Comments on the
***Final Proposed Plan for LHAAP-17,* Burning Ground No. 2/Flashing Area Group 2, *Longhorn Army Ammunition Plant, Karnack, Texas*, May 10, 2010**

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Introduction

These comments were prepared for the Caddo Lake Institute. They are based on evaluations of the final Proposed Plan and the final Feasibility Study for the Longhorn Army Ammunition Plant (LHAAP) site 17 (see references).

Between 1942 and 1997, explosives (TNT), pyrotechnic devices (flares, photoflash bombs), and propellants (rocket motors) were manufactured at LHAAP[1].

Site 17 covers about 3.9 acres[2]. Between 1959 and 1980, waste TNT, photo flash powder, rocket fuel, and material from the Universal Match Corporation were burned at the site. It was also used as a flashing area for decontaminating metals.[3]

Soils at site 17 are contaminated with explosives (TNT, DNT), dioxin, perchlorate, and barium[4]. Groundwater occurs in three zones: shallow, intermediate, and deep[5]. The shallow groundwater is contaminated with VOCs[6] (e.g., TCE, DCE) and perchlorate[7]. Groundwater in the intermediate zone is contaminated with TCE[8] and perchlorate[9].

The Army's preferred remedial alternative is Alternative 4. Under this alternative, contaminated soil would be excavated and disposed off-site.[10] In the shallow zone, contaminated groundwater would be extracted through wells and treated at the existing water treatment plant (pump and treat)[11]. Pump and treat would continue until perchlorate concentrations are less than 20,000 µg/L[12]. Then, natural attenuation (MNA)[13] would be relied on to reduce contaminant concentrations. In the intermediate zone, only MNA would be relied on to reduce contaminant concentrations[14]. Land use

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[1] EPA 2009a, page 3.
[2] US Army, 2010b, page 3.
[3] US Army, 2010b, page 3; US Army, 2010a, page 2-12.
[4] US Army, 2010b, page 5.
[5] US Army, 2010b, page 5.
[6] VOC: volatile organic compound.
[7] US Army, 2010a, page 2-13.
[8] US Army, 2010a, page 2-13.
[9] US Army, 2010a, appendix A, table A-1.
[10] US Army, 2010b, page 16.
[11] US Army, 2010a, page 5-9.
[12] US Army, 2010b, page 16. If perchlorate concentrations have not been reduced to 20,000 µg/L within 1.5 years, a contingency action may be performed (e.g., in-situ bioremediation, US Army, 2010b, page 16).
[13] MNA: monitored natural attenuation.
[14] US Army, 2010b, page 12.

controls (LUCs) would be maintained until contaminant concentrations are reduced to acceptable levels (clean-up levels, i.e., MCLs or State of Texas standards)[15]. The estimated cost of this alternative is $2,090,000[16].

Comments

1. Trigger for stopping pump and treat

1a. The Army intends to stop pumping and treating groundwater once average perchlorate concentrations are reduced to 20,000 µg/L[17]. According to the Army, high concentrations of perchlorate inhibit the natural attenuation of TCE[18].

However, the Army has not presented any evidence to show that there are significant differences in the attenuation of TCE when the perchlorate concentration is below 20,000 µg/L. In fact, TCE concentrations are increasing at monitor wells 130 and 17WW03, even though perchlorate concentrations at these wells are well below 20,000 µg/L (see figures 1a, 1b, 2a, and 2b). On the other hand, perchlorate concentrations in monitor well 17WW06 are much higher than 20,000 µg/L, but TCE concentrations are decreasing (see figures 3a and 3b).

Thus, there does not appear to be a strong relationship between perchlorate concentrations and the attenuation of TCE. The Army should not rely on a reduction in perchlorate concentrations to result in the attenuation of TCE.

1b. It appears that the Army intends to stop pump and treat once the trigger is reached, regardless of the effect that pump and treat is having on contaminant concentrations[19]. This is not a reasonable approach to contaminant clean-up. The Army should evaluate the effectiveness of pump and treat when the trigger is reached. Then, if it is still having a substantial effect on contaminant concentrations, pump and treat should be continued. The pump and treat system should be operated as long as it is causing significant reductions in contaminant concentrations.

[15] US Army, 2010b, page 10. MCL: EPA maximum contaminant limit for drinking water. Because there is no MCL for perchlorate, the State of Texas standard will be used (72 µg/L, GW-Ind; US Army, 2010a, appendix A, page 3-1).
[16] US Army, 2010b, page 13.
[17] US Army, 2010b, page 16.
[18] US Army, 2010a, appendix A, page 3-3.
[19] US Army, 2010b, page 16.

2. Increasing TCE concentrations and effectiveness of MNA

TCE samples have been collected from 11 monitor wells in the shallow zone[20]. TCE concentrations have exceeded the 5 µg/L MCL in six of these wells[21]. Of these six wells TCE concentrations are rising in four, and dropping in two (see figures 1b, 2b, 3b, 4, 5, and 6). The table below shows the most recent TCE concentrations found in the six wells.

Table 1
Most Recent TCE Concentrations in Shallow Zone Monitor Wells[22]

Wells with increasing concentrations of TCE		**Wells with decreasing concentrations of TCE**	
Well ID	TCE (µg/L)	Well ID	TCE (µg/L)
130	31.1	17WW04	0.9
17WW01	6090	17WW06	176
17WW02	867		
17WW03	12.8		

Clearly, natural attenuation is not acting to reduce TCE concentrations throughout the site. Although the Army claims that high concentrations of perchlorate are inhibiting the attenuation of TCE, this assertion is not supported by the data (see comment 1a). The Army should reevaluate its reliance on natural attenuation to reduce TCE concentrations at site 17.

3. Time required for MNA to achieve TCE clean-up level

3a. The Army estimates that natural attenuation will reduce TCE concentrations in the shallow groundwater zone to the clean-up level (5 µg/L) in less than 120 years[23]. It is not reasonable to propose a plan that could require the maintenance of LUCs for a century.

3b. The clean-up time estimate is based on data from monitor well 17WW06, where TCE concentrations are declining (see figure 3b)[24]. However, this estimate does not apply to those portions of site 17 where TCE concentrations are increasing (see comment 2). The Army should provide an estimate of clean-up time for the entire site.

[20] US Army, 2010a, appendix A, table A-1.
[21] US Army, 2010a, appendix A, table A-1.
[22] Data source: US Army, 2010a, appendix A, table A-1.
[23] US Army, 2010b, page 13; and US Army, 2010a, appendix A, page 4-3.
[24] US Army, 2010a, appendix A, table A-4.

4. Time required for MNA to achieve perchlorate clean-up level

The Army estimates that natural attenuation will reduce perchlorate concentrations to the clean-up level (72 µg/L) within 15 years[25]. This estimate is based on perchlorate degradation rates (half-lives) calculated for eight monitor wells[26]. However, the Army did not calculate degradation rates for two monitor wells that currently contain high perchlorate concentrations: well 17WW01 (56,000 µg/L) and well 17WW02 (160,000 µg/L)[27]. Over the entire period of record, perchlorate concentrations in these two wells have increased, although concentrations in both wells are currently decreasing (see figures 7 and 8).

Wells 17WW01 and 17WW02 are important data points that the Army has not accounted for in its estimate. The Army should explain why it did not use data from these wells to estimate the clean-up time for perchlorate at site 17.

5. Perchlorate in the intermediate zone

The Army does not consider perchlorate to be a contaminant of concern (COC) in the intermediate groundwater zone[28]. However, high concentrations of perchlorate have been detected in intermediate zone monitor well 17WW11[29]. Therefore, perchlorate should be a COC in the intermediate zone.[30]

6. Remedial Design

The Army will present details of the soil excavation plan, the pump and treat system, the groundwater remediation performance objectives, the plan for implementing and evaluating MNA, and the LUC implementation plan, in the Remedial Design (RD)[31]. However, the RD has not yet been produced. Given its importance, the Army should make the RD available for public review and comment as soon as practicable.

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[25] US Army, 2010a, appendix A, page 4-2.
[26] US Army, 2010a, appendix A, table A-4.
[27] US Army, 2010a, appendix A, table A-1. The Army did calculate a distance-dependent degradation rate for these wells (US Army, 2010a, appendix A, table A-5). However, the EPA has stated that distance dependent attenuation rates should not be used to directly estimate contaminant plume lifetimes (US Army, 2010a, appendix A, page 3-9).
[28] US Army, 2010a, page 2-13.
[29] The most recent sample collected from well 17WW11 contained 990 µg/L perchlorate (US Army, 2010a, appendix A, table A-1).
[30] It should be noted that the Army classifies well 17WW11 as shallow/intermediate because there is no distinct layer of clay separating the shallow and intermediate zones at this location (US Army, 2010a, appendix A, page 3-10). However, the perchlorate in well 17WW11 probably comes from the intermediate zone because a shallow zone well immediately adjacent to well 17WW11, well 17WW12, contains no perchlorate (US Army, 2010a, figure 2-2; US Army, 2010a, appendix A, table A-1; and appendix B, figure B-3).
[31] US Army, 2010b, page 17.

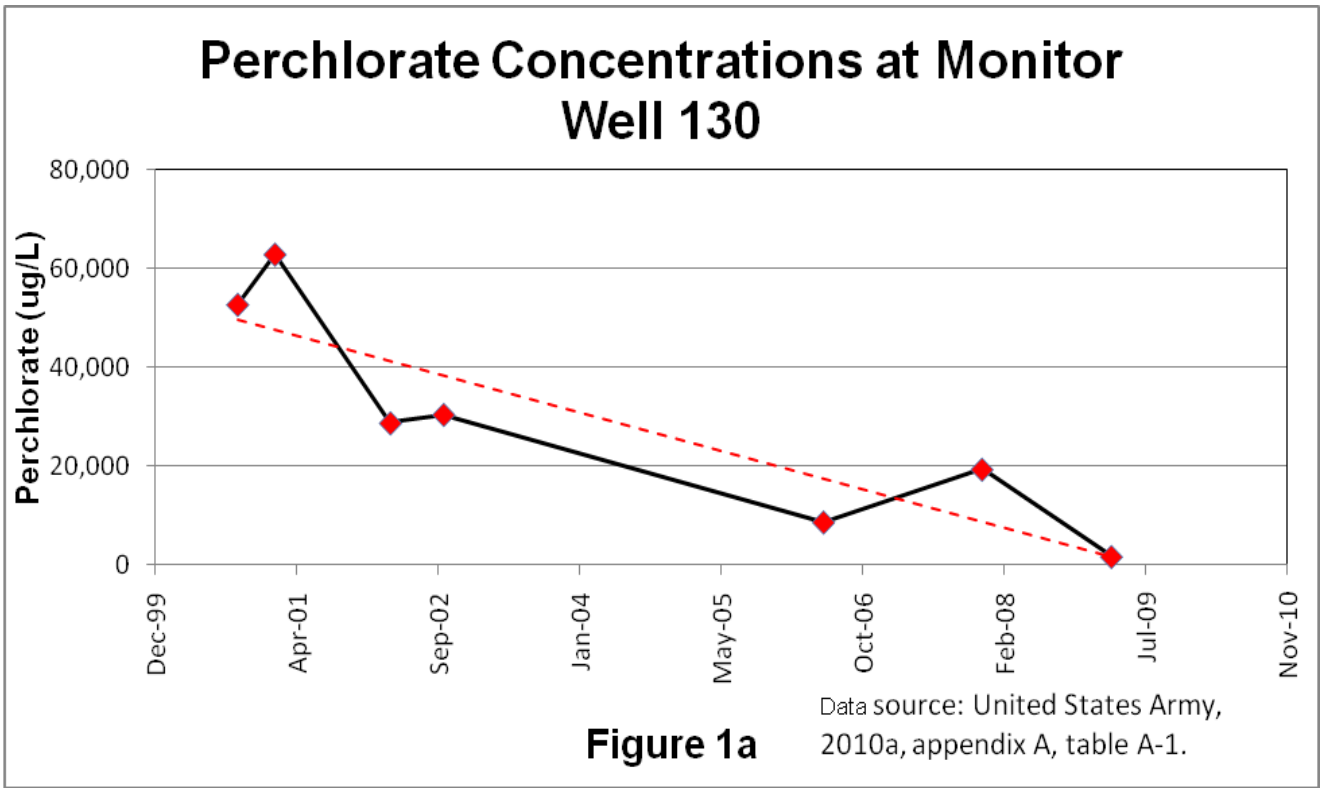
References

EPA, 2009a, *Longhorn Army Ammunition Plant, Harrison County, Texas,* November 2009.

United States Army, 2010a, Final Feasibility Study, LHAAP-17, Burning Ground No. 2/Flashing Area, Group 2, , *Longhorn Army Ammunition Plant, Karnack, Texas*, April 10, 2010.

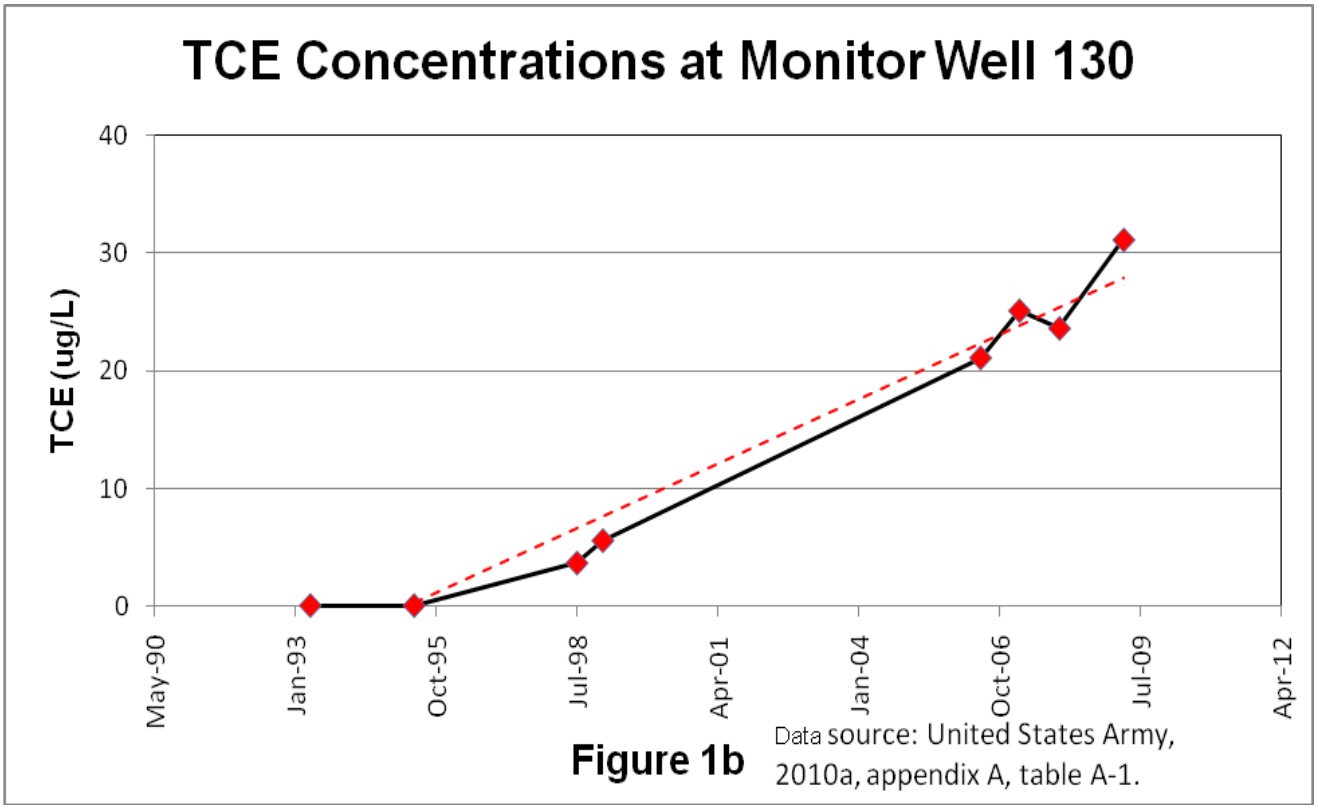
United States Army, 2010b, *Final Proposed Plan for LHAAP-17,* Burning Ground No. 2/Flashing Area Group 2, *Longhorn Army Ammunition Plant, Karnack, Texas*, May 10, 2010.

Figures



Data source: United States Army, 2010a, appendix A, table A-1.

Figure 1a



Data source: United States Army, 2010a, appendix A, table A-1.

Figure 1b

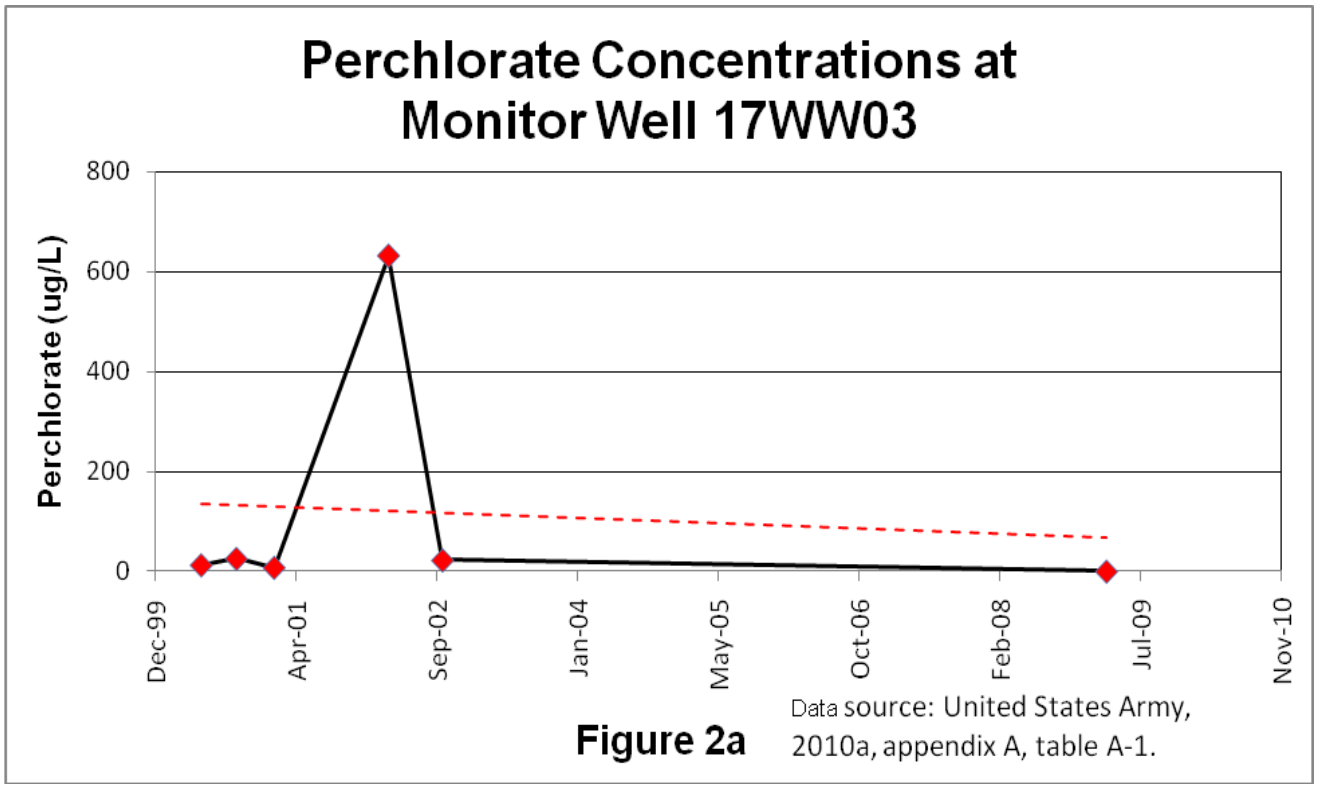


Figure 2a Data source: United States Army, 2010a, appendix A, table A-1.

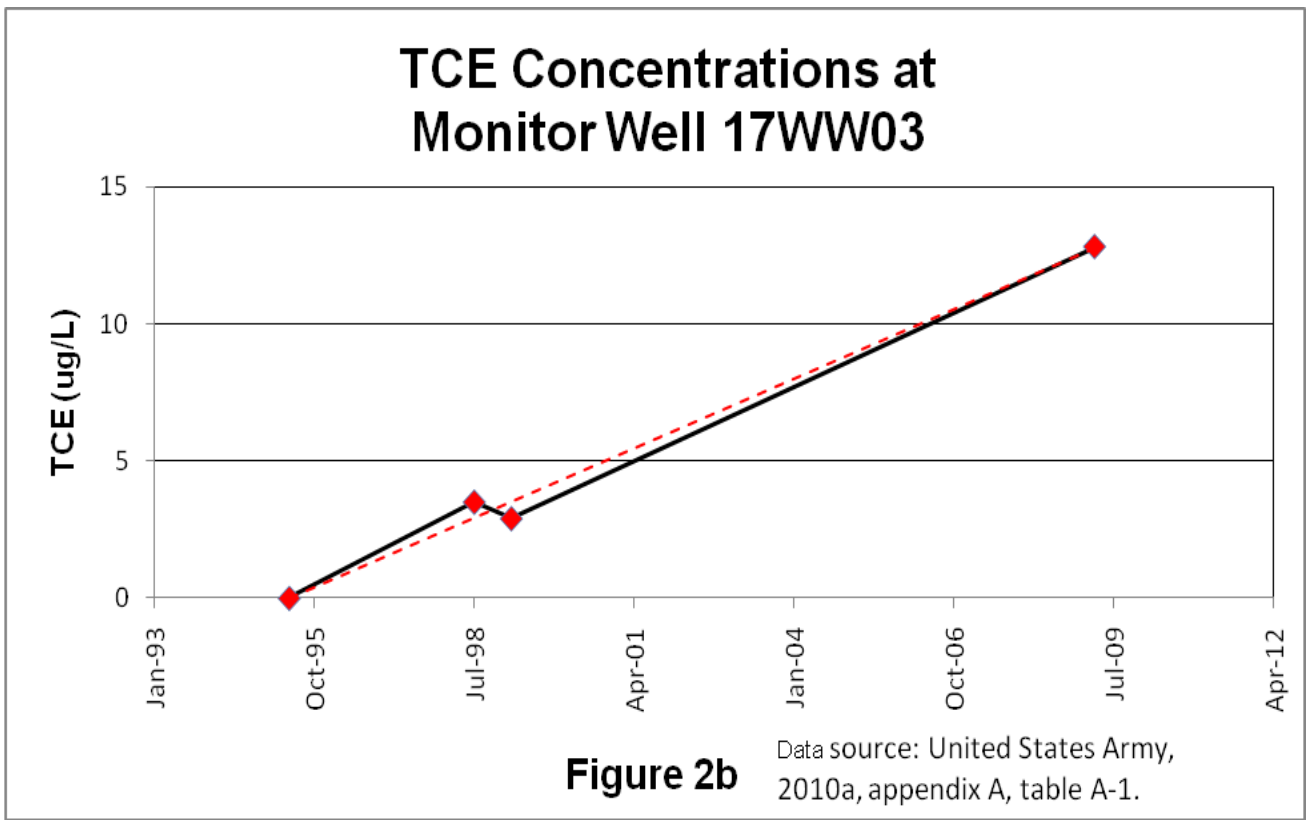
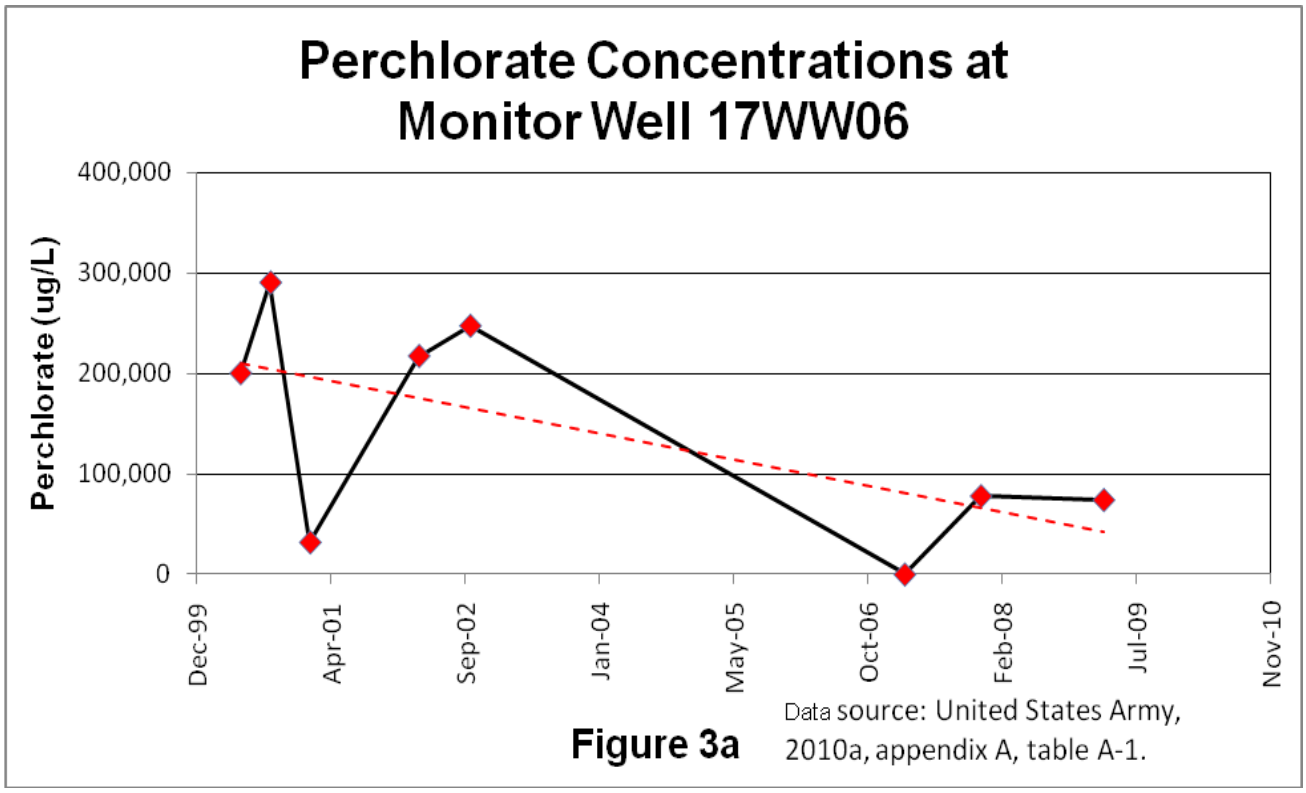
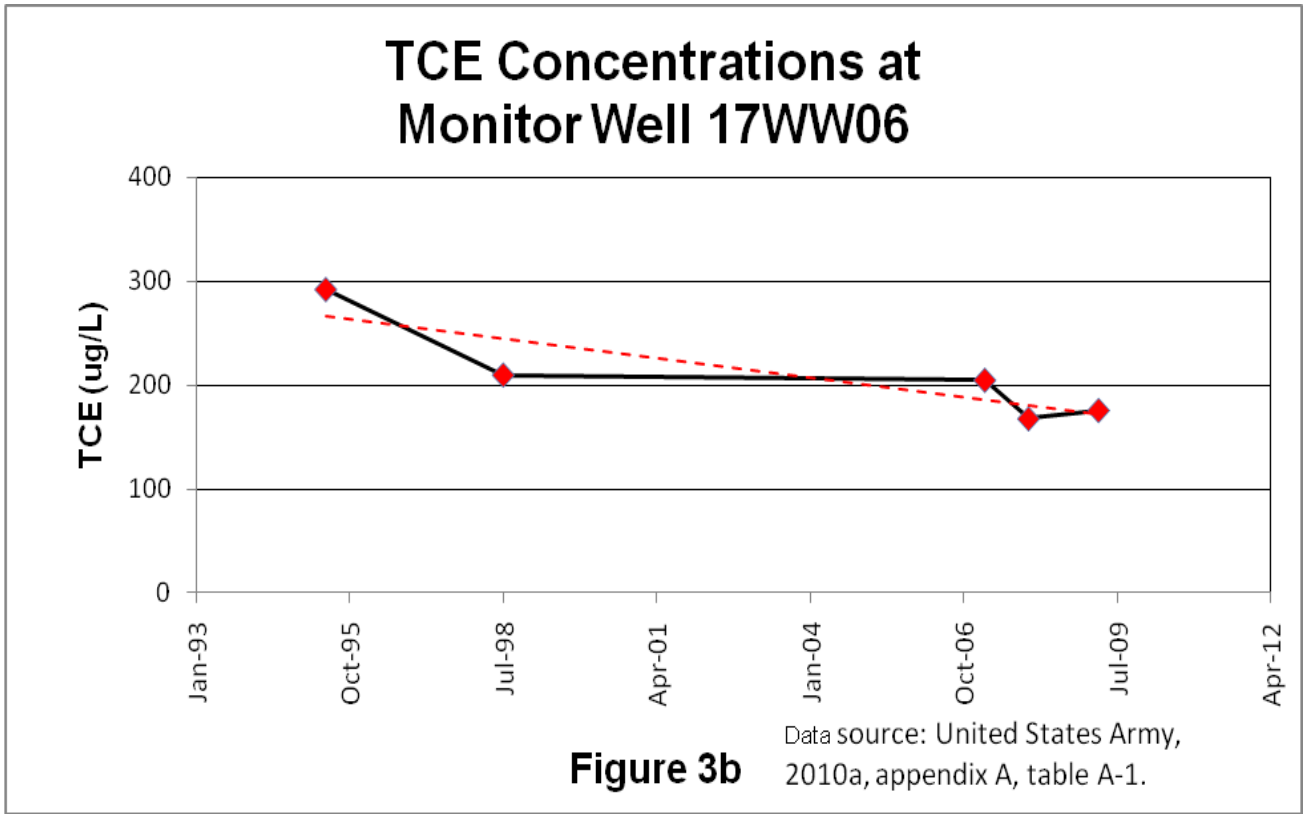


Figure 2b Data source: United States Army, 2010a, appendix A, table A-1.



Data source: United States Army, 2010a, appendix A, table A-1.

Figure 3a



Data source: United States Army, 2010a, appendix A, table A-1.

Figure 3b

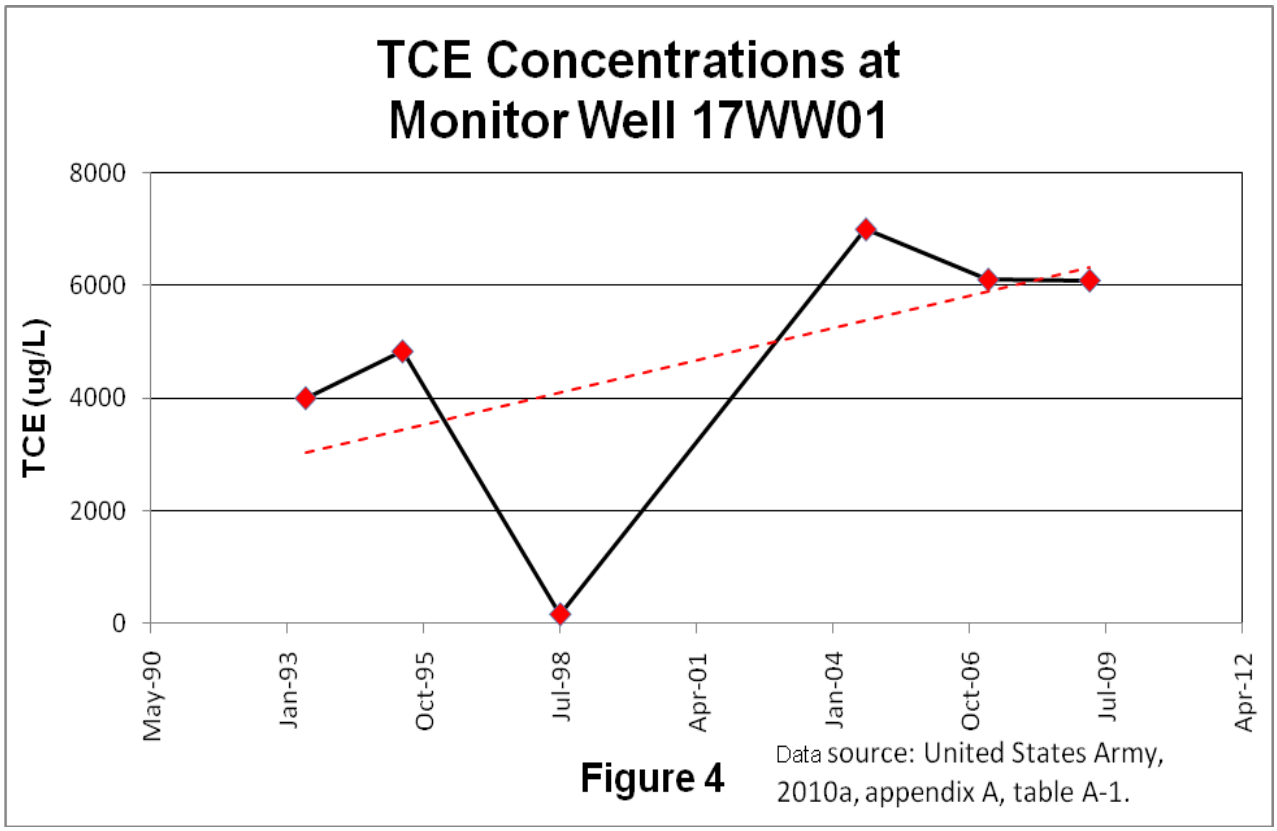


Figure 4 Data source: United States Army, 2010a, appendix A, table A-1.

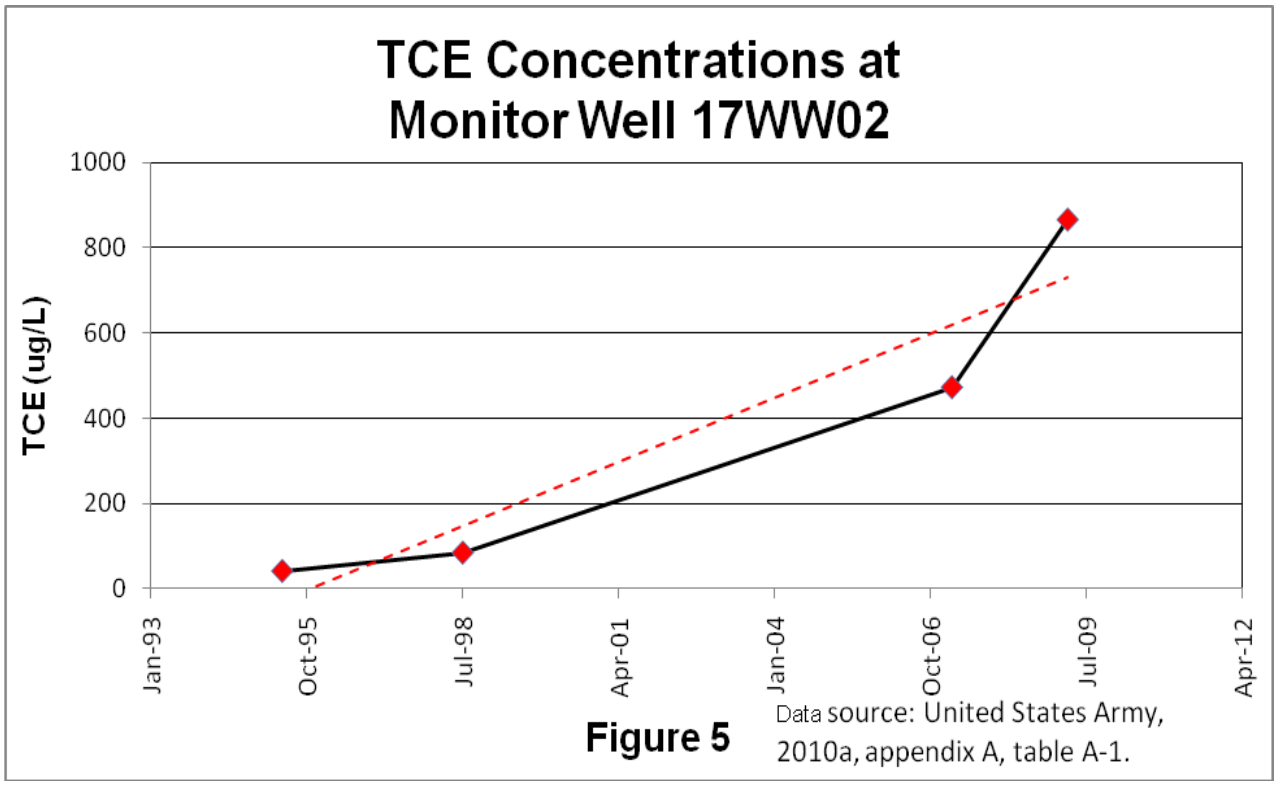


Figure 5 Data source: United States Army, 2010a, appendix A, table A-1.

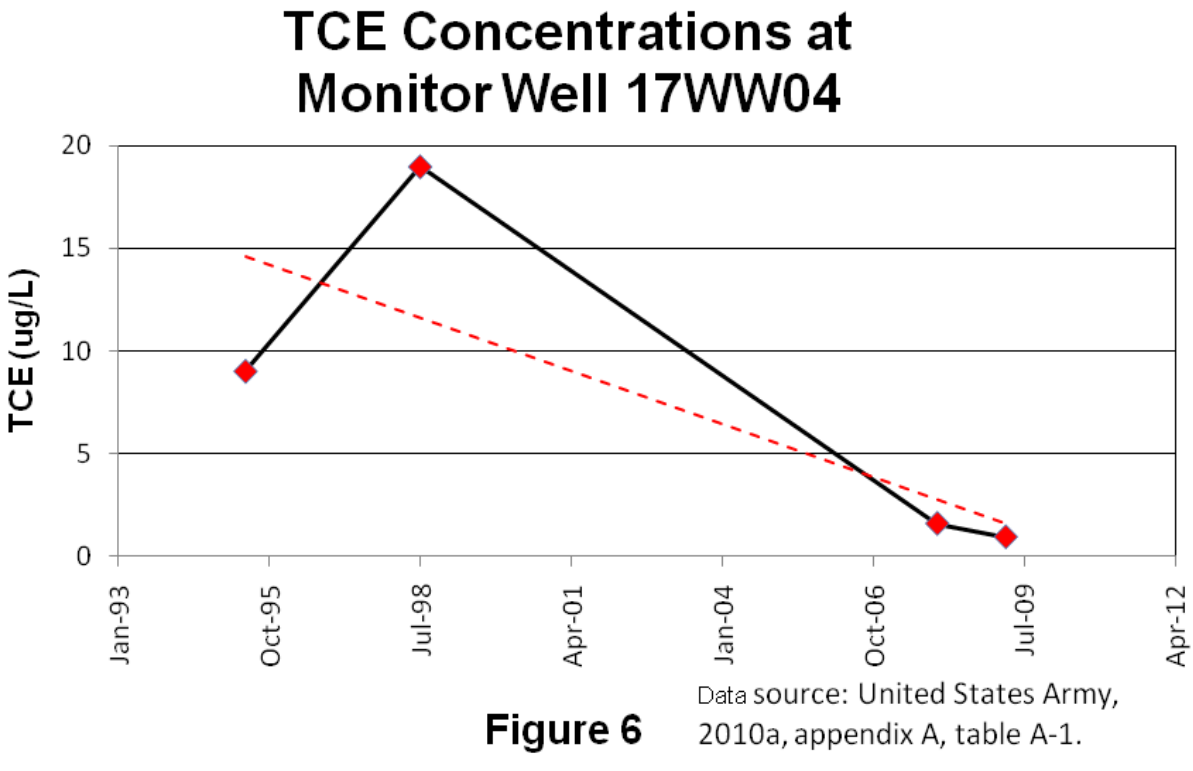


Figure 6 Data source: United States Army, 2010a, appendix A, table A-1.

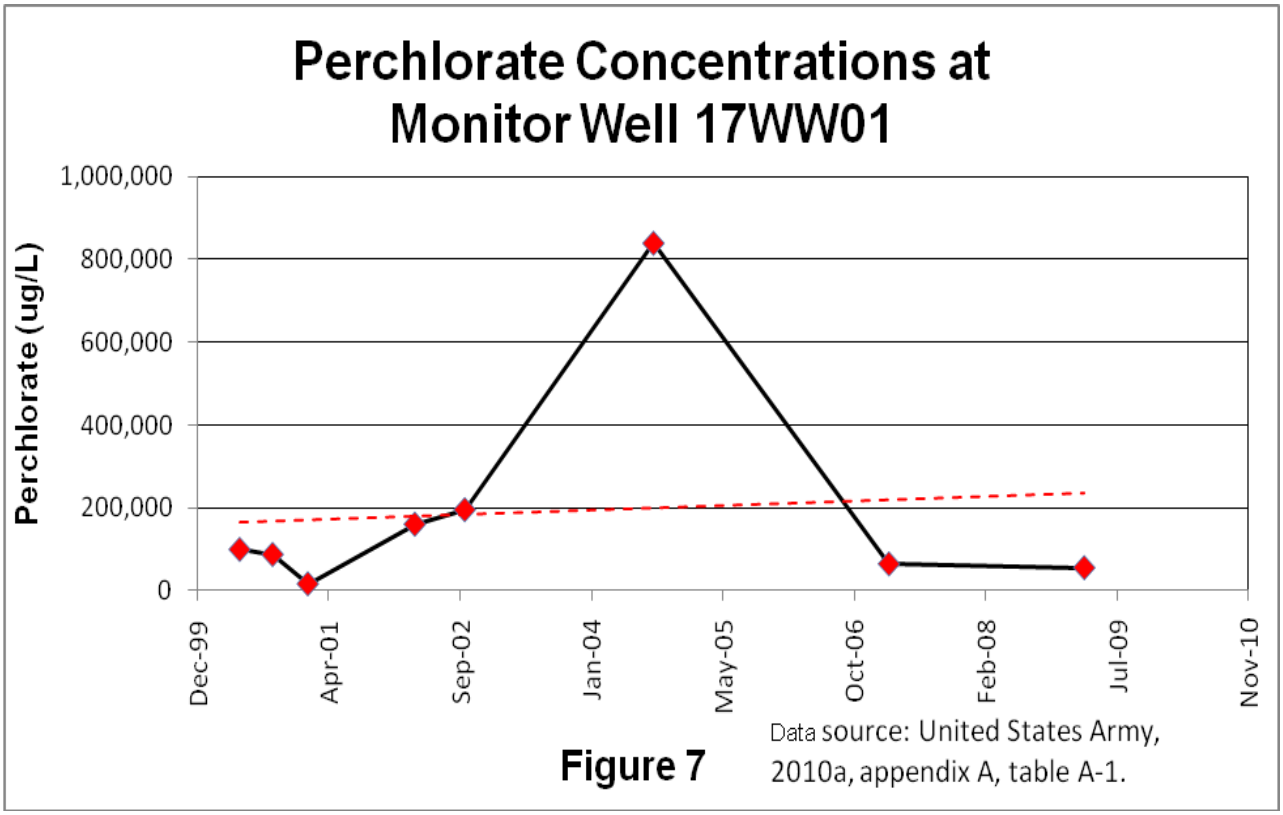
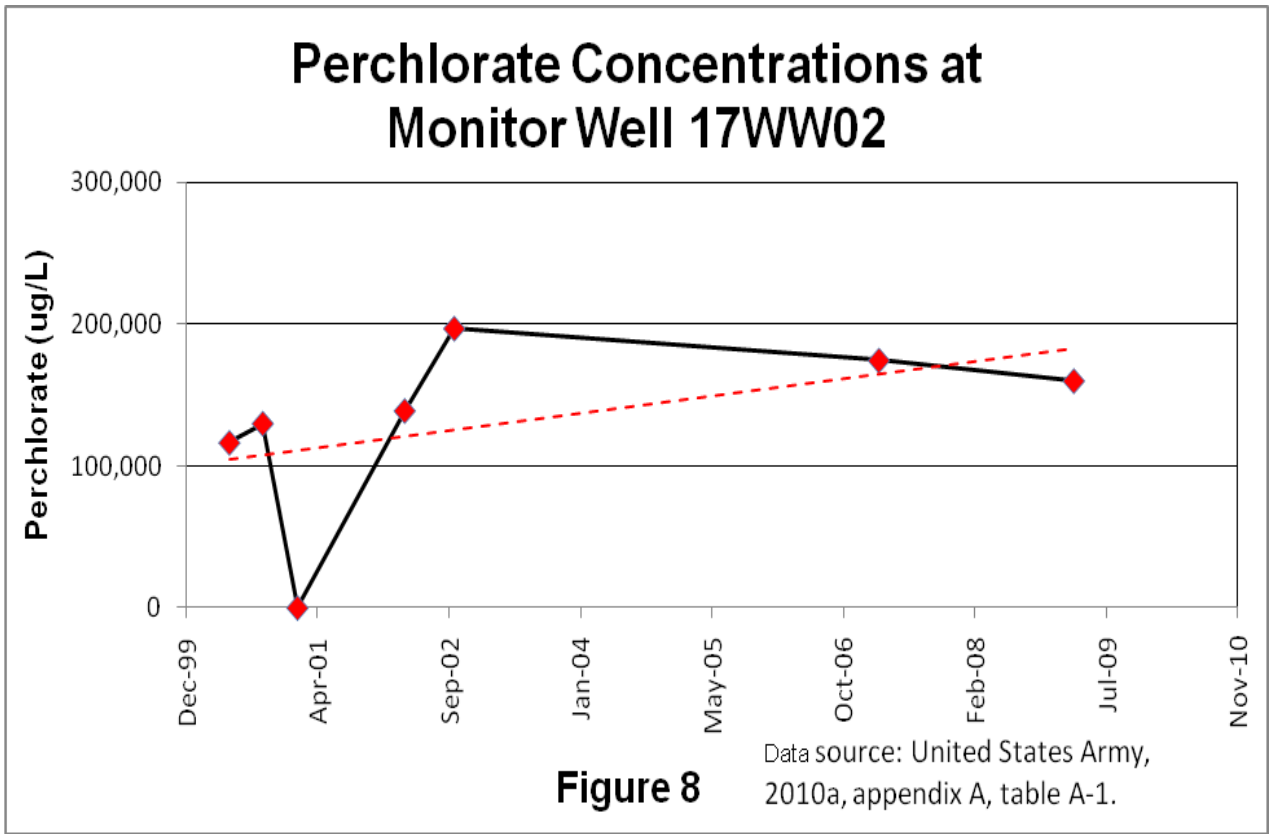


Figure 7 Data source: United States Army, 2010a, appendix A, table A-1.



Data source: United States Army, 2010a, appendix A, table A-1.

Figure 8