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WARM-9608.002.01

Mr. Lonnie Monaco
Naval Facilities Engineering Command (NAVFACENGCOM)
Northern Division
Environmental Contracts Branch, Mail Stop No. 82
10 Industrial Highway
Lester, PA 19113

RE: RI/FS for Area D Groundwater
Former NAWC Warminster, Pennsylvania

Dear Mr. Monaco:

Pennoni Associates Inc. ("Pennoni") has reviewed the draft "*Remedial Investigation/Feasibility Study Report for Area D Groundwater*" prepared by Tetra Tech NUS and dated February 2000. We have also reviewed a technical memorandum by Jeff Orient, dated 3/10/2000 and a fax from Tom Ames dated 4/18/2000 including comments from Kathy Davies of the EPA.

We offer the following preliminary comments:

1. The Area D report discusses various and somewhat confusing designations for the shallow, intermediate and deep hydrogeologic units. Although the Navy has stated that their revisions will clarify this issue, the fact remains that the complex hydrogelogy does not fit designations of continuous hydrogeologic units across the site. An example of this is a comparison of the Foster Wheeler cross-section of the extraction wells showing variation in extent and thickness of the geologic units and the Tetra Tech NUS cross-sections showing more uniform units.

2. The groundwater flow gradients shown for the shallow and intermediate zone show a complex flow system which cannot be entirely attributed to topography. Due to the substantial amount of impervious surfaces in area, recharge locations such as grassy areas and leaks in storm sewers will have a significant impact on shallow groundwater gradients. The anomalies in the deeper gradients are more likely attributable to fracture systems, a possibility, which was not addressed in the report. The current designation of shallow and intermediate on the figures gives no information as to the relation of the monitored interval to lithologic interval. For discussion purposes, groundwater flow gradient should be shown in an assumed lithologic interval to reflect groundwater movement along the bedrock bedding planes. In this way, departures from the predicted gradients can be evaluated.

3. In order to better evaluate the nature and extent of the contaminant plumes, the isopleths and plume delineation should be shown along the same assumed lithologic interval. In addition, the plume should be shown in at least one representative cross-section. This would be preferable to illustrating the plumes in shallow and intermediate zones, which do not take into account the structural profile of the bedrock.

4. The report implies that the 1,1-DCE, which was found at elevated levels in off-base wells and in trace levels on-site, originated off-site and is due to an off-site source. However there is no basis provided for a migration route to the upgradient, on-base wells where trace 1,1-DCE was detected. Jeff Orient's memorandum also raised the possibility of off-site TCE contamination originating from an off-base source. We do not believe there is sufficient evidence for an off-site source of TCE. The plume delineations shown for TCE in the report indicate a plume with an Area D source. Therefore, evaluation of extraction systems for TCE should focus on remediating the plume. Consideration of an additional extraction well near the property boundary should still be considered. We believe the expressed concern about pulling contamination from an off-site source is unwarranted.

5. We disagree with the report's conclusion that the capture zone encompasses the TCE plume. A portion of the plume extends to off-base well HN-19I, which is downgradient of the capture zone.

6. Alternative 3 is presented as including the installation of off-base extraction wells, which would present a number of implementation obstacles such as access. We believe the alternative should evaluate the location of additional extraction wells along the property boundary between HN-17 and HN-33.

7. We concur with the EPA comments requesting the basis for a number of statements in the report. If the report is going to be revised to discuss monitored natural attenuation ("MNA"), is it going to be on the basis of dispersion and dilution? There does not appear to be evidence of significant degradation in the TCE plume.

Should you have any questions concerning the above comments, please do not hesitate to contact us.

Very Truly Yours,

PENNONI ASSOCIATES INC.

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Senior Hydrogeologist

Kevin J. Davis, P.E.
Associate Vice President

cc. Robert Camarata, Warminster Township
David Fennimore, Earth Data

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