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# NOTES FROM TELECONFERENCE ON 12 JANUARY 2011 REGARDING CONSTRUCTION EQUIPMENT DEPARTMENT HUMAN HEALTH RISK ASSESSMENT FOR STUDY AREAS 1 AND 4 AND SITES 2 AND 3 NCBC DAVISVILLE RI

01/12/2011

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**NOTES FROM TELECONFERENCE ON JANUARY 12, 2011**
**CONSTRUCTION EQUIPMENT DEPARTMENT HUMAN HEALTH RISK ASSESSMENT**
**FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE**
**NORTH KINGSTOWN, RHODE ISLAND**

## PARTICIPANTS

| | |
|---|---|
| David Barney (Navy) | Richard Gottlieb (RIDEM) |
| Christine Williams (EPA) | Richard Sugatt (EPA) |
| Todd Finlayson (Gannett Fleming) | Lee Ann Sinagoga (Tetra Tech) |
| Peggy Churchill (Tetra Tech) | Steve Vetere (Tetra Tech) |

The Former Construction Equipment Department (CED) at NCBC Davisville consists of Study Areas 1 and 4 and Installation Restoration (IR) Sites 2 and 3. In 2000, the Navy completed a baseline human health risk assessment for soils at the former CED Area. The Navy intends to utilize this risk assessment to support a limited action remedy for soils at the CED Area. During 2010, the Navy reviewed the 2000 assessment and updated human health risk estimates using present day risk assumptions and methodologies to determine whether the conclusions of the 2000 risk assessment were still valid today.

On December 6, 2010, the Navy provided the executive summary (including supporting tables and figures) of the human health risk screening evaluation to EPA and RIDEM. The objective of this teleconference was to present the findings of the 2010 risk screening evaluation in advance of submitting the human health risk evaluation report to the EPA and RIDEM for review.

Lee Ann Sinagoga of Tetra Tech began the discussion with a short overview of the background and environmental concerns associated with the individual Study Areas/Sites that make up the CED Area.

- Study Area 1, CED Drum Disposal Area, is an open field that was previously used to store drums of waste. The area was later converted to leaching field that was used to dispose of water originating from a truck washing station adjacent to the former Building 224.

- Site 2, Battery Acid Disposal Area, was used between 1955 and 1980 for the disposal of battery acid and dilute sulphuric acid. There was anecdotal evidence that dilute sulphiric acid was discharged into a dry well adjacent to Building 224. The dry well was remediated and closed under the IR program in the early 1990s.

- Site 3, Solvent Disposal Area, was and is a grass-covered lot that was reportedly used as a disposal area for paint thinners and other solvents. Groundwater monitoring has been ongoing since 2000 to monitor groundwater in an effort to understand the plume underlying Site 3 in relation to an upgradient plume originating from the PR-58 Nike Site.

- Site 4, Asphalt Disposal Area, is a long but narrow area west of former Building 224 that was reported to be an open trench 600 to 700 feet long into which an asphalt-like substance was disposed.

Ms. Sinagoga described some of the details of the risk screening evaluation. Each study area/site was addressed separately, although there was a global chemical of potential concern (COPC) selection process. The soil data utilized in the assessment were collected between 1986 and 2007.

The most likely future use scenario for the CED Area would be commercial/industrial, however the risk assessment evaluates a range of potential exposure scenarios. The four exposure scenarios considered are construction worker, industrial worker, recreational user, and lifelong resident (combination of adult and child).

Surface soil was defined as 0- to 2-feet below ground surface. Subsurface soil was defined as 2- to 10-feet below ground surface. This is consistent with historical conventions utilized at NCBC Davisville to

comply with RIDEM requirements for the surface soil interval and EPA requirements for a “total” soil depth of 10 feet. There is soil data available from depths greater than 10 feet but these were evaluated qualitatively only because human contact with soils at this depth is not likely.

COPCs were identified through a screening of site data (maximum site concentration) against EPA RSLs and RIDEM screening levels for residential soil. EPA SSLs and RIDEM Leachability Criteria were also used as screening criteria to evaluate the potential for migration of contaminants from soil to groundwater.

There was a discussion about the role of vapor intrusion in the soil risk assessment. Vapor intrusion risks are typically associated with groundwater contamination but the restrictions associated with the soils remedy may require include a component designed to mitigate potential vapor intrusion risks, if present. Since there are no longer any building slabs at the CED Area now that Building 224 has been demolished, EPA suggested modeling groundwater concentrations to determine the potential for vapor intrusion risks and the need for restrictions.

The COPCs identified in surface soil included carcinogenic PAHs, PCBs, and several metals including aluminum, antimony, arsenic, beryllium, cobalt, iron, lead, manganese, mercury. For subsurface soil COPCs are aluminum, antimony, arsenic, beryllium, cadmium, cobalt, iron, and manganese.

The risk screening evaluation utilized a risk ratio technique to calculate cancer and non-cancer risk estimates for residential receptors and industrial worker receptors using the EPA RSLs. The RSLs are risk-based concentrations representing 10E-6 cancer risk and a Hazard Index of 1. Since these relationships are linear, a ratio evaluation between exposure point concentrations and the RSL can be used to develop risk estimates. Since there are no RSLs for the construction worker or recreational user scenarios, risk estimates were developed by calculating risk-based concentrations using EPA methodology then using the risk ratio technique.

The basic exposure assumptions that were used for the assessment are presented on Slides 14 and 15 of the presentation (Attachment A). Note the slides in Attachment A were updated to include some slides that were initially omitted by mistake.

The results of the human health risk screening evaluation are summarized below:

- All estimated ILCRs were less than or within the EPA target range of 1E-04 to 1E-06.
- Estimated ILCRs exceeded the State of Rhode Island cancer risk limit of 1E-05 for residential receptors exposed to surface soil at Study Areas 1 and 4.
- Estimated HIs exceeded the HI threshold of 1.0 for residential receptors exposed to surface soil in Study Area 4.
- Estimated HIs exceeded the HI threshold of 1.0 for receptors exposed to subsurface soil at Site 2.

In conclusion, the existing data could support a limited action remedial response for the CED Area.

At the end of the presentation, there was some discussion about the use of background to screen out COPCs at the CED Area. There is no formal background study for NCBC Davisville. Previous assessments have used a background data set for metals in soil developed during the Phase II RI in 1994. There was general agreement that qualitative comparison of data to these background data points would be acceptable, along with a discussion of uncertainty associated with metals concentrations in site soils, so that risk managers could make a decision on the need to implement remedial actions to address metals in soil.

There was also a discussion about how to implement restrictions on activities with the intention of mitigating risks from vapor intrusion when typically vapor intrusion is associated with groundwater contamination. Navy agreed to propose some language for the ROD that will acknowledge the

groundwater contamination present and the need for additional restrictions beyond those associated with soil contamination.

The next step for the CED Area will be for the Navy to issue the full report summarizing the human health risk screening evaluation with all of the methodology and background data included. The team agreed that a technical memorandum summarizing potential remedial alternatives (essentially summarizing the 2001 Feasibility Study but omitting the discussion about groundwater) would be a reasonable substitute for a revised Feasibility Study report.

Steve Vetere of Tetra Tech closed the teleconference with a brief summary of the recent investigation at QDC Outfall 001. The field investigation was completed along the drainage line and at the outfall during December 2010. The field investigation included a drain line reconnaissance using a remote controlled vehicle equipped with a camera, collection of samples from catch basins along the length of the drain line, collection of soil samples from the 2008 soil removal area, and collection of sediment samples from the wetland area downgradient from the outfall.

Mr. Vetere noted the original intent was to excavate test pits and collect soil samples at areas where the pipe was observed to have been compromised. However, the camera survey suggested the pipe was in good condition and the Navy redirected sampling efforts to the wetland area downgradient from the outfall. Additional samples were collected from the portion of the wetland requested by EPA to further delineate the presence and nature of contamination.

Navy is awaiting laboratory data from this investigation and will provide a report to the team in March.

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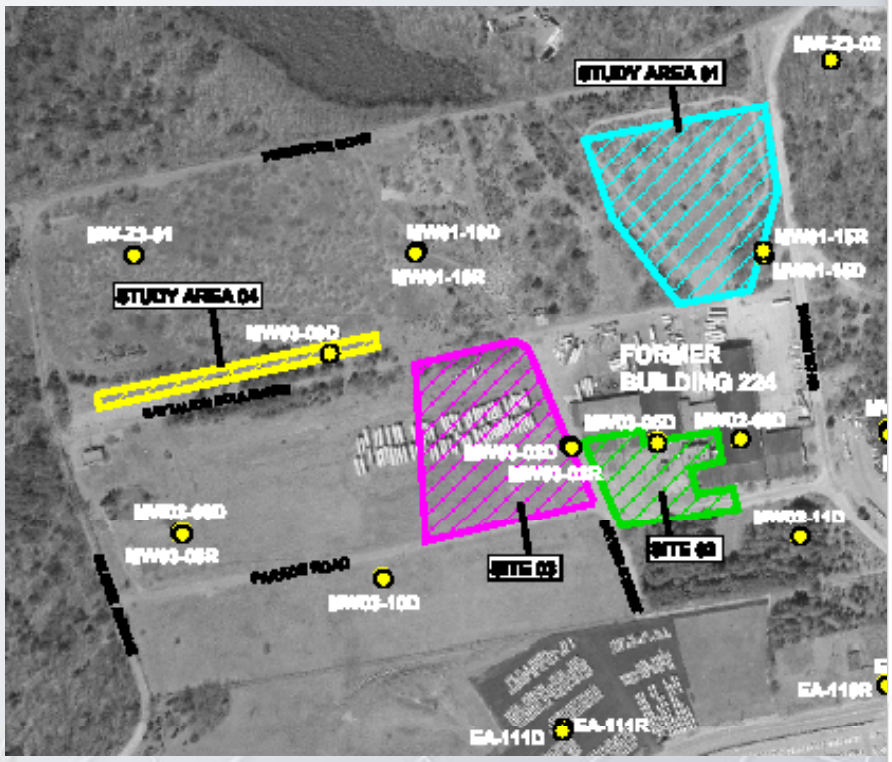
# Summary of Human Health Risk Evaluation for Soils

## Former Construction Equipment Department, Former NCBC Davisville

Date: 01/12/2011

# Former Construction Equipment Department

- Study Area 01 – Drum Storage Area
- Site 02 – Battery Acid Disposal Area
- Site 03 – Solvent Disposal Area
- Study Area 04 – Asphalt Disposal Area



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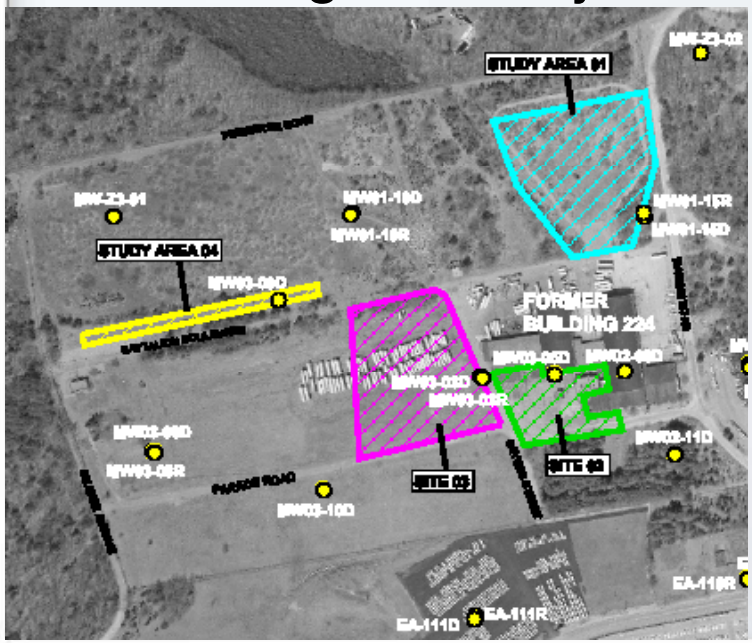
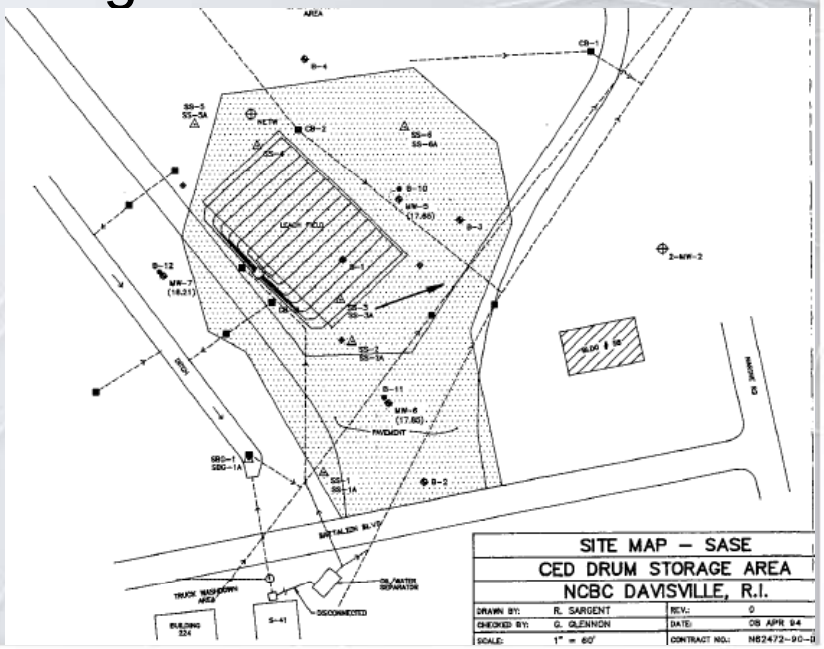
# Study Area 01 – CED Drum Storage Area

- Open field used to store 55-gallon drums of waste petroleum products between late 1960s to 1974.
- Later converted into a leaching field to dispose surface water runoff and storm water runoff from a truck washing area adjacent to Building 224.

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# Site 02 – CED Battery Acid Disposal Area

- Between 1955 and 1980, battery acids (primarily dilute sulfuric acid) were discharged into a drain at the southwest end of Building 224.
- Drains connected to a dry well and leach field.
- Estimated that 18,000 gallons of dilute sulfuric acid discharged into the drain.
- Dry well, associated piping, and lead-contaminated soils removed in 1996.
- Refueling area at Site 02 addressed under the UST Closure Program in 1992.



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# Site 03 – CED Solvent Disposal Area

- Grass-covered lot to the west of former Bldg 224.
- Served as discharge location for paint thinners and unidentified solvents from maintenance shop between 1955 and the late 1970s.
- Aerial photos from 1951 through 1970 show Site 03 and the immediate surrounding area as paved, used for vehicle and equipment storage.
- Groundwater monitoring initiated in 2000 to evaluate contribution to CVOC plume emanating from upgradient PR-58 Nike Site.



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# Study Area 04 – CED Asphalt Disposal Area

- Open trench, 600 to 700 feet in length.
- 8 to 15 feet wide.
- 2 to 5 feet deep.
- Asphaltic material disposed in trench in late 1960s.
- Removal of asphaltic material and contaminated soil in 1996.



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# Human Health Risk Evaluation

- Each study area/site evaluated individually for human health risk.
- Soil data collected during various previous investigations used in human health risk evaluation.
- Includes data collected between 1986 and 2007.



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# Human Health Risk Evaluation

- Current land use is industrial/commercial.
- Evaluated potential risks to receptors based on soil analytical data.
  - Construction workers
  - Industrial workers
  - Lifelong recreational users (child and adult)
  - Hypothetical Lifelong resident (child and adult)



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# Human Health Risk Evaluation

- Included all available soil data for surface [0 to 2 feet below ground surface (bgs)] and subsurface (greater than 2 feet bgs to 10 feet bgs) soils.
- Deep subsurface soil data (> 10 feet bgs) were not included because it is unlikely that human receptors would be exposed to soil greater than 10 feet bgs.
  - Elevated concentrations were noted in Site 03 deep subsurface soil for 1,1,2,2-tetrachloroethane and trichloroethene.
  - Other chemicals did not have notably higher concentrations in deep subsurface soil versus the shallower soil data sets.



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# Human Health Risk Evaluation

- Chemicals of Potential Concern (COPCs) selected based on a toxicity screen of maximum site concentrations to screening criteria.
  - USEPA Regional Screening Levels (RSLs) for residential soil (May 2010).
  - RIDEM screening levels for residential soil (February 2004).
  - USEPA SSLs for groundwater protection (USEPA, May 2010).
  - RIDEM GA leachability criteria and GB leachability criteria (February 2004).
- For COPC selection, data from all sites/study areas were combined. COPCs were selected for surface soil and subsurface soil separately.
- COPCs were selected for direct contact exposure and groundwater protection (migration from soil to groundwater).



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# Human Health Risk Evaluation

- COPCs selected for groundwater protection were evaluated qualitatively and, therefore, were not carried through the quantitative risk assessment.
- COPCs selected for direct contact exposure to surface soil:
  - Carcinogenic PAHs (cPAHs)
  - PCBs (Aroclor-1254 and total Aroclor)
  - Inorganics (aluminum, antimony, arsenic, beryllium, cobalt, iron, lead, manganese, mercury)
  - Total Petroleum Hydrocarbons (TPH)
- COPCs selected for direct contact exposure to subsurface soil:
  - Inorganics (aluminum, antimony, arsenic, beryllium, cadmium, cobalt, iron, manganese)



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# Human Health Risk Evaluation

- Developed estimates of cancer risk and hazard indices using risk-ratio techniques.
  - Developed for each study area/site.
  - Estimated incremental lifetime cancer risk (ILCR) for exposure to carcinogens.
  - Estimated Hazard Index for exposure to noncarcinogens.
  - Calculated using the following equation:

$$\text{Hazard Index or Cancer Risk Estimate} = \frac{\text{EPC for COPC x Hazard Index of 1 [or Cancer Risk Estimate of 1E-06]}}{\text{Risk-based Concentration for Receptor}}$$

  - Exposure Point Concentration (EPC) is the COPC concentration to which the receptor is exposed and represents site concentration.
  - Risk-based concentrations for receptor exposures to soil represent a Hazard Index (HI) of 1 for noncarcinogens and the 1E-06 cancer risk level for carcinogens.

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# Human Health Risk Evaluation

- EPCs were 95% Upper Confidence Limits (UCLs) on the arithmetic mean concentration.
  - Arithmetic mean concentration used for lead per USEPA guidance.
  - Maximum concentration used if there was insufficient number of samples to calculate 95% UCL or if the 95% UCL was greater than the maximum concentration.
- Risk-based concentrations (RBCs) used to calculate cancer/noncancer risks.
  - USEPA Regional Screening Levels (RSLs) used to evaluate residential user and industrial worker receptors.
  - RBCs calculated based on USEPA methodology used to evaluate recreational user and construction worker receptors.



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# Human Health Risk Evaluation

- Basic Exposure Factors Assumptions for Construction Worker:
  - Soil Ingestion Rate – 330 mg/day
  - Skin Surface Area – 3,300 $cm^2$/day
  - Exposure Frequency – 150 day/year
  - Exposure Duration – 1 year
  - Adherence Factor – 0.3 mg/$cm^2$
  - Particulate emission factor – 1.62E6 $m^3$/kg



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# Human Health Risk Evaluation

- Basic Exposure Factors Assumptions for Recreational User:
  - Adult Soil Ingestion Rate – 100 mg/day
  - Child Soil Ingestion Rate – 200 mg/day
  - Fraction Ingested – 0.5
  - Exposure Frequency – 100 day/year
  - Exposure Duration – 30 years
  - Adult Skin Surface Area – 5,700 $cm^2$/day
  - Child Skin Surface Area – 2,800 $cm^2$/day
  - Exposure Time – 4 hrs/day



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# Human Health Risk Evaluation

- All estimated ILCRs were less than or within the USEPA target range of 1E-04 to 1E-06.
- Estimated ILCRs exceeded the State of Rhode Island cancer risk limit of 1E-05 for residential receptors exposed to surface soil:
  - Study Area 01:
    - cPAHs were primary risk drivers.
    - Arsenic would be a risk driver if evaluated as a COPC; however, arsenic was within NCBC Davisville background values and was eliminated as COPC.
    - No site-specific PAH background values were available for comparison.
  - Study Area 04:
    - Total Aroclor was primary risk driver.



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# Human Health Risk Evaluation

- Estimated HIs exceeded the HI threshold of 1.0 for residential receptors exposed to surface soil.
  - Study Area 04:
    - Total Aroclor was primary risk driver.
    - Aroclor-1254 were conservatively used to evaluate total Aroclor concentrations in absence of compound/mixture-specific data in historical data. If criteria for another Aroclor mixture (e.g., Aroclor-1016) were used, the HI would not exceed 1.0.
- Estimated HIs exceeded the HI threshold of 1.0 for receptors exposed to subsurface soil.
  - Construction worker receptors at Site 02:
    - Manganese was primary risk driver.
    - Manganese within range of literature background values.
  - Residential receptors at Site 02:
    - Although HI exceeds 1, adverse noncancer effects are not anticipated because individual target-organ HIs < 1.



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# Human Health Risk Evaluation

**Summary of COCs for Direct Contact**

| Site/Study Area | Environmental medium | Receptors | Chemicals of Concern |
|---|---|---|---|
| Study Area 01 | Surface soil | Resident | cPAHs |
| | Subsurface soil | NA | None |
| Site 02 | Surface soil | NA | None |
| | Subsurface soil | Construction worker | Manganese |
| Site 03 | Surface Soil | Resident | TPH |
| | Subsurface Soil | NA | None |
| Study Area 04 | Surface Soil | Resident | Total Aroclor |

NA - Not applicable

- Manganese in subsurface soil at Site 02 was within literature background values.

- TPH selected as COC based on comparison to RIDEM residential soil criterion. Only one sample result (3,100 mg/kg) was available for TPH at Site 03 and the concentration exceeded RIDEM residential (500 mg/kg) and industrial (2,500 mg/kg) soil screening levels.



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# Human Health Risk Evaluation

- Based on the results of the Human Health Risk Evaluation, these data could support a limit action remedial response (residential land-use restriction) for soils in the CED Area.



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Questions???



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