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## Memorandum

**To:** Scott Alfonse and Cheryl Henlin, City of New Bedford  
**From:** David M. Sullivan, LSP, TRC Environmental Corporation  
**CC:** G. Hunt, D. Silverman, D. Peterson, J. Saunders, TRC Environmental Corporation  
**Subject:** Proposed NBHS Dioxin Follow-up Sampling - Technical Approach  
**Date:** April 13, 2011

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TRC Environmental Corporation has prepared the following outlines of the proposed technical approach for conducting a follow-up to the environmental investigation for polychlorinated dibenzo-p-dioxins (dioxins), polychlorinated dibenzofurans (furans), and dioxin-like PCB congeners, collectively referred to as dioxin compounds, This first sampling event was conducted by TRC for soil at the New Bedford High School (NBHS) campus in April 2010.

### Background

As stated in the March 3, 2010 memorandum outlining the proposed NBHS dioxin compound investigation, the April 2010 sampling event was an initial step in an iterative approach to the evaluation of dioxin in this portion of the Parker Street Waste Site (PSWS). This iterative approach is consistent with prior environmental investigative activities undertaken by TRC Environmental Corporation (TRC), where available data are used to help define the stages of environmental investigation.

The results of TRC's April 2010 dioxin compound sampling were provided in several prior documents as follows:

- July 2010 Fact Sheet issued by the City of New Bedford (City);
- July 6, 2010 memorandum providing an explanation for the Toxic Equivalent or TEQ approach unique to expressing environmental data for dioxins, furans, and polychlorinated biphenyl (PCB) compounds that exhibit dioxin-like toxicity;
- Draft February 2011 Release Abatement Measure (RAM) plan; and
- January 2011 Final Phase II Comprehensive Site Assessment (Phase II CSA) for NBHS.

In developing a proposed soil sampling program for dioxin compounds at NBHS, TRC reviewed all soil data collected from the PSWS. As discussed in Attachment A (Recommended Technical Approach for Dioxin Evaluation) to TRC's March 3, 2010 memorandum that outlined the prior sampling event, TRC's evaluation focused principally on data for metals, polynuclear aromatic hydrocarbons (PAHs), PCBs (homologs or Aroclors), and other semi-volatile organic compounds (SVOCs) as part of the process for sample selection. Based on an evaluation of all analytical

results, TRC selected soil sample locations with concentrations greater than regulatory limits for PCBs, PAHs, SVOCs, and/or metals for review. TRC selected sample locations based on the visual presence of ash, metals enrichment, and PAHs; PCB concentrations greater than regulatory limits; and the need to provide geographic coverage. TRC also reviewed soils data for the presence of other organochlorine compounds, the manufacture of which can result in the artifactual formation of dioxins (e.g., chlorinated benzenes and chlorinated phenols) and determined that PCBs are the only class of such compounds present. The available analytical data provide no indication of the presence of any other chlorinated organic compounds in significant concentrations based on analysis for volatile organic compounds (VOCs), SVOCs, pesticides, and PCBs conducted by TRC and prior consultants (the BETA and VHB). Absent combustion of waste materials containing chlorinated organic precursor compounds such as PCBs, dioxin formation is not expected to be significant.

From this evaluation, TRC identified a population of samples from which sample locations were selected to undergo dioxin, furan and dioxin-like PCB congener analyses based on existing chemical signatures. From these samples, TRC selected and sampled five locations (HB-26, HF-14, HF-40, HG-2, and HF-31D) where the highest concentrations of dioxins, furans and dioxin-like PCBs would be expected. At each location, soil samples were collected from the top foot of soil, the 1 to 3 foot depth zone, and the fill. The purpose of the sampling was to evaluate current and future risk. The biased sampling approach was intended to avoid underestimating risk from exposure to dioxin compounds in campus soil and, in all likelihood, results in overestimating risk. In the January 2011 Phase II CSA, risk from exposure to dioxin compounds, expressed as TEQ concentration, was estimated by assuming that the TEQ concentration calculated from these five "worst-case" samples is present at all areas of the high school campus along with other chemicals of concern. Despite this biased approach that is likely to overestimate risk, a condition of No Significant Risk is indicated for dioxin compounds based on a site-specific Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) Method 3 risk characterization.

The five sampling locations were selected for two reasons: 1) examine what relationship (if any) exists between PCBs and dioxins in soils at the site and 2) to efficiently target potential high concentration dioxin and dioxin-like compound areas. The sampling program met those goals. The levels of dioxins compounds detected in soil were consistent with background concentrations for soils in urban areas, even when in the presence of measured concentrations of PCBs above background. (Birmingham, 1990; Pearson et al., 1990; Creaser et al., 1990; Duarte-Davidson et al., 1997; and Hyeon Im et al., 2002).

### **MassDEP Comments**

In a January 13, 2011 letter to the City, MassDEP acknowledged that the technical approach utilized for the April 2010 soil sampling for dioxin compounds was designed to capture the worst-case conditions. MassDEP suggested further sampling at locations where dioxin precursors may be present, as well as where exposure potential is likely to support additional quantification of risk. MassDEP also suggested that no additional soil sampling for dioxin compounds should take place in locations that are expected to be consolidated/capped and excavated, as well as in locations where future exposure potential will be controlled by the application of an activity and use limitation (AUL).

**New Bedford High School Technical Approach (Proposed) - Supplemental Dioxin Investigation**

TRC will plan, implement and oversee the dioxin compounds investigative work at the NBHS Campus.

In developing a proposed supplemental soil sampling program for dioxin compounds at NBHS, TRC essentially utilized the same approach discussed in Attachment A to TRC’s March 3, 2010 memorandum (Recommended Technical Approach for Dioxin Evaluation). TRC reviewed all soil data collected from NBHS and excluded from consideration those locations that would be excavated, consolidated/capped, or for which exposure would otherwise be controlled. Note that this screening process eliminates the dioxin compounds soil boring locations sampled in April 2010 from consideration.

TRC selected additional areas for dioxin compounds sampling employing the same approach used to select sampling locations in April 2010. From this evaluation, TRC identified the following prior soil sampling locations listed below for further consideration (see Figure 1), along with the Phase II CSA defined exposure area identification.

<b>Sample locations</b>	<b>NBHS Campus Areas</b>
SB-362	Rear traffic island
SB-359	Near tennis courts.
HRN-26	
HRO-30	
HRK-33A	
HA-43 + HA-44	Southwest corner of campus.
HB-22	Sample cluster on west edge of campus.
HB-23G	
HC-23	
HD22 + HC22 + HB22	

TRC further, selected one location from each of these four (4) groupings: SB-362, SB-359, HA-43+HA-44, and HB-22.

TRC selected one sample location each from representative areas that will have exposed surface soil at the conclusion of the remedial action to further evaluate where exposure potential is likely to support additional quantification of risk. TRC selected no samples from areas that will be paved at the conclusion of the remedial action.

<b>Sample locations</b>	<b>NBHS Campus Areas</b>
PG-6	Little Whalers Playground
SS-28	Fenced Playing Field
SS-38	Unfenced Playing Field
SB-365	Near NBHS Gym (west side)
SS-52	NBHS House Area Exterior

At each location, TRC proposes to conduct sampling in the top foot of soil and the 1 to 3 foot depth zone.

Consistent with MassDEP's requested screening criteria, the fill layer below 3 feet will not be sampled since the AUL anticipated to be placed on the NBHS Campus will control exposure to this depth level and lower.

For each sample, TRC proposes the following analyses:

- Chlorinated dioxin/dibenzofuran congeners by SW-846 Method 8290 to evaluate the presence/absence of these compounds.
- PCB congeners by SW-846 Method 1668A to evaluate the presence/absence of PCB dioxin-like congeners and evaluate what relationship (if any) exists between PCBs and dioxins in soils at the site.

The existing database is deemed sufficient to support characterization of risk from exposure to PAHs, PCBs (aroclor/homologs), and metals; therefore, no further sampling is proposed for these compounds.

TRC will conduct field screening of soil samples based on visual and olfactory observations, jar headspace readings using a calibrated PID, and professional judgment. Screening will be conducted consistent with TRC Standard Operating Procedures (SOPs) and general industry practice. TRC field investigators may collect soil samples for analysis to supplement the findings of the soil boring program. Sample decisions will be based on professional judgment in consultation with the Licensed Site Professional (LSP).

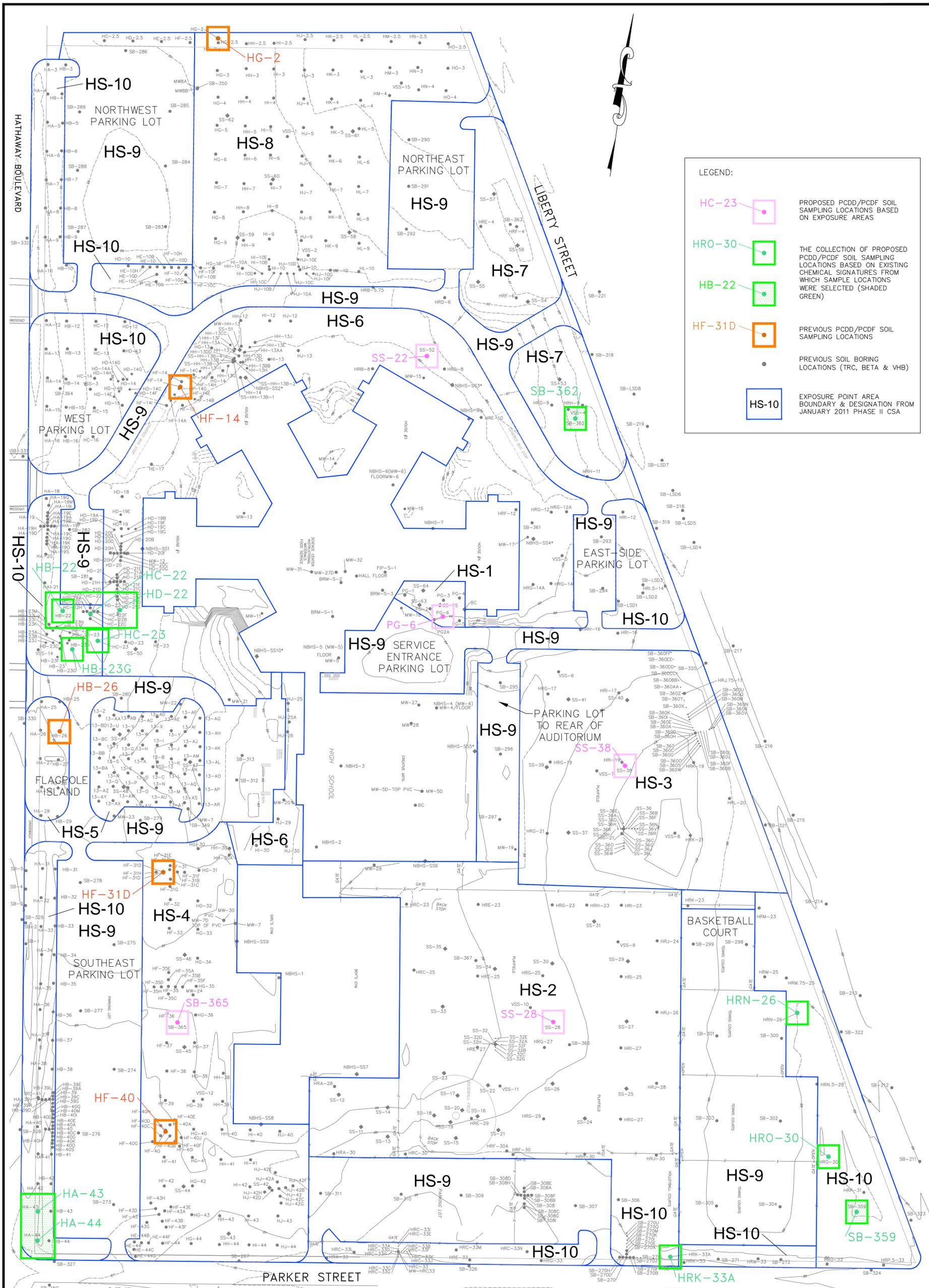
As a contingency, TRC is prepared to submit soil samples for VOC analysis contingent upon the results of field screening and professional judgment. The following analytical method will be specified in such an event:

- VOCs by Method SW-846 Method 8260B.

We look forward to discussing this memorandum with you at your earliest convenience.

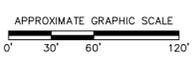
## References

- Birmingham, B. (1990) Analysis of PCDD and PCDF Patterns in Soil Samples: Use in the Estimation of the Risk of Exposure. *Chemosphere* 20(7-9): 807-814.
- Pearson, R.G.; McLaughlin, D.L.; McIveen, W.D. (1990) Concentrations of PCDD and PCDF in Ontario Soils from the Vicinity of Refuse and Sewage Sludge Incinerators and Remote Rural and Urban Locations. *Chemosphere* 20: 1543-1548.
- Creaser, C.S.; Fernandes, A.R.; Harrad, S.J.; Cox, E.A. (1990) Levels and sources of PCDDs and PCDFs in Urban British Soils. *Chemosphere* 21:931-938.
- Duarte-Davidson, et al. (1997) *Environmental Science and Technology*, Vol 31, No 1, pp 1-11.
- Hyeon Im, et al. (2002) *Environmental Science and Technology* Vol 36, No 17, pp 3700-3705.



**LEGEND:**

- **HC-23** PROPOSED PCDD/PCDF SOIL SAMPLING LOCATIONS BASED ON EXPOSURE AREAS
- **HRO-30** THE COLLECTION OF PROPOSED PCDD/PCDF SOIL SAMPLING LOCATIONS BASED ON EXISTING CHEMICAL SIGNATURES FROM WHICH SAMPLE LOCATIONS WERE SELECTED (SHADED GREEN)
- **HB-22**
- **HF-31D** PREVIOUS PCDD/PCDF SOIL SAMPLING LOCATIONS
- PREVIOUS SOIL BORING LOCATIONS (TRC, BETA & VHB)
- HS-10 EXPOSURE POINT AREA BOUNDARY & DESIGNATION FROM JANUARY 2011 PHASE II CSA



**NOTES:**

1. MAP PREPARED BASED ON DRAWINGS AND SURVEY DATA PROVIDED BY LAND PLANNING, INC. OF HANSON, MASSACHUSETTS.
2. ALL TRC SAMPLING LOCATIONS SURVEYED BY LAND PLANNING, INC. OF HANSON, MASSACHUSETTS.
3. BETA SAMPLE LOCATIONS ARE APPROXIMATE AND BASED ON THE FIGURE PROVIDED IN THE JUNE 9, 2006 "SUMMARY OF ANALYTICAL DATA, NEW BEDFORD HIGH SCHOOL, NEW BEDFORD, MASSACHUSETTS" BY BETA GROUP, INC. OF NORWOOD, MASSACHUSETTS.

<b>NEW BEDFORD HIGH SCHOOL</b>		<b>FIGURE</b>  <b>1</b>
NEW BEDFORD, MASSACHUSETTS		
PROPOSED PCDD/PCDF SOIL SAMPLING LOCATIONS		
<b>Wannalancit Mills</b> 650 Suffolk Street Lowell, MA 01854 (978) 970-5600		
DRAWN BY: HWB	DATE:	
CHECKED BY: JBS	MARCH 2011	

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