PLAN OF ACTIONS FOR THE GROUNDWATER EVALUATION PROJECT CAMP STANLEY STORAGE ACTIVITY, TEXAS

OCTOBER 26, 1995

Introduction

An investigation of groundwater contamination at Camp Stanley Storage Activity (CSSA), located northwest of San Antonio, Texas, is currently underway. Concentrations of tetrachloroethene (PCE), trichloroethene (TCE), and dichloroethene (DCE) were detected in CSSA water well 16 in 1991. The well was immediately closed and users were notified. The investigation has involved groundwater monitoring, geologic mapping, and identification of potential source areas around the well.

Solid waste generator numbers are noted herein for regulatory file identification. The Texas Natural Resource Conservation Commission (TNRCC) solid waste generator identification number for CSSA is 69026; the Environmental Protection Agency (EPA) identification number is TX2210020739. Project work is performed for CSSA by Parsons Engineering Science (Parsons ES) under Armstrong Laboratory/OEB contract F33615-89-D-4003, order 67.

Background

A preliminary evaluation was performed by Parsons ES for CSSA in 1992-1993. Actions included a geologic survey, downhole camera surveys, and groundwater sampling in all CSSA water wells. The information was compiled in three plans of action and a hydrogeologic report sent to TNRCC and EPA for review. Quarterly groundwater monitoring was initiated in May 1994 and is continuing to date. Other investigative actions were begun in August 1994, and the results through September 1995 are summarized below:

1. Quarterly groundwater monitoring results indicate that the typical flow direction is to the south-southeast with general gradients of 0.003 to 0.06 foot/foot. Chlorinated hydrocarbons (PCE, TCE, and DCE) have been detected above MCLs in CSSA wells 16 and D (the latter is located about 500 feet west of well 16; neither have been used for water production since detection of PCE in well 16). PCE has been detected below MCLs in wells 2, 3, 4, and 6, all located southwest of well 16. In addition, a packer test was performed in well 16; results indicated hydraulic connections through a "confining" layer, the Bexar Shale, to producing zones of the Middle Trinity aquifer located above and below the Bexar Shale. Well 16 is an open borehole to both zones and the Bexar Shale.
2. In August 1994, downhole geophysical surveys were performed in wells 2, D, and 16 to further define subsurface lithology and the water table. Discrete interval sampling and well upgrades were also performed.
3. In February 1995, surface geophysical surveys by EM and GPR were performed at potential source areas within an approximate 1-mile radius around well 16. Results indicated 26 anomalies located upgradient, sidegradient, and downgradient of well 16.
4. Results from drilling and sampling in 30-foot boreholes indicated chlorinated hydrocarbons at sites B-3 and the former oxidation pond (O-1). Groundwater was detected at several sites in discontinuous perched zones; only groundwater at B-3 contained the biodegradation chain of PCE, TCE, *cis*-1,2-DCE, and vinyl chloride; only PCE and TCE have been detected in soil samples. Both sites are downgradient of well 16.

5. Soil gas surveys were performed at all geophysical anomalies, with additional points added to complete concentration contours. The highest concentrations of PCE were at sites B-3 and O-1. A summary PCE concentration contour map of all the sites strongly indicated that B-3 and O-1 were the source areas of PCE.
6. CSSA's inner cantonment was mapped for surface geology. Lithology and contact between key beds were mapped using two index fossils, and strike and dip measurements of beds and fault planes were taken. Surface geologic data were correlated with surface information taken from geophysical well logs in the area and from CSSA wells. Primary results of the geologic survey were identification of a northern fault zone that trends northeast-southwest through the well 16, B-3 and O-1 areas. A second fault zone was identified along the southern border of CSSA, a fault which is likely between CSSA well 1 (located 1.8 miles downgradient of well 16 on Camp Bullis lands) and the PCE source areas B-3 and O-1.

Project status of the groundwater evaluation was presented to TNRCC and EPA personnel during a meeting at CSSA on October 19-20, 1995. CSSA personnel were Lt Col Dean Schmelling, CSSA Commander; Rod Chatham, Director of Special Projects; Brian Murphy, Environmental Officer; Tom Tutweiler, Deputy Director of Special Projects; and Paul Oliver, Chief of Security. Guy Tidmore, Chief, Texas Section of EPA Region VI RCRA Enforcement, attended. TNRCC personnel were Richard Clarke, Closure Team Program Manager, Corrective Action Section of TNRCC Industrial and Hazardous (I&H) Waste Division, Luis Campos of the I&H Waste Division, and Malcolm Ferris of the District 13 field office. AFCEE ERC personnel were represented by Rene Hefner. The technical presentation was given by Susan Roberts, Parsons ES Project Manager. The Armstrong Laboratory project manager, Capt Christopher Williston, was not able to attend the meeting due to schedule constraints. However, Capt Williston reviewed the draft presentation on 17 October 1995, and his comments were incorporated into the final presentation.

After a technical presentation of the investigation work to date and results, the following actions were agreed upon by the meeting attendees as appropriate and relevant to future actions regarding the groundwater contamination at CSSA.

Action 1. Continued geologic and hydrogeologic characterization of area (actions to be completed by Parsons ES and subcontracted firms for CSSA)

- Parsons ES: Complete soil gas investigation to determine extent of PCE concentrations in the south pasture, along Salado Creek, and west of B-3. The CSSA H and I areas will be included in survey if soil gas results along Salado Creek indicate that significant concentrations along the fence line of the H and I areas. The survey will also address better delineation of hot spots at B-3 and O-1.
- Parsons ES: Complete geologic mapping north pasture, east pasture, and within Camp Bullis lands adjacent to CSSA. Request information from Rene Hefner's masters thesis (UTSA) regarding stratigraphy and structure that he mapped west of CSSA on private lands. Request additional well logs from area west of CSSA to better define subsurface geology and faulting. Integrate additional data into cross sections and geologic maps for better understanding of faults around the well 16 area, particularly the northeast-southwest fault estimated to run north of the oxidation pond.
- Parsons ES: Perform next round of groundwater monitoring (due in November-December 1995) with additional sampling from private wells west and southwest of CSSA. Private wells to be determined from location with respect to well 16 and fault locations. CSSA wells with submersible pumps will be sampled by bailer.
  [To-be-determined water well drilling firm:] Prior to groundwater sampling, a local water well driller will be retained to attempt correction of sucker rod problems in well H.

- Parsons ES: Use better identified fault strike and dip trends to locate a monitoring well downgradient of the source areas. This well will be used to monitor downgradient effects on the water table from results of action 2 (below). Therefore, the well will be located so as to intersect the fault north of the oxidation pond below the water table.
  [Drilling firm to be determined]: A pilot hole will be run prior to well installation for geophysical logging. It is anticipated that a Edwards Underground Water District geophysicist/geologist will perform the geophysical well logging. The well will be installed open borehole, with casing to 150 feet BGL in accordance with the highest water levels found during groundwater monitoring. Samples will be collected prior to action 2.
- Parsons ES: Provide technical memorandum of investigation results to CSSA, for review and subsequent submittal to EPA and TNRCC.

Action 2. Source characterization and remediation of B-3 and O-1 (actions to be performed by Parsons ES and subcontracted firms for CSSA)

Because information to date strongly indicates that the sources of PCE in groundwater are from B-3 and O-1, and those sites are fairly shallow subsurface disturbed areas (less than an estimated 15 feet in depth) that have a high potential for containing high concentrations of residual or pooled PCE on clay layers or waste materials within the disturbed areas, it was agreed at the meeting that the most appropriate action was removal of these sources for subsequent disposal or treatment.

- Parsons ES: Determine area and depth of soils to be removed, based on geophysical anomalies, soil sample analyses, and updated soil gas concentration contours. Additional characterization of the amount of soil to be removed from B-3 and O-1 may be necessary to determine exact depth of soils to be removed and anticipated health and safety levels. A better estimate of the volume of potentially hazardous vs. nonhazardous soils would also be determined to establish soil treatment vs. soil disposal costs.
  Jones Environmental Drilling: The additional characterization would be accomplished through soil borings drilled around the geophysical anomalies and soil gas hot spots for collection of soil/rock samples and analysis of VOCs and metals. Parsons ES will log the drilled boreholes and collect samples for evaluation.
- Parsons ES: Determine best options for ex-situ treatment of soils, or disposal of hazardous vs. nonhazardous soils.
  CSSA: The option, to be selected by CSSA from viable alternatives and associated costs, will be based on site-specific effectiveness, implementability and costs.
- Parsons ES: Prepare a work plan and amend the existing health and safety plan to deal with excavation of soils and other waste materials, potential exposure to chlorinated hydrocarbons, exclusion zones, site controls, staging of nonhazardous and hazardous soils for treatment or disposal, and schedule of actions. A quality assurance plan will be attached to the workplan. Submit workplan and amended health and safety plan to CSSA, for subsequent submittal to EPA and TRNCC for review and comments.
- Parsons ES, subcontracted firm for excavation of contaminated soils, and if part of the treatment selected by CSSA, a to-be-determined subcontracted treatment firm: Implement excavation of B-3 and O-1 to bedrock under workplan schedule, followed by treatment or disposal option for ex-situ soils.
- Parsons ES: Determine if major fractures exist under either site after excavation. Such fractures would provide information on pathways of PCE migration to groundwater. Collect verification samples from the pit sidewalls and floor to determine if any contaminants remain in the bedrock.
  [To-be-determined excavation firm]: Perform additional excavation as necessary to removed contaminated rock for ex-situ treatment or disposal.
- Parsons ES: After gathering pertinent data from the excavated areas, oversee backfilling of excavations with clean soils.

- Parsons ES: Provide interim report of source remediation actions and results to CSSA, for subsequent submittal to EPA and TNRCC.

Action 3. Groundwater Remediation Options (to be prepared by Parsons ES)

TNRCC and EPA indicated at the meeting that they feel much of the groundwater contamination may be alleviated by removal of the source area soils. After source removals followed by soil verification analyses and groundwater monitoring data are collected, the data and associated risk assessment will be evaluated to determine if groundwater remediation actions are necessary. Should such actions be indicated, Parsons ES will prepare a memorandum of feasible groundwater remediation options applicable to site-specific conditions.

Other issues that will be addressed as part of the ongoing groundwater investigation:

1. Unexploded ordnance (UXO) is not expected at B-3 and O-1. However, it will be requested that CSSA EOD specialists be at the sites during excavation, particularly at B-3, to determine if any unidentified objects may be UXO. Should UXO be found, UXO and EOD specialists will be contracted to provide clearance and deal with the UXO.
2. Should shallow groundwater be encountered during additional characterization at B-3 and O-1, shallow monitoring wells may be installed if they are not in areas estimated necessary to be removed for source remediation.
3. Onsite treatment of soil from B-3 and O-1 is allowed under Corrective Action Management Unit (CAMU) rules only if the site is under a Corrective Action Order. It has not yet been determined if the groundwater evaluation is to be under an EPA Corrective Action Order or as a SEP, and thus it is not known if a CAMU can be established to deal with ex-situ onsite soil treatment.
4. If soil from B-3 and O-1 is treated "within 90 days", request determination from TNRCC on beginning point of 90 days with respect to staging operations for nonhazardous versus hazardous soils. Hazardous soils will be stored prior to treatment in rolloff bins.