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LETTER REGARDING U S EPA REGION IV REVIEW AND COMMENTS ON SITE SCREENING REPORT STUDY AREA 17 NTC ORLANDO FL

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
61 Forsyth Street
Atlanta, Georgia 30303-3104

December 8, 1998

4WD-FFB

Mr. Wayne J. Hansel
Southern Division
Naval Facilities Engineering Command
P.O. Box 190010
Charleston, SC 29419-9010

SUBJ: BRAC Environmental Site Screening Report, Study Area 17, Naval Training Center, Orlando, Florida.

The United States Environmental Protection Agency (EPA) has completed the review of the BRAC Environmental Site Screening Report, Study Area 17, Naval Training Center, Orlando, Florida. EPA's comments on the subject report are enclosed.

If you have any questions regarding these comments, please call me at (404) 562-8536.

Sincerely,

Nancy Rodriguez
Remedial Project Manager

cc: Dave Grabka, FDEP
Lt. Gary Whipple, NTC Orlando
Steve McCoy, Tetra Tech NUS
Rick Allen, HLA
Barbara Nwokike, SouthDiv

BRAC ENVIRONMENTAL SITE SCREENING REPORT
STUDY AREA 17, NTC ORLANDO

Comments:

1) HLA has identified important features of the groundwater flow system at this site which are critical in performing an effective site characterization. The groundwater flow system has been identified as a 3-dimensional system with a vertical flow component. Variations in the horizontal and vertical distribution of contamination have been observed. Geologic features which influence groundwater and contaminant transport have been identified. Figure 4-10 is particularly effective in summarizing these features. An excellent foundation for subsequent investigation steps has been laid.

Some of the comments in this letter are intended to highlight procedures and data which will be needed for the evaluation of remedial measures which may be considered for this site, particularly Monitored Natural Attenuation (MNA). Unlike other remedial measures which can be designed or evaluated from the office and which are specifically designed to alter or overcome natural processes, MNA requires a significant amount of field investigation, observation, sampling and interpretation of the results. Therefore, some of the comments provided in this letter are intended to identify data which will be required for an evaluation of MNA early in the process so the selection of an appropriate remedial measure will be delayed as little as possible. Please note that National Guidelines for demonstration of MNA were released by EPA in November, 1998. The guidelines are similar to previously relevant MNA guidelines such as the Region 4 Draft MNA guidelines of November, 1997 and the AFCEE Natural Attenuation Protocol. The primary difference is that descriptions of methods for collecting and interpreting data are improved. There are no new requirements which are significantly different from the previously applicable MNA guidance. The new MNA guidelines are available at:

http://www.epa.gov/ada/reports.html

Other comments are meant to focus future efforts on apparent discrepancies related to horizontal and vertical groundwater flow directions, recharge areas and discharge areas. There are a number of apparently conflicting observations, particularly regarding the drainage canal which flows along the south side of the source area. The water table is relatively flat at this site and seasonal water level variations may effect groundwater flow directions. It may be necessary to re-survey the elevations of the staff gauges and the measuring points on the monitoring wells to resolve the questions.

2) Groundwater contamination detected at this site includes BTEX at relatively low concentrations, and chlorinated VOCs at concentrations greater than applicable standards. Monitored Natural Attenuation may be an appropriate remedial measure for the plume of contaminated groundwater, if the plume is found not to present a risk to potential receptors, and if it is not expanding. The

burden of proving that natural attenuation is appropriate for the site is on the proponents.

If monitored natural attenuation is to be considered as a remedial measure, a plan to monitor the process of natural attenuation should be implemented as soon as possible. The guidelines for a monitoring plan to demonstrate the effectiveness of monitored natural attenuation, including lists of parameters to be measured in the field and laboratory, and the recommended frequency of sample events, are included in the EPA Monitored Natural Attenuation Protocol (USEPA, 1998, p. 44 & p. 52). Typically, sample events should be conducted quarterly for the first year of a MNA evaluation to determine seasonal changes in groundwater flow direction, hydraulic gradient, water table elevation, MNA indicators and contaminant migration. The last round of water level data and water quality samples were collected in July and August, 1998. Therefore, the next quarterly sampling event should be completed in November, 1998. Quarterly sampling should be maintained for at least one year, after which an evaluation of the observed variations in water level and water quality should be performed, and the appropriate interval for subsequent sample events should be determined.

The elements necessary for an evaluation of MNA, particularly the number and location of wells to be sampled and the list of analyses to be performed, are site specific and will depend on the results of the concept model developed to describe groundwater flow and solute transport, on the location of potential receptors and the potential pathways to these receptors. Methods for interpreting these data are provided in the references cited.

HLA should follow the EPA Protocol for the evaluation of MNA (USEPA, 1998) to the extent possible. All depth to water measurements, well drilling procedures, sample collection procedures, sample analysis methods, etc, shall be performed in a manner consistent with the specifications in the EPA Region 4 Standard Operating Procedure (SOP, USEPA, 1996). Data collected during the investigation should be stored and reported to EPA in a digital format, in addition to any data presented in tables and figures included in the final report. A generic digital data format is presented in Table 2 of this letter. The format is intended to facilitate data transfer with as little transcription from paper records as possible, and therefore is negotiable on a project by project basis. Please contact Dave Jenkins (404-562-8462, jenkins.dave@epamail.epa.gov) at EPA Region 4 with questions or suggestions regarding the recommended data exchange format.

3) An evaluation of MNA should be initiated and up dated during the course of the quarterly monitoring period. An evaluation of natural attenuation should include:

1) a determination of the distribution of electron acceptors, electron donors and metabolic by-products along the flow path,

2) a demonstration of contaminant biodegradation or reduction versus distance along the flow path from the source, and

3) an evaluation of contaminant biodegradation or reduction versus time at selected points along the flow path from the source.

Data which may be used to perform a Preliminary Natural Attenuation Scoring are defined in USEPA, 1998, Table 2.4. Table 2 of this letter lists the analyses for which points are given in the

Preliminary Natural Attenuation Scoring Process. The distribution of electron acceptors, donors and metabolic by-products (Point 1) will be a result of application of the Preliminary Natural Attenuation Scoring process. Additional lines of evidence which support MNA will be developed by combining data from previous investigations with the results of the MNA investigation to achieve the evaluations described in Points 2 and 3.

4) Groundwater modeling and solute transport calculations should be performed. The EPA Technical Protocol for Natural Attenuation (USEPA, 1998, p.6) requires presentation of multiple lines of evidence to support natural attenuation. Groundwater model results generated during the proposed investigation need to be supported with field data from monitoring wells which confirms that the model calculations are correct. Rates of contaminant movement must be determined, degradation rates calculated and clean-up times estimated.

Data from previous investigations is available for this site and it should be utilized to fulfill the monitoring requirements to the extent possible. Water level contour maps which best describe seasonal groundwater flow directions and gradients on dates should be created. Specific recommendations for maps which should be included in a MNA evaluation report are presented in USEPA, 1998, Section 2.4.1. Additional water-level data from sample events other than those shown in the maps should be plotted as hydrographs to determine the seasonal variation of the water table and to determine if vertical gradients between well pairs are consistent over time. Hydrographs may be particularly useful at this site where the water table is relatively flat and vertical contaminant movement is apparent.

Water quality data should be plotted as concentration versus time. The scale of the time axis used for water level hydrographs and water quality trend plots should be the same to facilitate interpretation of the results.

5) The groundwater flow direction arrows on Figures 4-3 through 4-8 indicate that groundwater flow is toward the southeast. However, the 86.5 and 86.0 foot contours on Figure 4-3, as drawn, indicate that groundwater flow is radial from the vicinity of well OLD-17-23A. The groundwater flow direction arrow is incorrect at the location shown on Figure 4-3.

Similar comments apply to Figures 4-11 and 4-12. As drawn, a radial flow pattern is present in a small portion of the intermediate zone (Figure 4-11), and relatively few flow paths are in the direction of the groundwater flow arrow shown on Figure 4-11. No area of radial flow is apparent on Figure 4-12, but the most common flow path direction is directly south, not southwest as indicated by the arrow on Figure 4-12.

The groundwater analytical results confirm the radial flow pattern in the shallow and intermediate zone. The text (p.4-17) states that monitoring well OLD-17-05A is in the up gradient well cluster, but this up gradient well contained m-dichlorobenzene. Figures 4-4, 4-5 and 4-6 show groundwater contamination has spread both west and north from the apparent source areas, in directions opposite from that shown by the groundwater flow direction arrow.

As presented, the groundwater flow arrows are mis-leading. Further, the average horizontal hydraulic gradients in the shallow, intermediate and deep zones (0.004 ft/ft, 0.003 ft/ft and 0.002 ft/ft, page 4-22) are an order of magnitude less than the downward hydraulic gradient beneath the source area shown in Figures 4-13 and 4-14. These data, coupled with the contaminant distribution shown on Figure 4-10 show that regardless of how many horizontal flow direction arrows are added to the maps, the dominant direction of groundwater flow is downward. The consequences of radial and downward flow from the source areas must not be under emphasized. Please place groundwater flow arrows on all appropriate figures to indicate selected local groundwater flow directions and highlight radial flow from the source. Please expand the text to include more detail regarding vertical groundwater movement, the discharge area for groundwater contamination and contaminant travel times along the flow paths between the source and the discharge area.

6) The text (page 4-22) states that the plume extends no more than 50 to 75 feet west and north from the two source areas. Figure 4-4 indicates that the plume extends more than 150 feet north from the vicinity of 17Q002. The concentrations in this direction are relatively low, but the text and mis-placed flow direction arrows de-emphasize the radial flow from high water table area in the center of the site (Figure 4-3). Contamination has moved both west and north from the source area. The text on page 4-22 could be revised to state that the extent of contamination is shown on Figures 4-3, 4-4 and 4-5, rather than specify distances in the text.

7) The water table shown on cross-section 4-10 is not consistent with the water level contour map of Figure 4-3. In particular, the canal is shown as a recharge area, not as a discharge area. Figure 4-10 is inconsistent with the text (p.4-22) which states that the plume has migrated along the upper surface of the silt layer and is discharging to the canal. The intersection of a silt layer with the bottom of the canal is not apparent from Figure 4-10. Some dissolved contamination may discharge to the canal at some times of the year, but the data on Figure 4-10 shows the contaminants moving vertically downward, so the canal may not be the primary discharge area. The relationship between water levels in the canal and in monitoring wells near the canal needs to be verified. If the canal is a discharge area, water levels measured at the staff gauges must be lower than in the monitoring wells and a connection to a silt layer at the bottom of the canal is not necessary. If the canal is a recharge area, there may be no contaminant pathway to surface water. However, the surface water results reported in Section 4.6.2.1 show VOCs detects in 4 of 5 samples. Please evaluate this apparent discrepancy and determine whether the canal is a recharge or discharge area. It may be necessary to draw flow-nets on cross-sections through the canal, including water level data from well screens and staff gauges, to show upward flow to surface water, if that is what is happening at this site.

8) The inferred location of the 85.5 foot contour shown in Figure 4-3 does not appear to be supported by the data, which suggests that the 86.0 foot contour should be drawn through wells OLD-17-29A, OLD-17-30A, and OLD-17-32A. The locations of all three of these wells are shown as being within the drainage ditch. The text in section 4.5.4, Groundwater Flow Evaluation, does not explain the discrepancy between the water level elevations and the way the contours are drawn. The water level elevations shown on Figure 4-3 for wells OLD-17-29A, 30A, 31A, 32A, and 33A

are higher than in wells adjacent to the canal and do not appear to support statements on page 4-27 than the plume discharges to surface water. Please re-evaluate the water level contours shown on Figure 4-3.

9) There appears to be a discrepancy between the well depths and screen elevations for wells listed in Table I-2 <u>after</u> well OLD-17-28C. For example, the depth of well OLD-17-32A is listed as being 83.7 feet below land surface. As drawn on Figure 4-10, this well is only about 5 feet deep. The elevation of the screened interval is listed as being 83.7 to 84.7 feet above Mean Sea Level. The screened interval elevation appears to be agree with Figure 4-10. Please check the monitoring well construction information presented in Table I-2.

10) Please change the well name "OLD-15-25C" to "OLD-17-25C" in Table I-3.

11) Figure 4-9 shows the cross-section passing through 17Q013. The cross-section location on Figure 4-2 does not pass through 17Q013. Please alter the line of the cross-section on Figure 4-2 to coincide with Figure 4.9.

12) Figure 4-10 shows the cross-section passing through OLD-17-32A. The cross-section location on Figure 4-2 does not pass through OLD-17-32A. Please alter the line of the cross-section on Figure 4-2 to coincide with Figure 4.10.

References

McAllister and C.Y. Chiang, 1994, A Practical Approach to Evaluating Natural Attenuation of Contaminants in Groundwater, Ground Water Monitoring and Remediation, Spring, 1994, pp. 161-173.

USEPA, 1996, Region 4, Science and Ecosystem Support Division, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May 1996.
http://www.epa.gov/region04/sesd/eib/eisopqam.html

Wiedemeier, T.H., M.A. Swanson, D.E. Moutoux, E.K. Gordon, J.T. Wilson, B.H. Wilson, D.H. Kampbell, P.E. Haas, R.N. Miller, J.E. Hansen, F.H. Chapelle, 1998, TECHNICAL PROTOCOL FOR EVALUATING NATURAL ATTENUATION OF CHLORINATED SOLVENTS IN GROUND WATER, USEPA Office of Research and Development, Washington DC 20460, EPA/600/R-98/128, September 1998
http://www.epa.gov/ada/reports.html

Table 1. RECOMMENDED GENERIC FORMATS FOR DIGITAL DATA EXCHANGE EPA REGION 4

Four types of data should be stored in a digital format:

1. Depth to water in monitoring wells,
2. Location of monitoring wells (X-Y Coordinates),
3. Construction of monitoring wells,
4. Field and laboratory analysis results.

DEPTH TO WATER DATA

The depth to water data should include all measurements ever made in any of the area wells which are available to the consultants. These can be submitted in any of the following formats, listed in order of preference:

1. (Most Desirable) A file created by a common database program containing fields for:
    - UNIQUE WELL NAME
    - DATE OF MEASUREMENT
    - TIME OF MEASUREMENT
    - DEPTH TO WATER
    - COMMENTS
2. (Almost as desirable) A common spreadsheet program containing columns for:
    - UNIQUE WELL NAME
    - DATE OF MEASUREMENT
    - TIME OF MEASUREMENT
    - DEPTH TO WATER
    - COMMENTS

WELL CONSTRUCTION DATA AND WELL LOCATION DATA

The data necessary include:

Boring Name or Number		if not same as Well Name or Number
Well Name or Number		Same unique name as for depth to water measurements
Date Drilled		
Date Abandoned		defines valid range of well data
Depth to Screen Top	ft	
Screen Length	ft	
Total Depth	ft	may be different from screen bottom
Ground Elev.	ft msl	
Reference Elev1	ft msl	Top PVC or measuring point elevation
Reference Elev Change Date		Date of elevation resurvey

Reference Elev2	ft msl	New measuring point elevation
X Coordinate		Easting
Y Coordinate		Northing
Screen Slot Size	mm	
Mean Grain Size	mm	in screened interval
Comments		TEXT

It would be best if the data were in a dBASE type file or spreadsheet in the format shown, but these data are only entered only once for each sample location, so the construction data could be entered manually from paper copies of the well construction records.

FIELD ANALYTICAL DATA AND LABORATORY ANALYTICAL DATA
The analytical data could be better utilized if it were available in a dBASE type file. This usually is a little more difficult than for water level or well construction data. The format requirements are somewhat flexible because some data conversion always is necessary. An ideal minimum analytical data format for EPA use would resemble the following:

Laboratory #	Lab Sample ID number
Sample Name	Common location or well name
Date	Sample Collection Date
Time	Sample Collection Time
Sample ID	Sample ID from Chain of Custody
Matrix	Water (W), Soil (S) or other as defined
Analyte	Chemical or compound name
Units	Analysis units
Concentration	as text or "<" detection limit for non-detects
Qualifiers	Analysis Qualifiers & Flags
Method	Method Description or Number
Top	Soil Sample Interval Top
Bottom	Soil Sample Interval Bottom

Table 2. MONITORED NATURAL ATTENUATION PRELIMINARY SCORING EVALUATION INPUT

Analyte		Units
Dissolved Oxygen	afp	mg/l
Nitrate Nitrogen as N	a p	mg/l
Iron++	a p	mg/l
Sulfate	a p	mg/l
Sulfide	a p	mg/l
Methane	a p	mg/l

Redox Potential	afp	mV
pH	afp	
Total Organic Carbon (TOC)	p	mg/l
Temperature	afp	°C
Carbon dioxide	a p	consistent
Alkalinity, Total	p	consistent
Chloride	a p	consistent
Hydrogen	fp	nm/l
Volatile Fatty Acids	p	
Benzene	a p	µg/l
Ethylbenzene	a p	µg/l
Toluene	a p	µg/l
Xylenes (Total)	a p	µg/l
Tetrachloroethylene	a p	µg/l
Trichloroethylene	a p	µg/l
1,2-Dichloroethylene, cis-	a p	µg/l
1,2-Dichloroethylene, trans-	a p	µg/l
1,2-Dichloroethylene, Total	a p	µg/l
Vinyl Chloride	a p	µg/l
Ethene	p	µg/l
Ethane	p	µg/l
1,1-Dichloroethane	a p	µg/l
1,2-Dichloroethane	a p	µg/l
Chloroethane	a p	µg/l
1,1,1-Trichloroethane	a p	µg/l
1,1-Dichloroethylene	a p	µg/l
1,2-Dichlorobenzene	a p	µg/l
1,3-Dichlorobenzene	a p	µg/l
1,4-Dichlorobenzene	a p	µg/l
Chloroform	a p	µg/l
Carbon Tetrachloride	a p	µg/l
Methylene Chloride	a p	µg/l
Specific Conductance	f	µmhos/cm

NOTES
a = analysis required
f = field analysis
p = points given in scoring process