DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, MCAPP
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

September 5,2006

U-160-06

Mr. Bryan Smith
Texas Commission on Environmental Quality
Industrial and Hazardous Waste Permits Section
P.O. Box 13087 (MC-130)
Austin, TX 78711-3087

Subject: Draft Quarterly Status Report of the Pilot Study Class V Aquifer Remediation Substrate Injection Well Activities at Camp Stanley Storage Activity, Boerne, Texas, TCEQ Authorization No. 5X2600408 WWC11140446/ CN602728206/RN104431655

Dear Mr. Smith:

The Camp Stanley Storage Activity (CSSA), McAlester Army Ammunition Plant, U.S. Army Field Support Command, Army Materiel Command, U.S. Army, is submitting this quarterly report summarizes the injection activities performed at the on-post Solid Waste Management Unit (SWMU) B-3 site. The activities performed are part of the planned SWMU B-3 Pilot Study being performed to evaluate the effectiveness of enhanced anaerobic biodegradation (EAB) for treatment of chlorinated compounds in groundwater. The pilot study activities include the injection of a conservative tracer to evaluate groundwater flow conditions followed by the injection of an organic substrate mixture for the EAB evaluation. Both the tracer and substrate mixtures were injected into monitoring well CS-B3-MW01 under the approved SWMU B-3 UIC Class V Inventory Authorization Form. The locations of the injection well and nearby monitoring wells are shown on Figure 1.

On March 15, 2006, Parsons initiated the tracer test at SWMU B-3 with the injection of 5 gallons of iodide/water solution into well CS-B3-MW01. The tracer mixture was prepared by mixing 12.6 grams of potassium iodide flakes with 5 gallons of distilled water resulting in an iodide concentration of approximately 500 milligrams per liter (mg/L). After preparing the tracer, the mixture was injected under gravity into the screened interval of monitoring well CS-B3-MW01. A sample of the tracer mixture was collected prior to injection and the iodide concentration was determined to be approximately 497 mg/L. A sample collected from the injection well after placement of the tracer mixture contained an iodide concentration of 146 mg/L.

Following the tracer injection, groundwater samples were collected primarily from the downgradient multiport monitoring well CS-WB05 at interval CS-WB05-LGR-04A. Samples were also collected from the injection well CS-B3-MW-01, CS-MW16-LGR, and from additional CS-WB05 multiport intervals CS-WB05-LGR-03B and CS-WB05-LGR-04B. Sampling frequency was varied based on expected arrival of the tracer slug and varied from daily to every three days as deemed appropriate. The groundwater samples were analyzed for iodide concentrations using a laboratory-grade ion meter equipped with an ion-selective electrode. Groundwater sampling for the tracer test was discontinued on March 23, 2006.

During the tracer test, the highest concentration of the iodide tracer detected was 0.700 mg/L, which was measured in a sample collected from downgradient location CS-WB05-LGR-04A on March 17, 2006, approximately 2 days after the tracer injection. Iodide detections above 0.100 mg/L were limited to the injection well and downgradient monitoring point CS-WB05-LGR-04A. The iodide concentration in injection well CS-B3-MW01 decreased from 146.1 mg/L on March 15, 2006 to 73.2 mg/L on March 17, 2006. Based on this decrease, sampling from the injection well was discontinued. Iodide was not detected above the 0.100 mg/L detection limit in any other wells tested. A plot of the breakthrough curve for the iodide tracer test is presented in Figure 2.

Between April 6 - 8, 2006, an organic substrate mixture was injected into the formation at monitoring well CS-B3-MW01. The substrate injection process involved mixing 100 gallons of sodium lactate with 2,900 gallons of water extracted from nearby well, CS-MW16-LGR, into a stainless steel tank placed at the site. The substrate injection consisted of injecting 1,700 gallons of the water/lactate mixture along with approximately 170 gallons of emulsified vegetable oil. Following the substrate injection, the remaining 1,300 gallons of water/lactate mixture was injected into the well to flush the residual substrate from the well and into the formation. A sample of the injected substrate mixture collected on April 6, 2006 is summarized in Table 1 and laboratory results are attached.

Following injection of the organic substrate in April 2006, CSSA initiated groundwater sampling at the site to assess geochemical changes within the aquifer. Groundwater samples were collected at one and two month intervals (May and June, 2006). Samples were collected from the injection well (CS-B3-MW01) and downgradient monitoring points CS-WB05-LGR-03B, CS-WB05-LGR-04A, and CS-WB05-LGR-04B. The groundwater samples were analyzed for volatile organics, methane, ethane, ethene, carbon dioxide, manganese, nitrate/nitrite, ferrous iron, alkalinity, total organic carbon, chloride, bromide, sulfate/sulfite, and volatile fatty acids (acetic acid, butyric acid, etc.).

Review of the post-injection sample results indicates that anaerobic biodegradation of the contaminants is occurring. Contaminant concentrations have declined and geochemical indicators such as dissolved oxygen and oxygen reduction potential indicate that the groundwater geochemistry is becoming more anaerobic. Concentrations of methane, ethane, and ethene have increased due to the degradation of the chlorinated compounds to these biodegradation byproducts. Concentrations of manganese, nitrate, and sulfate have decreased whereas nitrite, ferrous iron, chloride, and bromide have increased due to oxidation/reduction reactions associated with microbial activity within the aquifer. Additionally, the concentrations of volatile fatty acids have increased which can also be attributed to an increased in microbial activity. The post-injection sample results are summarized in Table 2 along with pre-injection results collected in January 2006 for comparison. Laboratory results for the samples are attached.

The post injection monitoring results indicate that the addition of the organic substrate is causing the increased biodegradation of the groundwater contaminants as expected. CSSA will continue to monitor groundwater conditions in the injection area to assess progress of the anaerobic degradation processes. Recent drought conditions have prevented the collection of water from the injection well with the dedicated bladder pumps due to low water levels in the well. CSSA will continue to attempt the collect of samples in accordance with our proposed schedule.

If you have any questions regarding the information contained in this letter, please feel free to contact Glare Sanchez, CSSA Environmental Program Manager, at (210) 698-5208 or Gary Cobb, Parsons, at (512) 719-6011.

Sincerely,

Jason D. Shirley
Installation Manager

Attachments

cc: Glare Sanchez, CSSA Environmental Program Manager
Julie Burdey, Parsons
Brian Vanderglas, Parsons
File: 744223.06000

Aerial Photo Date: 2003

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140 70 0 140 Feet

Groundwater Flow Direction
Faults (USGS)
Creeks (Dashed where intermittent)
Monitoring Well Locations
SWMU Boundary

Figure: 1

Pilot Study Well
Location Map
Camp Stanley Storage Activity

PARSONS

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Figure 2
Breakthrough Curve for Iodide Groundwater Tracer Test
SWMU B-3 Enhanced Anaerobic Biodegradation Pilot Study
Camp Stanley Storage Activity, Texas

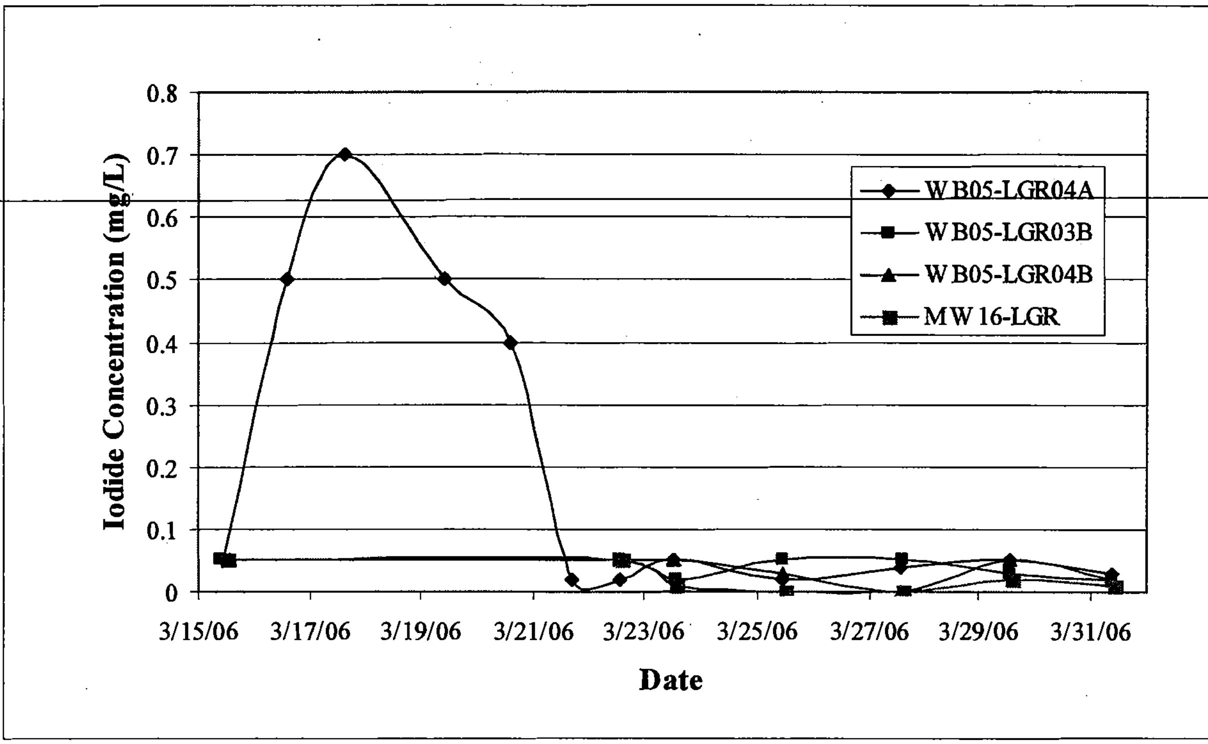

Table 1
Organic Substrate Analytical Results
SWMU B-3 Enhanced Anaerobic Biodegradation Pilot Study
Camp Stanley Storage Activity, Texas

Analyte	Concentration (mg/L
Tetachloroethene	0.0352
Trichloroethene	0.048
cis -1,2-Dichloroethene	0.0638
Naphthalene	0.00188 B
Total Organic Carbon	49,600
Bromide	114

B - analyte detected in equipment blank

Table 2
Summary of Groundwater Monitoring Results, SWMU B-3 EAB Pilot Study, CSSA
SWMU B-3 Enhanced Anaerobic Biodegradation Pilot Study
Camp Stanley Storage Activity, Texas

	DO				ORP (mV)				PCE (µg/L)				TCE (µg/L)				cisDCE (µg/L)				transDCE (µg/L)				Vinyl Chloride (µg/L)			
Well	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06
CS-B3-MW01	5.53	3.31	2.86	3.07	157.5	-126.9	-21.9	-70.5	15.0	4.73	nd	nd	30.7	10.1	1.46	1.46	57.8	16.9	48.1	48.1	nd	nd	nd	nd	nd	nd	nd	nd
WB05-LGR-03B	7.65	5.10	3.95	5.78	153.6	26.9	-25.0	-40.9	45.8	31.6	nd	nd	78.3	46.6	48.1	48.1	69.6	54.4	39.2	39.2	nd	nd	nd	nd	nd	nd	nd	nd
WB05-LGR-04A	7.51	4.09	3.85	4.47	-39.9	-79.6	-97.5	-119.6	22.5	nd	15.2	15.2	54,6	16.5	28.4	28.4	111	17.6	37	37	nd	nd	1.01	1.01	nd	nd	nd	nd
WB05-LGR-04B	8.26	6.45	6.68	9.71	166.4	129.0	52.9	60.9	586	239	417	417	562	280	491	491	624	355	506	506	nd	nd	nd	nd	nd	nd	nd	nd

	Ethane (µg/L)				Ethene (µg/L)				Methane (µg/L)				CO_2				Mn				Nitrate				Nitrite			
Well	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06
CS-B3-MW01	nd	4.76	nd	nd	nd	3.55	nd	nd	1.14F	4.64	505	505	52.5	570	570	570	nd	384	0.971	0.971	0.386	nd	nd	nd	nd	0.218	0.039	0.039
WB05-LGR-03B	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	41.7	41.7	134	312	290	290	0.8	4.01F	.005F	.005F	0.016	nd	nd	nd	nd	nd	0.003F	0.003F
WB05-LGR-04A	nd	nd	nd	nd	nd	nd	nd	nd	1.38F	2.67	3.5	3.5	182	285	325	325	nd	6.87F	0.89F	0.89F	nd	nd	nd	nd	nd	nd	0.003F	0.003F
WB05-LGR-04B	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	170	288	201	201	0.1	1.54F	nd	nd	0.697	0.723	1.11	1.11	nd	0.003F	0.002F	0.002F

	Nitrite				Ferrious Iron				Alkalinity				TOC				Chloride				Bromide				Sulfate			
Well	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06
CS-B3-MW01	nd	0.218	0.039	0.039	0.04	8.52	12.5	12.5	252	779	--	--	4.6	609	773	773	24.1	24.5	26.2	26.2	0.240	30.9	30.4	30.4	141	1.24	nd	nd
WB05-LGR-03B	nd	nd	0.003F	0.003F	0.01	0.048F	0.33	0.33	370	280	--	--	1.7	nd	1.4	1.4	14.8	13.3	11.8	11.8	0.190F	0.120F	nd	nd	61.8	69.7	34.7	34.7
WB05-LGR-04A	nd	nd	0.003F	0.003F	0.1	0.224	0.047F	0.047F	408	304	--	--	3.4	nd	1.2	1.2	15.9	11.8	12.4	12.4	0.180F	0.110F	nd	nd	38.8	35.7	65.2	65.2
WB05-LGR-04B	nd	0.003F	0.002F	0.002F	nd	nd	nd	nd	334	251	--	--	1.2	0.64F	0.67F	0.67F	16.9	12.6	12.5	12.5	0.190F	0.120F	nd	nd	15.1	15.2	14.6	14.6

	Sulfide				Acetic Acid				Butyric Acid				Formic Acid				Lactic Acid				Propionic Acid				Pyruvic Acid			
Well	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06	Jan-06	May-06	Jun-06	Aug-06
CS-B3-MW01	0.02	0.010F	0.424	0.424	nd	360	569.92	569.92	nd	nd	14.62	14.62	nd	1.61	nd	nd	nd	23.5	nd	nd	nd	687	961.82	961.82	nd	nd	nd	nd
WB05-LGR-03B	0.01	0.008F	0.531	0.531	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
WB05-LGR-04A	0.06	nd	0.043	0.043	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
WB05-LGR-04B	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd