related to volumes of potentially impacted sediment using the screening values be removed from the 2014 GLNPO Report.** Impacted sediment areas and volumes can be presented as part of a future Corrective Measures Study or Feasibility Study, if appropriate after Corrective Action Objectives have been established and the need for corrective action has been determined.

4. Main Comment #3 – Comparison of 2014 GLNPO and Prior Beazer Datasets

2014 GLNPO Report references associated with this comment and Sections 4.1 through 4.3 below:

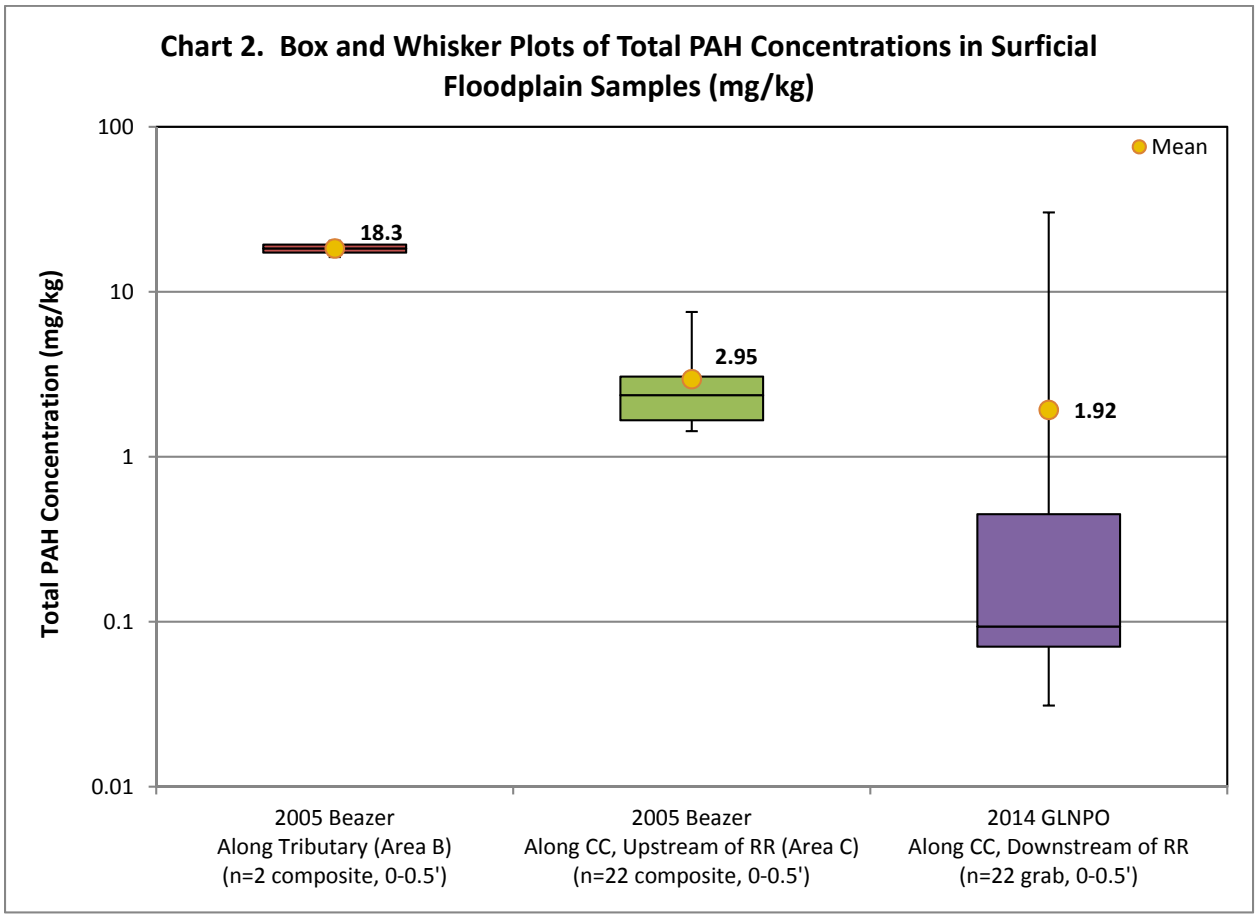
- Pgs 11-16, Section 3.4 (Analytical Results Summary)
- Pg 20, Section 3.6.4 (Fish Tissue Sampling Results Summary)
- Pgs 20-23, Section 4.1 (Assessment of Sediment and Floodplain Soil Contamination)
- Pgs 23-24, Section 4.2 (Opportunities to Address Beneficial Use Impairments)

The last bullet in Section 4.2 of the 2014 GLNPO Report (Opportunities to Address Beneficial Use Impairments) states that "integration is warranted of the findings of this study with the findings and conclusions of prior studies from portions of Crawford Creek that are upstream of the railroad bridge." Beazer agrees, and has performed a comparison of data collected from prior investigations to the 2014 GLNPO data. This data comparison is discussed below, and helps put the 2014 GLNPO results into context relative to the conceptual site model developed using the prior data set.

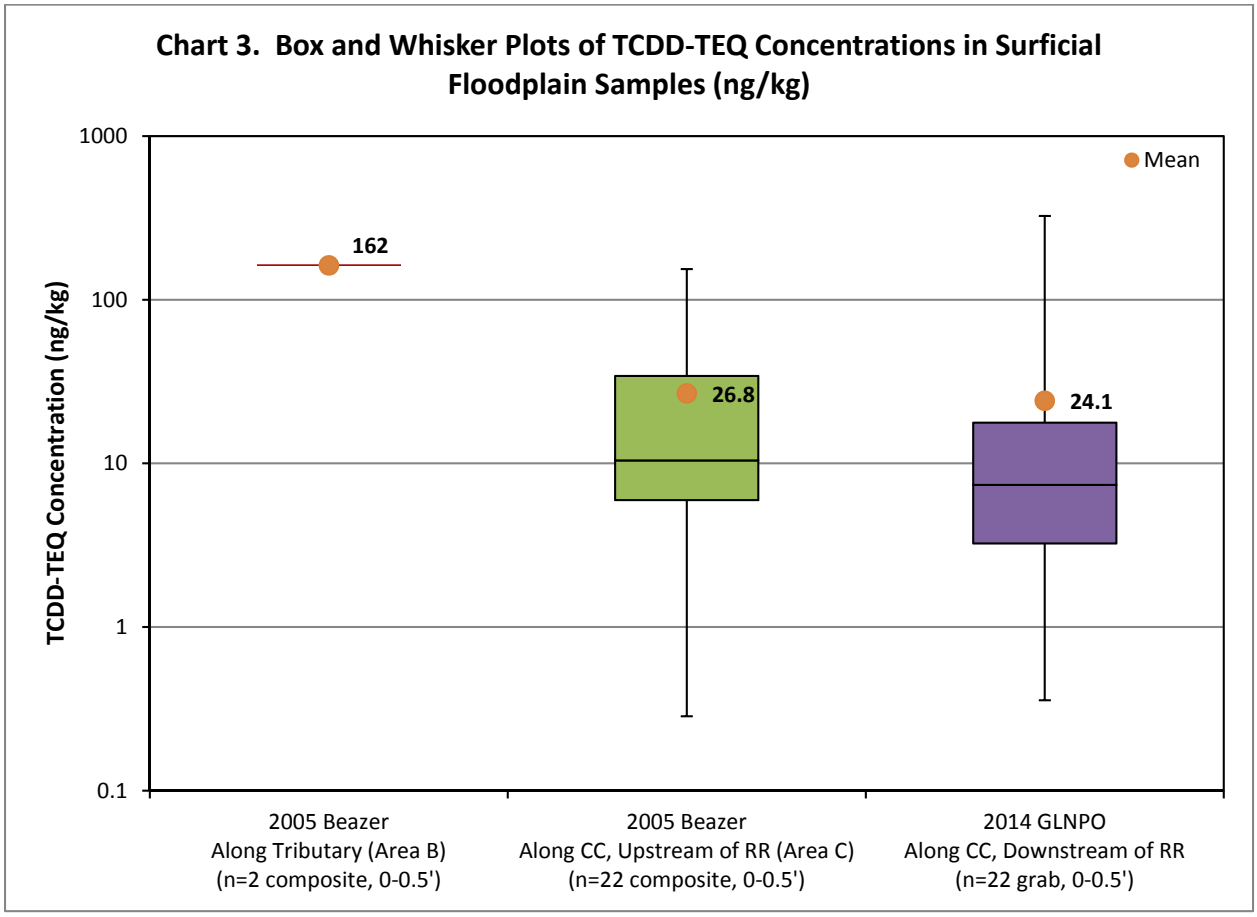
4.1 Crawford Creek Floodplain Samples

In 2005, Beazer collected 22 composite samples throughout the Crawford Creek floodplain, between the Tributary to Crawford Creek and the railroad embankment. Although Beazer did not collect floodplain samples downstream of the railroad embankment, the conceptual site model concluded that concentrations of constituents of potential concern (COPCs) in the floodplain materials downstream of the railroad embankment would be similar to or lower than concentrations in floodplain samples collected from upstream of the railroad embankment. The HHERA concluded that there were no unacceptable risks associated with exposures to floodplain materials between the Tributary and the railroad embankment, and it was therefore presumed that the same conclusions would apply to floodplain materials downstream of the railroad embankment.

In 2014, GLNPO collected 35 grab samples from the Crawford Creek floodplain downstream of the railroad embankment. Chart 2 (Total PAHs) and Chart 3 (TCDD TEQ) below compare the average concentrations for the 2005 Beazer samples relative to the 2014 GLNPO samples (for the 0-0.5 foot depth interval).



Notes:
CC=Crawford Creek, RR=Railroad Embankment
Total PAH calculations assume non-detects = ½ detection limit



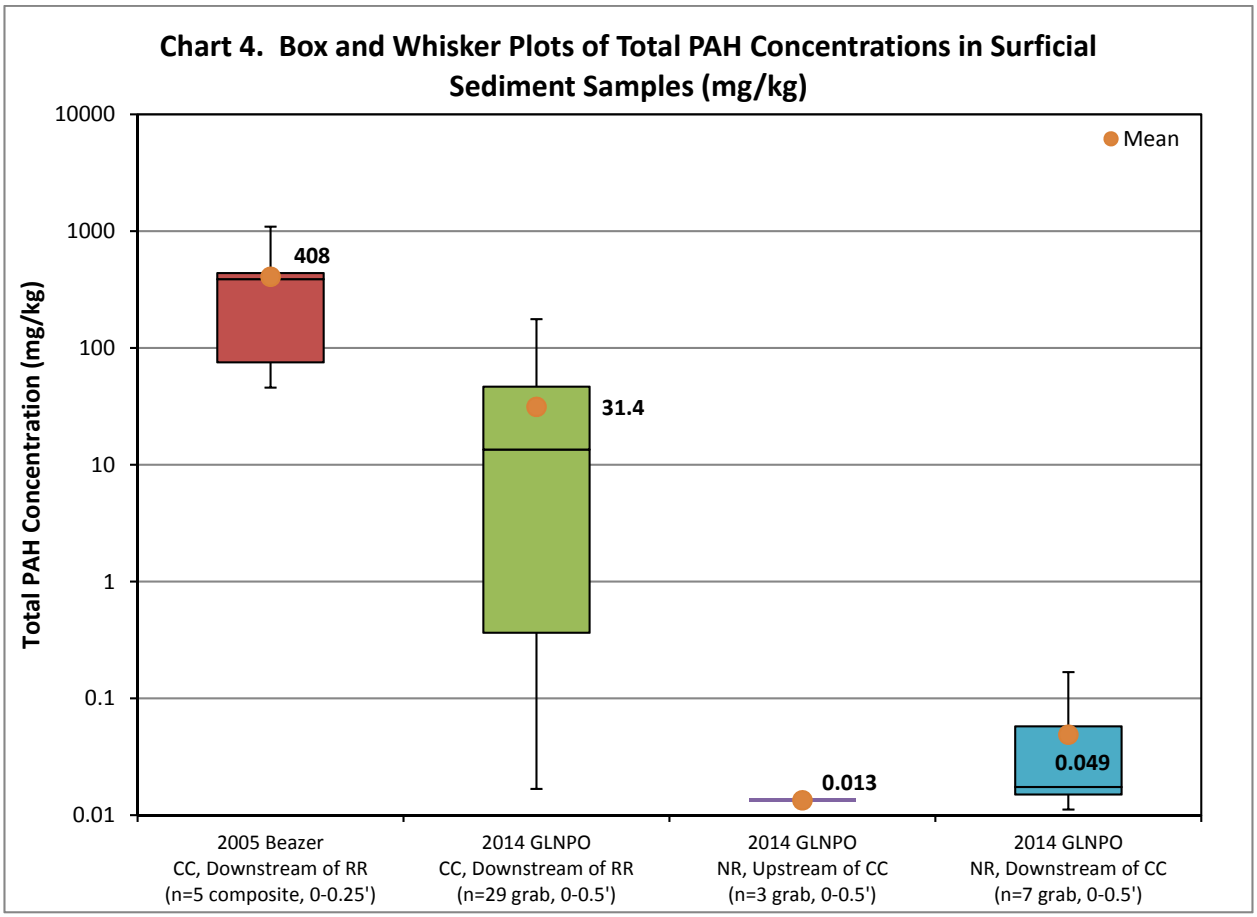
Notes:
CC=Crawford Creek, RR=Railroad Embankment
TCDD-TEQ calculations use WHO 2005 TEFs and assume non-detects = zero

As shown in Charts 2 and 3, Total PAH and TCDD-TEQ concentrations in surficial floodplain samples collected downstream of the railroad embankment by GLNPO in 2014 are, on average, slightly lower than the concentrations in samples collected upstream of the railroad embankment by Beazer in 2005, which is consistent with the conceptual site model developed based on the prior Beazer dataset, and supports the HHERA conclusions of no unacceptable risk in the downstream floodplain area. These charts also show that the Total PAH and TCDD-TEQ concentrations in floodplain samples along Crawford Creek (both upstream and downstream of the railroad embankment) are an order of magnitude lower than concentrations in floodplain samples from along the Tributary to Crawford Creek, where remediation is planned, as discussed in the Off-Property FCMS.

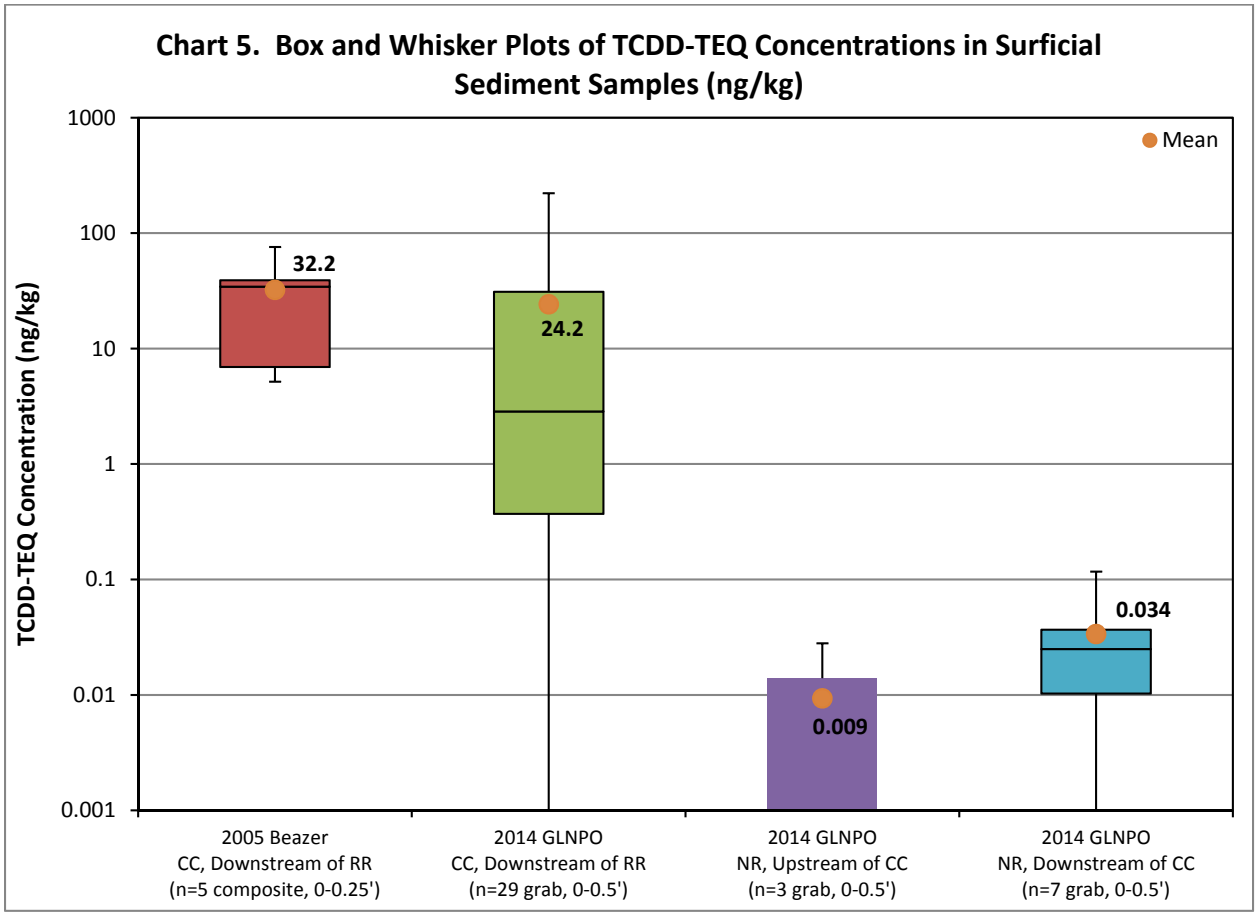
4.2 Crawford Creek and Nemadji River Sediment Samples

In 2005, Beazer collected five composite sediment samples from three Crawford Creek reaches downstream of the railroad embankment. In 2014, GLNPO collected 64 grab sediment samples from Crawford Creek downstream of the railroad embankment, 12 grab samples from the Nemadji River upstream of the confluence with Crawford Creek, and 18 grab samples from the Nemadji River downstream

of the confluence with Crawford Creek. Chart 4 (Total PAHs) and Chart 5 (TCDD-TEQ) below provide a comparison of the concentrations for the 2005 Beazer samples relative to the 2014 GLNPO samples (for the 0-0.5 foot depth interval).



Notes:
CC=Crawford Creek, NR=Nemadji River, RR=Railroad Embankment
Total PAH calculations assume non-detects = ½ detection limit



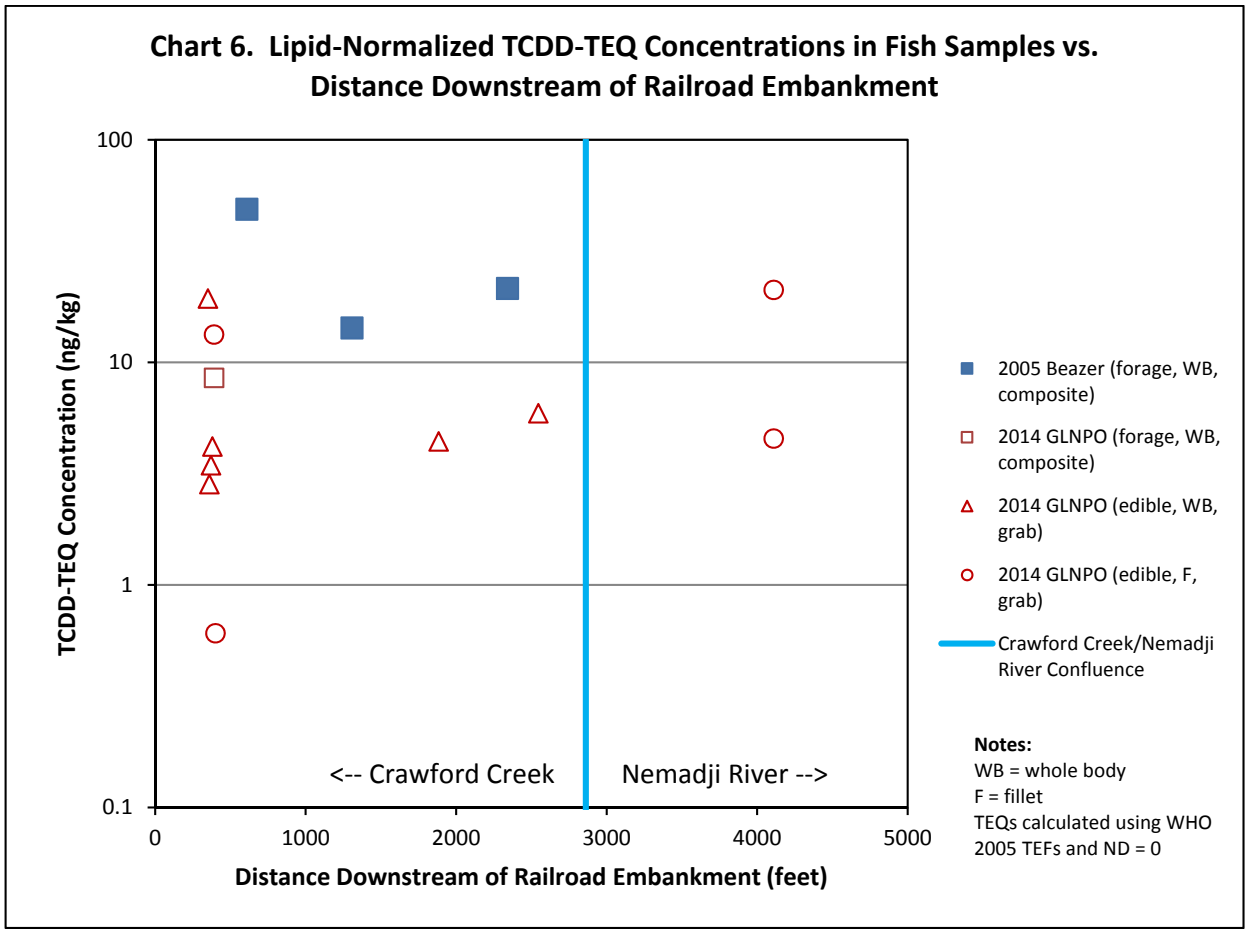
Notes:
CC=Crawford Creek, NR=Nemadji River, RR=Railroad Embankment
TCDD-TEQ calculations use WHO 2005 TEFs and assume non-detects = zero

As shown in Chart 4, average Total PAH concentrations in surficial Crawford Creek sediment samples collected downstream of the railroad embankment by GLNPO in 2014 are an order of magnitude lower than the concentrations in surficial sediment samples collected from the same reach by Beazer in 2005. Average Total PAH concentrations in surficial Nemadji River sediment samples collected by GLNPO in 2014 are three orders of magnitude lower than concentrations in 2014 GLNPO Crawford Creek samples collected downstream of the railroad embankment.

As shown in Chart 5, average TCDD-TEQ concentrations in surficial Crawford Creek sediment samples collected downstream of the railroad embankment by GLNPO in 2014 are slightly lower than the concentrations in surficial sediment samples collected from the same reach by Beazer in 2005. Average TCDD TEQ concentrations in surficial Nemadji River sediment samples collected by GLNPO in 2014 are three orders of magnitude lower than concentrations in 2014 GLNPO Crawford Creek samples collected downstream of the railroad embankment.

4.3 Crawford Creek and Nemadji River Fish Samples

In 2005, Beazer collected three composite fish samples from Crawford Creek downstream of the railroad embankment (all 2005 samples were of whole body forage fish). In 2014, GLNPO collected 11 fish samples (two fillet, two offal, seven whole body) from Crawford Creek downstream of the railroad embankment and four samples (two fillet, two offal) from the Nemadji River downstream of the confluence with Crawford Creek. Chart 6 below compares the lipid-normalized TCDD-TEQ concentrations for the 2005 Beazer fish samples relative to the 2014 GLNPO fish samples, plotted as a function of distance downstream of the railroad embankment (Note: chart includes data for whole body and fillet samples only).



As shown on Chart 6, lipid-normalized TCDD-TEQ concentrations in fish samples collected from Crawford Creek (downstream of the railroad embankment) and the Nemadji River by GLNPO in 2014 are generally lower than the concentrations in fish samples collected from the same reach of Crawford Creek by Beazer in 2005.

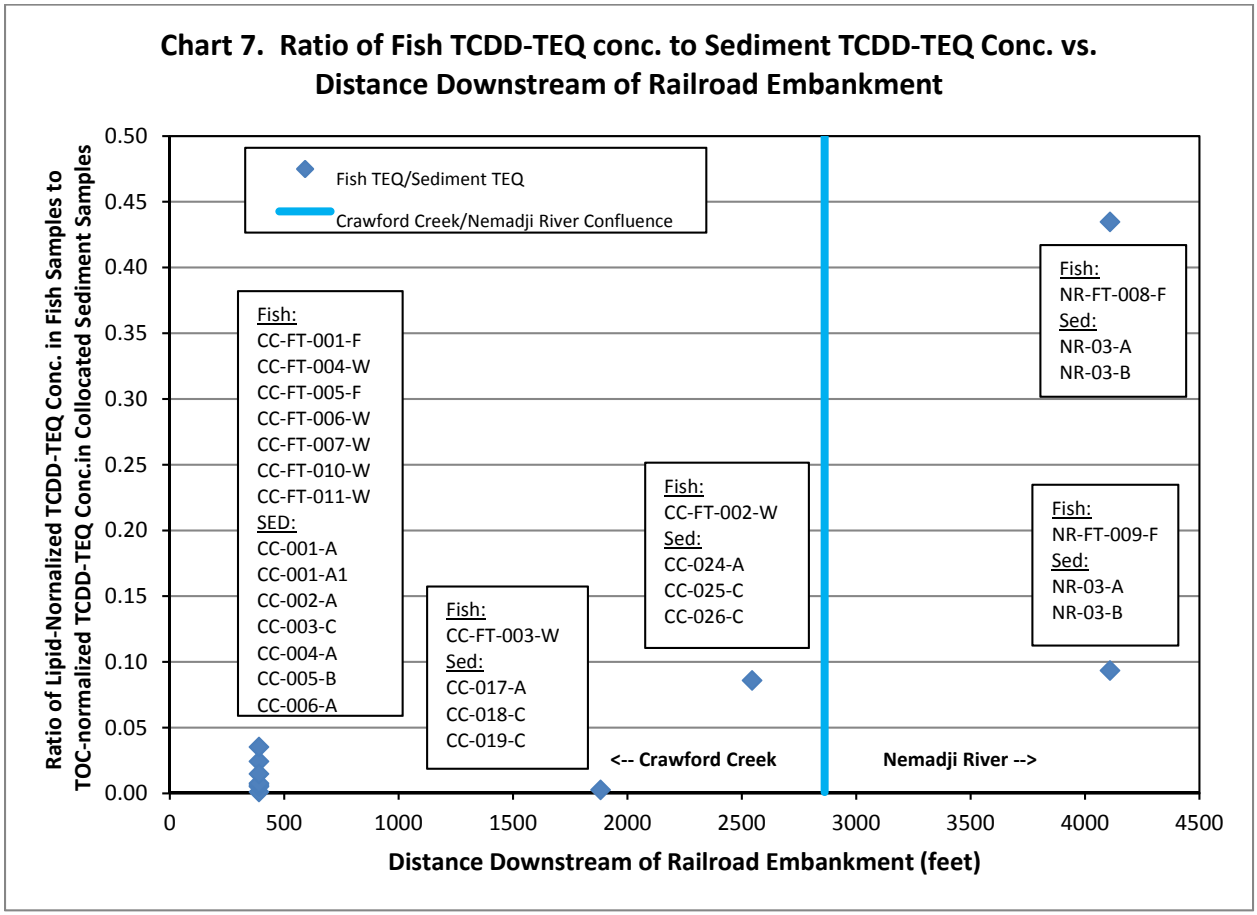
Because TCDD-TEQ concentrations in Nemadji River sediment were, on average, three orders of magnitude lower than concentrations in Crawford Creek sediment downstream of the railroad embankment, we would have expected similar trends in the fish sample data set. However, as indicated above on Chart 6,

there is no significant difference between the TCDD-TEQ concentrations in the Nemadji River fish samples compared to the Crawford Creek fish samples. To further investigate this finding, the TCDD-TEQ fish sample data set was evaluated for differences in chemical composition (i.e., fingerprints) that could be indicative of different sources of dioxins/furans in the fish samples. Dioxin/furan composition was assessed on both a congener (Figure 1, attached) and homologue (Figure 2, attached) basis. Key findings of this fingerprinting evaluation are as follows:

- The relative composition of dioxins and furans is similar in forage fish collected from Crawford Creek in 2005 (Beazer) and 2014 (GLNPO). Fewer congeners were detected in 2014 forage fish than in 2005 forage fish (Figure 1) possibly reflecting a decrease in the concentration of some congeners between 2005 and 2014.
- Larger fish caught in Crawford Creek during the 2014 GLNPO sampling event have a different composition than the 2005 and 2014 forage fish, indicating a different source of dioxins/furans in these larger fish is likely.
- Congener and homolog compositions of the fish caught in the Nemadji River are different than the Crawford Creek forage fish samples. Specifically, the Nemadji River fish samples do not have a proportionally large presence of octachlorodibenzo-p-dioxin (OCDD) as seen in the majority of the Crawford Creek fish samples.

These findings indicate that dioxin/furan concentrations in fish, particularly larger fish caught in the portion of Crawford Creek downstream of the railroad embankment and those caught in the Nemadji River, are attributable to sources other than Crawford Creek sediments. This makes intuitive sense, in that smaller forage fish are more likely to stay within the Crawford Creek channel, whereas larger fish are more likely to migrate into and out of Crawford Creek and the Nemadji River and be exposed to other sources of dioxins/furans.

The fingerprinting results were corroborated by comparing ratios of lipid-normalized TCDD-TEQ concentrations in fish samples to the average organic-carbon normalized TCDD-TEQ concentrations in collocated sediment samples. The results of this comparison are shown on Chart 7 below.



As shown on Chart 7 above, the ratios of lipid-normalized TCDD-TEQ concentrations in fish samples to organic carbon- normalized TCDD-TEQ concentrations in collocated sediment samples in the Nemadji River samples were higher than in the Crawford Creek samples. In other words, the TCDD-TEQ concentrations in the Nemadji River fish samples (in particular, the 17.25-inch channel catfish at NR-FT-08-F) are higher than would be expected based on the corresponding sediment concentrations. This provides further evidence that larger fish, like those caught in the Nemadji River, are being exposed to other sources of dioxins/furans other than those in Crawford Creek sediments.

In addition, as discussed in Section 2.3, TCDD-TEQ concentrations in Crawford Creek and the Nemadji River fish samples collected by both Beazer in 2005 and GLNPO in 2014, are consistent with or lower than regional concentrations.

4.4 Visual Observations

2014 GLNPO Report references associated with this comment:

- Pgs 9-10, Section 3.2 (Visual Observations)
- Pgs 20-21, Section 4.1.1 (NAPL Observations)

- Table 1 (Summary of Sediment and Soil Probing Data)
- Table 2 (Summary of Sediment and Soil Sampling Activities)
- Figure 4 (Summary of Total PAHs Exceeding WI TEC or PEC or Region 5 ESL Criteria – Crawford Creek and Floodplain)
- Figure 11 (Summary of Contamination in Crawford Creek and its Floodplain)
  Appendix C (Sediment Core Logs)

4.4.1 Data Discrepancies

Discrepancies exist in the visual impacts reported for numerous locations between the 2014 GLNPO Report text (Sections 3.2 and 4.1.1), Tables 1 and 2, Figures 4 and 11, and Appendix C (Sediment Core Logs). For example, visible impacts at floodplain sample CF-01-B are reported as follows:

- Section 4.1.1 – Category B
- Table 1 (probing observations) – no impacts reported
- Table 2 (sample observations) – visual impacts reported as "Sheen observed in the top 4 inches of the core. Moderate creosote-like odor."
- Figures 4 and 11 – identified as "Location with Category A NAPL Impact Observations"
- Log in Appendix C – log does not indicate any signs of impacts, other than noting that "odor/sheen observed" during probing the previous day

Note that CF-01-B is just a single example; there are other samples with similar discrepancies.

Beazer requests that USEPA provide an explanation for the discrepancies, or that the report be revised to correct the discrepancies in the visual impacts reported in the report text, tables, figures, and Appendix C. Further, it would be helpful if the Category A/B/C classifications were consistently used in Tables 1 and 2. If the discrepancies cannot be reliable rectified based on field notes, we suggest that the visual observation discussions be removed from the report.

4.4.2 Comparison to Beazer Classification Scheme

On June 25, 2014, David Bessingpas of ARCADIS observed the processing of sample cores by CH2M HILL staff. One observation that Mr. Bessingpas made was that CH2M HILL was classifying visible impacts differently than how Beazer/ARCADIS typically classifies impacts. In the sample cores that Mr. Bessingpas observed being processed, what CH2M HILL identified as "NAPL," Mr. Bessingpas would have called a "staining or sheen" under Beazer's established classification system.

In various presentations to WDNR, Beazer has demonstrated a strong correlation between visible impacts and PAH concentrations. Beazer's classification scheme used for prior investigations is summarized below, along with average Total PAH concentrations for samples collected by Beazer between 1999 and 2005 that comprise each of the classifications.

Table 2. Summary of Beazer Visual Classifications and Average Total PAH Concentrations.

Beazer Classification	Description	# Samples (Beazer 1999-2005)	Avg. Total PAH Conc. (mg/kg)
1	Visibly impacted with creosote-like product	28	6,699
2	Visibly impacted with staining or sheens, or exhibits creosote-like odor, but does not contain visible product	76	3,003
3	No visible impacts (i.e., staining, sheens, product) or odor	193	91

By comparison, the table below summarizes the visible classifications and Total PAH concentrations for the 2014 GLNPO data set.

Table 3. Summary of GLNPO Visual Classifications and Average Total PAH Concentrations.

GLNPO Classification	Description	# Samples (GLNPO 2014)	Avg. Total PAH Conc. (mg/kg)
A	Staining, creosote like product (NAPL), chunks of coal-tar like material, strong creosote-like odor, or NAPL-wetted fibers	31	51
B	Lesser sheens, milder odor, or trace NAPL	4	84
C	No signs of impacts	94	3

Note: As discussed in Section 44.1, the visible classifications for several samples were not reported consistently between the report text, tables, figures, and appendices. The classifications reported above are ARCADIS' best interpretation based on the collective information presented in the report.

Based on the above information, the 2014 GLNPO samples with reported NAPL impacts have an average Total PAH concentration (51 mg/kg) that is well below the average Total PAH concentrations associated with NAPL-impacted samples collected by Beazer from 1999-2005 (6,699 mg/kg).

Because of the difference in visible classification approaches, it is difficult to compare the Beazer and GLNPO visible observation data sets. **Therefore, Beazer requests that the following statement be added to the document (Section 3.2 [Visual Observations], Section 4.1.1 [NAPL Observations], and as notes in Tables 1 and 2 and on Figures 4 and 12): "Note that, due to differences in the visual classification approaches, visual observations/classifications described in this report are not directly comparable to visual observations/classifications for samples collected by Beazer during prior investigations."**

4.5 Habitat, Fish, and Benthic Macroinvertebrate Community Assessments

2014 GLNPO Report references associated with this comment:

- Pg 18, Section 3.6.1 (Physical Habitat Survey)
- Pgs 18-19, Section 3.6.2 (Fish Community Survey)

- Pgs 19-20, Section 3.6.3 (Benthic Macroinvertebrate Assessment)
- Pg 23, Section 4.1.8 (Habitat Assessment)
- Pg 23, Section 4.1.9 (Fish Community Assessment)
- Pg 23, Section 4.1.10 (Benthic Macroinvertebrate Community Assessment)
- Pg 24, Section 4.2 (Opportunities to Address Beneficial Use Impairments)

Based on the results of the physical habitat survey, fish community survey, and benthic macroinvertebrate assessment, the 2014 GLNPO Report concludes:

- The in-stream habitat of Crawford Creek is limited for supporting a diversity of aquatic life (Section 4.1.8);
- The fish community data indicate impairment of the stream environment (Section 4.1.9); and
- The benthic macroinvertebrate community in Crawford Creek is limited, and has low abundance and taxa richness (Section 4.1.10).

The report does not state, but implies, that the habitat and biological community deficiencies are the result of impacted sediments, and concludes that habitat improvements in Crawford Creek should be considered to address beneficial use impairments. However, the 2014 GLNPO habitat and biological community evaluations did not seek to establish whether habitat conditions are associated with the presence of constituents of concern rather than simply naturally occurring habitat conditions in the creek. Further, based on prior fish and benthic community studies conducted by Beazer in 1999 (which included a comparison of data from three Crawford Creek sample points downstream of the source area [including one location downstream of the railroad embankment] to data from one Crawford Creek reference sample point located upstream of the source area), it is likely that biological community differences between downstream and reference locations are attributable to differences in habitat and not sediment impacts (Blasland, Bouck & Lee, Inc. [BBL] 2000). Based on the 1999 evaluations, Beazer believes that any habitat and biological community impacts in Crawford Creek are the result of prevailing natural conditions, and not indicative of any Site-related impacts, and therefore habitat restoration is not warranted. As indicated in Section 4.2 of the 2014 GLNPO Report, “the lack of flow may limit the long-term effectiveness of habitat restoration.”

5. Additional Study Unwarranted

Section 4.2 of the 2014 GLNPO Report (Opportunities to Address Beneficial Use Impairments) implies that the results of the completed GLNPO investigations warrant further studies. Beazer does not believe that additional studies or data collection are warranted at this time. The 2014 GLNPO investigation data are consistent with Beazer’s prior conceptual site model, and the levels of impacts documented by GLNPO are consistent with, and in most cases lower than, the levels that were determined by prior Beazer investigations. Beazer believes that the existing data set is sufficient to evaluate the potential need for and scope of corrective actions for the downstream study area.

Specific to the Nemadji River, Beazer believes that the 2014 GLNPO sediment and fish data demonstrate that the Nemadji River does not pose unacceptable risks to potential human or ecological receptors, and therefore the Nemadji River does not warrant inclusion in future discussions regarding potential corrective actions for the Site. This conclusion is based on the observations and findings described below:

- In all 30 sediment samples collected from the Nemadji River in 2014, Total PAH concentrations were at least two orders of magnitude below the wood-treating specific PAH benchmark of 100 mg/kg. Nine of the 10 surface sediment samples from the Nemadji River had Total PAH concentrations below the conservative TEC (1.61 mg/kg @ 1% TOC) and PEC (22.8 mg/kg @ 1% TOC).

- The average TCDD-TEQ concentration in surficial Nemadji River sediment samples collected by GLNPO in 2014 (0.04 ng/kg; for samples downstream of Crawford Creek) is and order of magnitude below the conservative sediment ESL (0.12 ng/kg).

- All TCDD-TEQ concentrations in Nemadji River fish samples were well below the 10 ng/kg Wisconsin Fish Consumption Advisory Limit (WDNR 2011) and an ecological benchmark of 57 ng TCDD-TEQ/kg lipid (Steevens et al. 2005). In addition, TCDD-TEQ concentrations in Crawford Creek and the Nemadji River fish samples collected by both Beazer in 2005 and GLNPO in 2014, are consistent with or lower than regional concentrations. Further, an evaluation of the chemical composition of the Nemadji River fish shows that that dioxin/furan concentrations in Nemadji River fish are attributable to sources other than Crawford Creek sediments.

- There is no fish consumption advisory issued by the State of Wisconsin that is specific to the Nemadji River, other than the “all other waters” of Douglas County advisory due to mercury – which is applicable to most inland waters in Wisconsin.

6. Additional Comments

6.1 Flooding Frequency

Section 3.3 of the 2014 GLNPO Report (Sediment Type and Distribution) states that “This observation can be explained by the tendency of the creek and river sediments to accumulate in low-lying areas during the annual flooding of Crawford Creek and the Nemadji River.” Flooding of this area has been observed to be more frequent than annual. **Beazer requests that GLNPO revises the document to remove the word “annual” when referring to flooding frequency.**

6.2 Pentachlorophenol and Metals

Pentachlorophenol was non-detect in all of the 2014 GLNPO sediment and floodplain samples, which is consistent with the 2005 Beazer investigation findings. The report compares elevated pentachlorophenol detection limits to screening values, but concludes (Section 4.1.3) that the data provide a “degree of confidence that there is not a trend of widespread pentachlorophenol impacts exceeding screening criteria at the site.”

Metals were detected in Crawford Creek sediment and floodplain samples, as well as Nemadji River sediment samples, above the specified screening levels. However, the report concludes (Section 4.1.5) that "…the vast majority of the [Crawford Creek sediment and floodplain] samples pose low risk of adverse biological effects due to cadmium, copper, lead, nickel, or zinc" and "…the exceedances seen in the Nemadji River samples are an artifact of the low measurements and are likely not predictive of effects."

Beazer agrees with these conclusions, and does not consider pentachlorophenol or metals to be COPCs in the off-property portion of the Site.

7. References

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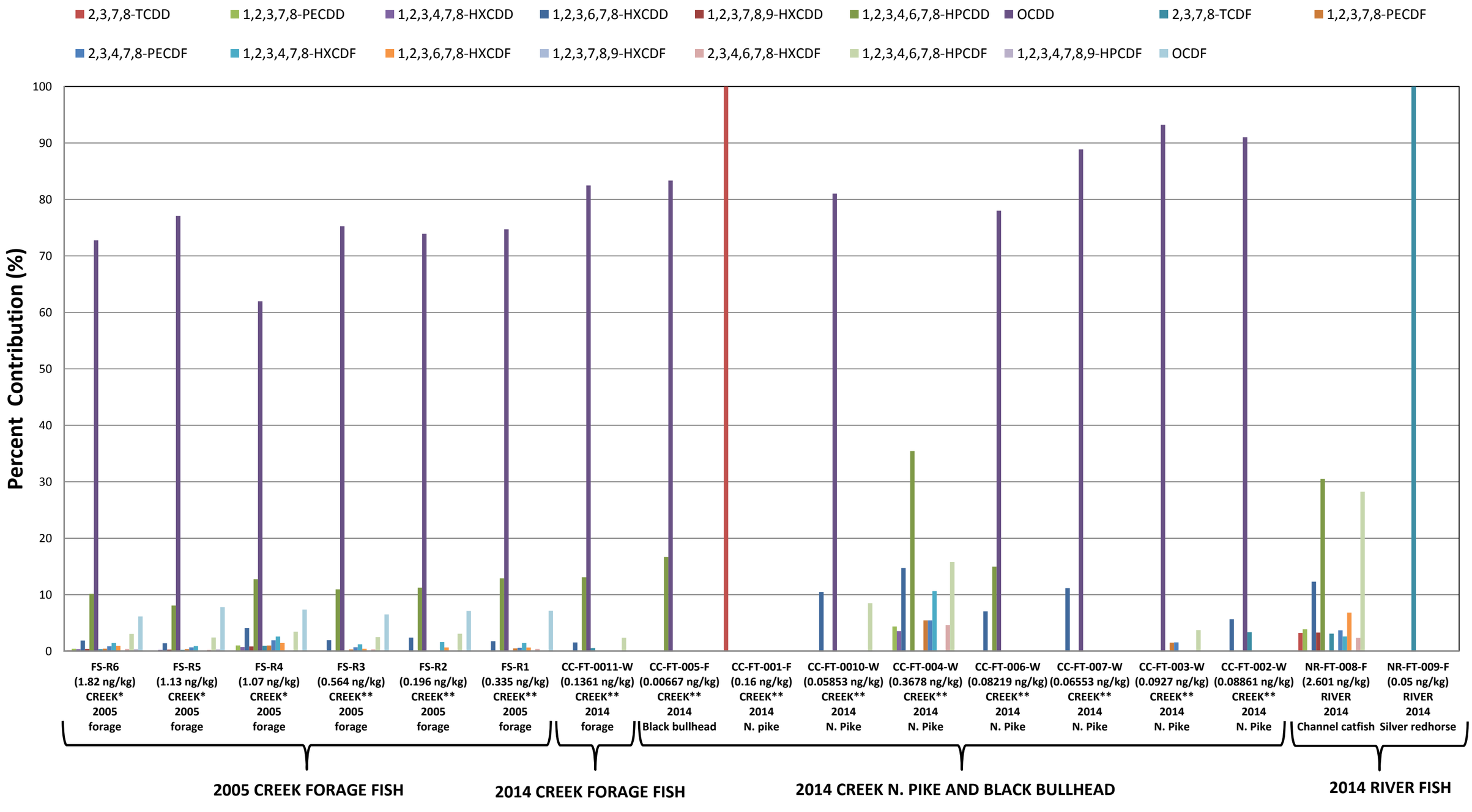
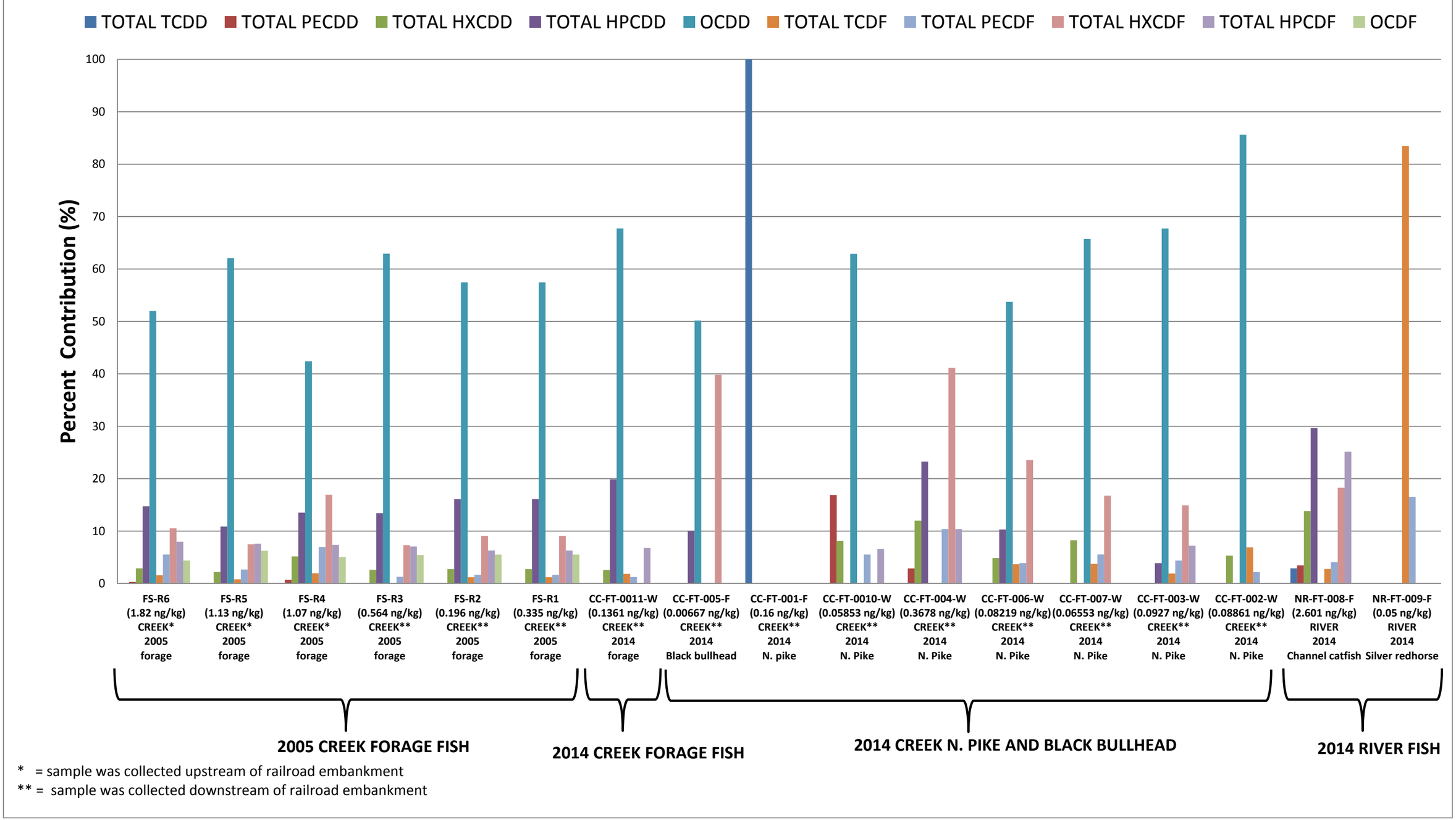
Figure 1: 2005 and 2014 Fish Dioxin/Furan Congener Concentrations



* = sample was collected upstream of railroad embankment

** = sample was collected downstream of railroad embankment

Figure 2: 2005 and 2014 Fish Dioxin/Furan Homolog Concentrations



* = sample was collected upstream of railroad embankment

** = sample was collected downstream of railroad embankment