N00102.AR.000186
NSY PORTSMOUTH
5090.3a

STATE OF MA.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN R. McKERNAN, JR.
GOVERNOR

DEAN C. MARRIOTT
COMMISSIONER

DEBRAH RICHARD
DEPUTY COMMISSIONER

September 27, 1993

Ms. Deborah Carlson
Remedial Project Manager
Department of the Navy/Northern Division
Naval Facilities Engineering Command
10 Industrial Highway Mail Stop #82
Lester, PA 19113-2090

RE: Review comments on the Hydrodynamic Modeling of the Piscataqua River and Textural Characteristics and Surficial Sediment Distribution Map of the Lower Great Bay/Piscataqua River Estuary Case Studies.

The Department has received and reviewed two case studies entitled, "Hydrodynamic Modeling of the Piscataqua River" and "Textural Characteristics and Surficial Sediment Distribution Map of the Lower Great Bay/Piscataqua River Estuary." Attached to the Department's general comments are review comments submitted by Paul Mitnik, a Civil Engineer II in the Bureau of Water Quality Control, MEDEP, who reviewed and commented on the Hydrodynamic Modeling Study only. Some of Mr. Mitnik's comments concerning dye studies may be addressed in the "Estuarine Dynamics and Water Quality Assessment" Case Study, submitted for his review after the attached comments were written. Review Comments on the Hydrodynamic Modeling Case Study are also provided by the Maine Geological Survey. All comments are provided below.

Textural Characteristics and Sediment Distribution

1. Areas impacted by dredging and blasting must be shown on a figure. The text should include a discussion of how sediment distribution has been impacted by past blasting and dredging activities around Seavey Island.

2. Page 16. The legend should be placed in the report so that it can viewed with the map, without having to turn pages. The map and legend could be placed on facing pages.

3. Page 17. The channel in Spruce Creek does not appear to have the correct pattern associated with it. The pattern shown for the channel in Spruce Creek is the pattern designated for upland areas, white with blue specks. Please correct or clarify.

AUGUSTA
STATE HOUSE STATION 17
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
OFFICE LOCATED AT: RAY BUILDING, HOSPITAL STREET

PORTLAND
312 CANCO ROAD
PORTLAND, ME 04103
(207) 879-6300 FAX: (207) 879-6303

BANGOR
106 HOGAN ROAD
BANGOR, ME 04401
(207) 941-4570 FAX: (207) 941-4584

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, ME 04769
(207) 764-0477 FAX: (207) 764-1507

printed on recycled paper

4. Why are areas south and west of New Castle not shown on the map? According to the map there are 13 sample points within this area.

Hydrodynamic Model of the Piscataqua River
General Comments

5. It appears that only four transects were used to calibrate the Model. This approach may not be appropriate given the complexity of flow patterns in the estuary. Spruce Creek appears to behave as a small salt-wedge estuary, with different layers flowing in different directions during tidal fluctuations. This type of flow will influence contaminant transport and the contaminant transport model should be capable of simulating this flow.

6. Please provide supporting data and/or references for flow predictions made by Dynhyd3.

7. The text describes details that are not shown on the figures due to the inadequate (large) scales used for some of the figures. A complete figure showing all of the stretches of the Piscataqua should be included.

8. The text does not adequately describe data collection procedures. Most of the text describing procedures appears to be taken from a manual and does not reflect how data was collected in this study.

9. Raw data for this study should be supplied in an appendix.

Specific Comments

10. Page ix: There are many typos in this paragraph, please correct them.

11. Page 1: Please submit a map showing areas that have been impacted by dredging sediments and blasting bedrock around Seavey Island. How have these practices influenced flow?

12. Page 3, third paragraph: The text should clarify what is meant by "virtually anything" in the statement, "...areas between islands were filled in with virtually anything." Hazardous materials disposed of at the JILF has been published in previous reports.

13. Page 3, third paragraph: Please remove the sentence, "The battery storage sites have been removed and further cleanup is anticipated." "Battery storage sites" are not designated SWMUs.. Limited surficial removal of batteries has taken place at the DRMO only.

14. Page 5, second paragraph: Please remove the sentence," If the pollutants were flushed out into the open ocean, then little threat to the population would be anticipated." This statement has not been substantiated and does not belong in this report.

15. Page 9, third paragraph: Demonstrate how the conceptual grid, used by Dynhyd3, was overlaid on a graphical history of boat trajectories to determine which channels correspond to a given transect.

16. Page 9, fourth paragraph: Figures 3.2 and 3.3 should be referenced in this paragraph. J1, J2, and J3, discussed in the text are shown as 1, 2, and 3 on Figure 3.2. Please use consistent references.

17. Page 14, last paragraph: Figure 2.1 does not show enough detail to illustrate the end of the transects. Please include a map at a scale that shows the transects more clearly. How many of the transects were run all the way to shore?

The quality of Tables' 2.1, 3.1, 3.2, and 3.5 should be improved. Some of the data in the last column is not legible.

18. Page 19, Table 2.1:. What is the impact of not having half the data for an entire tidal cycle? What, if any, is the impact on water quality? Why wasn't the data collected for the entire tidal cycle?

19. Page 25, first paragraph: How were the parameters for freshwater inflow entered into the model? Was there enough information from Spruce Creek for the parameters to be entered into the model?

20. Page 36, last paragraph: Please provide a figure showing the topography of the bottom slopes. It appears that bottom slopes in the Piscataqua River are not moderate, especially in the vicinity of the Shipyard.

Maine Geological Survey Comments

21. The report concentrates on mean flows that may be important in determining suspended or dissolved pollutant transport. No discussion appears of the fortnightly (spring-neap) variation in flow. The estuarine circulation is probably strongly affected by such temporal changes in tidal amplitude. The range of current speeds and water transport, and not just the mean flow, may be important in considering pollutant movements. In addition, there is no discussion of (a) the spring freshet, (b) seasonal variability, or (c) interannual variability. Given the difficulty in developing the model thus far, it may be more reasonable to study (a), (b), and (c) with a field program.

Sincerely,

Nancy Beardsley

Nancy Beardsley
Remedial Project Manager, Federal Facilities Unit
Office of the Commissioner

pc: Mark Hyland, MEDEP
Jim Tayon, PNSY
Ernest Waterman, EPA

September 9, 1993

To: Troy Smith, BHWSWC
From: Paul Mitnik, BWQC PM
Subject: Portsmouth Naval Shipyard - Hydrodynamic Modeling of Piscataqua River

My comments are limited to the report that you gave me to review titled "An Estuarine Ecological Risk Assessment Case Study For Naval Shipyard Portsmouth Kittery, Maine." The text of the report does not always explain certain aspects very clearly. For example, the figures depicting the velocity transects that were done are poor diagrams and the explanation of the data collection is vague. After reading over this material several times, I am still not sure what was done. Were velocity measurement done in the main channel only? How many measurements in the vertical and horizontal were made in an individual cross section? Several measurements within a cross section (20 to 30 in the horizontal) are needed to obtain an accurate estimate of flow. In tidal situations this data is sometimes difficult to obtain since the stage is changing so quickly. In table 2.1 in the report the cross sectional area times the velocity should equal the flow ; it does not. It appears that the areas are off a factor of 1000; the decimal points should perhaps be commas.

Better resolution will be needed in the vicinity where the pollutants are entering the river. When modeling marine pollutant transport, one usually is concerned with both near field and far field impacts. The DYNHYD and TOXIWASP models are generally being used here to address far field effects after considerable dilution has occurred. Plume modeling and/or dye studies are used to determine near field impacts. In some cases if it can be shown that impacts are not of concern in the near field, the far field analysis may not even be necessary. Dye studies would also be useful to determine which direction and transport mode that the pollutants are actually traveling. In the current modeling analysis, much judgment is used to determine the transport.

Ideally, in a near field modeling analysis, the model could be calibrated to dye concentrations under a variety of tidal conditions. Chemical sampling of the pollutants of concern in the vicinity where the pollutants are believed to be entering the river could be a useful check on the theoretical leaching rates that were calculated. Both the near field model and far field model (TOXIWASP) should be calibrated to chemical data to give them predictive reliability.

The prior modeling analysis undertaken in 1989 in which organitin was modeled was used to set up the channels and junctions in this effort. The seven NOAA stationary stations were used to calibrate this model. One point in a cross section is largely inadequate to estimate flow I agree that, assuming these stations are located in the main channel, they would lead to an overestimation of flow although it is unclear why the original model would be off as much as 600% with the ECOS data. . However there are some advantages to continuous data that the NOAA stations would provide over the ECOS data which was collected, it appears, hourly. It would be easy to miss the peak tidal flow in hourly data collection whereas continuous data will at least determine at what point in the tidal cycle the peak flow occurs.

As a start of any estuarine modeling analysis, the tidal prism above the mouth is usually used to check the flow estimate at the mouth. The integral or area under the tidal flow curve Vs time should equal the tidal prism above the cross section of the tidal flow curve. If this cannot be achieved a valid calibration will not be possible. In the report this was done to validate the ECOS data. I would agree that the original effort was in error and the reduction of volumes to achieve calibration was valid.

It is not clear why the authors of the report did not know whether the boat was in Clark Cove or not. Why not ask the people who collected the data? Since Clark Cove will most likely be an area of impact, this should be resolved. It is not clear anywhere in the report where Clark Cove is located. There could be some complex transport mechanisms not being accounted for by the current model.

Finally I am not sure that a one dimensional flow model will be suitable here. From the Endico data that was collected in 1991 it appears that the direction of transport in the deeper portions of the estuary is often in the opposite direction than surface transport. This could lead to erroneous conclusions if, in particular, the re suspension of bottom sediment is of issue. The re suspension of bottom sediments frequently occurs in some estuaries during peak tidal velocity conditions. In summary:

1. More work is needed in the determination of near field transport. Dye studies over a variety of tidal conditions at suspected discharge points are recommended. Plume modeling may also be necessary.

2. A better explanation of the ECOS data collection together with better diagrams depicting the transects is needed.

3. The NOAA and Endico data could be presented with the ECOS data. Was there any overlap of data, i.e. similar locations at different dates. How do they compare?

4. In future modeling efforts, the chemical component of the models, i.e. TOXIWASP should be calibrated to actual chemical data.

5. Discreptancies in Clark Cove should be resolved.

6. The model should be further evaluated for adequacy / inadequacy of one dimensional flow.