ENVIRONMENTAL STEWARDSHIP DEPARTMENT/

NEW BEDFORD CONSERVATION COMMISSION

CITY OF NEW BEDFORD
SCOTT W. LANG, MAYOR

Response to comments received on the
PHASE II COMPREHENSIVE SITE ASSESSMENT, NEW BEDFORD HIGH SCHOOL CAMPUS
AT THE PARKER STREET WASTE SITE

The following are comments (shown in bold) which were received by the City on the *Phase II Comprehensive Site Assessment (CSA)* on the New Bedford High School campus. The City's response follows each comment.
*Note: Comments which were submitted on the *Phase II CSA* during the March 2, 2011 Public Involvement Plan (PIP) meeting are also included in this document for completeness.

1. **At sampling locations HF-31A and HF-31B, PCBs were detected above the S-1 soil standards at 1-3 feet below the ground surface. Therefore, it is unclear why the Comprehensive Site Assessment (CSA) selected these sampling locations as boundaries of contamination, rather than delineating a larger impacted area bounded by the corresponding outer ring samples (HF-31E and HF-31F). The soil removal to be conducted at location HF-31 is described in a separate Release Abatement Measure (RAM) Plan approved by MassDEP in February 2011, which was not reviewed as part of this Technical Assistance Services for Communities (TASC) report (RAM Plan p. 1-2). The shading in Table 3-4 of the current RAM Plan indicates that locations HF-31, HF-31C and HF-31D will be excavated; these locations enclose an area smaller than the contaminated area delineated in the CSA (p. 4-10).**

   As identified on Pages 3-1 through 3-2, and 4-2 of the Phase II CSA, for the areas targeted as being considered for excavation, the excavation limits were determined by recalculating the exposure point concentrations (EPCs) for each targeted area after the samples within the excavation boundaries were eliminated from the data set, confirming that a condition of No Significant Risk would be achieved for the targeted areas following excavation. Confirmation samples collected at the edges of each excavation area were used in the calculation of EPCs used to demonstrate No Significant Risk.

2. **The community may want to confirm whether the proposed cleanup will reduce the exposure point concentrations (EPCs) for dioxin and dioxin-like toxicity equivalent (TEQ) Summations to levels below the S-1 soil standard. The potential presence of dioxins on the site is historically a source of great concern to the community. The community may want to request that the Massachusetts Department of Environmental Protection (MassDEP) require additional investigation of dioxin as a contaminant of concern.**

   Since site-specific risk and hazard calculations have been performed (i.e., a Method 3 Risk Characterization approach is used), Method 1 standards are not applicable and are not used in the risk characterization. The Method 3 Risk Characterization uses the EPCs for all constituents of potential concern, including the dioxin and dioxin-like TEQs, to demonstrate that cumulative receptor risks and hazards are below MassDEP cumulative risk limits. Please see pages ES-5 of the Phase II Executive Summary and pages 4-31 and 4-32 of the Phase II text for additional details of the

risk characterization regarding dioxin. Note that additional investigation of dioxin and dioxin-like compounds is planned for the high school campus per MassDEP's January 13, 2011 letter addressed to the City of New Bedford.

3. **The Release Abatement Measure (RAM) Plan states that most of HS-8 will be paved, but that most of the edges will remain grassed (p. 4-5 and Drawings C-101 and C-102). All of the HS-8 sample locations presented in Table 3-8 of the RAM Plan are shaded, indicating that they are to be excavated or paved; some of these locations seem to be in areas to be left unpaved. The community may want to ask whether the areas that will remain unpaved will be excavated down to 3 feet, the minimum depth of excavation proposed in the RAM Plan.**

   As identified on page 4-5 of the RAM Plan (Section 4.2.6 - Extent of Asphalt Pavement), soil from areas adjacent to the limits of the proposed asphalt cover in area HS-8 will be graded beneath the new paved areas in order to support the necessary drainage features around the cover system and to level the new parking surface.

   Following the grading and parking area construction, all perimeter areas of HS-8 outside the limit of the pavement will have at least three feet of new clean cover in place in accordance with the RAM Plan objectives.

4. **The community may want to request an explanation of why it is important whether the elevated lead levels detected in ground water are due to dissolved lead or lead associated with particulate matter.**

   A discussion of total lead (lead associated with particulates) and dissolved lead is included in the Phase II CSA on Pages 4-33, 5-5, and 7-24, as well as on page ES-6 of the Executive Summary. The "importance" of whether lead concentrations are attributable to dissolved lead or lead associate with particulate matter (total lead), is that lead associated with particulate matter has little potential to move (migrate) through the groundwater and therefore, does not contribute to a groundwater exposure pathway.

5. **Because semi-volatile organic compounds (SVOCs) were detected in the site's soil (see, for example, CSA Tables 4-4 and 4-8), the community may want to request that a discussion of their fate and transport be added to Section 5.0.**

   Some SVOCs were detected at the Site at concentrations below MCP Method 1 Standards and were not deemed to be of concern. A subset of SVOCs, referred to collectively as polycyclic aromatic hydrocarbons (PAHs) are present at the site above MCP Method 1 Standards in some sample locations. The fate and transport of PAHs is thoroughly discussed in Section 5.0 (Fate and Transport Analysis). SVOCs detected at the Site, but not included in the PAH subset of SVOCs, exhibit the same or similar fate and transport characteristics as PAHs (e.g., low solubility, negligible volatility, strong tendency to adsorb [stick] to soil, and highly immobile).

6. **Some of the sampling locations with high levels of PCBs are omitted from Table 4-10 (for example, HB-23A and HB-23E). The community may want to inquire about the reason for this omission.**

   As identified on Page 4-1 of the Phase II CSA, sample results for locations where soils have been previously excavated under an Immediate Response Action (IRA) are not included in the tables of results. A summary of IRA activities is included in Section 6.0 - Discussion of Immediate Response

Actions. Also, the following reports related to IRA are posted on the City's website (New Bedford High School tab, Outdoor Studies→HB-23 Area Soil Removal):

- *Immediate Response Action Plan, New Bedford High School – HB-23 Soil Removal, 230 Hathaway Boulevard, New Bedford, Massachusetts. Release Tracking Number 4-21847.* Prepared for: City of New Bedford, 133 William Street, New Bedford, Massachusetts. Prepared by: TRC Environmental Corporation, Lowell, Massachusetts. May 2009.

- *Immediate Response Action Completion Report and Imminent Hazard Evaluation, New Bedford High School – HB-23 Area Impacted Soil Removal, New Bedford High School, 230 Hathaway Boulevard, New Bedford, Massachusetts. Release Tracking Number 4-21847.* Prepared for: City of New Bedford, 133 William Street, New Bedford, Massachusetts. Prepared by: TRC Environmental Corporation, Lowell, Massachusetts. July 16, 2009.

Note also that both of the aforementioned documents are cited and included in the references in the Phase II CSA.

7. The Phase II CSA Figure 5-1 (the conceptual site model) contradicts several of the risk characterization's assumptions presented in Section 7.0. Figure 5-1 assumes *unrestricted future use*, including future residents; the risk characterization assumes *no future residential use* (p. 7-1). Figure 5-1 assumes that utility and construction workers are present on the site in both the *current and future use* scenarios; the risk characterization assumes that utility and construction workers are present only in the *future use* scenario (pp. 7-6 to 7-7). The community may want to inquire why Figure 5-1 contradicts the Section 7.0 narrative.

As stated in the footnote on Figure 5-1, the Conceptual Site Model (CSM) was prepared assuming unrestricted future use, whereas the risk characterization focuses on future land uses that will not be restricted by the Activity and Use Limitation (as clearly stated on Page 7-1 of the Phase II CSA). The CSM is providing a listing of "potentially" complete pathways and therefore, identified construction/excavation workers as theoretical current receptors. Because no major construction/excavation projects are currently occurring at the NBHS campus, exposures to construction/excavation workers were assumed to occur under a future exposure scenario in the risk characterization. The risk characterization incorporates a more refined understanding of current and future exposures than that presented by the CSM.

8. MassDEP's July 1995 *Guidance for Disposal Site Risk Characterization* provides the following guidance to risk assessors about how to select exposure points when performing a human health risk characterization:

> **When considering whether the exposure point should cover an area larger than that which is contaminated, the scale of the contaminated area relative to the anticipated exposure pattern is an important consideration. For example, consider a vacant lot where children are likely to play. If ¼ of a 2000 ft^2 lot were contaminated, it may be reasonable to assume that activity levels and exposures in the 500 ft^2 contaminated area are not likely to be any higher than those in the rest of the lot. However, if the ¼ of a one acre lot is contaminated, it would be more difficult to justify the assumption that activity levels in the ¼ acre that is contaminated will never be higher than in the surrounding area.**

Another important consideration is whether the foreseeable activities are likely to result in more intense or more frequent exposures in some areas than in others. For example, in play parks, exposure intensity at any location depends upon the landscaping, the pattern of open space and the layout of equipment. If a small area of surface soil located within a large park were contaminated, the risk assessor may not be able to rule out the possibility that exposures to individual children will not be higher in that area than in other areas of the park. Therefore it would be more appropriate to designate the contaminated area alone as the exposure point, and not the entire park (p. 7-31).

Of the 11 exposure areas currently used in the CSA, 10 have known geographic locations; these 10 exposure areas have an average area of 3.5 acres. These areas are used as a playground, playing fields, a student congregating area, a gym class area, and other uses. Therefore, considering the current exposure areas' large sizes and recreational uses, along with the above guidance, the community may want to request that the CSA create an exposure point at each area of soil contamination, rather than the CSA's current practice of including both contaminated and uncontaminated areas within the same exposure area.

Exposure points were selected following the MassDEP risk characterization guidance. Note that the passages cited in this comment refer to instances where only a portion of a property is impacted, with the remaining portion lacking impacts. Per the cited guidance, the site boundary should, therefore, only encompass the portion of the property containing impacts, and the exposure point(s) should be selected to fall entirely within the site boundary. In the case of this Phase II CSA, the entire NBHS campus falls within the boundary of the site as it is underlain by the fill materials of interest. The site boundary for this Phase II CSA has been established as the entire NBHS campus, and exposure points were selected to represent the activity patterns occurring *within* the site boundary. This approach provides for protectiveness as the areas of lesser impact within the site (e.g., HS-7) were not combined with the areas of greater impact levels (e.g., HS-5). By using this approach, EPCs were calculated for each area where specific exposures were identified, and EPCs for each exposure area were not influenced by the impacts detected, or conversely not detected, in other exposure areas.

9. The CSA defines the site's remedial goal as S-1 soil standards (p. ES-3). Later, the CSA states, "based on the above-summarized information, and Table 40.0933(9) of the MCP, soil categories S-1, S-2 and S-3 currently apply to Site soil" (p. 7-10). However, based on the CSA's assumptions (high frequency and intensity of use for both adults and children) (p. 7-10) and the MCP Table 40.933(9) it seems that S-1 should apply to soil 0-15 feet deep and S-3 should apply to soil deeper than 15 feet or under a building. The community may want to ask the City to clarify which site locations and depths are subjected to each soil standard.

The S-1 standards typically apply to soil volumes found within 3 feet of ground surface that are not covered with pavement or permanent structures (i.e., accessible soils). Most of the unpaved areas of the campus are high intensity areas where athletics and other recreational activities may occur. The S-2 standards typically apply to soil volumes found at depths between 3 and 15 feet below ground surface where no pavement is present, or at depths between 0 and 15 feet below ground surface when pavement is present (i.e., potentially accessible soils). The S-1 standards may also apply to the 0-15 depth zone depending on the assumptions for frequency and intensity of use for certain receptors. The paved areas of the campus (parking lots, roadways) are low intensity areas where exposures are assumed to occur via passive activities (e.g., walking). The S-3 standards typically apply to soil volumes located greater than 15 feet below ground surface or beneath permanent structures such as the NBHS building (i.e., isolated soils). Because the risk characterization assumed that all soils will be moved to within 3 feet of the surface and not paved

(i.e., are or will become accessible), S-1 standards are considered applicable to all soils between 0 and 15 feet below ground surface in the future.

10. The community may want to ask the City to clarify when (current vs. future use) and where ground water standards GW-2 and GW-3 apply at the site.

As identified on Page 7-10 of the Phase II CSA, GW-3 standards apply universally to groundwater across the campus under current and future site conditions. GW-2 standards apply to groundwater found at an annual average depth of less than 15 feet below ground surface and within 30 feet of an occupied structure (e.g., the NBHS building) under current conditions. For future conditions, GW-2 standards apply to groundwater found at an annual average depth of less than 15 feet below groundwater surface across the campus, assuming that an occupied structure may be built at any location across the campus in the future.

11. The CSA assumes a soil ingestion rate of 100 milligrams per day (mg/d) for construction workers (p. 7-14). However, Appendix B of the *Guidance for Disposal Site Risk Characterization* provides "a default soil ingestion rate [500 mg/d] for an enhanced (or more intense) exposure. The enhanced soil ingestion rate should be used for adult receptors who are exposed to soil at a more intense rate (e.g., a construction worker digging a ditch)" (p. B-7) The community may want to ask the City why the enhanced soil ingestion rate was not assumed for construction workers.

In 2002, MassDEP published a Technical Update entitled "Calculation of an Enhanced Soil Ingestion Rate", which updated the information related to the enhanced soil ingestion rate presented in Appendix B of the1995 *Guidance for Disposal Site Risk Characterization*. In this Technical Update, available at the following link: www.mass.gov/dep/cleanup/laws/soiling.doc, MassDEP describes the technical basis for the updated enhanced incidental soil ingestion rate of 100 mg/kg, applicable to a utility/heavy construction worker scenario. This MassDEP-endorsed value is used in the MassDEP Construction Worker Soil Shortform, which was used to evaluate construction worker exposures in the Phase II CSA report.

12. The CSA assumes a skin-soil adherence factor of 0.14 milligrams per square centimeter (mg/cm^2) for students (p. 7-13). This is the factor presented for the "trespasser" receptor group in MassDEP's technical update, *Weighted Skin-Soil Adherence Factors*. The technical update presents a factor of 0.35 mg/cm^2 for "child resident/child recreational." It seems that the higher value may be more appropriate to represent students engaging in outdoor sports. The community may want to ask why the factor for child recreational is not used.

Soil adherence factors are age-specific factors that consider the surface area exposed and activity being performed that results in soil-skin contact. The adherence factor of 0.14 mg/cm^2 is the value endorsed by MassDEP for older child/adolescent residents and recreational receptors (age 8-15 years old), as published in the MassDEP Residential Soil and Park Visitor Soil Shortforms. The value of 0.35 mg/cm^2 is appropriate for children under the age of 8, and was used to quantitatively evaluated daycare children in the risk characterization at each exposure point. Both older children/adolescents and daycare children were selected for evaluation in the risk characterization as the most exposed non-adult receptors at the campus.

13. The CSA states, "soil located beneath paved parking areas, roadways, and buildings is considered isolated" (p. 7-10). Therefore, the CSA does not assess the current risks from soil in the site's paved areas (HS-9). However, the MCP table referenced in question 9 seems to indicate

that soil beneath pavement, at a depth of 0-15 feet, is considered "potentially accessible." The community may want to inquire as to why the CSA assumes that such soil is isolated.

Soils located beneath the high school building or other permanent structures should be considered isolated, while soils beneath paved parking areas and roadways should be considered potentially accessible or accessible, depending on the assumptions for frequency and intensity of use for certain receptors. The Phase II CSA does not quantitatively assess current risks to soil beneath paved areas as this soil volume is not currently accessible. However, soils located beneath pavement are evaluated as accessible under a future exposure scenario, assuming the pavement is removed or falls into disrepair.

14. How can the City/TRC say 0-1 ft soil is okay at the school campus if 0-3 ft needs to be excavated from some locations?

In general, chemical concentrations are higher in soil that is 1-3 ft below the ground surface than in soil that is 0-1 ft below the ground surface. As a result, TRC's risk analysis indicated that a Condition of No Significant Risk exists for 0-1 ft soils. When TRC included the deeper soils in the risk analysis, this conclusion changed such that a Condition of No Significant Risk does not exist in some areas of the high school campus; these are the areas that have been recommended for excavation. The presence of this 1-foot top layer in this condition provides a measure of protection from exposure to deeper soils for day-to-day activities until the implementation of the proposed remedy.

15. The community may want to ask why the site's sampling and proposed remediation are considered sufficient to protect public health. For example, location SS-32 in area HS-2 was found to have high levels of PCBs so it will be excavated (CSA Figure 2-2; RAM Plan Drawings C-101 and C-101A). Although "more than 1,000 soil samples were collected during the Phase II investigation of the Site" (p. 7-20), high levels of soil contamination could be present in areas of the site that were not sampled; any unknown areas of contamination will be left in place. Unless they are located in one of the areas of the site that will be paved, any unknown areas of contamination will remain uncapped. The community may want to ask whether the City would expect to find more areas to excavate if additional sampling were conducted.

The goal of a characterization effort is to provide adequate spatial sampling, in the vertical and horizontal directions, such that an estimate of exposure can be made for each exposure point. As acknowledged in the comment, more than 1,000 soil samples were collected from the site. In addition, the nature and extent of chemical impacts was evaluated in detail and extensively described in the Phase II CSA. The soil sampling conducted to date provides reasonable certainty that areas of elevated chemical levels requiring excavation have been characterized.

16. Legibility of parts of the CSA report is poor (e.g., Appendix D Figure 2 sample locations, Appendices F-1, F-3 and F-4). The community may want to request that the City provide a more legible report. Possible options may include converting to PDF using a method that does not include optical scanning and, where possible, using smaller margins around the tables to allow for larger font sizes.

The Phase II CSA report as submitted is legible, and a hard copy of the report was made available for review. If the noted illegibility had been brought to the City's attention during the public comment period, action could have been taken at that time to facilitate the reviewer's efforts. Nevertheless, the City will take this comment into consideration for future submittals.

17. Significant investigatory work has been performed by the consultants that have been retained by the City of New Bedford and a very large database of chemical testing results exists. However, it is very difficult to know from the text, figures, and tables whether there is adequate testing for each contaminant of concern in each of the areas where exposure was assessed (HS-1 through HS-11). For example, for the HS-1 – Children's Playground the text is clear that PAHs, metals, and PCBs were not detected but what is unclear is how many samples were tested for each of these parameters. Summary tables of samples tested for each contaminant of concern by elevation and exposure area would allow for this review to be readily made. Without this information readily available, it is near impossible to assess whether the absence of PCBs on the Children's Playground is based on one sample result or ten sample results.

Summary tables of sample locations, sample depths, and detected chemicals were included in Tables 4-1 through 4-13 as well as a statistical summary of detected chemicals, including number of samples analyzed, in Tables 7-1 through 7-34 and in Appendices F-3, F-4 and F-5 for soils within the 0-1', 0-3' and 0-15' soil horizon. Additionally a description of sample data was included in Section 4 of the report. As discussed in Section 4, no SVOCs or PCBs were detected in Exposure Point Area HS-1. A summary of sample analyses by exposure point, including all analytes whether ever detected or not, will be added to Section 4.1.1 in the Final Phase II.

18. Dioxin testing is required throughout the Site. The data presented in the CSA do not demonstrate correlation between elevated PCB concentrations and dioxin concentrations and, therefore, the limited dioxin results must not be used to evaluate risk to human health. This opinion is supported by TRC's risk assessor, who stated at a PIP meeting that there were not enough sample results to establish correlation. Furthermore, the need for dioxin testing is supported by the Massachusetts Department of Environmental Protection (MassDEP) in its letter dated January 13, 2011 that clearly states that further testing is required for dioxin in order to assess the risks to human health.

Roux Associates agrees that PCBs may be a precursor for dioxins. However, we disagree that it should be considered the only indicator. In fact, Agency for Toxic Substances and Disease Registry (ATSDR) in their December 1998 Toxicological Profile for Chlorinated Dibenzo-*p*-Dioxins clearly states that dioxins are released to the environment during combustion processes including the burning of municipal solid waste, medical waste, and industrial wastes, and fossil fuel and wood combustion. Based upon the history of the Parker Street Waste Site (PSWS), it is clear that burning occurred and it is unknown what materials were burned.

In light of the ATSDR report, Roux Associates strongly disagrees with TRC (p. 3-3) that "…PCBs are the only chlorinated dioxin/dibenzofuran precursor compounds at the [New Bedford High School campus]." We do not concur that the absence of other chlorinated organic compounds from previous testing is adequate to conclude that there are no chlorinated organic compounds present. The test methods used analyze for a very limited universe of chlorinated organic compounds (the MassDEP Compendium of Analytical Methods suggests that testing for Tentatively Identified Compounds [TICs] is a cost-effective analytical tool that can be particularly effective in assessing locations with suspect disposal practices and/or complex or uncertain site history. Testing for TICs may identify many more chlorinated organic compounds at the New Bedford High School Campus and throughout the rest of the PSWS).

The dioxin data collected to date were intended to represent worst-case impacts at the Campus. The dioxin data are also appropriate for use in the risk characterization. Additional investigation of dioxin and dioxin-like compounds will be conducted at the high school campus per MassDEP's

January 13, 2011 letter. The supplemental dioxin data collected to augment the existing dioxin data set will be incorporated into the risk characterization, as appropriate.

The commentator correctly cites that the ATSDR document, accessible on-line at http://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=366&tid=63, describes sources of dioxin and dioxin-like compounds, including natural sources such as forest fires and volcanic activity, and anthropogenic sources such as dioxins unintentionally produced by industrial, municipal, and domestic incineration and combustion processes. ATSDR further states that emissions associated with human incineration and combustion activities are the predominant environmental source of dioxins, noting further that dioxins are found everywhere in the environment, and are typically found in soil in industrialized areas as a background condition. As noted in the Phase II CSA, the levels of dioxins in site soil were consistent with background concentrations for soils in urban areas, even in the presence of PCB detections. ATSDR cites a number of different sources contributing to the background presence of dioxins, including city dust, particulate deposits in car and truck mufflers, in exhaust from vehicles, cigarette smoke, and soot from home fireplaces.

In developing the 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, 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 TRC's evaluation of all analytical results, TRC focused on soil sample locations with concentrations greater than regulatory limits for PCBs, PAHs, SVOCs, and/or metals for further 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 the soils data for the presence of other organochlorine compounds (e.g., chlorinated benzenes and chlorinated phenols), the manufacture of which can result in the artifactual formation of dioxins 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. TRC evaluated analytical results for volatile organic compounds (VOCs), SVOCs, pesticides, and PCBs collected 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, beyond that imparted by urban background sources.

From this evaluation, TRC identified a population of samples from which TRC selected sample locations 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 to be present. 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. This biased sampling approach was intended to avoid underestimating risk from exposure to dioxin compounds in campus soil and, in all likelihood, resulted 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 a biased sampling 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) to examine what relationship (if any) exists between PCBs and dioxins in soils at the site and to answer the question of whether the presence of PCBs serves as a reliable surrogate or indicator that dioxins are present above background concentrations in soils, and 2) to efficiently target potential high concentration dioxin and dioxin-like compound areas in lieu of a larger sampling program. The sampling program met those goals.

The levels of dioxin compounds detected in soil were consistent with background concentrations for soils in urban areas, even though they co-occur on the high school campus with 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).

19. TRC needs to render an opinion that the data are scientifically valid and defensible, and of sufficient accuracy, precision and completeness to support the risk characterization. Currently, it is unknown whether the BETA data, to the extent that they are being used, as well as the TRC data are of adequate accuracy, precision, and completeness.

Data usability evaluations and/or data validation are performed on an ongoing basis to support regulatory submittals where required. Data usability evaluations and/or data validation were performed on all data used in support of the risk characterization. TRC also performed data usability evaluations on all data generated from BETA sampling activities. Any data points that were deemed unusable due to quality control issues were not used in the risk characterization and were flagged as rejected "R" on the data tables; refer to antimony and thallium results in Table 4-9 of the Phase II CSA. In submitting the Phase II CSA, the LSP certifies in part his opinion that the report has been developed and implemented in accordance with the applicable provisions of the MCP and is appropriate and reasonable. Further, as identified in the Massachusetts Contingency Plan Section 40.1056(2)(k), entitled Content of Response Action Outcome Statements, "for all Class A, B, or C Response Action Outcomes, a Data Usability Assessment documenting that the data relied upon is scientifically valid and defensible, and of a sufficient level of precision, accuracy, and completeness [is required] to support the RAO, and a Data Representativeness Evaluation, documenting the adequacy of the spatial and temporal data sets [is required] to support the RAO." A Data Representativeness Evaluation and full data usability assessment documentation will be included in the RAO statement and are not required in the Phase II CSA.

20. In section 6.3.3.5, TRC concludes that the VOCs detected in indoor air are not attributable to contaminants in the environment. These conclusions are based, in part, on indoor air testing results for samples collected in April and August 2010. However, no explanation is given for why site contaminants were detected in the sample collected in January 2010. We recommend that further indoor air samples be collected in the winter ("worst case") months, similar to when contaminants were detected historically.

Data collected in the vicinity of classroom A-3-112 subsequent to the January indoor air sample (TRC-IA-5) included the following: indoor air samples in the same room and nearby locations, groundwater samples in nearby locations, and soil gas samples at this location and nearby locations. None of the VOCs detected in indoor air in January were detected in these subsequent samples.

Indoor air testing can detect volatile chemicals from a variety of different sources, including subsurface environmental sources, ongoing indoor activities in the school, or transient indoor/outdoor activities. The testing performed by TRC has addressed the possibility of subsurface sources of contamination, regardless of seasonal variations in temperature and pressure.

21. Wetlands abut the New Bedford High School campus immediately to the north. TRC identified this area but did not consider it in the risk characterization as the wetlands are not within the boundaries on the New Bedford High School campus. While this may be acceptable for this submittal, we recommend that the CSA state that the wetland area will be investigated and evaluated separately at a later date as it appears that erosion and/or runoff from contaminated areas likely may have come to be in the wetlands and would, therefore, be required to be considered as part of the PSWS.

A segment of the northern portion of the NBHS campus is located within 100 feet of the isolated wetland area located between the state-owned ice arena (Hetland Rink) and Liberty Street. As indicated in Section 2.3.2 of the CSA, based on a review of historical USGS topographic maps from 1941 and 1949, the Site was the location of a wetland area prior to the apparent waste disposal activity. Subsequent to filling, the NBHS campus has historically exhibited relatively flat topography. Soil sampling results in excess of MCP Method 1 soil standards from the NBHS campus nearest the isolated wetland were limited. The northern portion of the property generally slopes gently toward the south-southwest and as a result, surface water runoff from the NBHS campus tends to migrate away from the isolated wetland area. In addition, as indicated in the EPA's Action Memorandum dated August 26, 2010, the MassDEP has conducted investigation activities within the Hetland Rink property (including the isolated wetland) as part of site assessment activities. For these reasons, further investigation of the isolated wetland area by the City is unwarranted because a complete exposure pathway from the Site to the isolated wetland has not been identified and MassDEP has not indicated to the City that actionable levels of contamination are present in the wetland based on their investigative efforts.

22. Section 7-9 – Uncertainty Analysis lists five bulleted items of uncertainty. However, TRC does not render any opinion about their impact on the risk characterization. TRC should state their opinion about each item and the basis for their opinion.

All five bulleted items are identified as general sources of uncertainty. Site-specific uncertainties are discussed for these five bulleted items, as applicable, in Section 7.9. For example, the adequacy of the site investigation and sampling plan are discussed in Section 7.9.1 including statements concerning the impact of these uncertainties on the risk characterization conclusions. Uncertainties related to the development of dose-response values are discussed in Section 7.9.2, and uncertainties related to the accuracy of exposure assumptions are discussed in Section 7.9.3. Following the completion of the Data Usability Assessment for the RAO, uncertainties related to data quality, if any, will be discussed in the risk characterization completed for the RAO.

23. Roux Associates understands TRC's argument about the "occupancy" of the Mechanical Room and has the following comments:

a. Vapor intrusion into the Mechanical Room is a Critical Exposure Pathway and must be eliminated to the extent feasible regardless of occupancy.

The commentator appears to be referring to the performance standard for CEPs in the MCP. To be clear, the MCP states the following under 310 CMR 40.0414:

(3) Immediate Response Actions shall be presumed to require the elimination and/or mitigation of Critical Exposure Pathways, which are defined in 310 CMR 40.0006. This presumption may be

rebutted, however, by the RP, PRP or Other Person conducting response actions, based upon a showing by a preponderance of the evidence that:

(a) the Critical Exposure Pathway(s) does not present an Imminent Hazard, either at present or for the time period that is likely to be required for the implementation and/or completion of Comprehensive Response Actions;
(b) it is not feasible to eliminate the Critical Exposure Pathway(s); and
(c) in cases where it is not feasible to eliminate the Critical Exposure Pathway(s), it is not feasible to mitigate the Critical Exposure Pathway(s).

(4) Immediate Response Actions shall be presumed to require the prevention and/or mitigation of Critical Exposure Pathways, which are defined in 310 CMR 40.0006. This presumption may be rebutted, however, by the RP, PRP or Other Person conducting response actions, based upon a showing by a preponderance of the evidence, that:

(a) the Critical Exposure Pathway(s) does not present an Imminent Hazard, either at present or for the time period that is likely to be required for the implementation and/or completion of Comprehensive Response Actions;
(b) it is not feasible to prevent the Critical Exposure Pathway(s); and
(c) in cases where prevention is not feasible, it is not feasible to mitigate the Critical Exposure Pathway(s).

As documented in the IRA Plan dated March 2010, there is no Imminent Hazard associated with the CEP. The March 2010 IRA Plan and subsequently issued IRA Status Reports dated May 2010 and November 2010 describe how the City of New Bedford has assiduously pursued the implementation of measures to mitigate the intrusion into the Mechanical Room (i.e., the CEP), components of which are ongoing. These measures were discussed in detail in the IRA submittals, which are available to the public both at the City's website and at MassDEP's website. These measures include efforts to seal the cracks to mitigate seepage into the basement area of the Mechanical Room and efforts to reduce the concentrations of chlorinated VOCs in this area. Measures to seal the cracks are part of the original IRA approval and are identified in the Phase II Report as such (Section 6.3.1). Groundwater remediation measures were introduced in the January 2011 IRA Plan Modification (i.e., Total Fluids Extraction). These ongoing efforts are tracked in the IRA status reports.

b. Future use of the property must consider an "occupied" use of the room and must consider that use without negative pressure.

Both TRC and the City do not believe that occupied use of the Mechanical Room is a reasonably foreseeable change in site operations and/or occupancy. It is reasonably foreseeable that the groundwater impacts will be mitigated or remediated. Nevertheless, the Phase II CSA risk characterization did provide a quantitative estimate of potential risk associated with minimal occupied use of the Mechanical Room (30 minutes per day for 250 days per year for 27 years), as presented in the uncertainty section of the Phase II report (see Section 7.9.4). The spreadsheet used to evaluate this pathway can be found in Appendix F-7 and indicates a cancer risk of 4E-07 and a non-cancer hazard quotient of 0.008. Regardless of how unlikely, even if the Mechanical Room were to be occupied for 8 hours of each working day in the future (i.e., a 16-fold increase in exposure over that assessed in the above calculation), the risks and hazards associated with fully occupied use would still be less than the MCP Risk Limits for chronic exposure. In addition, the negative pressure in the Mechanical Room is generated as a result of the routine operation of the

HVAC system and the draft induced by the former incinerator stack and would tend to induce more vapor intrusion from the subsurface, not less.

24. The CSA refers to the New Bedford High School Campus as the Site. We recommend that the term Site be replaced with "Campus". This will eliminate confusion between the New Bedford High School site from the PSWS.

Section 1.0 identifies that "The Site as defined for the purposes of this Phase II CSA is focused on the NBHS campus."

25. Please explain the distinction being made in the first paragraph of Section 7.1.1 regarding data used to determine "extent" and data used for "delineation".

The sampling at the campus was done in a sequential fashion. The initial rounds of sampling were used to adequately identify the nature and extent of contamination. These are the "extent" data specifically identified in the Phase II CSA report. A preliminary risk characterization was then conducted, using the "extent" data, to identify target locations and compounds associated with a Condition of Significant Risk for the top 3 feet of soil. Once these target locations were identified, the "delineation" sampling was performed to further characterize the target locations and determine volumes of soil that required removal. Because both "extent" and "delineation" samples had been collected prior to publication of the Phase II CSA report, both sets of data were discussed in the Phase II CSA. As explained in Section 7.1.1, "the delineation soil samples were not used to characterize risks and hazards at the Site, because doing so would bias the exposure point concentrations since the delineation locations were sampled multiple times during delineation activities." The distinction between sampling for "extent" vs. "delineation" is further described in Sections 3.1, 4.1.1, and 7.1.2.

26. Are data that have not undergone a "data assessment" being used in the risk characterization of for any other purpose in the CSA?

No. Please refer to the response to question 19.

27. Can the City/TRC provide more information about groundwater flow across the high school campus, such as a cross-section showing water flow through soil strata?

The general flow direction and a discussion of site hydrogeology was provided in groundwater contour Figure 3-1, and Section 3.2.2 of the Phase II Comprehensive Site Assessment, New Bedford High School Campus, dated January 2011. In summary, based on groundwater elevation monitoring conducted in March 2009 to determine groundwater flow direction and gradient across the study area, groundwater flows predominantly to the southeast at a gradient of about $2x10^{-3}$ ft/hr. The groundwater aquifer is unconfined and is present about 10 feet below ground surface. The unconfined aquifer is composed of ash fill, organic peat, and/or glacial outwash sediments (listed from the ground surface down, as typically observed). A geologic profile (a cross-section showing water flow through soil strata) is not necessary to support our investigative findings and/or remediation objectives.

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