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NSWC CRANE
5090.3a

DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE, INDIANA 47522-5000

IN REPLY REFER TO:

5090/S4.7.5
Ser RP3/5251
18 JUL 2005

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Corrective Action Section
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center submits responses to the June 29, 2005 comments submitted via email by the U. S. EPA on the Mustard Gas Burial Grounds (MGBG), Solid Waste Management Unit 01, Draft Corrective Measures Study (CMS). The responses along with marked up change pages showing the proposed changes, are found as enclosure (1). The proposed changes will be reflected in the final CMS. The permit required Certification Statement is provided as enclosure (2).

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code RP3-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Manager, Environmental Protection
By direction of the Commanding Officer

Enclosures: 1. MGBG Draft CMS Response To Comments
2. Certification Statement

Copy to:
ADMINISTRATIVE RECORD
SOUTHNAVFACENGCOM (Code ES31) (w/o encl)
IDEM (Doug Griffin)
TTNUS (Tom Johnston) (w/o encl)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE

Manager, Environmental Protection
TITLE

7/18/05
DATE

RESPONSES TO U.S. EPA COMMENTS DATED JUNE 29, 2005 IN ELECTRONIC MAIL FROM MR. P. RAMANAUSKAS TO MR. B. GATES CONCERNING THE DRAFT CORRECTIVE MEASURES STUDY REPORT FOR THE NAVAL SURFACE WARFARE CENTER CRANE MUSTARD GAS BURIAL GROUND.
(JULY 15, 2005)

Overall Comment concerning Limited Treatment of Groundwater Volatile Organic Chemical Plume:
Looking over the CMS again, I have another item/alternative I'd ask that you/Tetra Tech evaluate. Doug G. & I were tossing some emails back & forth and think that perhaps a small scale active treatment (perhaps three injection wells in the center of the highest concentrated areas) might pay for itself by reducing the number of years of monitoring. I was thinking that perhaps we could set an intermediate goal (MCS) of IDEM RISC Default Industrial Groundwater Closure numbers for TCE (260 ppb) and 1,1,2,2-TCA (14 ppb) for the highest contaminated points. You could periodically actively treat (inject) in the areas of consistently highest concentrations (wells 01T07, 01-19, 01-12) and continue to monitor concentrations. This could even reduce levels to residential/MCL possibly. Once you hit the intermediate goal, you can let natural attenuation take over and monitor to check for continuing declines or rebound. Of course, the boundary monitoring would be based on lowest MCS (MCLs/RBCLs) and if the plume were to continue to expand, you'd have to take action.

Please run an analysis of this alternative (including cost estimate as in Appendix G). In looking at the Alternative 3 cost estimate in Appendix G, your Injection Point Installation would run $12,128 for 3 holes (can you inject using existing wells?), you would probably greatly cut/eliminate site-prep, and you could simplify or eliminate full-scale implementation cost (perhaps keep it on a pilot scale level unless plume expansion triggers the need for more aggressive treatment/actions).

Response to Overall Comment concerning Limited Treatment of Groundwater Volatile Organic Chemical Plume:
Based on a teleconference held on July 13, 2005 among EPA Region 5 (Peter Ramanauskas), Navy NSWC Crane (Tom Brent), Navy EFD South (Bill Gates and Mike Singletary), and Tetra Tech NUS, Inc. (Keith Henn, Tom Johnston, and JP Kumar), an agreement not to make changes to the CMS report was reached on this topic. The agreement was based primarily on technical considerations as indicated below.

SWMU 01 has a tight but fractured geology and groundwater seepage velocities are low. Available data indicate that the groundwater VOC plume is stationary or very nearly so and the total VOC contaminant mass has decreased significantly since the 1980s. VOC concentration decay rates are uncertain because of the way the data are distributed over time. Collecting additional data over time is expected to reduce the uncertainty significantly. There is also considerable uncertainty regarding exact locations of VOC contaminant sources near wells. The geology and uncertainties described here would require a much more aggressive treatment than the proposed treatment in order to effectively reduce groundwater VOC concentrations. In addition, based on aggregate experience of the Navy and TtNUS, VOC concentration reduction is not expected to be significant over the long term if a very limited treatment is implemented as proposed. Also considered was the fact that groundwater contaminants at SWMU 01 do not pose an impending threat to human health or the environment.

The recommended CMS Alternative 2 requires continued monitoring while land use controls are in place. It is expected that monitoring will continue for several decades. The combination of monitoring and effective land use controls will be adequately protective of human health and the environment. The Corrective Measures Implementation plan will establish a decision logic for monitoring and taking actions based on the monitoring data. Active plume treatment will be considered as a potential action in the decision logic.

While technical factors were the primary consideration during the teleconference, the perceived cost-benefit to be gained from limited source treatment was small. The cost of any limited treatment that would be expected to have significant benefit is estimated to range from at least $150,000 to $500,000 or more. These costs are based on considerations of factors such as project planning, anticipated number of wells, equipment and consumables costs, labor and travel costs, multiple rounds of monitoring, report generation, etc. If contaminant concentration rebound were to occur, the estimated costs could escalate significantly.

Not changes are required in response to this comment.

Comment 1:
The first paragraph of Section 2.5.4. states that MCS calculations are shown in Appendix E which does not appear to be the case.

Response 1:
Figures E.1-9, E.2-9, and E.3-9 of Appendix E show the calculation of media cleanup standards (MCSs) for 1,1,2,2-tetrachloroethane, trichloroethene, and chloroform, respectively. A reference to these specific figures has been added to the third sentence of Section 2.5.4, paragraph 1. The new sentence is:

> "The media cleanup standards (MCSs) determined for TCE, 1,1,2,2-PCA, and chloroform in ground water are 5, 0.9, 80 µg/L, respectively (calculations shown are shown in Appendix E, Figures E.1-9, E.2-9, and E.3-9, respectively)."

Comment 2:
Where did the Co (initial concentration) values used in the Appendix E calculations come from as they are not shown in the Appendix E tables (e.g. Figure E.1.9 uses 660 ppb as a maximum 1,1,2,2-TCA concentration for 2004 data, but Table E.1-1 does not show this value in any well)?

Response 2:
The maximum concentration shown for 1,1,2,2-PCA is correct on Figure E.1-9. Table E.1-1 only lists the data from wells that have been sampled four or more times. These data were used to calculate attenuation rate constants. Multiple concentration values over time are needed to compute degradation rates. The highest concentration of 1,1,2,2-PCA measured in 2004 (660 µg/L) was detected in well 01T07, which was only sampled once. This value, which is the highest of the recently measured concentrations, is posted on Figure 2-2. The following note has been added to Figure E.1-9 to clarify the origin of this value:

> "Note: The maximum value in 2004 (C0 = 660 µg/L) was detected in well 01T07. This value is not shown in Table E.1-1; however, it is listed in Table 2-2 and posted on Figure 2-2."

In addition, Figure E.2-9 (TCE decay calculation sheet) erroneously lists the 2004 maximum TCE concentration as 660 µg/L. The maximum TCE concentration (620 µg/L) was detected in 2004 in well 01T07, which was only sampled once. Consequently, this value (620 µg/L) is not listed in Table E.2-1. The 2004 maximum TCE concentration of 660 µg/L listed in Figure E.2-9 has been corrected to 620 µg/L. However, the calculated time to reach risk-based cleanup level without treatment (80 years) is still correct.

Finally, Figures E.1-9, E.2-9, and E.3-9 (the calculation pages) have been re-organized slightly to better present the calculations. The changes associated with the re-organization are not described here but they are shown in Attachment 1. In addition, the word "decay" has been changed to "concentration" in the second line following Note 1 on the left side of the page.

Comment 3:
Referring to the last sentence of Section 2.5.6., please provide additional explanation on why the groundwater flow would be expected to shift northward as the plume reaches well 01-25 and 01T05.

Response 3:
The following text will be added to the end of the paragraph:

"Shallow ground water is expected to flow to the north-northeast near wells 01-25 and 01T05, because the potentiometric surface (Figure 1-10) suggests that the hydraulic gradient is to the north-northeast in the immediate vicinity of these two wells."

Comment 4:
Referring to footnote 4 in Table 4-1, where is it decided if groundwater extraction is retained?

Response 4:
On page 2 of 5, under the evaluation of "Removal" general response action, and "Extraction" technology, the last column designates a value of "3" under the "Notes" heading. The value "3" corresponds to the technology not being retained for further evaluation, as described in Footnote 3 to the table. The rationale for eliminating this technology is described under "General Screening" in the main body of the table for this technology. In summary, the rationale is that the hydrogeology of the bedrock renders the effectiveness of plume capture questionable."

No change is required in response to this comment.

Attachment 1. Change Pages Showing Final Text and Appendix E Changes after Incorporation of Responses to Comments as Described in Response to Comment Document Dated July 15, 2005.

Note: Changes are highlighted.

2.5.3 Biodegradation Rates and Products

As discussed in Section 2.4, the concentration-time plots (Appendix E) indicate that the concentrations of the three primary COCs are decreasing over time. Large concentrations of biodegradation products were detected in the monitoring wells in the 1980s and were still being detected, but at lower concentrations, in 2001 through 2004. Additional discussion of rates of VOC degradation is presented in the next section.

2.5.4 Concentration-Time Graphs and Natural Attenuation Rates

Natural logarithm concentrations versus time were plotted for eight major wells within the plume that have three or more samples analyzed over time (Appendix E). As discussed in Section 2.4.4, concentrations of the three primary VOCs are decreasing over time. The media cleanup standards (MCSs) determined for TCE, 1,1,2,2-PCA, and chloroform in ground water are 5, 0.9, and 80 µg/L, respectively (calculations are shown in Appendix E, Figures E.1-9, E.2-9, and E.3-9, respectively). A slope was calculated for each concentration-time graph in Appendix E. This slope represents an attenuation rate constant for the particular COC within a small area adjacent to the specific well where monitoring is taking place. In Appendix E, the median slope for the wells near the source and the center of the plume was calculated for each COC being evaluated. These median slopes are used to represent the overall attenuation rates of the COCs over time. Assuming that the representative concentration is the maximum concentration observed in 2004, the predicted length of time (rounded to one significant figure) for the plume concentrations to reach the MCSs will be about 80 years for TCE and 1,1,2,2-PCA and 60 years for chloroform.

The graphs showing the overall plume concentration trends over time (Figures 2-3 through 2-5) were also used to calculate an approximate cleanup time for the plume via natural attenuation using the median concentrations. Based on the graphs of median concentrations over time, the predicted lengths of time for the plume concentrations to reach the MCSs will be about 30 and 42 years for TCE, and 1,1,2,2-PCA, respectively. The median chloroform concentration (2 µg/L) is already less than the MCS (80 µg/L). Because of the significant uncertainty in estimating decay rates and representative concentrations for a plume that varies significantly in concentrations as this plume does, these decay times should be used only as rough estimates. It would not be surprising to find that decay under natural attenuation conditions with no treatment takes longer than 100 years.

The data for mean and maximum plume concentrations over time were prepared for TCE and 1,1,2,2-PCA; these are included as Figures 2-6 and 2-7, respectively. Supporting calculations are provided in Appendix E. The vertical axes of these two plots show the logarithms (base 10) of the

concentration data. The time scale, however, is the more important scale. The lease squares lines of best fit for the data have also been plotted and extended into the future. Using the best-fit lines shown on Figure 2-6, the maximum and mean concentrations of TCE in the plume reach the MCS of 5 µg/L between 2035 and 2040.

These are approximate estimates of time necessary to achieve MCSs because of the "noisy" concentration-time relationships (i.e., the r^2 values of the trend lines are moderate). Because these plots show the logarithms of the concentrations, the scatter is not as evident as if the plots of concentration versus time are viewed. Such plots for individual wells are provided in Appendix E, Figures E.2-1 through E.2-8. The data scatter is evident from the large prediction intervals that are represented by curved lines drawn above and below the trend lines of best fit. These 95% intervals represent the span of possible concentration values (with 95% statistical confidence) that could be obtained at any particular time, based on the lines of best fit and associated uncertainty. They are similar to confidence intervals except that they represent concentration point estimates rather than average concentration estimates. Prediction intervals are typically wider than confidence intervals, which are used to place boundaries on the best estimate of the location of the actual trend line rather than individual temporal concentration estimates. In the plots of Figure 2-6, the upper prediction limit does not intersect the MCS at any time in the future. The lower prediction limit is already less than the MCS at all times.

The large uncertainty observed in these predictions is a result for several factors. First, there are only a few data points available for plotting. The denominator of the prediction interval includes the statistical degrees of freedom as a factor. With only four data points, there are just two degrees of freedom. This indicates that one of the best ways to obtain better estimates of the trend lines (and to yield narrower prediction intervals) would be to increase the number of data points in the trend. The spacing of the data points also creates some uncertainty. There is a 15 year gap between the 1980s and 2000s data sets. This effectively causes the early 1980s and early 2000s each to be represented by a single point, which is the average of two data values. On a linear concentration scale, the plot of the concentrations over time is curved. It is difficult to define the shape of the curve when the data points are spaced in this manner. The concentration data are also subject to significant scatter. The large changes in contaminant concentrations over time are reflected in the plots. Finally, as the prediction intervals are extrapolated further into the future, predictions have less and less relationship with the data on which they are based. Hence, the intervals diverge rapidly from the best fit line at future times.

Figure 2-7 shows the same type of predictions mean and maximum 1,1,2,2-PCA plume concentrations. Similar to the TCE predictions, the best-fit line through the 1,1,2,2-PCA data shows a time to reach MCS (0.9 µg/L) that is between 2035 and 2040. Also similar to the TCE predictions, there is a lot of error

associated with the trend lines. Plots for individual wells can be viewed with a normal concentration axis in Appendix E. Figures E.1-1 through E.1-8. The actual year in which maximum and mean 1,1,2,2-PCA plume concentrations reach the MCS is uncertain.

Despite the uncertainties revealed in these plots, the consistency of time estimates for the best fit trend lines to achieve MCSs for TCE and 1,1,2,2-PCA is encouraging. They are essentially identical, regardless of whether mean or maximum concentrations are used as the bases for the estimates. Minimum concentration data were not plotted because they would not add any more useful information to the plots.

An additional analysis of the TCE and 1,1,2,2-PCA data is presented in Appendix E in terms of contaminant mass. The area contained within the smallest contours for Figures 2-1 and 2-2 were calculated. The plume area for TCE within the 5 µg/L contour was calculated to be 234,000 ft^2. Using an average of 30 feet for the saturated sandstone thickness and a porosity value of 0.005 for cemented, fractured sandstone, a volume of contaminated groundwater was calculated to be 1.00×10^6L for TCE and 1.22×10^6L for 1,1,2,2-PCA. Using the average plume concentrations for the two compounds over time, a graph of mass versus time was prepared for the two compounds. These graphs are included in Appendix E (Figures E.4-1 and E.4-2. These graphs of mass versus time show that mass decreases relatively fast over time. The mass of each compound is below 1 kg between 2035 and 2050. However, the error bounds for these predictions are even larger because of the additional uncertainties associated with estimating the exact plume size, plume thickness, porosity, and average concentrations over time.

Based on best fit lines through the concentration data, the estimate of the time necessary to achieve MCLs for COCs without any treatment of the contaminant plume is about 35 years. The prediction intervals indicate that the actual time to remediation could be much longer. Collecting additional temporal data would significantly improve the precision of these estimates.

2.5.5 Contaminant Plume Dynamics

The plume has maintained the same overall shape for at least 22 years (1982 through 2004). Concentrations are decreasing through all of the source area and the center of the plume. Slight increases in COC concentrations near the leading edge of the plume (i.e., monitoring wells 01-22, 01-25 and 01T05) have been observed. If any size increase is occurring, it appears to be occurring in the northwesterly direction at a very slow rate that will not result in increased risks to any receptors.

2.5.6 Discharge of Shallow Ground Water

The shallow sandstone has a base elevation of about 620 ft amsl (see Section 1.4.3). The sandstone crops out along the hillside about 150 to 200 feet north of the PBA. It is believed that contaminated ground water is flowing along the base of this sandstone toward the northern hillside and discharging into the thin soil and shallow weathered bedrock in the vicinity of wells 01-12, 01-13, and 01-20. The ground water does not necessarily discharge to the ground surface; it could be moving along the rock-soil interface. Where this shallow ground water intersects fractures in the weathered bedrock along the edge of the ridge, the ground water is seeping downward into deeper rock strata (interlayered shales, siltstone, and sandstone) and affecting the water quality in monitoring wells 01-12, 01-13, and 01-20.

The main bulk of contaminants is migrating northwestward toward wells 01-25 and 01T05. By the time the plume reaches well 01-25 and 01T05 however, the ground water flow direction is expected to shift northward and eventually approach the land surface at an elevation of about 615 to 620 feet amsl. Shallow ground water is expected to flow to the north-northeast near wells 01-25 and 01T05, because the potentiometric surface (Figure 1-10) suggests that the hydraulic gradient is to the north-northeast in the immediate vicinity of these two wells.

2.5.7 Transfer of Contaminants to Shallow Soils, Vegetation, and Gully Sediments

Because contaminated ground water may approach the ground surface along the side of the northern slope, there is potential for contaminants to be transferred to shallow soil along the hillside or to surface water and sediment in the gullies on the sides and at the base of the northern slope. As discussed in Section 2.4.1, the volatility of these three COCs usually prevents them from accumulating or residing for any length of time in surface or near-surface soil, sediment, or surface water.

Two sediment samples (01SD0301 in 2001 and 01SD0302 in 2002) had very low detections of 1,1,2,2-PCA (7 µg/kg and 9 µg/kg, respectively). The single location where these two samples were collected is shown on Figure 1-3). These detections may indicate that ground water has transported contaminants to a seep on the hillside, thereby contaminating a surface sediment location on the northern side of the ridge. No seeps were identified during the 2001, 2002, or 2004 sampling events, even though a thorough search for seeps was made. Anecdotal observation indicates the visual detection of one seep immediately south of well 01-02 in 2003 during a casual site visit (undocumented conversation between TtNUS Program Geologist, Keith Henn, and TtNUS Task Order Manger, Tom Johnston).

It is common for seeps of low-flow rates to go undetected on a hillside in spring, summer, and fall because the water can either be taken up by trees and other vegetation (i.e., evapotranspiration) or the wet soil is hidden by grass, other ground vegetation, and/or dead leaves. Because of this, the existence of seeps is expected and the seeps would provide a mechanism for COCs to volatilize when exposed to the atmosphere at or near the land surface. VOCs were not detected in any surface water sample collected on the sides of the ridges. Note that the 1,1,2,2-PCA detected at the one sediment location did not cause an exceedance of human health or ecological screening values and therefore does not pose a risk.

FIGURE E.1-9. RATE CONSTANT CALCULATIONS FOR 1,1,2,2-TETRACHLOROETHANE ATTENUATION IN GROUND WATER

Well No.	Attenuation Rate Constant[1] ($year^{-1}$)
01-02	-0.2518
01-05	-0.087
01-11	-0.2554
01-12	-0.0802
01-15	-0.0671
01-19	0.0172
01-22	0.0192
01-25	-0.0243

1 Assumes first order decay model.
Constants computed from linear least squares fit of concentration data over time.

Calculations by: J. Schubert, TtNUS
Checked by: T. Johnston, TtNUS

Slope value statistics for boxed values to left:

minimum=	-0.2554				
maximum=	0.0172				
median=	-0.0836	=k	$t_{1/2}$ =LN(2)/(-k)	8.3	years

where $t_{1/2}$ = half life.

Decay Model: **First order; uses median decay rate to compute C_{MCS}.**

$C_t = C_0 \cdot e^{-kt}$ where C_t = concentration at time = t.
and C_0 = initial concentration (at t=0)

Time, t_{RBCL}, required to reach RBCL without treatment
Using maximum concentration and median slope:

C_t = MCS = 0.9 ug/L C_0 = 660 ug/L = maximum concentration in 2004
-k = -0.0836 $t_{MCS} = [Ln(C_t/C_0)]/(-k)$
t = LN(0.9/660)/(-0.0836) = 80 years

Note: The maximum value in 2004 (C_0 = 660 ug/L) was detected in well 01T07. This value is not shown in Table E.1-1; however, it is listed in Table 2-2 and posted on Figure 2-2.

Using Median concentration and median slope:

C_t = RBCL = 0.9 ug/L C_0 = 29 ug/L = median well concentration in 2004.
-k = -0.0836 $t_{MCS} = [Ln(C_t/C_0)]/(-k)$
t = LN(0.9/29)/(-0.0836) = 42 years

% TCE Concentration Reduction to Achieve Cleanup Goals or PRGs:

(Med-MCS)/Med 0.98 where Med = median concentration

FIGURE E.2-9. RATE CONSTANT CALCULATIONS FOR TRICHLOROETHENE ATTENUATION IN GROUND WATER

Well No.	Attenuation Rate Constant[1] ($year^{-1}$)
01-02	-0.2657
01-05	-0.0467
01-11	-0.1538
01-12	-0.0728
01-15	0.0102
01-19	0.0275
01-22	0.0142
01-25	0.0191

1 Assumes first order decay model.
Constants computed from linear least squares fit of concentration data over time.

Slope value statistics for boxed values to left:

minimum= -0.2657
maximum= 0.0275
median= -0.05975 $t_{1/2}$ = 11.6 years

Decay Model: **First order; uses median decay rate to compute C_{MCS}.**

$C_t = C_0 \cdot e^{-kt}$ where C_t = concentration at time = t.
and C_0 = initial concentration (at t=0)

Time, t_{RBCL}, required to reach RBCL without treatment
Using maximum concentration and median slope:

C_t = MCS = 5 ug/L C_0 = 620 ug/L = maximum concentration in 2004
-k = -0.05975 $t_{MCS} = [Ln(C_t/C_0)]/(-k)$
t = LN(5/660)/(-0.05975) = 80 years

Note: The maximum value in 2004 (C_0 = 620 ug/L) was detected in well 01T07. This value is not shown in Table E.2-1; however, it is listed in Table 2-2 and posted on Figure 2-1.

Using Median concentration and median slope:

C_t = MCS = 5 ug/L C_0 = 30 ug/L = median concentration in 2004
-k = -0.05975 $t_{MCS} = [Ln(C_t/C_0)]/(-k)$
t = LN(5/30)/(-0.05975) = 30 years

% TCE Concentration Reduction to Achieve Cleanup Goals or PRGs:

(Med-MCS)/Med . 0.96 where Med = median concentration

Calculations by: J. Schubert, TtNUS
Checked by: T. Johnston, TtNUS

FIGURE E.3-9. RATE CONSTANT CALCULATIONS FOR CHLOROFORM ATTENUATION IN GROUND WATER

Well No.	Attenuation Rate Constant[1] ($year^{-1}$)
01-02	-0.0357
01-05	NA
01-11	-0.0409
01-12	-0.0376
01-15	-0.1016
01-19	-0.041
01-22	0.0604
01-25	-0.0173

1 Assumes first order decay model.
Constants computed from linear least squares fit of concentration data over time.

Slope value statistics for boxed values to left:

minimum=	-0.1016			
maximum=	-0.0357			
median=	-0.0409	$t_{1/2}$ =	16.9	years

Decay Model: **First order; uses median decay rate to compute C_{prg}.**

$C_t = C_0 \cdot e^{-kt}$ where C_t = concentration at time = t.
and C_0 = initial concentration (at t=0)

Time, t_{RBCL}, required to reach RBCL without treatment
Using Maximum Conncetration and median slope:

C_t = MCS = 80 ug/L C_0 = 790 ug/L = maximum concentration in 2004

-k = -0.0409 $t_{MCS} = [Ln(C_t/C_0)]/(-k)$

t = LN(80/790)/(-0.0409) = 60 years

Note: The maximum value in 2004 (C_0 = 790 ug/L) was detected in well 01T07. This value is not shown in Table E.3-1, however, it is listed in Table 2-2.

Using Median concentration and median slope:
Does not apply because median concentration is 2 ug/L, which is already less than the MCS (80 ug/L).

Calculations by: J. Schubert, TtNUS
Checked by: T. Johnston, TtNUS