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MOFFETT FIELD
SSIC NO. 5090.3.A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

April 26, 2001

Ms. Andrea Muckerman
BRAC Environmental Coordinator
Southwest Division, Naval Facilities Engineering Command
BRAC Operations Office
1230 Columbia Street, Suite 1100
San Diego, CA 92101-8517

Dear Ms. Muckerman:

Enclosed Please find EPA's review of "West-Side Aquifers Treatment System Piezometer Installation Work Plan," Moffett Federal Air Field, Mountain View, California, dated April 13, 2001. Please discard the prior e-mail versions we sent and replace them with this letter and the attached comments. Due to some last minute changes, inconsistent versions of the comments were submitted earlier, but this has been corrected herein.

We very much appreciate your responsiveness to our prior request for installation of piezometers to assist in the analysis of the WATs system capture zones. The attached comments are EPA's recommendations for changes to the proposed scope of the work plan (additional piezometers and locations), which we believe will further advance our common goals for this work

Please contact Michelle Schutz, Chief, Air Force and Navy Section, at (415) 744-2202, if you have any questions regarding this evaluation, and for further discussion. We appreciate the opportunity to provide comments to you on this project.

Sincerely,

Roberta Blank

Roberta Blank
Remedial Project Manager

Enclosure (4 pages)

cc: Lynn Suer, RWQCB
Michelle Schutz, EPA
Herb Levine, EPA
Alana Lee, EPA
James McClure, RAB
Don Chuck, NASA
James Boarer, MEW
Mary Parker, Navy
Tom Mohr, SCVWD

Review of West-Side Aquifer Treatment System
Piezometer Installation Work Plan
Moffett Federal Airfield, California

General Comments

1. The scope of work presented in the "West-Side Aquifer Treatment System Piezometer Installation Work Plan" (the Piezometer Work Plan) does not appear to be sufficient to achieve the stated objective, which was to improve the definition of the cones of depression and capture zones around each of the West-Side Aquifer Treatment System (WATS) extraction wells. In general, the proposed piezometer locations do not include piezometers located downgradient of the WATS extraction wells, or located along the eastern and western edges of the estimated capture zones. Piezometers in these locations are necessary to define the cone of depression and refine the drawing of groundwater elevation contours in the vicinity of the extraction wells, which are used to graphically define the capture zone in these areas. Additionally, these piezometers may be useful as part of the groundwater monitoring program, in order to demonstrate a reduction in chemical concentrations within the capture zone of the extraction wells.

   Many of the proposed piezometers are located very close (within 10 to 20 feet) to the extraction wells. While these piezometers may be useful in demonstrating that drawdown and capture are occurring in these areas, there is not enough data at the periphery of the capture zones (typically on the order of 50 to 100 feet laterally away from the extraction wells) to demonstrate how far the capture zone extends out from each extraction well. Nor are there enough data points to define water levels to support the graphical solution method. The Navy will need to place piezometers to delineate the extent of capture and to refine water levels. We recommend additional piezometers at each extraction well location, in order to obtain sufficient groundwater elevation data to improve the definition of the capture zone for each extraction well.

2. The Navy has provided some lithologic information in the Piezometer Work Plan, in order to justify the placement of the proposed piezometers. In particular, the Sand Thickness Isopach Maps (Figures 3, 5, 7 and 14) were helpful in understanding the aquifer heterogeneities present at Moffett Federal Airfield (MFA). For example, the Isopach Maps seem to indicate relatively thick sand deposits in the eastern portion of the WATS area, in the vicinity of EA1-2. However, these maps only present data at small, isolated areas of MFA. Because the WATS is intended to be an integrated system, with all of the extraction wells working together to create a containment/remediation system, it would be more useful to have a larger-scale sand isopach map, which shows the extent of these sand channels.We would like to see one sand isopach map which shows the thickness of sand deposits in the A1 aquifer across the entire WATS area. In order for this map to be readable, it may be necessary to present the map on a size D plate. Similarly, it would be helpful to have one capture zone map (size D plate) for the A1 aquifer extraction wells and a separate capture zone map for the A2 aquifer extraction wells.

Specific Comments

1. **Section 2.1, Capture Zone Analysis, page 2:** This section discusses the techniques used to evaluate the capture zones for each of the WATS extraction wells. The text indicates that one of the techniques used was a simple analytical model based upon an equation developed by Grubb. Please provide a table which lists the input parameters for this equation for each of the extraction wells.

2. **Figure 2, Extraction Well EA1-1 Capture Zone, February 2001:** The groundwater elevation contours shown on this figure appear to be strongly influenced by the groundwater elevation for well W9SC-17, which is approximately 250 feet upgradient of extraction well EA1-1. However, well W9SC-17 has a much lower groundwater elevation than might be expected based upon wells that are located closer to EA1-1, such as W9-18 or W9SC-14. The estimated capture zone (graphical solution) shown on this figure is approximately 200 feet wide, and this large capture zone appears to be a function of the drawdown shown at well W9SC-17. However, since the groundwater elevation for well W9SC-17 may be anomalous and not reflective of actual site conditions, the estimated capture zone shown in this figure may be significantly larger than the actual capture zone for extraction well EA1-1. Please provide a discussion of the groundwater elevation observed at W9SC-17, including:the screened interval of this well; historical groundwater elevations measured at this well; a comparison of historical measurements of groundwater elevations at this well; and, groundwater elevations measured at nearby wells. Additionally, it may be useful to draw groundwater elevation contours in this area without the data from W9SC-17.

3. **Figure 2, Extraction Well EA1-1 Capture Zone, February 2001:** The proposed piezometers for extraction well EA1-1 are located within approximately 10 feet of the extraction well. However, the capture zone depicted on this figure is at least 200 feet wide, and there are few piezometers on the eastern edge of the capture zone and no piezometers on the western edge of the capture zone. While the proposed piezometers will likely be useful in evaluating drawdown in the vicinity of the extraction well, they will not provide sufficient data to evaluate the peripheral extent of the capture zone. We recommend additional piezometers on the eastern periphery of the depicted capture zone, as well as downgradient of the extraction well. EPA recommends adding two piezometers to define lateral extent. One placed at approximately 20 ft away (south-east) from proposed PZA1-1A and one placed approxiametly 50 ft away (south-east). This would provide a transect between W9-1B and PZA-1A. EPA also recommends adding a piezometer downgradient of EA1-1 to define the downgradinet capture.

4. **Figure 4, Extraction Well EA1-2 Capture Zone, February 2001:** The proposed piezometer for extraction well EA1-2 is located within approximately 10 feet of the extraction well. However, there are no piezometers located along the eastern or western edge of the capture zone for EA1-2, and there are no piezometers located downgradient of this

well which might help define the capture zone for this well. EPA recommends adding two piezometers approximately 20 and 50 ft west of PZA1-2A to further define lateral extent. EPA also recommends adding a well downgradient of EA1-2 to define the downgradient extent of capture.

5. **Section 3.2, Well EA1-3, page 6:** The first paragraph in this section states that the A1 sand channel trends perpendicular to the axis of the capture zone. As depicted in Figures 6 and 7, this statement appears to be true. However, this is not an expected result. If the sand channel is acting as a preferential pathway for groundwater flow due to its higher transmissivity relative to the surrounding sediments, it is expected that the groundwater elevation contours would be perpendicular to the trend of the sand channel, not parallel to the trend.

6. **Section 3.2, Well EA1-3, page 6:** The last paragraph in this section states that "the capture zone is oriented such that the configuration of the sand deposits within both limbs of the capture zone is similar". This statement does not appear to be accurate. According to Figure 7, Extraction Well EA1-3 Sand Thickness Isopach Map, well EA1-3 is located on the eastern edge of the sand deposits, and the sand channel is not symmetrical about the extraction well. Therefore, it is not expected that the capture zone will be symmetrical around extraction well EA1-3, and therefore additional piezometers may be needed in this area to evaluate the asymmetry of the capture zone.

7. **Figure 6, Extraction Well EA1-3 Capture Zone, February 2001:** The proposed piezometer for extraction well EA1-3 is located within approximately 10 feet of the extraction well. However, there are no piezometers located along either the northwestern or southeastern edges of the capture zone for EA1-3. EPA recommends adding two piezometers approximately 20 and 50 ft to the south-west of EA1-3 to further define the lateral extent of capture.

8. **Section 3.3, Well EA1-4, page 6:** The first paragraph in this section indicates that the graphical capture zone shown for well EA1-4 on Figure 8 is larger than the capture zone predicted by the analytical model. This is due to the presence of regional extraction well REG-9B1, which is screened in the A2 aquifer. Please revise Figure 8 to show extraction well REG-9B1.

9. **Figure 8, Extraction Well EA1-4 Capture Zone, February 2001:** The proposed piezometers for extraction well EA1-4 are located within approximately 25 feet of the extraction well. However, there are no piezometers located along the western edge of the capture zone for EA1-4, and there are no piezometers located downgradient of this well which might help define the capture zone for this well. EPA recommeds adding piezometers approximately 50 ft. and 100 ft.west of EA1-4 to further define the lateral extent of capture.

10. **Figure 10, Extraction Well EA1-5 Capture Zone, February 2001:** The proposed piezometers for extraction well EA1-5 are located within approximately 10 to 50 feet of the extraction well. However, there are no piezometers located downgradient of this well which might help define the capture zone for this well. Additionally, because the only groundwater

extraction well located downgradient of EA1-5 is located to the west (EA1-6), it may be necessary to add an additional piezometer along the eastern edge of the capture zone to ensure that contaminated groundwater is not migrating past this well or past EA1-6.

11. **Figure 11, Extraction Well EA1-6 Capture Zone, February 2001:** The proposed piezometers for extraction well EA1-5 are located within approximately 10 to 25 feet of the extraction well. However, there is no piezometer located along the western edge of the capture zone of this well which might help define the capture zone. EPA recommends adding a piezometer about 40-50 ft to the south-west of EA1-6 to further define the lateral extent of capture.

12. **Figure 12, Extraction Well EA2-1 Capture Zone, February 2001:** The proposed piezometer for extraction well EA2-1 is located within approximately 10 feet of the extraction well. However, there is no piezometer located along the eastern edge of the capture zone of this well which might help define the capture zone. Due to the lack of data points to confidently draw water levels EPA recommends adding three piezometers. These should be spaced at about 50, 100 and 150 ft. to the east or south-east of EA2-1.

13. **Figure 13, Extraction Well EA2-2 Capture Zone, February 2001:** The proposed piezometer for extraction well EA2-2 is located within approximately 50 feet of the extraction well. However, there is no piezometer located along the western edge of the capture zone of this well and there is no piezometer located downgradient of the extraction well which might help define the capture zone. EPA recommneds adding two piezometers at about 100 and 150 ft to the west of EA2-2 to further define the lateral extent of the plume.