East Pasture Well TW-2 and CS-13 Installation and Testing

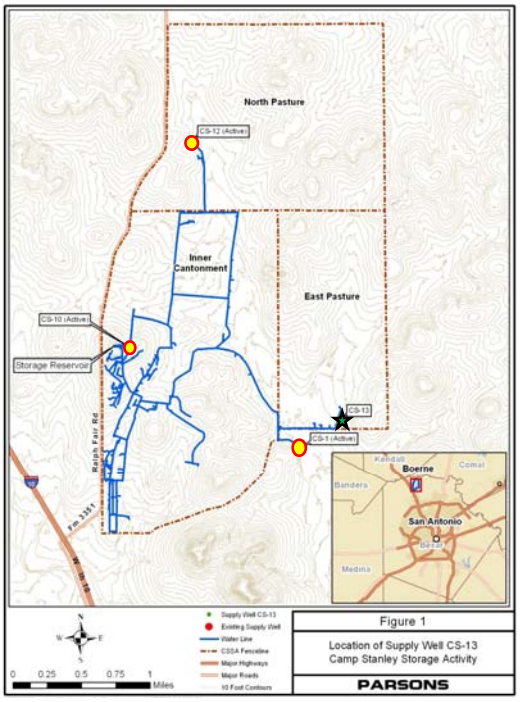
Camp Stanley Storage Activity - U.S. Army Boerne, Texas

June 26, 2012

PARSONS

Introduction

- CSSA has installed a new groundwater well in the East Pasture as a result of recent events:
  - EPA request for additional groundwater quality data point
  - Expansion of fire fighting capacity for the munitions storage facility
- The newly installed monitoring and fire fighting well in the East Pasture:
  - Is contaminant-free
  - Is high yielding
  - Pumping does not affect current plumes
  - Meets TCEQ requirements for a public water supply well

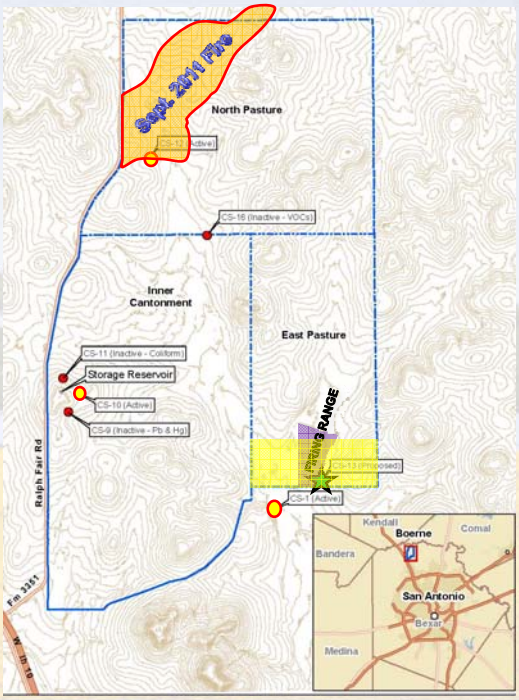


North Pasture Fire of September 7, 2011

- Started off-post at CPS electrical substation
- Scorched 230 acres in two hours
- Threatened buildings and facilities
- Included Emergency Response from multiple fire departments, Camp Bullis, and Fort Sam Houston helicopter support
- All efforts enabled containment of the fire and kept it from jumping the road to Fair Oaks Ranch and surrounding development

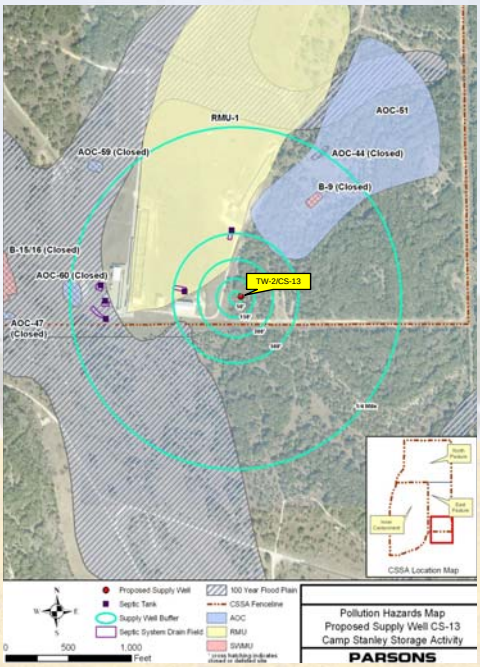
Project Evolution

- CSSA currently uses 3 supply wells (CS-1, CS-10, and CS-12) for potable water production and fire protection.
- In 2011, EPA requested an additional well to monitor water quality in the East Pasture.
- The September 2011 wildfire prompted CSSA to re-evaluate fire management capability in the active East Pasture firing range.
- Factors for the new well location included yield, lack of contamination, and proximity to existing utilities.
- The East Pasture location fulfilled these needs, and was also under consideration as a potable water source.

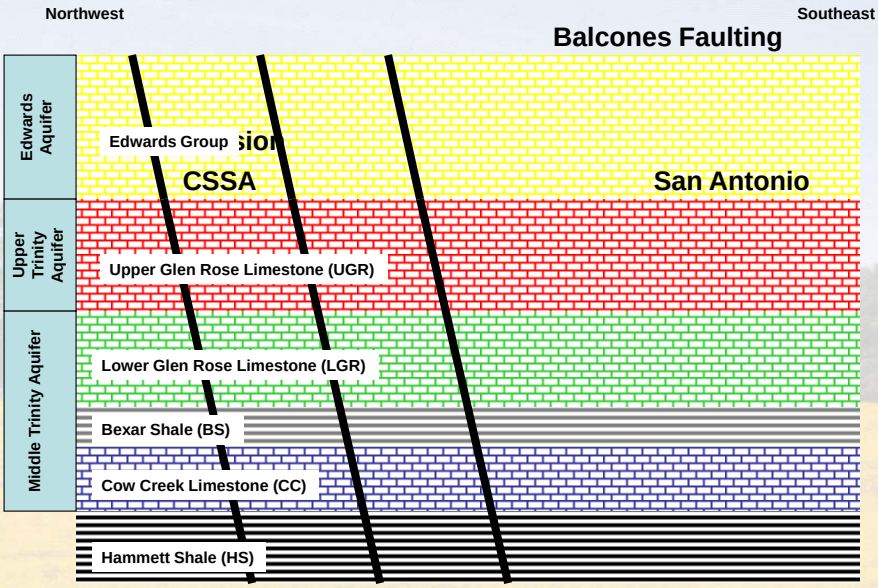


Project Activities

- CSSA submitted a ***Request to Construct a Supply Well*** on 11/30/2011 (amended 1/6/2012).
- Per TCEQ Rules, potential hazards identified within ¼-mile include 5 septic systems, active firing range, 3 closed disposal units, and one AOC currently being investigated.
- Request denied until additional information on groundwater and plume characteristics is provided.
- CSSA instructed Parsons to drill a test well (TW-2) at the East Pasture location to meet requirements for the EPA and fire fighting capacity.
- Preliminary AOC-51 site boundary from 1990s was refined in January 2012 based on detailed site investigations.
- Parsons installed TW-2 between March-April 2012.



Environmental Setting

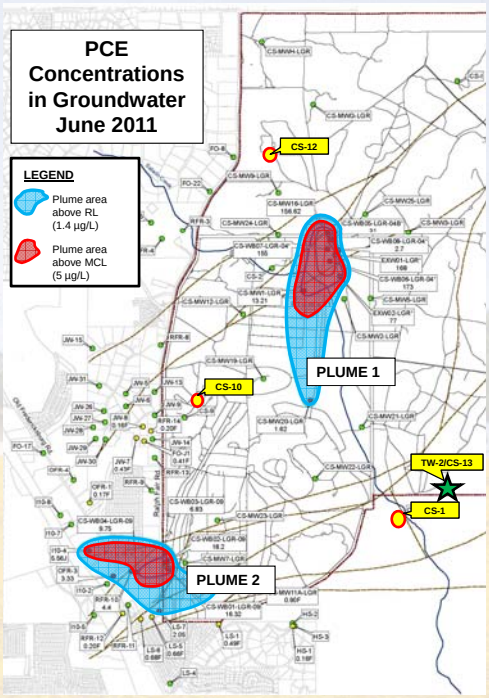


Groundwater Monitoring Program Overview

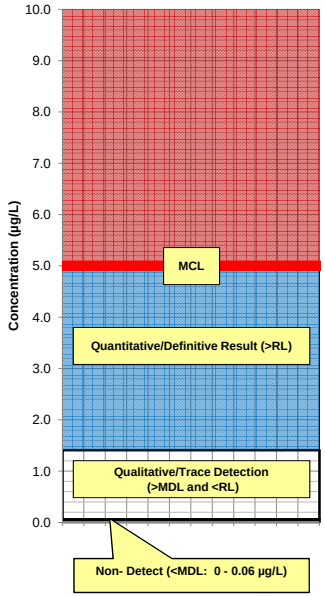
- CSSA, with EPA and TCEQ oversight, has carefully delineated plume boundaries using over 12 years of quarterly groundwater monitoring:
  - On-post since December 1999: 50 events
  - Off-post since September 2001: 43 events
- Monitoring Network includes 118 wells:
  - 57 On-post Middle Trinity Aquifer monitoring wells
  - 61 Off-post private and public supply wells
  - This does not include focused monitoring wells around plumes which would add 50+ locations
- All wells in network are monitored at least every 9 months. Geostatistical evaluations were used to determine monitoring locations and frequencies (approved by USEPA and TCEQ)

Contaminant History

- PCE solvent has been used as a degreaser between 1950s and 1990.
- Soil and Middle Trinity groundwater have become impacted by PCE, TCE, and *cis*-1,2-DCE.
- Two distinct VOC plumes are present at CSSA:
  - Plume 1: Associated with waste management activities at SWMU B-3 and O-1 in the central portion of CSSA.
  - Plume 2: Associated with the Building 90 (AOC-65) maintenance facility in the SW corner of the post.



PCE



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Transmitted via e-mail

February 13, 2012

MEMORANDUM

FROM: Greg J. Lyssy
Senior Project Manager
Federal Facilities Section (6PD-F)

TO: Gabriel Moreno-Ferguson
CSSA

CC: Kirk Coulter
TCEQ

RE: **CSSA Constituent Concentration Maps**

This Memo is written pursuant to our meeting on January 24, 2012, and as a follow-up to the discussions on the graphical depiction of analytical data in groundwater plume maps, and in accordance with the final Resource Conservation and Recovery Act (RCRA), Section 3008(h) Administrative Order on Consent (Order) for Camp Stanley Storage Activity (CSSA), Docket No. RCRA-VI 002(h)99-H FY99, dated May 5, 1999.

Historically, CSSA has created groundwater plume delineation maps utilizing all analytical data, including historical data points as well as data points that are near or at the method detection limit of the constituents. Preparing plume maps utilizing data points that are in the part per trillion range (and several orders of magnitude below the Maximum Contaminant Levels (MCLs)) may create a misleading graphical representation of the actual plume size.

In order to have consistency on plume maps across different facilities, it is my recommendation that CSSA create a groundwater plume map at the MCL (or appropriate regulatory level if there is not an MCL) for the constituents of concern (COCs). In addition, CSSA should also create a groundwater plume map that depicts isoconcentrations at 20% of the MCL.

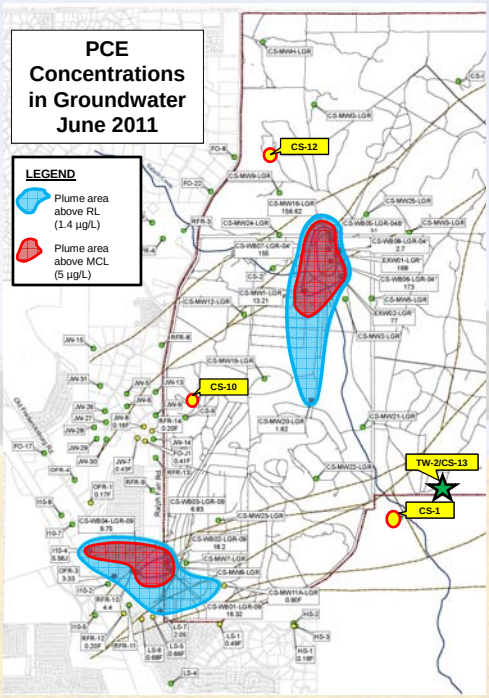
If desired, CSSA may create a ***base*** groundwater plume map using data near the method detection limit, but that map ***must*** contain qualifying information on the data that was used to create the map.

Groundwater monitoring of the plume at CSSA is required, and will continue to be required, as long as the Order is in place and there are COCs in the groundwater.

If CSSA, or your technical consultants, have any questions regarding this Memo, please do not hesitate to call me at 214.665.8317, or I may be contacted via e-mail at lyssy.gregory@epa.gov.

Current Status

- Groundwater monitoring is conducted in accordance with TCEQ and EPA-approved long-term monitoring optimization (LTMO) frequency.
- Up to 12 wells (both on- and off-post) typically exceed the MCL for PCE and/or TCE.
- Another 5 wells typically have quantifiable detections of PCE above the reporting limit (RL) of 1.4 µg/L, but less than the MCL (5 µg/L).



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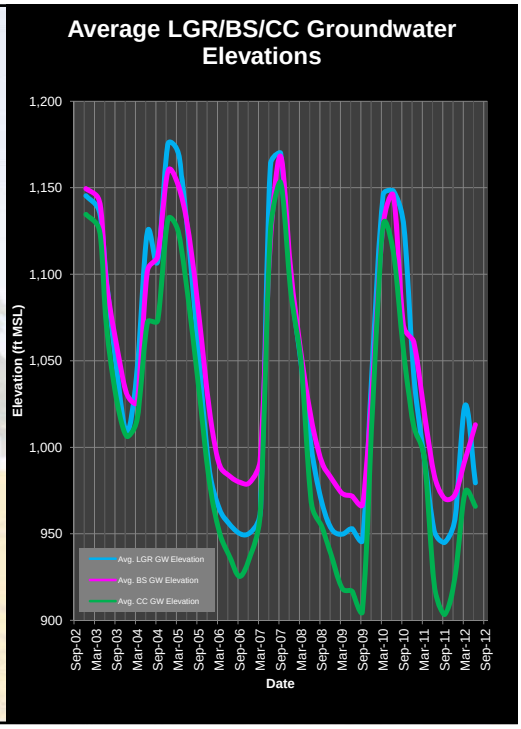
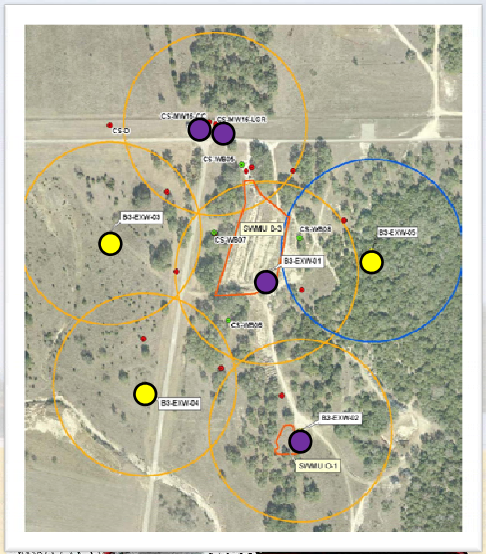
Groundwater Flow

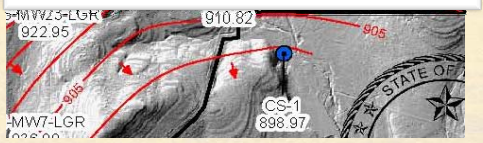
- CSSA monitors 57 wells for groundwater elevation on a quarterly basis.
- Groundwater elevation is susceptible to the hydrologic cycle.
- Potentiometric surface decreases to the south-southeast.
- VOC Groundwater Plume 1 advectively migrates southward with hydraulic gradient.
- Seasonal groundwater mound exists south of Plume 1.
- The "cone of depression" is the result of remediation system treating the Plume 1 Source Area.



Groundwater Control and Remediation Efforts

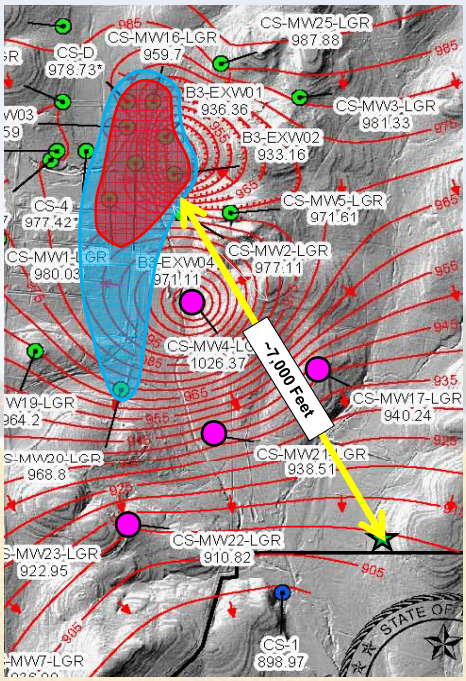
- Proactive groundwater remediation is occurring in the Plume 1 source area.
- Bioreactor Remediation System includes 4 wells actively extracting groundwater.
- Three new extraction wells have been drilled and are being incorporated into the system and will be on-line in Summer 2012.





Downgradient Detection Monitoring

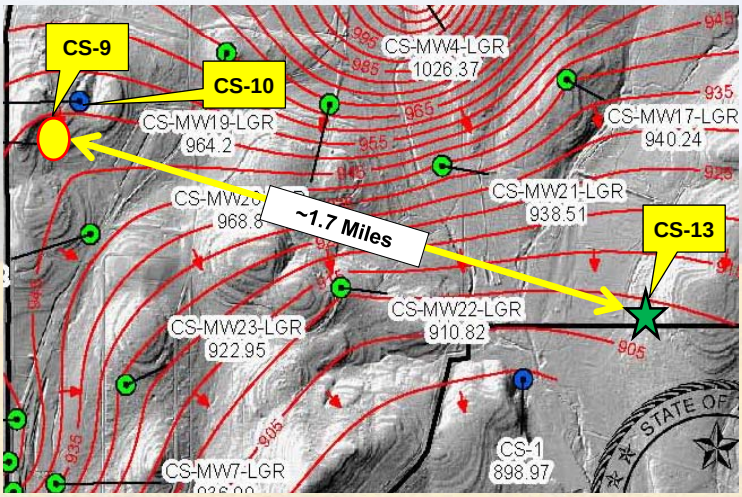
- CSSA considers existing wells MW4, MW17, MW21, and MW22 adequate downgradient coverage as "sentinel" wells.
- These 4 wells have been sampled between 18 to 28 times each since June 2001. No VOC detections above RL.
- More than 5 years of sampling shows the plume extent is static, but concentrations at the source are decreasing due to remediation.



CS-9 Lead and Mercury Concern

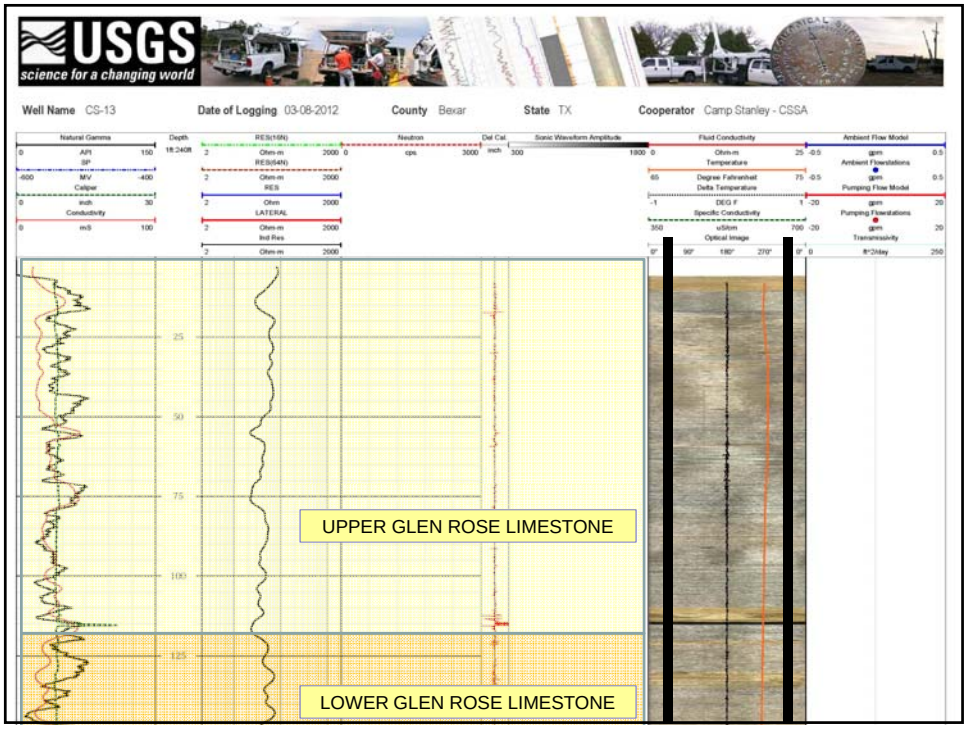
CS-9 is located 1.7 miles from CS-13 and is not upgradient of CS-13

CS-10 is 700 feet from CS-9, and does not have a Pb/Hg issue



TW-2 Test Well Installation

- Drill 8” borehole through Middle Trinity Aquifer (total depth is 579.5 feet bgs)
- Perform geophysical and video surveys
- Install 30-hp submersible pump
- Step-Drawdown Test
- 36-Hour Pumping Test
- Water Quality Analysis

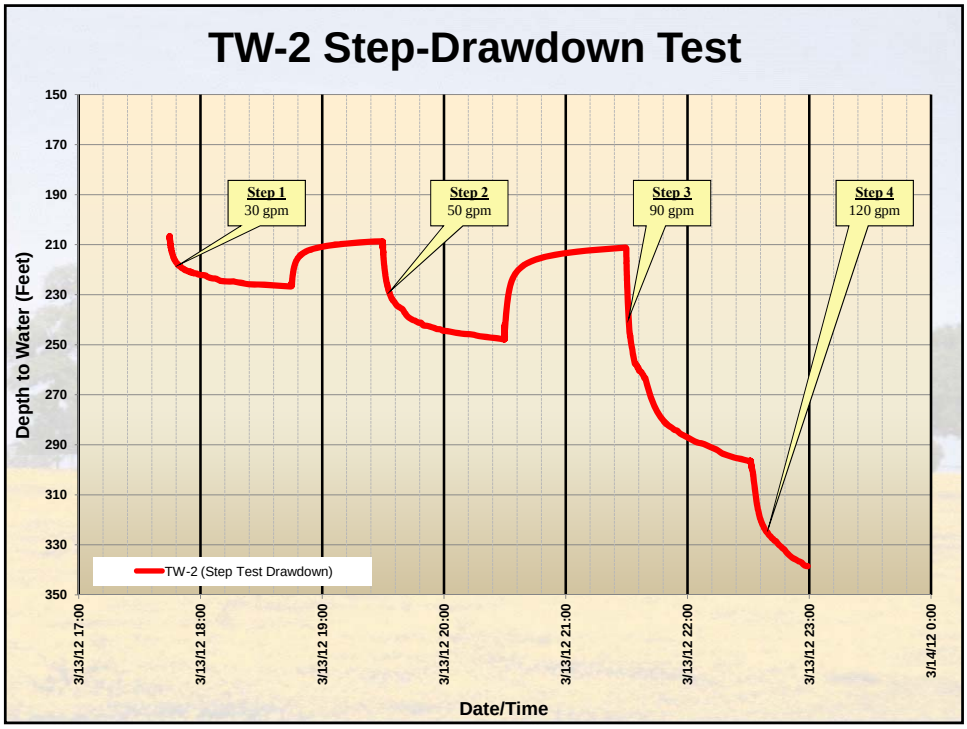


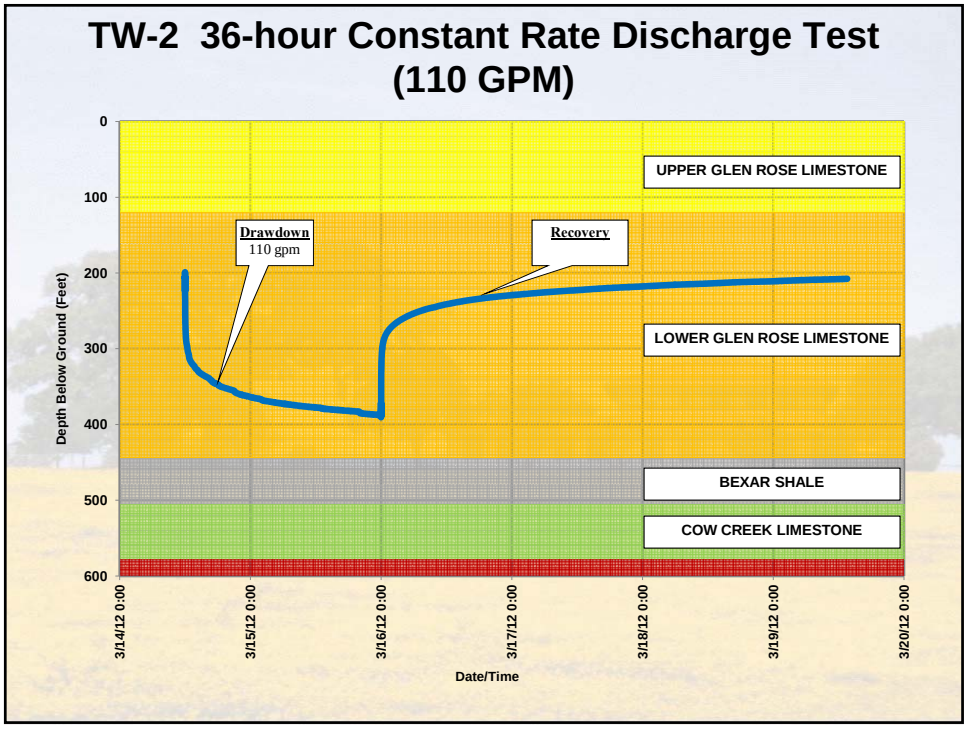
Pumping Tests

- Step Test
  - Initial test to determine a suitable flow rate for a long-term test
  - Well is pumped at increasing flowrates in “steps”
  - 4 steps were conducted at 30, 50, 90, and 120 gpm
  - 110 gpm was determined to be a sustainable rate for the 36-hour test
- Constant Rate Discharge Test
  - Test well pumped a steady 110 gpm for 36 hours with 182 feet of drawdown
  - Measure water level decline vs. discharge to determine hydraulic parameters
  - Monitor observation wells for measurable drawdown (pumping influence)
  - Based on historical monitoring well data, the pumping test occurred during a “slightly below average” aquifer level (-16 feet)
  - Aquifer levels were increasing during testing period (+8 feet)

Water Quality in Test Well (TW-2)

- Collected two samples during pumping test at 20 hours and 36 hours.
- All VOC, SVOC, and inorganic compounds were below applicable MCL, SCL, or AL.
- No radionuclides were detected above TCEQ levels of concern.


TW-2 Step-Drawdown Test
Depth to Water (Feet)
150
170
190
210
230
250
270
290
310
330
350
Step 1
30 gpm
Step 2
50 gpm
Step 3
90 gpm
Step 4
120 gpm
TW-2 (Step Test Drawdown)
3/13/12 17:00
3/13/12 18:00
3/13/12 19:00
3/13/12 20:00
3/13/12 21:00
3/13/12 22:00
3/13/12 23:00
3/14/12 0:00
Date/Time


TW-2 36-hour Constant Rate Discharge Test
(110 GPM)
Depth Below Ground (Feet)
0
100
200
300
400
500
600
UPPER GLEN ROSE LIMESTONE
LOWER GLEN ROSE LIMESTONE
BEXAR SHALE
COW CREEK LIMESTONE
Drawdown
110 gpm
Recovery
3/14/12 0:00
3/15/12 0:00
3/16/12 0:00
3/17/12 0:00
3/18/12 0:00
3/19/12 0:00
3/20/12 0:00
Date/Time

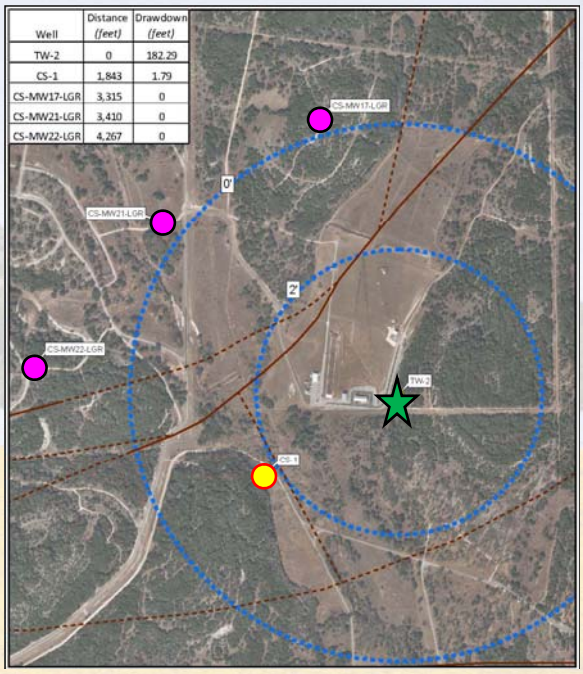
Hydraulic Results

- TW-2 was able to sustain 110 gpm for 36 hours
- Aquifer level was drawn down in the pumping well by 182 feet
- Specific Capacity (SC) is 0.60 gpm/ft
- Transmissivity (T) is 1,280 gpd/ft
- Drawdown of 1.79 feet was observed in one observation well (CS-1) at a distance of ~1,850 feet from TW-2
- USGS borehole flowmeter data indicate more than 84% of TW-2 groundwater is developed from Cow Creek Strata (historically uncontaminated strata)
- No other well at CSSA could sustain 110 gpm for 36 hours during the current drought cycle

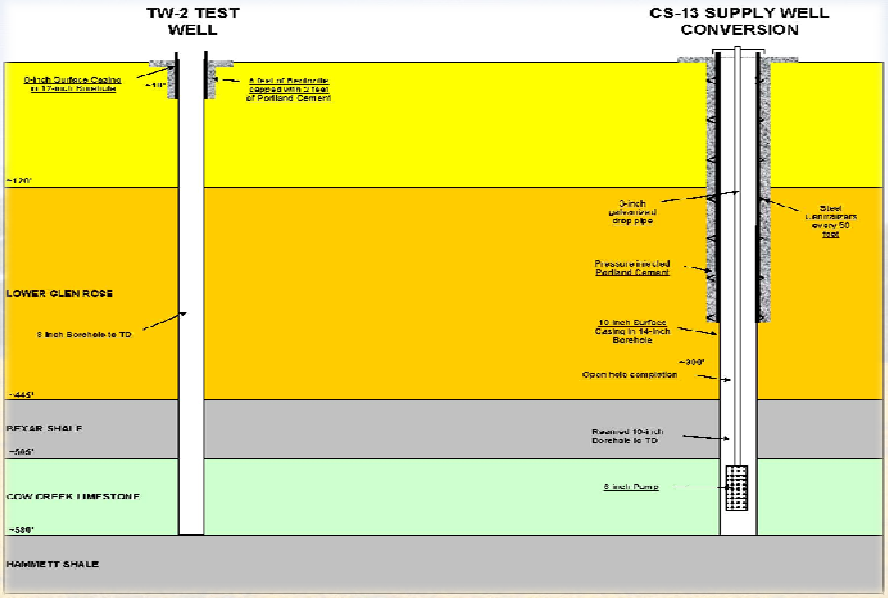
Radius of Pumping Influence

- 4 observations wells were monitored during the pumping test.
- Only one well (CS-1) showed a response to 36 hours of pumping (1.79 feet).
- Test concludes that there is no measureable pumping influence beyond 3,200 feet.

Well	Distance (feet)	Drawdown (feet)
TW-2	0	182.29
CS-1	1,843	1.79
CS-MW17-LGR	3,315	0
CS-MW21-LGR	3,410	0
CS-MW22-LGR	4,267	0



Test Well Construction and Eventual Fire Supply Well Design



Water Quality in Well CS-13

- Collected samples after well development, disinfection, and purging
- All VOC, SVOC, and inorganic compounds were below applicable MCL, SCL, or AL
- No Total Coliform, Fecal Coliform, or *e. coli* was reported in three consecutive daily samples per TCEQ requirement

	SAMPLING EVENT				REGULATORY LIMITS		
PARAMETERS	4/30/2012	5/1/2012	5/2/2012	5/2/2012	MCL	Action Level	SCL
SVOCs (ug/L)							
All				<MDL			Varies
VOCs (ug/L) - Detections Only							
Chloroform				3.53	80 (total THMs)		
Toluene				3.64	1,000		
METALS (mg/L)							
Aluminum				0.19F			0.2
Arsenic				0.00824F	0.01		
Barium				0.0316	2		
Cadmium				<MDL	0.005		
Calcium				62.70			
Chromium				<MDL	0.1		
Copper				<MDL		1.3	1.0
Iron				0.15			0.3
Lead				<MDL		0.015	
Magnesium				42.97			
Manganese				0.006			0.05
Mercury				<MDL	0.002		
Nickel				0.009F			
Phosphorous				0.173B			
Potassium				5.35			
Sodium				16.80			
Zinc				0.342			5
ANIONS & WATER QUALITY (mg/L)							
TDS				407			500
Hardness				334			
Bromide				<MDL			
Chloride				16.11			250
Fluoride				1.17	4		2
Nitrate				4.32	10		
Nitrite				<MDL	1		
Phosphate-P				<MDL			
Sulfate				80.87			250
Bicarbonate as $CaCO_3$				273.60			
Carbonate as $CaCO_3$				<MDL			
Total Alkalinity as $CaCO_3$				273.58			
pH				7.30			6.5-8.5
Coliform							
Total Coliform	Not Found	Not Found	Not Found		<5%/annually		
E-Coli	Not Found	Not Found	Not Found		None		
Fecal Coliform	<1	<1	<1		None		

Table 4.3
CS-13 Analytical Sampling Results
April-May 2012

PARAMETERS	SAMPLING EVENT				ANALYTICAL LIMITS		REGULATORY LIMITS		
	4/30/2012 (07:05) Normal	5/1/2012 (07:05) Normal	5/2/2012 (07:25) Normal	5/2/2012 (15:30) Normal	MDL	RL	MCL	Action Level	SCL
SVOCs (µg/L)									
All				<MDL	Varies	Varies			Varies
VOCs (µg/L) - Detections Only									
Chloroform				3.53	0.06	0.3	80 (total THMs)		
Toluene				3.64	0.06	1.1	1,000		
METALS (mg/L)									
Aluminum				0.19F	0.02	0.2			0.2
Arsenic				0.00824F	0.00022	0.03	0.01		
Barium				0.0316	0.0003	0.005	2		
Cadmium				<MDL	0.0005	0.007	0.005		
Calcium				62.70	0.03	1.1			
Chromium				<MDL	0.001	0.01	0.1		
Copper				<MDL	0.003	0.01		1.3	1.0
Iron				0.15	0.03	0.2			0.3
Lead				<MDL	0.0019	0.025		0.015	
Magnesium				42.97	0.01	0.1			
Manganese				0.006	0.001	0.005			0.05
Mercury				<MDL	0.0001	0.001	0.002		
Nickel				0.009F	0.001	0.01			
Phosphorous				0.173B	0.008	0.05			
Potassium				5.35	0.1	1			
Sodium				16.80	0.11	1			
Zinc				0.342	0.008	0.05			5
ANIONS & WATER QUALITY (mg/L)									
TDS				407	4.4	10			500
Hardness				334		1			
Bromide				<MDL	0.07	0.50			
Chloride				16.11	0.08	1.0			250
Fluoride				1.17	0.10	1.0	4		2
Nitrate				4.32	0.03	1.0	10		
Nitrite				<MDL	0.04	0.6	1		
Phosphate-P				<MDL	0.07	1.0			
Sulfate				80.87	0.26	1.0			250
Bicarbonate as $CaCO_3$				273.60	0.30	2.0			
Carbonate as $CaCO_3$				<MDL					
Total Alkalinity as $CaCO_3$				273.58	0.85	2.0			
pH				7.30					6.5-8.5
Coliform									
Total Coliform	Not Found	Not Found	Not Found			Found/Not Found	<5%/annually		
E-Coli	Not Found	Not Found	Not Found			Found/Not Found	None		
Fecal Coliform	<1	<1	<1			1.0	None		

J - The analyte was positively identified; the quantitation is an estimation
F - The analyte was positively identified but the numerical value is below the Reporting Limit (RL)
B - The analyte was found in an assoiated blank, as well as in the sample
MDL - Method Detection Limit

Conclusions

- At a minimum, CSSA intends to complete CS-13 as a groundwater source for fire protection in the East Pasture.
- However, water quality analysis also shows that CS-13 meets or exceeds all TCEQ requirements for a public water supply.
- A small area within AOC-51 with elevated metals in soil (about ¼-mile from CS-13) was removed in Spring 2012.
- Plume 1 is located more than 7,000 feet hydraulically upgradient of the proposed well.
- More than 12 years of groundwater monitoring has shown the plume to be relatively static with moderate temporal changes. Supply well CS-1 is also downgradient of the plume and has not shown any trends of increased VOC contamination.
- CSSA is actively remediating the Plume 1 source area through plume capture and biodegradation techniques.

Conclusions

- Four wells (MW4-LGR, MW17-LGR, MW21-LGR, and MW22-LGR) are upgradient of the proposed supply well location. None of these wells have ever had a VOC detection above the RL, with data going back to 2001 in some of the wells.
- 84% of the groundwater from this well is developed from the historically uncontaminated CC portion of the aquifer.
- Testing and analysis indicates that CS-13 is an “above-average” producing well typical for the area.
- Based on pumping data, the operational capacity of CS-13 should meet or exceed the highest average daily demand utilized at CSSA.

JUNE 26, 2012

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