DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

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MOFFETT FIELD
SSIC NO. 5090.3.A.

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July 31, 2002

Ms. Alana Lee
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street, SFD-73
San Francisco, CA 94105

Ms. Adriana Constantinescu
Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Ms. Lee and Ms. Constantinescu:

I am pleased to submit to you the Response to Comments on the Draft West-Side Aquifers Treatment System Piezometer Installation Technical Summary Report dated May 9, 2002, Moffett Federal Airfield, Moffett Field, California. The only comments received on this draft report were from Locus Technologies Corp.

If you have questions or comments, please contact either me in any of the following ways:

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Sincerely,

LAWRENCE LANSDALE, P.E.
BRAC Environmental Coordinator
By direction of the Commander

Encl: (1) Response to Locus Technologies' Comments on the Draft West-Side Aquifers Treatment System Piezometer Installation Technical Summary Report

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Copy to:

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ENCLOSURE

RESPONSE TO LOCUS TECHNOLOGIES' COMMENTS ON THE WEST-SIDE AQUIFERS TREATMENT SYSTEM DRAFT PIEZOMETER INSTALLATION TECHNICAL SUMMARY REPORT

July 31, 2002

1.0 INTRODUCTION

This document presents the U.S. Department of the Navy's (Navy) response to review comments by Locus Technologies (Locus) on the West-Side Aquifers Treatment System, Draft Piezometer Installation Technical Summary Report for Moffett Federal Airfield (MFA), dated May 9, 2002. Comments on the draft summary report were received from Locus Technologies, on June 24, 2002. Comments are presented in **bold type**; responses follow in regular type.

2.0 RESPONSES TO COMMENTS

Responses to Locus' general comments are contained in Section 2.1. Responses to Locus' specific comments are contained in Section 2.2.

2.1 GENERAL COMMENTS

General Comment 1: **The results of this Navy study confirm our belief that the addition of more piezometers does not prevent or reduce discrepancies in interpolation of capture zones. Our interpolation of capture zones, even with the additional data, continues to differ significantly from the Navy's interpolation. Some of the obvious discrepancies are explained in the Specific Comments below.**

Response: In response to Locus' "belief that the addition of more piezometers does not prevent or reduce discrepancies in interpolation of capture zones", the Navy reaffirms that the purpose of the additional piezometers is to better define the capture zones and cones of depression created by the west-side aquifer treatment system (WATS) extraction wells, as stated in the draft summary report. The Navy considers both goals to have been met with the additional piezometers.

Data collected at the new piezometers provide a better foundation for the Navy's interpretation of capture zones in the WATS area. The addition of "close-in" piezometers also has improved understanding of the depth and breadth of the cones of depression, particularly near wells, such as EA1-5 and EA2-2, where closed contours indicate extensive drawdown in the aquifer.

As a result of a brief shutdown of WATS during the February 28, 2002 "Black Thursday" water level measurement event, some of the capture zones developed from these data are not representative of steady-state conditions. This is particularly true at wells EA1-3 and EA2-1 (Figures 9 and 17), which were measured shortly after WATS was restarted. In these cases, the graphical capture zones are narrower than likely steady-state capture zones. Nevertheless, even these figures provide a conservative interpretation of capture zone widths, which will be improved with additional data in future Navy reports.

The Navy cannot respond to Locus' contention that capture zones developed by Locus differ significantly from those presented in the draft summary report because these capture zones were not provided to the Navy.

The document has not been changed in response to general comment 1.

General Comment 2: **The Navy indicates in Section 3.1 of the Report that capture zones were developed using a flow-net analysis and a simple analytical model based on an equation by Grubb. Locus did not find any such supporting calculations in its copy of the Report. More importantly, and as we have discussed with EPA previously, the basic assumption underlying use of simple calculations is that the aquifer is homogeneous. This condition is not met at the site. For example, when the Navy installed the piezometers to test the capture zones for EA1-1, they observed that the sand lenses tapped by EA1-1 are of limited extent (Section 5.1.1).**

Response: The draft summary report presents capture zones that were developed only through the graphical method (flow net analysis), which is described in Section 3.1. The draft summary report clearly indicates that the analytical model was used only to evaluate proposed piezometer locations. The analytical equation, supporting assumptions, and the calculated capture zones were provided in the Final Piezometer Installation Work Plan (TtEMI 2001). The work plan indicated that the underlying assumption of aquifer homogeneity is not met at the site, but that the analytical capture zones were used to identify the areas that deviate most significantly from "ideal" conditions. Thus, the analytical model was a useful tool to characterize hydraulic conditions near the extraction wells during this early stage of the investigation. This information was not reproduced in the draft summary report because it was not relevant to subsequent stages of the investigation.

The document has not been changed in response to general comment 2.

2.2 SPECIFIC COMMENTS

Specific Comment 1: **EA1-1: There is little, if any influence shown on adjacent piezometers when pumping EA1-1 even though each of the piezometers installed by the Navy is reported to tap one of the same units pumped by EA1-1. Nevertheless, the Navy interpolates a capture zone that is about 200 feet wide.**

It appears that the 12.5 feet contour line would fit best if drawn through PZA1-1E, where the water elevation there is 12.48 feet. A localized cone of depression is apparent only within a few feet of EA1-1. As such, the flow

net analysis would show a smaller capture zone for EA1-1, which is expected based on the results of the pump test.

Response: Data provided in this report do not support Locus' contention that there is little, if any, influence on adjacent piezometers from the pumping of EA1-1. Figure 6 of the draft summary report shows that all five new piezometers responded quickly after the pump was turned off at well EA1-1. This response also is supported by data in Appendix D. (The data in this appendix show water level increases ranging from 0.05 to 0.5 feet, which were recorded at these piezometers between the baseline and first recovery measurement). The response measured at the five new piezometers can be clearly distinguished from the lack of immediate response observed at the more distant wells included on Figure 6 (with the exception of UST85-MW3, which also responded quickly).

The 12.5-foot contour line has been modified to provide a better representation of water level conditions northwest of well EA1-1. As a result, the estimated capture zone does not include piezometer PZA1-1E. However, the overall width of the capture zone did not change significantly.

Specific Comment 2: EA1-3: It is not clear how the capture zone for EA1-3 is drawn on Figure 9. It appears that the stagnation point is at the well, which is not possible. It is apparent from Figure 9 that the new piezometers did not provide useful data in defining the capture zone for this well.

Response: The capture zone has been revised to indicate the stagnation point is located downgradient of the extraction well. The hydraulic conditions at the time of the water level measurement were atypical, as described below.

WATS operating records indicate that the wells and piezometers depicted on Figure 9 were measured shortly after a 0.5-hour shutdown of WATS at approximately 1:00 p.m. on February 28, 2002. Furthermore, the efficiency of well EA1-3 was reduced because of pump problems and possibly biofouling, as noted in the draft summary report. Therefore, the water levels at the time of this measurement were not representative of steady-state pumping conditions. This would likely result in a narrower capture zone than would occur under steady-state conditions.

Every effort will be made to minimize interferences (such as shutdown of the WATS) during future quarterly water level measurement events. Furthermore, a regular maintenance schedule is being maintained at well EA1-3, which will minimize and mitigate pump and biofouling problems. The new piezometers should be useful in delineating the capture zone around well EA1-3 when these conditions are met. The conditions at the time of the measurement will be noted in the text of Section 5.3.2.

Specific Comment 3: EA1-6. The Navy indicates in Section 5.6.2 that EA1-6 was not in operation. It is not clear from Figures 15 and 16 how the capture zone was developed. It is apparent that the newly installed piezometers do not provide useful data in defining the capture zone for this well either. For example, they do not substantiate the bend in the 8-foot contour behind the extraction well on Figure 15.

Response: The differences in well EA1-6's operating status when data were collected for Figure 15 and Figure 16 are detailed in the text. For example, paragraph one of Section 5.6.2 states "well EA1-6 was not in operation immediately before, or during, the drawdown test." Therefore, there is little change in water levels on the graphs during the drawdown test (Figure 16). Paragraph two of Section 5.6.2 states "the pump was operating when the sitewide water level measurement was conducted on February 28, 2002." Consequently, Figure 15 shows considerable capture zone development when the pump was operating at 2.3 gallons per minute (gpm). Therefore, Figure 15, which was developed from data collected at the new piezometers, provides essential information to evaluate the capture zone at well EA1-6.

As for the statement that the data do not substantiate the bend in the 8-foot contour on Figure 15, this bend brings the 8-foot contour closer to well W4-17, which has a measured water level of 8.07 feet above mean sea level (msl). The Navy asserts these contours were drawn conservatively. The 8-foot contour could be brought closer to well WU4-17 and the 8.5-foot contour could be bent away from well WU4-17 to provide a more representative interpretation, which would result in a wider eastern limb to the capture zone.

The document has not been changed in response to specific comment 3.

Specific Comment 4: **EA2-1: Based on the Navy's interpretation of the capture zone, the stagnation point, located downgradient of the 8-foot contour line, has a water elevation lower than the pumping well (Figure 17). This means that the water in the downgradient reaches of the capture zone would have to move upgradient to be captured by the recovery well, which is not physically possible.**

Response: The 8-foot contour has been modified to encompass the extraction well location to reflect probable hydraulic conditions at the time the water levels were measured at the piezometers. The water level at the extraction well was posted on the figure but not used to develop contours, as was clearly indicated on the figure.

WATS operating records indicate that extraction well EA2-1 was measured during a 0.5-hour shutdown of WATS at approximately 1:00 p.m. on February 28, 2002, and that the piezometers depicted on Figure 17 were measured shortly after pumping was resumed. The extraction well water level, therefore, was not measured under the same conditions as the surrounding piezometers that were used to develop the contours. The conditions at the time of the measurement will be noted in the text in Section 5.7.2 in the final summary report.

REFERENCES

Tetra Tech EM Inc. 2001. Final Piezometer Installation Work Plan. Moffett Federal Airfield, California. November 19.