Area of Concern 55C Wetland Investigation

Phoebe Call
Tetra Tech NUS

January 10, 2008
Restoration Advisory Board Meeting

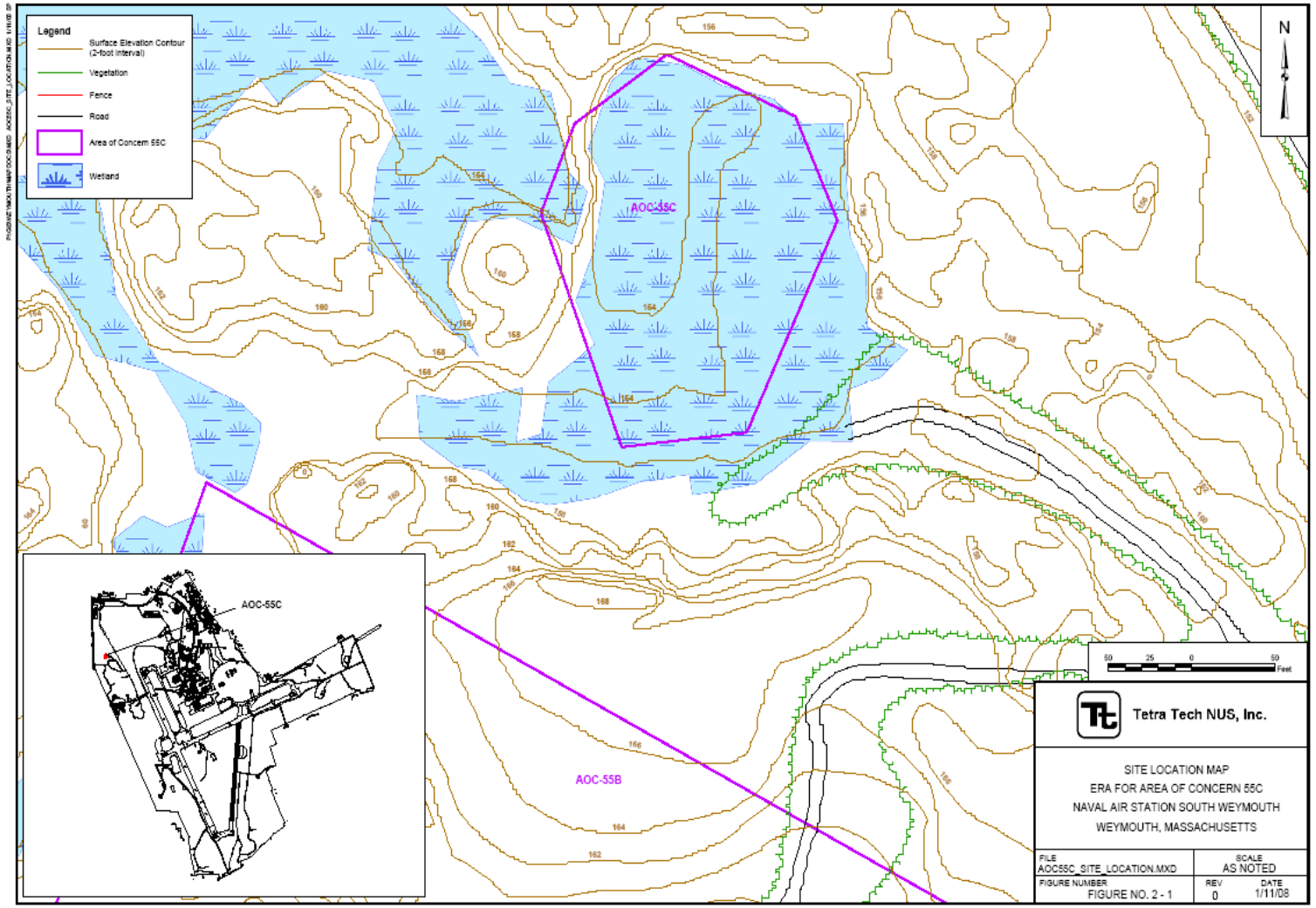
Objectives of Tonight's Presentation

- Review site history and investigations
- Describe the eco screening field program
- Summarize the 2007 results
- Summarize the Ecological and Human Health Risk Assessments
- Present Conclusions and Next Steps

AOC 55C Site Description

- Site is located in Weymouth, in northwest portion of Base.
- Most of Site is within a delineated wetland.
- Environmental investigation area approx. 0.6 acre.
- Evidence of historical disturbance by filling and dumping.
- Metallic debris observed, especially around the ponded area.
- Debris concentrated in 3 mounded areas.

AOC 55C Location



Wetland Area – April 2007

AOC 55C Ponded Area

April 25, 2007

November 15, 2007

Investigation History

- Site sampled during EBS mobilizations 2 (2001) and 3 (2002-2003).
- Surface/subsurface soil, sediment, and co-located surface water samples collected.
- Metals, pesticides, PCBs, VOCs, PAHs exceeded eco screening benchmarks.
- Navy planned a removal action.
- In June 2006, EPA suggested sediment lead analysis and sediment and surface water toxicity testing to aid in determining whether a removal action in a wetland was warranted.

Objectives of AOC 55C Wetland Investigation

- Collect sediment to better characterize concentrations of lead and other chemicals.
- Determine if sediment is acutely toxic to sediment invertebrates.
- Determine if surface water is acutely toxic to fish and aquatic invertebrates.
- Evaluate risk to small mammals and birds via a food chain pathway.
- Determine the functions and values of the wetland.

AOC 55C Field Program

Sediment sampling:

- 19 samples for quick-turn lead analysis to determine locations for full chemical analysis and toxicity testing.
- Sampled 0-2 in. below sediment surface.
- Collected 6 site and 3 reference samples; split samples for chemical and toxicity testing.
  - 6 site sample locations selected based on lead results.
  - Reference samples were collected from a nearby non-impacted wetland (between Trotter Road and AOC 55B).

AOC 55C Field Program – cont.

Surface Water sampling:

- 4 site and 1 reference grab samples; co-located with sediment samples for chemical and toxicity testing.
  - 4 site sample locations selected based on lead results in sediment samples.
  - Reference sample was collected from same nearby non-impacted wetland.

Functions and Values Assessment:

- Followed N.E. Army COE Methodology
- Qualitative assessment of 13 functions by a Professional Wetland Scientist based on field observations and scientific judgment.

AOC 55C Field Program – cont.

- Sediment sample analysis:
  - Chemical analysis: PCBs, PAHs, metals, TOC, grain size, AVS/SEM.
  - Toxicity testing: 10-day tests using amphipod (*Hylella azteca)* and midge (*Chironomus tetans*)
- Surface Water sample analysis:
  - Chemical analysis: metals (filtered/unfiltered).
  - Toxicity testing: 48-hr. tests using daphnia (*Ceriodaphnia dubia)* and fathead minnow (*Pimephales promelas*)

Sediment Sampling – Feb. 2007

Surface Water Sampling – April 2007

Ecological Risk Assessment

- Combined 2007 data with EBS datasets.
- Identified receptors and exposure pathways.
- Generally followed Streamlined Risk Assessment screening process to select chemicals of potential concern (COPCs).
- Used toxicity test results in ERA refinement step.

Eco Pathways Evaluated

Direct contact &/or ingestion of:

- Surface soil by plants, invertebrates, mammals, birds.
- Wetland sediment by invertebrates, mammals, birds.
- Surface water by fish, aquatic invertebrates, amphibians, mammals, birds.

Eco Risk Assessment Conclusions

Potential risks to terrestrial plants & invertebrates.

- Concentrations in surface soil were greater than screening benchmarks.
- Some chemicals were detected infrequently or at low concentrations, or concentrations were similar to Base background.
- Primary risk drivers were copper, lead and zinc.
  - Greater than Base background concentrations.
  - Exceeded screening benchmarks in several samples.
  - Greatest concentrations found in eastern portion of the site.

Eco Risk Assessment Conclusions (Cont.)

Potential risks to sediment invertebrates.

- Concentrations in sediment were greater than screening benchmarks.
- Some of the sediment samples were acutely toxic.
- The toxicity was correlated to chemical concentrations to develop:
  - No observed effects concentrations (NOECs).
  - Lowest observed effects concentrations (LOECs).
- Concentrations of PAHs, PCBs, copper and lead were greater than LOECs in several samples; these chemicals were retained as final COPCs.

Eco Risk Assessment Conclusions (cont.)

- No significant risks to fish, aquatic invertebrates, or amphibians from chemicals in surface water.
  - Surface water samples were not acutely toxic.
  - No final COPCs.
- No significant risks to mammals and birds from chemicals in soil, sediment, or surface water.
  - No final COPCs.

Human Health Risk Assessment

- Media of concern: sediment, soil, surface water
- Evaluated most conservative scenario:
  - Considered future residents only
  - Considered reasonable maximum exposure risks only
- Evaluated cancer risks, non-cancer health hazards, and lead exposures (IEUBK model)

Human Health Risk Assessment Conclusions

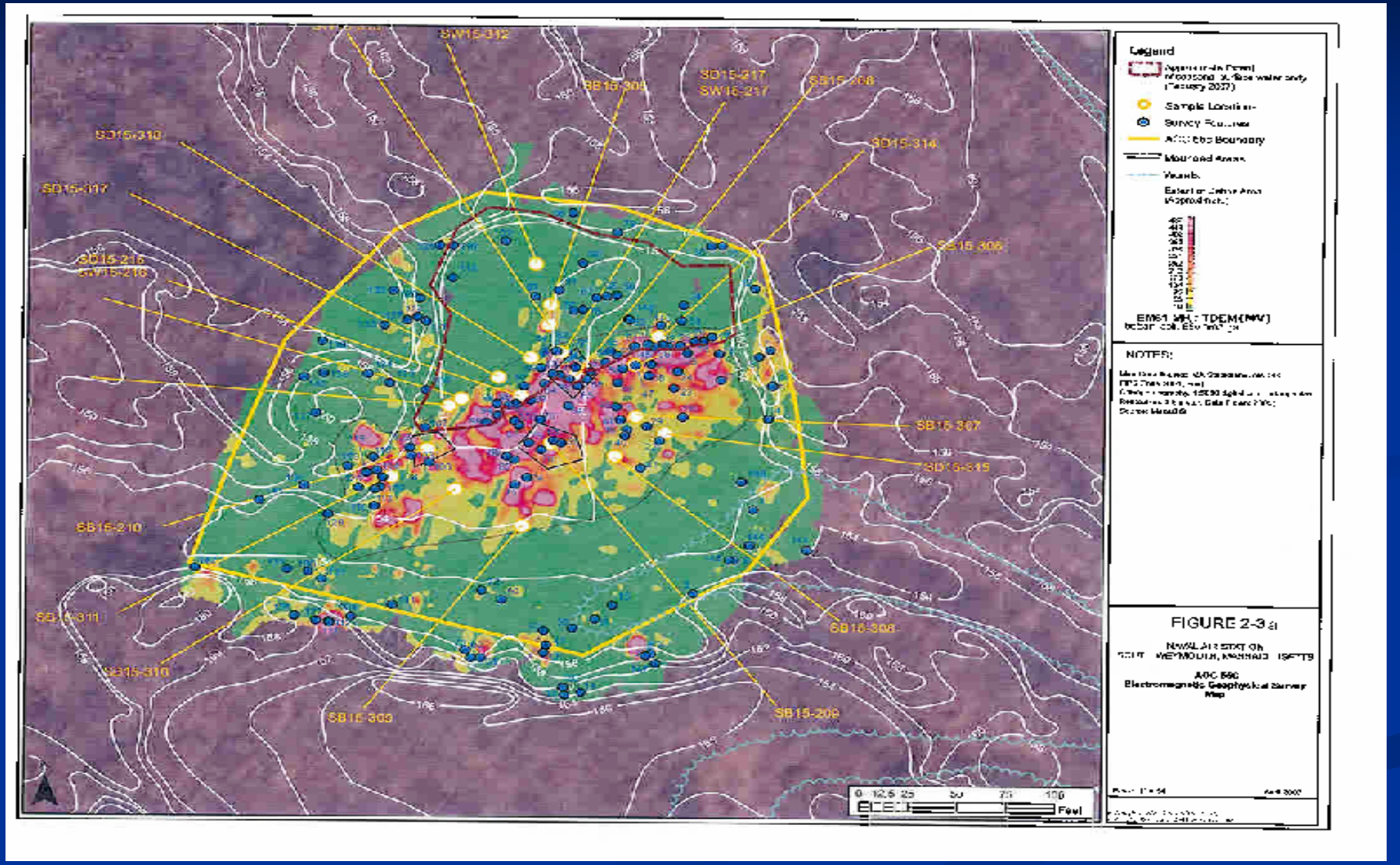
- No anticipated adverse non-cancer human health effects.
- Exposure to lead in soil and sediment did not exceed EPA's target blood-lead levels.
- Potential unacceptable cancer risk to residents exposed to soils and sediments.
- Contaminants of concern:
  - Soils - PAHs, arsenic, PCBs
  - Sediments - PAHs, arsenic, dieldrin

Wetland Functions and Values

Of the 13 common wetland functions and values, 7 were identified at AOC 55C. The results:

- Principal Functions:
  - Sediment/toxicant retention
  - Wildlife habitat
- Minor Functions:
  - Groundwater recharge/discharge
  - Floodflow alteration
  - Nutrient removal
  - Production export
  - Endangered species habitat

Electromagnetic Survey Results



Pink = greatest amount of metal debris

Conclusions

- Potential risks to terrestrial plants and invertebrates and sediment invertebrates.
- Potential cancer risks to future residents exposed to soil and sediment.
- No eco or human health risks from exposure to surface water.
- Functions and values of wetland compromised by filling and dumping.
- Metallic debris located within the wetland.

Next Steps

- Navy responding to comments on Draft ERA.
- Draft Functions and Values Assessment to be issued next week.
- Draft HHRA issued January 9, 2008.
- Navy will finalize the ERA and HHRA.
- Based on the ERA, HHRA, and electro-magnetic survey, Navy, with EPA and MassDEP input, will determine if removal action is warranted.