



STATE OF MAINE  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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October 18, 2001

Mr. Orlando Monaco  
Department of Navy  
Engineering Field Activity-Northeast  
Code 1823/OM  
10 Industrial Highway, Mailstop 82  
Lester, PA 19113-2090

Re: Direct Push Investigation-Eastern Plume Southern Boundary & Site 11  
Naval Air Station, Brunswick, Maine

Dear Mr. Monaco:

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the report entitled draft Summary Report of the Direct-Push Investigation of the Southern Boundary of the Eastern Plume and Site 11, dated September 2001, prepared by EA Engineering, Science and Technology. Based on that review the Department has the following comments and issues.

**General Comments:**

1. The Department's interpretations differ with the Navy's interpretations as to the analysis and meaning of the new data at Site 11 and the South Boundary of the Eastern Plume. Because these differences are significant, we cannot agree with some of the Navy's conclusions and recommendations. Major conceptual issues are discussed below in General Comments. Specific items of disagreement are explained in detail under Specific Comments and are keyed to specified text and figures.
2. For Site 11, the line of sections shown in Figures 4 and 5 do not provide the best realistic portrayal of the subsurface configuration. Suggested revisions are offered in Specific Comment 15.
3. Section F-F' geologic contacts can be drawn such that bedrock "pokes" above the transition unit in two places, without violating the data presented. Unfortunately this could have been addressed if a rough draft cross-section had been developed during the field effort, however now this can be disproved by additional explorations.
4. The Membrane Interface Probe (MIP)-VOC concentration logs are poorly discussed, and consequently, it is difficult to understand how the log traces actually responded to in-situ presence of contamination. For example, at what depth was the calibration log activated which was run beside MW-205 on May 11? The report states that the total VOCs in MW-205 was 500 µg/L in September 2000, however, exactly what log deflections (detector 2?) were involved in the calibration is unclear. Overall, the value and validity of using the MIP data to select the depth intervals sampled appears dubious. The emphasis for selection of sampling depths should have been on the electrical conductivity (EC) logs, as the MIP results are suspect. Please clarify in the report whether MIP or electrical conductivity logs were used to select sampling depths.

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5. Interpretations of the new EC logs do not agree with previously interpreted cone penetrometer logs in regards to lithology (e.g., CP-142). It appears that sandy zones, previously documented on the CP logs (see Well Book CD files), were either not consulted or were dismissed during the interpretation of the new data. The 1990 CP logs should not be dismissed and represent defensible interpretations of geologic units. The Navy needs to justify its basis for not incorporating these logs into the report's cross sections. This oversight represents a major problem to State acceptance of subsurface geology interpretation.
6. Another obvious problem is the inconsistency of log interpretation of the new EC logs. Relatively speaking, low-end electrical conductivity readings coupled with low but somewhat variable penetration rates are indicative of sandy zones at NAS-B. The Navy has correctly interpreted this relationship regarding the log traces through the Upper Sand Unit. However, at greater depths, zones exhibiting such log responses are generally not recognized as being sandy (with the related connotation of higher permeability than the surrounding soils). Therefore, the report has concluded that the Lower Sand pinches out in the area investigated. MEDEP disagrees with this conclusion, and believes that sandy zones as thin as 1 to 2 feet in thickness exist and are important to map.
7. MEDEP selected cross section D-D' of the Eastern Plume to examine in detail. This cross section is not properly drawn, and thus gives a false impression of the subsurface. Several basic problems exist: (1) the land surface elevations for EP-DP-10 and CP-144/MW-318 are 10 feet too high on the section, (2) CP-141, CP-143, and CP-144 log information are not utilized, and (3) lithologic interpretations appear erroneous (see comments 5 and 6 above).

Because of these problems, MEDEP saw no point in scrutinizing the other cross sections at this time. This issue needs to be discussed at the next technical meeting and the cross sections revised based on that discussion..

### Specific Comments

8. Introduction, Section 1.0, page 1, 2<sup>nd</sup> bullet:

This item might better be phrased "Delineation of the Lower Sand South of New Gurnett Road".

9. Introduction, Section 1.0, page 1, 3<sup>rd</sup> bullet:

Please specify what the data gap is at CP-118, as a matter of record.

10. Introduction, Section 1.0, page 1, 3<sup>rd</sup> para, 1<sup>st</sup> sentence:

"In addition to the EC and MIP *in situ* downhole logging, ground-water samples were collected from pre-selected locations and depth intervals at both site 11 and the ..."

Is "pre-selected" correct? MEDEP thought that the log data were used to chose locations and depths of sampling intervals. If this was not the case, the April 26, 2001 Letter Work Plan was not followed.

11. Direct-Push Ground-Water Sampling Methods, Section 2.3, p.4, 2<sup>nd</sup> para:

This paragraph states that water level measurements were made for at least 15 minutes inside the DP probe to determine if a static level was attained prior to sampling. These data are not presented in this report, but should be added. Also, please describe the water collection technique within the probe in more detail, or show an equipment setup schematic.

12. Direct-Push Membrane Interface Probe and Electrical Conductivity Data Logging Methods, Section 3.2, p.6, top para:

The last sentence says that the EC log C-205 run beside MW-205 was compared with existing data. In Section 5.2.1 the quality of the comparison is not really addressed; only that the C-205 log was comparable to existing data. Examination of the EC logs that were made with the MIP probe suggests that these logs were subpar. The Navy wisely chose to use the Yarmouth Environmental EC logs on all cross sections. However, the report should contain some statement concerning the poor quality EC logs obtained with the MIP probe, so the reader will ignore these.

13. Direct-Push Soil Sampling Methods, Section 3.4, p.6:

"No elevated headspace reading were detected in the soil sample recovered from boring locations EP-DP-01.

The finding of no elevated headspace readings in the recovered soil from EP-DP-01 should have been expected, as this location is west of where the plume was anticipated. MEDEP can not find evidence that continuous soil sampling was performed at this location, as stated in the first sentence. The referenced Table 1 only presents results for 80 to 84 feet bgs. What was the rationale for selecting this location?

14. Piezometer Installation, Section 3.5, p.7, 1<sup>st</sup> para:

The screened intervals of three of the four piezometers (exception is EP-DP-11) are too shallow to properly represent the deep groundwater potentiometric surface. The sandy lenses that have had hits of VOCs occur substantially deeper (20 to 30 feet). Therefore, although the screens may be positioned in sandy intervals within the Transition Unit, the groundwater heads are probably different than those measured at the depth of the lower sand.

Unfortunately MEDEP was not consulted or given an opportunity for input, concerning vertical placement of the piezometers, consequently the delineation of deep groundwater flow direction was not accomplished to our satisfaction.

15. Site 11 Geology and Bedrock Surface, Section 5.1.2.1, p. 10, 2<sup>nd</sup> para:

- a.) This report should include a second contour map, which would show the interpreted configuration of the top of clay. The two contour maps could then be overlain and an "elevation difference" contour map produced that would show the estimated thickness of clay over bedrock.
- b.) Please add a statement to the text to indicate that interpreted bedrock contours are shown in Figure 2.

- c.) The lines of cross sections for Site 11, shown on Figures 4 and 5, can be improved, and better assist the understanding of the subsurface geology. The basic problem is that these two sections start perpendicular to each other in the north and west, and end up parallel to each other in the east. It is best to keep the section lines as straight as possible, and headed in a single direction. For Section E-E', MEDEP suggests that points S11-DP-3 and S11-DP-2 be dropped, and S11-DP-5 and S11-DP-6 be added. Point S11-DP-6 should be deleted from Section F-F'.

16. Direct-Push Membrane Interface Probe/Electrical Conductivity Results, Section 5.2.1, p. 12, 1<sup>st</sup> para:

"These MIP/EC data results at the Southern Boundary were used to determine the sampling intervals at each probe location (as summarized in Table 1)."

It is the Department's perspective that only the EC logs collected by Yarmouth Environmental are of adequate quality for selecting sampling intervals. Upon our review of the Yarmouth Environmental logs, deeper sampling intervals should have been selected at some DP locations instead of taking the samples at shallow and moderate sampling depths.

17. Cross Sections, Figures 6-9:

At least a total of a dozen groundwater sampling intervals given in Table 1 are not shown (red boxes) on these sections. These omissions, along with the absence of delineations showing sandy lenses in the Transition Unit, make it difficult to evaluate what gaps may yet remain in probing for the Eastern Plume. Please add the missing information to the sections.

18. Southern Boundary Geology and Clay Surface, Section 5.2.2.1, p. 13, 3<sup>rd</sup> bullet:

"A definable lower sand unit was not encountered during the MIP/EC investigation suggesting that the lower sand unit mapped within the northern portions of the Eastern Plume gradually pinches out and cannot be correlated laterally south of New Gurnett Road.

The Department's cursory evaluation of the new data (particularly the EC logs), in combination with the older data, strongly suggests that a lower sandy zone does occur within the area investigated by this study. However, it appears that this zone contains more interfingering with silty beds than occurs to the north. The Navy's description of the Transition Unit in Bullet 2 (above) reads "...consists of fine sand and silty fine sand, and was found to contain sporadic sand lenses throughout the unit...". To MEDEP, this geologic composition implies that a significant permeability must exist, and therefore, the Eastern Plume would be able to migrate further southward if it has not attenuated or has not been halted by remedial pumping. Interpretation and conclusions must be corrected to be consistent with the field data.

19. Southern Boundary Direct-Push Ground-Water Sampling Results, Section 5.2.3, p. 14, 2<sup>nd</sup> bullet:

"Trichloroethene was detected at direct-push sample location EP-DP-12 (65-67 ft bgs) at a concentration of 18  $\mu\text{g/L}$  that exceeds the corresponding MEG and MCL of 5  $\mu\text{g/L}$ ."

The finding of 18  $\mu\text{g/L}$  of TCE (lab analysis) at EP-DP-12 at -30 feet msl is quite significant. Figure 12 shows the Navy's interpretation that the leading nose of the Eastern Plume ends at this DP location. Such an abrupt stop is highly unlikely. The field program did not collect adequate groundwater samples to show that the plume stops at this point, and does not

move through the top of clay trough at CP-142 (see Figure 9). The sample taken at EP-DP-10 is actually from -50 ft msl, not -40 ft msl (see General Comment 7).

20. Shallow Ground-Water Potentiometric Surface, Section 5.2.4.1, p. 15, 2<sup>nd</sup> bullet:

"The ground-water contour data indicate a predominately east to southeasterly flow direction and slopes (with an approximate horizontal gradient of 0.045 ft/ft to the east between monitoring wells MW-242 and MW-104."

This bullet should be deleted as it is not germane to the Eastern Plume.

21. Deep Ground-Water Potentiometric Surface, Section 5.2.4.2, p. 15, 1<sup>st</sup> bullet:

"The deep ground-water contour map was constructed from the water level gauging data obtained from the deep monitoring well and piezometers screened between 30 and 98 ft bgs within the lower portion of the Transition Unit and the lower sand unit."

- a.) Wells/piezometers with screens shallower than approximately 50 feet bgs should not be used to map the deep potentiometric surface. The 30 feet used in this draft report is certainly too shallow. In examining the well depths of wells used to develop the contours in Figure 11, the EC log indicates that PZ-11 (at EP-DP-11) is screened just above the clay at depth of 35 feet bgs, which is 15 feet above msl. Our review has shown that the lower sand does not extend higher than approximately 0 feet msl in the Eastern Plume area. Therefore, PZ-11 appears not to represent the deep groundwater system, and should be used only on the shallow potentiometric map. The deep system likely is not present at PZ-11, being truncated further eastward.
- b.) PZ-1 (at EP-DP-1) is screened above -10 feet msl, and appears to be above that part of the Transition Unit that contains the lower sand. Therefore, its potentiometric elevation is likely irrelevant to Figure 11 contouring. Even MW-231A with its screen extending to -17 feet msl is approximately 20 feet higher than the two detections of VOCs (CP-118 and EP-DP-12). In light of the new geologic cross sections, MW-231A may not monitor the lower sand unit that may be conducting Eastern Plume contamination, and inclusion of its potentiometric elevation on Figure 11 is questionable.

22. Deep Ground-Water Potentiometric Surface, Section 5.2.4.2, p. 15, 2<sup>nd</sup> bullet:

"The ground-water contour data indicate a predominately east to northeasterly flow direction in the southern Boundary area with moderate flow gradient throughout the area."

On the basis of the likelihood that PZ-1, PZ-11 and MW-231A do not tap into the lower sand containing the plume, for the reasons given in the above comment, groundwater flow direction at depth is still not demonstrated to the Department's satisfaction. A southerly direction is just as plausible as Navy's east to northeast flow direction, particularly in the absence of full design capacity remedial pumping (which has not been achieved for the past several years).

23. Deep Ground-Water Potentiometric Surface, Section 5.2.4.2, p. 15, 4<sup>th</sup> bullet:

"The overall deep ground-water flow pattern also correlates with the more regional deep ground-water potentiometric surface contour maps constructed as part of the April and September 2000 Monitoring Events 16 and 17, respectively (EA 2000a and EA 2000b)."

Based the above comments MEDEP cannot agree with this statement in that the deep groundwater system of interest has not been correctly interpreted as shown on figure 11. (See comments 21. and 22.)

24. SITE 11, Section 6.1, p. 16, 3<sup>rd</sup> bullet:

"These findings indicated that a low permeability unit does exist beneath the Site 11 area and to the east of the bedrock knob at the S11-DP-06 direct-push location."

The above sentence should be separated, and reformatted as a new bullet.

25. SITE 11, Section 6.1, p. 16, 5<sup>th</sup> bullet:

"These findings suggest there is no evidence [sic] VOC impact to the soil above the bedrock in the Site 11 area."

Please rewrite as: "*This investigation found no measurable evidence of residual VOC impact to the soil above bedrock where explorations were located.*"

26. Site 11, Section 6.1, p. 16, 6<sup>th</sup> bullet:

"No VOCs were reported above the applicable MEGs and/or MCLs in the 7 confirmatory ground-water samples collected from the 5 direct-push sample locations."

While this is true, but it is noteworthy that TCE was detected at one point at 4 µg/L, just below its MCL/MEG.

27. Site 11, Section 6.1, p. 17, 2<sup>nd</sup> bullet:

"The June 2001 direct-push ground-water sampling data and the previous sampling results from bedrock well MW-323 indicate that the bedrock has not been or is likely to have been impacted by the former source area at Site 11."

The Department objects to including "...has not been" because the area around S11-DP-06 should be investigated further upon finding TCE in groundwater at a concentration just below the MEG/MCL. Furthermore, Figure 5 cross section indicates that the bedrock surface might "poke out" through the Transition Unit between MW-NASB-087 and S11-DP-1, and/or within 80 feet south of S11-DP-3. These data gaps will need to be closed.

28. Southern Boundary of the Eastern Plume, Section 6.2, p. 17, 3<sup>rd</sup> bullet:

"A definable lower sand unit was not encountered during the June 2001 direct-push investigation, suggesting that the lower sand unit mapped within the northern portions of the Eastern Plume gradually pinches out and cannot be correlated before reaching New Gurnett Road."

The Department cannot agree with this statement, as the geologic cross sections presented in this report have numerous deficiencies. (See Comments 5-7, and 18.) The team will need to come to resolution on the interpretation of the logs and the geology at a technical meeting.

29. Southern Boundary of the Eastern Plume, Section 6.2, p. 18, 2<sup>nd</sup> bullet:

"...and the Presumpscot Clay was encountered between 82 and 84 ft bgs (the latter of which was refusal)."

EP-DP-01 was advanced to 120 ft bgs, and did not meet refusal according to the EC log and the Figure 6 cross section. Please correct this statement.

30. Southern Boundary of the Eastern Plume, Section 6.2, p. 18, next to last and last bullets:

"The deep ground-water gauging data collected on 25 July 201 indicate that the ground-water flow direction is primarily from the west, moving predominantly to the east and northeasterly directions in the Southern Boundary area."

"The gauging data indicated that the primary flow direction of both the shallow and the deep ground-water in the southern boundary is primarily to the east."

DEP does not believe that these are accurate assessments. See Comments 21-23 and correct these statement appropriately.

31. Implications to Conceptual Model, Section 7.0, p. 19 and Appendix H:

This draft report, as it now is presented, has too many inaccuracies and misinterpretations to be able to update the Eastern Plume conceptual model to the satisfaction of the State. The Navy needs to revisit the issues raised by the regulatory agencies, and then hold technical discussions to resolve remaining differences in interpretations.

32. Recommendations, Section 8, p.20:

"The direct-push ground-water sampling, soil sampling, and MIP/EC logging results from Site 11 do not indicate the evidence of VOC impact in the soil or the ground water. The EC logging and soil sampling data at Site 11 do not indicate that bedrock is exposed to the coarser-grained lower sand unit nor suggest the likelihood of bedrock impact. It is recommended that the ground water at Site 11 continue to be monitored and evaluated as part of the Long-Term Monitoring Program to determine changes in the ground-water quality."

"The direct-push ground-water sampling, soil sampling, and MIP/EC logging results from the Southern Boundary indicated that the area is underlain with Presumpscot Clay above the bedrock and the ground-water flow direction in the Southern Boundary area is primarily to the east. Based on the results of the June 2001 direct-push sampling data, slight revisions are proposed to the conceptual model for the Eastern Plume...."

For the reasons given in the preceding comment, the first two of the Navy's current recommendations on this page do not appear valid to the Department at this time.

33. Recommendations, Section 8, p.20:

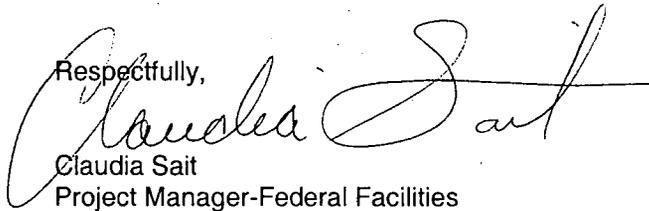
"In order to assess the natural attenuation occurring at the Eastern Plume, the overall distribution of dissolved contaminant mass, and ...it is recommended that a natural attenuation monitoring program for the Eastern Plume, or portions or [sic] the Plume, be developed and incorporated as part of the Long-Term Monitoring Program."

It is unclear what is meant by the last part of this recommendation. Is the Navy proposing to modify the LTMP to initiate monitoring to evaluate the possibility of moving toward natural attenuation or proposing to revise the LTMP to go to natural attenuation? Please clarify.

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Thank you for the opportunity to review this report. If you have any questions or comments please call me at (207) 287-7713.

Respectfully,

A handwritten signature in black ink, appearing to read "Claudia Sait". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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