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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: Nemasket Street Lots Dioxin Sampling - Technical Approach
Date: April 15, 2011

TRC Environmental Corporation (TRC) has prepared the following memorandum to outline the proposed technical approach for conducting an environmental investigation for polychlorinated dibenzo-p-dioxins (dioxins), polychlorinated dibenzofurans (furans), and dioxin-like polychlorinated biphenyl (PCB) congeners, collectively referred to as dioxin compounds, in soil at the Nemasket Street Lot in New Bedford, Massachusetts. The approach proposed herein is designed to capture worst-case conditions and provide representative spatial coverage, as well as to evaluate risk under the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) at the Nemasket Street Lots portion of the Parker Street Waste Site (PSWS).

Background

As stated in the March 3, 2010 memorandum outlining the proposed Nemasket Street Lots investigation approach (TRC 2010), soil sampling to evaluate and initially delineate potential impacts from waste disposal activities were to be guided by the results of geophysical investigation activities, exploratory test pit excavation activities and prior soil sampling conducted by BETA Group, Incorporated (BETA). These activities were designed to be an initial step in an iterative approach to the investigation of the Nemasket Street Lots, consistent with prior environmental investigative activities undertaken by TRC. The soil sampling was designed to potentially include analysis for dioxin compounds consistent with Attachment A of the March 3, 2010 memorandum.

TRC conducted geophysical investigation and test pit excavation activities at the Nemasket Street Lots in October and November 2010. A soil boring program to support characterization of risk from exposure to polycyclic aromatic hydrocarbons (PAHs), PCBs (homologs or Aroclors), and metals was implemented in December 2010, with supplemental sampling conducted in March 2011. Previous test pit and soil boring locations are depicted on Figure 1.

No previous soil sampling for dioxin compounds has been performed at the Nemasket Street Lots. However, previous soil sampling for dioxin compounds was conducted by TRC in April 2010 at New Bedford High School (NBHS). That sampling event was conducted consistent with the approach outlined in the Proposed New Bedford High School Dioxin Investigation Technical Approach memorandum dated March 3, 2010 (TRC 2010).

In development of the soil sampling program for dioxin compounds at the NBHS campus, TRC reviewed all soil data collected from the PSWS. As discussed in Attachment A (Recommended Technical Approach for Dioxin Evaluation) to TRC's above-referenced March 3, 2010 memorandum (TRC 2010), TRC's evaluation focused principally on data for metals, 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 also evaluated locations based on the visual presence of ash, metals enrichment, and PAHs; PCB concentrations greater than regulatory limits; and the need to provide representative 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 detected. The available analytical data from NBHS and elsewhere 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 the prior consultants (BETA and VHB). Absent combustion of waste materials containing chlorinated organic precursor compounds such as PCBs, dioxin formation is not expected to be significant.

TRC used a similar approach to identify a population of samples at the Nemasket Street Lots. Based on the existing chemical signatures and geographical distribution of sample points at the Nemasket Street Lots, a modified approach was employed to select which sample locations were to undergo dioxin, furan and dioxin-like PCB congener analyses as further described herein. Considering previous Massachusetts Department of Environmental Protection (MassDEP) comments on the outcome of the April 2010 NBHS sampling (MassDEP 2011) and consistent with previously proposed and implemented dioxin compounds investigative activities at the NBHS campus (TRC 2011), the approach proposed herein is designed to accomplish the following at the Nemasket Street Lots:

- **Biased Sampling** - Identify sample locations where the highest concentrations of dioxins, furans and dioxin-like PCB congeners would be expected. This component of the sampling approach is intended to avoid underestimating risk from exposure to dioxins compounds in this area of evaluation.
- **Risk Assessment** - Support the evaluation of current and future human health risk under the MCP using dioxin compound data that is representative of human exposures that could occur across the site.

Consistent with the previous investigation at the NBHS campus, this sampling program will also help: 1) examine what relationship (if any) exists between PCBs and dioxins in soils at the site; and 2) to efficiently target areas potentially impacted by dioxin compounds in lieu of a larger sampling program.

Nemasket Street Lot Technical Approach (Proposed) - Dioxin Investigation

TRC will plan, implement and oversee the dioxin compounds investigative work at the Nemasket Street Lots. TRC's approach is based, in part, on the methodology discussed in TRC's Proposed NBHS Dioxin Follow-Up Sampling – Technical Approach memorandum for NBHS dated April 13, 2011 (TRC 2011). That approach targeted both biased (“worst-case”) and unbiased sample locations to evaluate potential exposures that may be present following the future implementation of a soil remedial measure and an Activity and Use Limitation (AUL) for soil at depths greater than three feet below ground surface at the NBHS campus.

Based upon the chemical signatures observed in soil samples, TRC concluded that elevated concentrations of a number of the target compounds were widespread across the Nemasket Street Lots. The prevalence of PCBs, PAHs and metals in site soils precluded the selection of a population of locations representative of worst-case conditions. As a result, TRC utilized a grid-based approach to determine the locations for dioxin compound sampling.

The grid sampling design, as shown in Figure 1, subdivided the Nemasket Street Lot into ten approximately equal areas (each area is approximately 6,100 square feet) between the eastern property boundary along Hathaway Boulevard and the western limit of the isolated wetland. TRC then selected a minimum of one location within each quadrant for soil sampling. If feasible, a prior soil boring location was selected within each quadrant. In the absence of a previous soil boring location, an additional sample point was identified to provide adequate geographical coverage to support risk characterization.

From this evaluation, TRC identified the soil sampling locations listed below (see Figure 1).

Sample Location	Grid Quadrant (See Figure 1)
SB-NM-7	A-1
Bethel-3	B-1
SB-NM-28	A-2
SB-NM-33 (assumed location identification)	B-2
SB-NM-11	A-3
SB-NM-6	B-3
SB-NM-15	A-4
SB-NM-19	B-4
SB-NM-20	A-5
SB-NM-25	B-5

The proposed locations supplement the existing database of analytical results for PAHs, PCBs (homologs or Aroclors), and metals representing the 0 to 3 foot depth zone, while providing good spatial distribution of sample points within the Nemasket Street Lots to support risk characterization. At each location, TRC proposes to conduct sampling in the top foot of soil and the 1 to 3 foot depth zone.

The soils and fill layer below 3 feet will not be sampled since the AUL to be placed on the Nemasket Street Lots will control exposure to soils greater than three feet below ground surface. This approach is consistent with Mass DEP's January 13, 2011 comment (MassDEP 2011).

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 (homologs or Aroclors), and metals; therefore, no further sampling is proposed for these chemicals.

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.

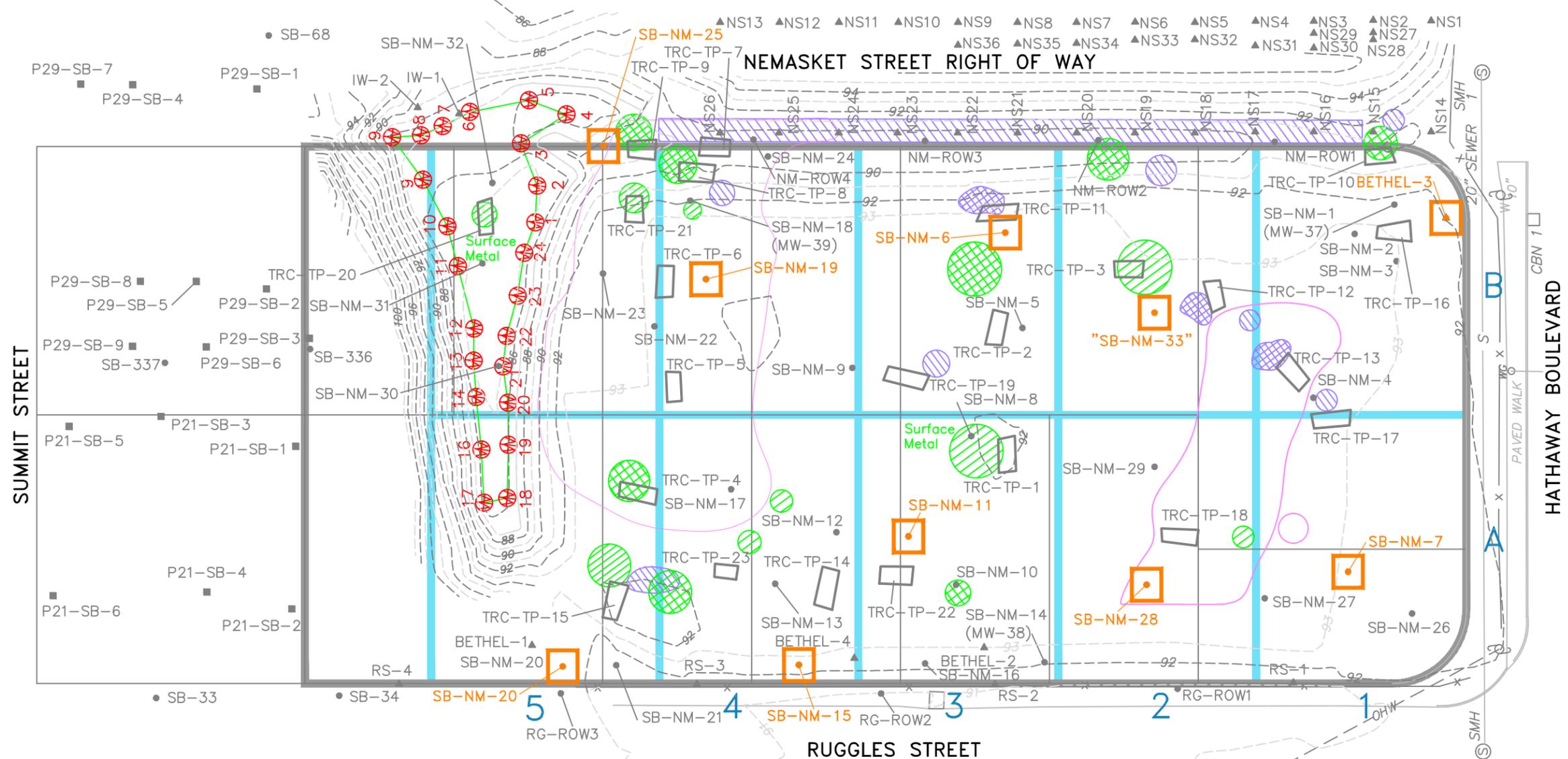
We look forward to discussing this memorandum with you at your earliest convenience.

References

MassDEP 2011 Letter. Prepared by Massachusetts Department of Environmental Protection (Leonard J. Pinaud). Addressed to: City of New Bedford (Scott Alfonse). RE: New Bedford High School Campus [Dioxin Sampling]. January 13, 2011

TRC 2010 Memorandum. Proposed Nemasket Street Lots Investigation Approach. Prepared for the City of New Bedford. Prepared by TRC Environmental Corporation. March 3, 2010.

TRC 2011 Memorandum. Proposed NBHS Dioxin Follow-up Sampling - Technical Approach. Prepared for the City of New Bedford. Prepared by TRC Environmental Corporation. April 13, 2011.



NOTES:

- EM AND GPR RESULTS BASED ON "COMBINED EM AND GPR RESULTS, NEMASKET STREET LOT, NEW BEDFORD, MA" BY HAGER GEOSCIENCE, INC. WOBURN, MA DATED NOVEMBER 2010.
- BETA INFORMATION DERIVED FROM "PERIPHERAL AREAS SOUTH OF McCOY FIELD" UNDATED AND "BETHEL A.M.E. SOIL SAMPLE LOCATION PLAN" DATED 9-9-2005, BOTH FROM BETA GROUP, INC. OF NORWOOD MA.

GPR = GROUND PENETRATING RADAR
EM = ELECTRO-MAGNETIC

LEGEND:

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|--|--|--|----------------------------------|
| | TEST PIT LOCATION | | EM METAL ANOMALY |
| | TRC SOIL BORING LOCATION | | EM METAL ANOMALY MARKED IN FIELD |
| | PREVIOUS BETA SOIL BORING LOCATION | | EM SOIL CONDUCTIVITY ANOMALY |
| | EPA SOIL BORING LOCATION | | LOT LINES |
| | PROPOSED PCDD/PCDF SOIL SAMPLING LOCATIONS | | APPROXIMATE PROPERTY BOUNDARY |
| | GPR ANOMALY | | GRID QUADRANTS |
| | GPR ANOMALY MARKED IN FIELD | | |
| | WETLAND FLAG | | |

APPROXIMATE GRAPHIC SCALE



ENVIRONMENTAL INVESTIGATION AND RELATED ENVIRONMENTAL CONSULTING SERVICES
NEW BEDFORD HIGH SCHOOL & SURROUNDING NEIGHBORHOOD
NEW BEDFORD, MASSACHUSETTS

NEMASKET STREET LOT PROPOSED PCDD/PCDF SOIL SAMPLING LOCATIONS

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DRAWN BY: HWB
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DATE:
APR 2011

FIGURE
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