

**Appendix F List of all CSSA Groundwater Monitoring Program On-Post Well Locations
and the Rationale for Installation**

<i>Drilling Location</i>	<i>Date Installed</i>	<i>Rationale</i>
<u>Supply Wells</u> (CS-1, CS-9, CS-10, CS-11)	March 1940 – September 1958	<ul style="list-style-type: none"> ➤ All production wells to supply CSSA with potable water, and are open-hole completions fully penetrating throughout the thickness of the Middle Trinity aquifer. ➤ CS-1 is located on Camp Bullis, but is operated and maintained by CSSA. Used as supplemental groundwater production by direct entry into the distribution system. ➤ Wells CS-9, CS-10, CS-11 are part of wellfield that are located in conjunction with the storage reservoir. CS-10 is the primary purveyor of groundwater for CSSA. CS-9 is generally inactive. CS-11 is no longer used due to coliform contamination.
<u>Agricultural Wells</u> (CS-1, CS-2, CS-3, CS-4, CS-D, CS-G, CS-H, CS-I)	Dates Unknown (<i>except CS-I in April 1979</i>)	<ul style="list-style-type: none"> ➤ Old agricultural and supply wells that generally produce groundwater from the Lower Glen Rose. Most were formerly equipped with windmills or motorized pump jacks. ➤ With exception of CS-I, all are inactive except for groundwater monitoring. ➤ CS-H was obstructed, and has been replaced by CS-MWH-LGR (see below).
<u>CS-MW1 Cluster</u> (CS-MW1-LGR, CS-MW1-BS, CS-MW1-CC)	July 2002 November 2002 December 2002	<ul style="list-style-type: none"> ➤ Monitors for southward flow components within Plume 1 and the fault zone. ➤ Helps evaluate the effects of topographic expression on the water table and local recharge. ➤ Determine if contamination detected in LGR groundwater at this location has migrated downward to the Bexar Shale and Cow Creek Limestone. ➤ Fills in spatial data gap in central portion of CSSA. ➤ CS-MW1 was installed in 1996 as an open borehole completion for preliminary investigation of the well CS-16 and CS-D VOC detections. This well was upgraded to a screen completion (CS-MW1-LGR) in July 2002.
<u>CS-MW2-Pair</u> (CS-MW-2-LGR CS-MW2-CC)	July 2002 March 2003	<ul style="list-style-type: none"> ➤ Fills data gap regarding Cow Creek in the eastern portion of the Inner Cantonment. ➤ Monitors for eastward flow of Plume 1 contaminants beyond the fault zone. ➤ Determine if contamination detected in LGR groundwater at this location has migrated downward to the Bexar Shale and Cow Creek Limestone. ➤ Helps evaluate effects of topographic expression on the water table and local recharge. ➤ CS-MW2 was installed in 1996 for preliminary investigation of the well CS-16 and CS-D VOC detections. This well was upgraded to a screen completion (CS-MW2-LGR) in July 2002.
CS-MW3-LGR	February 2001	<ul style="list-style-type: none"> ➤ Monitors for eastward flow components within Plume 1 and the fault zone. ➤ Helps evaluate the effects of topographic expression on the water table and local recharge. ➤ Fills in spatial data gap in eastern portion of CSSA.
CS-MW4-LGR	February 2001	<ul style="list-style-type: none"> ➤ Serves as a downgradient LGR well to Plume 1 outside the fault zone. ➤ Helps measure effects (if any) that Salado Creek may have on localized groundwater system.
CS-MW5 LGR	February 2001	<ul style="list-style-type: none"> ➤ Fills data gap regarding subsurface in the eastern portion of the inner

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		<p>cantonment area.</p> <ul style="list-style-type: none"> ➤ Monitors for eastward flow of Plume 1 contaminants within the fault zone. ➤ Helps evaluate effects of topographic expression on the water table and local recharge. ➤ Fills in spatial data gap in eastern portion of CSSA.
<u>CS-MW6-Cluster</u> (CS-MW6-LGR, CS-MW6-BS, CS-MW6-CC)	March 2001 - April 2001	<ul style="list-style-type: none"> ➤ Provides data for areas upgradient of Building 90 (AOC 65). ➤ Provides information regarding BS and CC Limestone in the vicinity of the Plume 2 area.
<u>CS-MW7-Pair</u> (CS-MW7-LGR, CS-MW7-CC)	June 2001 - July 2001	<ul style="list-style-type: none"> ➤ Monitors groundwater impacts in the most industrialized portion of CSSA (Plume 2). ➤ Provides information for area downgradient (based on historical potentiometric maps) of Building 90 during periods of normal groundwater levels.
<u>CS-MW8-Pair</u> (CS-MW8-LGR, CS-MW8-CC)	May 2001 - June 2001	<ul style="list-style-type: none"> ➤ Monitors groundwater impacts in the most industrialized portion of CSSA (Plume 2). ➤ Provides information for area downgradient (based on historical potentiometric maps) of Building 90 during periods of low (drought condition) groundwater levels.
<u>CS-MW9-Cluster</u> (CS-MW9-LGR, CS-MW9-BS, CS-MW9-CC)	November 2000 - January 2001	<ul style="list-style-type: none"> ➤ Provides background condition data, upgradient of Wells CS-16 and CS-D and fault zone. ➤ Provides a sentry well between Plume 1 and nearest Fair Oaks municipal production well. ➤ Provides information regarding BS and CC Limestone north of inner cantonment area.
<u>CS-MW10-Pair</u> (CS-MW10-LGR, CS-MW10-CC)	September 2001	<ul style="list-style-type: none"> ➤ Provides data in vicinity of former well CS-6, which had 1.5 ppb PCE in May 1994. Also within 500 feet of impacted off-post wells at Leon Springs Villa and Curres Creek Road. ➤ Monitors groundwater impacts in the most industrialized portion of CSSA. ➤ Helps spatially distribute data for future modeling efforts. ➤ Provides data for area proximal to mapped fault zone.
<u>CS-MW11 Cluster</u> CS-MW11A-LGR CS-MW11B-LGR	April 2003	<ul style="list-style-type: none"> ➤ Provides data for area east of Building 90 (AOC-65) and provide detection monitoring for public supply wells along southern post boundary. ➤ Investigate hydrologic properties of large, transmissive fault system encountered at this location (MW11B-LGR).
<u>CS-MW12 Cluster</u> (CS-MW12-LGR CS-MW12-BS CS-MW12-CC)	September 2002 - October 2002	<ul style="list-style-type: none"> ➤ Serves as a monitoring point down-gradient of Plume 1, within the fault zone, and between the source area and CSSA drinking water supply wells.
<u>CS-16 Cluster</u> CS-16-LGR CS-MW16-CC	July 2002 June 2003	<ul style="list-style-type: none"> ➤ CS-16 is a former supply well that was re-fitted as a monitoring well (CS-16-LGR) in July 2002. The BS and CC portions of the former supply well were plugged with cement to eliminate downward cross contamination between the LGR and CC portions of the Middle Trinity aquifer. ➤ Monitors Cow Creek major water-bearing zone adjacent to the alleged Plume 1 source area. ➤ Determine if contamination detected in LGR groundwater at this location has migrated downward to the Bexar Shale and Cow Creek Limestone.

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CS-MW17-LGR CS-MW18-LGR CS-MW19-LGR	July 2002 - August 2002	<ul style="list-style-type: none"> ➤ CS-MW17-LGR installed for detection of Plume 1 contaminants between source area and public supply well CS-1. ➤ CS-MW18-LGR and MW19-LGR monitors LGR groundwater downgradient of Plume 1 in central sections of CSSA.
CS-WB01-LGR CS-WB02-LGR CS-WB03-LGR	July 2003 - August 2003	<ul style="list-style-type: none"> ➤ Multi-port wells to provide information on UGR and LGR in AOC-65 area. ➤ Monitor subsurface throughout possible Plume 2 migration pathways. ➤ Provide continuous detailed profile analysis of hydrologic and contaminant properties near Plume 2 source area.
CS-WB04	July 2003 - August 2003	<ul style="list-style-type: none"> ➤ Provides off-post data near impacted off-post private wells and near faults thought to affect the advance of Plume 2. ➤ Helps spatially distribute data for future modeling efforts.
CS-WB05 CS-WB06-LGR CS-WB07-LGR CS-WB08-LGR	July 2005 - November 2005	<ul style="list-style-type: none"> ➤ These multi-port wells are used to support ongoing remedial activities at SWMU B-3. ➤ Provide information on UGR and LGR in SWMU B-3 area. ➤ WB05 is also completed through the BS and CC portions of the Middle Trinity aquifer in support of pumping and tracer testing being conducted as part of the remedial effort. ➤ Monitor subsurface throughout possible Plume 1 migration pathways from the source area. ➤ Provide continuous detailed profile analysis of hydrologic and contaminant properties near Plume 1 source area.
CS-G-LGR CS-MWH-LGR	June 2002 September 2002	<ul style="list-style-type: none"> ➤ Monitor LGR in northern portion of CSSA, up-gradient of affected areas. ➤ Monitor LGR for potential contaminants entering CSSA from the north. ➤ CS-G is an existing agricultural/livestock well (see above) re-fitted with a new surface completion in June 2002. Re-designated as CS-G-LGR, the well is an open borehole completion through most of the LGR. ➤ CS-MWH-LGR is a replacement well for former well CS-H (see above). Provides a remote water supply well for livestock, wild game, and fire protection. Also used for groundwater monitoring.
Proposed Well Location #1	2006	<ul style="list-style-type: none"> ➤ Area of less spatial certainty as determined by the LTMO Study statistical analysis. ➤ Defines the north-northeast margin of PCE/TCE/DCE concentrations detected around the MW16 well location. This location is proximal to SWMU B-8 and AOC 41 ➤ Additional characterization of the plume midpoint between MW4-LGR and CS-1 and to further define the shape of Plume 1.
Proposed Well Location #2	2006	<ul style="list-style-type: none"> ➤ Historical results indicate that Plume 1 may have a significant westward component. Concentrations in CS-D have increased while concentrations at MW16 have decreased. ➤ This location will help characterize the area of the plume which exceeds the MCLs toward Ralph Fair Road. <p style="text-align: center;">LTMO spatial statistical analyses indicate a high spatial certainty in this area, but selection of this location is driven by qualitative analysis.</p>
Proposed Well Location #3	2006	<ul style="list-style-type: none"> ➤ Area of less spatial certainty as determined by the LTMO Study statistical analysis. ➤ Further characterize the gap between MW19-LGR, MW4-LGR, MW17-LGR, and CS-1. ➤ Attempt to understand and delineate the groundwater elevation mounding at

July 2006

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<i>Drilling Location</i>	<i>Date Installed</i>	<i>Rationale</i>
		<p>MW4-LGR.</p> <ul style="list-style-type: none"> ➤ Additional characterization to further define the shape of Plume 1.
Proposed Well Location #4	2006	<ul style="list-style-type: none"> ➤ Area of less spatial certainty as determined by the LTMO Study statistical analysis. ➤ Further characterize the gap between MW19-LGR, MW4-LGR, MW17-LGR, and CS-1. ➤ Attempt to understand and delineate the groundwater elevation mounding at MW4-LGR. ➤ Attempt to determine the significance of Salado Creek as a conduit and determine if subsurface karst development has occurred in conjunction with Salado Creek.
Proposed Well Location #5	2006	<ul style="list-style-type: none"> ➤ Area of the least spatial certainty as determined by the LTMO Study statistical analysis. ➤ Additional characterization to further define the shape of Plume 1. ➤ Additional information for groundwater elevation data. ➤ Potentially intersect a large throw fault extending across southern CSSA.
Proposed Well Location #6	2006	<ul style="list-style-type: none"> ➤ Area of less spatial certainty as determined by the LTMO Study statistical analysis. ➤ This location will attempt to delineate upgradient VOCs near AOC-65, to support that no other VOC contamination source is present.