

DEVELOPED PUMPING STRATEGIES FOR MATHER AFB TCE  
PLUME

INTERIM REPORT

Prepared for  
Parsons Engineering Science

by

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**Accomplishments prior to BCT Meeting/Phone Conference of 14 October 2004**

Prior to 14 October 2004, the best pumping strategy USU achieved manually completely contains both PCE and TCE<sup>1</sup> (within revised containment zones proposed by USU on that date), at the end of years 2, 3, 4, 5 and 5-year intervals thereafter. This strategy uses two new extraction wells (USUE3 and USUE4). The strategy did not utilize a recently constructed well EW-12B. USU did not previously know about EW-12B and the well package USU received did not indicate a well at its location, cell (3,58,43). On 14 October, USU also learned of new aquifer parameter field data near well EW-12B.

**Modflow Model Aquifer Parameter Changes after 14 October 2004**

On 14 October, USU was tasked with attempting to develop a pumping strategy using the new well location, and the new aquifer data. Therefore, USU added EW-12B to the MODFLOW well package of its best strategy to date.

To incorporate the new aquifer data within its modeling, USU relied upon a revised Groundwater Vistas model (GWV file) of the study area, promptly provided by Dr. Sumani Al Hassan (Montgomery Watson Harza??). This model had some new hydraulic conductivity and storativity values and included 1 October 2004 simulated heads (to be used as initial heads for future simulation). Running MODFLOW within the new GWV file caused:

- hydraulic conductivity (K) and storativity (S) distributions to be written to a Block Centered Flow (BCF) data file.
- initial head array (ASCII format) to be placed within the BAS file.

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<sup>1</sup> TCE refers to the combined TCE and Normalized CCl<sub>4</sub>  
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**Pumping Strategy Development after 14 October 2004**

Utilizing the new BAS, BCF, and WEL packages, USU tested the best containment strategy it had on 14 October (using wells USUE3 and USUE4). This showed that the strategy no longer contained the plumes within the revised containment zones. Some cells outside the containment zones had concentrations greater than 5.0 ppb for PCE or TCE.

Next USU moved all the pumping from USUE3 and USUE4 to well EW-12B, and re-simulated. This new strategy did not contain the plume within the revised containment zone.

After that, USU tried to develop a pumping strategy that uses only the existing wells and contains the plumes within the revised containment zones. In this effort, USU primarily varied the pumping at well EW-12B. To date, none of the new strategies has achieved containment. Table 1 shows the best new strategy and its results.

Table 1: USU Best Partial Containment Strategy

| Management Period | Q (gpm) |       |                         |                         | Number of Violations |  |     |                |       |
|-------------------|---------|-------|-------------------------|-------------------------|----------------------|--|-----|----------------|-------|
|                   | EW-12B  | Total | $\Delta^L$ <sup>2</sup> | $\Delta^U$ <sup>3</sup> | PCE                  | Cells Violated   | TCE | Cells Violated | Total |
| 1                 | 112     | 1,499 | 1                       | 701                     | 0                    | 0  | 0   | 0              | 12    |
| 2                 | 106     | 1,525 | 27                      | 675                     | 6                    | (3,59,82,5.4)<br>(3,60,82,5.3)<br>(3,60,83,7.3)<br>(3,61,84,5.8)<br>(3,85,94,6.2)<br>(3,85,95,6.2) | 1   | (3,96,65,6.5)  |       |
| 3                 | 106     | 1,525 | 27                      | 675                     | 2                    | (3,83,92,5.6)<br>(3,84,93,5.7)   | 1   | (4,94,65,5.6)  |       |
| 4                 | 106     | 1,554 | 56                      | 646                     | 0                    | 0  | 0   | 0              |       |
| 5                 | 106     | 1,536 | 38                      | 664                     | 1                    | (4,61,84,6.2)  | 0   | 0              |       |
| 6                 | 106     | 1,522 | 24                      | 678                     | 1                    | (3,70,84,6.2)  | 0   | 0              |       |

<sup>2</sup>  $\Delta^L = Q - 1498$ . This shows how far the total period pumping is above the lower limit on total pumping (specified in the Work Plan)  
<sup>3</sup>  $\Delta^U = 2200 - Q$ . This shows how much more one can pump without exceeding the upper limit on total pumping.