STEP 3
IDENTIFY THE INPUTS TO THE DECISION

3.1 General CSSA Inputs

CSSA owns and operates three groundwater wells as part of TCEQ public water system (PWS 0150117). Sampling required by the TCEQ related to the operation of the CSSA PWS is not covered under these DQOs. TCEQ collects samples from the PWS drinking water wells at frequencies determined by TCEQ PWS regulations. TCEQ will also collect split samples from other monitoring well locations at their discretion.

Metals and VOCs will be sampled from CSSA on-post wells and VOCs only will be sampled from off-post wells. Frequencies for sampling are discussed in Sections 3.2 to 3.5, below. Only those COCs that have statistically significant detections above the reporting limit (RL) and the MCL based on historical data will be analyzed, and a statistical summary of the occurrence of groundwater COCs as prepared in the LTMO is provided in **Appendix C**. **Appendix B** includes a summary of all detections of VOCs and metals in sampled wells.

Newly installed on-post wells will be sampled the first time for the cadmium, lead and nickel, arsenic, barium, calcium, chromium, copper, iron, magnesium, manganese, mercury, potassium, sodium, and zinc and the full list of VOCs. On-post wells will be analyzed only for the metals cadmium, lead, and nickel and the VOCs 1,1-dichloroethene, *cis*-1,2-dichloroethene, *trans*-1,2- dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride (VOC Short List) for the next three quarterly events. A newly installed monitoring well will initially be sampled for four consecutive quarterly events to provide data for temporal and spatial statistical evaluation in future LTMO studies. Off-post wells will be sampled for the VOC Short List for four quarterly events. After one year of sampling, a future LTMO evaluation will be performed to provide a recommended sampling frequency for the well.

Any proposed modifications for future sampling will be submitted to USEPA and TCEQ for concurrence. **Figure 1** illustrates all on- and off-post well locations included in this DQO evaluation, both on- and off-post.

3.2 Off-post Sampling

Public and private off-post drinking water wells with historical VOC detections will be sampled in accordance with these project DQOs and the Off-Post Monitoring Response Plan. Approval of the LTMO study by TCEQ did not include approval to implement the LTMO for off-post sampling. Therefore, future sampling for off-post wells will follow these DQOs, without implementation of the LTMO sampling frequency recommendations.

Off-post drinking water wells will be analyzed for the VOC Short List (1,1-dichloroethene, *cis*-1,2-dichloroethene, *trans*-1,2- dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride), upon initial sampling. Metals will not be sampled in off-post wells. Metals (primarily lead) have been identified in soils at various sites due to past operations. Metals detections above the appropriate action level or MCL have not been frequently detected in groundwater sampled from on-post wells. Metals have been sampled in on-post monitoring,

agricultural/livestock, and drinking water wells since 1995. Based on the infrequent and inconsistent on-post detections, metals have not been sampled in off-post monitoring activities. Previous summaries of metals results were presented to TCEQ by correspondence on September 24, 2003, explaining the rationale for sampling VOCs only in off-post wells and the summary is attached as **Appendix D**.

Seven off-post wells have had historical sampling results exceeding the MCL for tetrachloroethene (PCE) and/or trichloroethene (TCE) and have been equipped with GAC water treatment systems. Pre-GAC samples will be collected quarterly to continue plume characterization. Post-GAC samples will be collected semi-annually to confirm GAC filtration is operating properly. These wells include LS-2, LS-3, LS-6, LS-7, OFR-3, RFR-10, and RFR-11. Previous analytical results and GAC water treatment systems installed on these wells are available in **Volume 5**, **Groundwater** of the **CSSA Environmental Encyclopedia,** behind the Off-post Groundwater Monitoring Reports Table of Contents. .

Private drinking water wells (LS-6, LS-7, OFR-3, RFR-10, and RFR-11) with a GAC system or any future wells with GAC systems installed will require semi-annual maintenance. Post-GAC samples will be collected to confirm each system's effectiveness during the next scheduled quarterly sampling event after maintenance has occurred.

Public wells LS-2 and LS-3 require GAC maintenance be performed approximately every 18 months. Post-GAC samples will be collected to confirm system effectiveness. At a minimum, post-GAC confirmation samples will be collected every six months and during the quarterly sampling event after maintenance occurs.

Action levels for detection of VOCs and decisions to sample an off-post private well are based on the following, see also **Figure 2**.

- If VOC contaminant levels are ≥ 90% of the MCL based on preliminary data received from the laboratory [≥ 4.5 parts per billion (ppb) for PCE and TCE] and the well is used as a potable water source, bottled water will be supplied within 24 hours of receipt of the data, and a confirmation sample will be collected from the well. The re-sampling will take place within 14 days of the receipt of the final validated analytical report. If the follow-up sampling confirms a COC is above MCLs, the residence or supply well will be evaluated and an appropriate method for wellhead protection, either installation of GAC or connection to an alternative water source will be selected. Cost related to the installation and maintenance of wellhead treatment equipment or connection to an alternative water source will be borne by CSSA.
- If VOC contaminant levels are ≥ 80% of the MCL during any single monitoring event based on preliminary data from the laboratory (4.0 ppb for PCE and TCE) and the well is used as a potable water source, it shall be monitored monthly. If the follow-up sampling confirms a COC is ≥ 80% of the MCL, it will be re-sampled until the level falls below the 80% value. If the concentration increases to ≥ 90% of the MCL see above.
- If any VOC COC is detected at levels ≥ the MDL (historically around 0.11 ppb for PCE and 0.14 ppb for TCE), and less than 80% of the MCL the well will be re-sampled on a quarterly basis. This sampling will be conducted concurrently with on-

post sampling events and will be used to develop historical trends in the area. Quarterly sampling will continue for a minimum of one year, after which the sampling frequency will be reviewed and possibly decreased.

- If VOCs are not detected during the initial sampling event, (i.e. no VOC contaminant levels above the MDL), further sampling of the well would be considered on an as needed basis. A well that has no detectable VOCs can be removed from sampling, unless plume migration could influence the well. The well owner will be apprised of any re-sampling decisions regarding the non-detect wells.

Action levels for detection of VOCs and decisions to sample an off-post public well are based on the following, see also **Figure 2**.

- If an off-post public supply system is ≥ 90% of the MCL, CSSA will coordinate solutions to the maximum extent feasible. The system operator and CSSA will determine the best course of action for providing potable water when data suggests an exceedance of the MCL. Possible options include:
  - Potable water could be brought in by tanker truck.
  - Potable water could be provided by another water system.
  - A wellhead treatment system (i.e., GAC) can be installed by CSSA.

Expansion or reduction of the off-post drinking water wells to be sampled will be dependent on an evaluation of results. New off-post drinking water wells may be added to the program in the future. Locations of new wells to be sampled will be based on the inferred-flow direction of the off-post VOC plume derived from historical data. Concerns of area residential well owners or municipal water purveyors will be dealt with on a case-by-case basis. These decisions will be made based on the action levels given above. Additional information on the inclusion of off-post wells to the sampling program is available in Volume 5, Groundwater, of the CSSA Environmental Encyclopedia.

3.3 On-post Sampling

These DQOs set out revised frequencies for sampling for on-post wells. **Appendix E** is a summary presented in the LTMO illustrating the recommended sampling frequencies for on-post wells. Sampling frequencies for the types of wells are discussed in Sections 3.4 and 3.5, below.

Prior to October 1999 all on-post wells have been tested for the complete list of VOCs or a selected short list of VOCs (8260B). The VOC Short List is revised in these DQOs to include 1,1-dichloroethene, *cis*-1,2-dichloroethene, *trans*-1,2- dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride. Methylene chloride, toluene, naphthalene, bromodichloromethane, bromoform, chloroform, dichlorodifluoromethane and 1,1-dichloroethene have been removed from this list based on statistical analysis of previous results provided from the LTMO study, see **Appendix C**.

Methylene chloride has been reported periodically in samples from both on- and off-post wells since 1992. Each time methylene chloride was detected in a sample, it was also consistently present in the analysis method blank, indicating the likelihood that this COC was introduced as a laboratory contaminant and was not present in the groundwater. Methylene chloride is considered a common laboratory contaminant and there are no known historical uses

of methylene chloride on-post. Only 1% of the methylene chloride samples analyzed have had an MCL exceedance, and these exceedances can be related to laboratory contamination.

Toluene has been detected in previous sampling events at concentrations ranging from 0.06 µg/L to 8.7 µg/L. These levels are below the applicable MCL for toluene in drinking water (1,000 µg/L). Toluene has been detected sporadically in CSSA groundwater monitoring. Based on a review of the data and the sample packaging procedures, it was concluded that the low-level toluene concentrations detected in the March 2003 event were likely introduced on tape used to label sample bottles. Contaminant-free tape was used in sampling events after March 2003 and subsequently toluene was detected at decreased concentrations and frequency. Toluene is not an expected COC related to activities conducted on-post and the sporadic appearance of toluene in off-post wells is considered to be related to other sources, not a source originating at CSSA. Toluene has been detected in 13% of the samples collected through December 2004, and none of these detections have exceeded the MCL.

Naphthalene has been detected in 2% of the samples collected through December 2004. Other COCs which have been detected, as indicated in the statistical summary included in **Appendix C**, include bromodichloromethane, bromoform, dichlorodifluoromethane and 1,1-dichloroethene. These COCs have been detected in 1% to 3% of the groundwater samples and all except 1,1-dichloroethene are contaminants related to the disinfection of drinking water. Chloroform has been detected in 15% of the samples analyzed, but never above the combined MCL for total trihalomethanes. Based on the occurrences of these COCs as summarized in **Appendix C**, they can be removed from the VOCs Short List.

Compliance sampling for metals (arsenic [SW7060A], cadmium [SW7131A], lead [SW7421], barium, chromium, copper, nickel, zinc [SW6010B], and mercury [SW7470A]) required under the Safe Drinking Water Act for CSSA's drinking water wells (CS-1, CS-9, and CS-10) will be continued per TCEQ rules. Sampling required by the TCEQ related to the operation of the CSSA PWS is not covered under these DQOs and is not related to sampling of the water wells for environmental monitoring purposes under these DQOs.

Metals detections above the appropriate action level or MCL have not frequently occurred in groundwater sampled from on-post wells. Metals have been sampled in on-post monitoring, agricultural/livestock, and drinking water wells since 1995. Based on the infrequent on-post detections, metals have not been sampled in off-post monitoring activities, as previously submitted to the TCEQ in September 2003, see **Appendix D**. Review of the occurrences of metals detections under previous project DQOs and statistical analysis as part of the LTMO study show that the metals lead, cadmium, and nickel only should be analyzed in the future for on-post wells. These metals will be sampled at the frequency recommended in the LTMO recommendations. Annual sampling for metals conducted under the previous project DQOs will no longer be conducted. **Appendix C** sets out the statistical occurrences of metals detections in on-post wells and supports that lead, cadmium and nickel only should be sampled in on-post wells.

3.4 On-post Drinking Water Well Sampling

CSSA on-post drinking water wells (CS-1, CS-9, and CS-10) have had very low detections of VOCs (above the MDL but less than 1 ppb) and were sampled quarterly. Under the LTMO

study the drinking water wells will be sampled at a 9-month frequency for the VOC Short List and the metals cadmium, lead, and nickel. Historical detections have been below the RL or non-detect and the sampling will ensure that on-post drinking water will continue to meet drinking water standards in the future.

3.5 On-post Monitoring and Agricultural Wells

Existing on-post monitoring wells and open borehole agricultural wells will be sampled for the VOC Short List and cadmium, lead, and nickel at the frequencies set out in the LTMO study, as approved by TCEQ and USEPA (see **Appendix E**). A list of all existing wells present at CSSA and the date and rationale for their installation, is included in **Appendix F**.

The Westbay® equipped wells will be sampled at the frequency of semi-annually for wells in the Glen Rose, or biennially for wells in the BS and CC formations, as set out in the LTMO study. The Westbay® equipped wells will be sampled for the VOC Short List at the frequencies recommended in the LTMO (see **Appendix E**).

3.6 Water Levels

Water levels will be collected from all available wells at least quarterly. Additional water level data will be collected weekly, monthly and/or after significant rainfall events are measured. Water level gradient/potentiometric maps will be prepared separately for each formation of the Middle Trinity aquifer.

3.7 New Monitoring Wells

CSSA will complete the installation of six monitoring wells at locations suggested in the LTMO, see **Figure 3**. No coring will be performed for future well installations. Geophysical and video surveying will be conducted for each borehole. Other well construction details will be set out in specific scope of work documents.

Each newly installed monitoring well will be sampled at the first event for the full list of VOCs, metals (arsenic, cadmium, lead, mercury, barium, chromium, copper, nickel, and zinc) and selected groundwater quality parameters (bromide, chloride, fluoride, nitrate, nitrite, sulfate, alkalinity [SW9046], TDS, pH, resistivity, alkalinity, bicarbonate [E310.1]). Subsequent monitoring events will utilize the VOC Short List. At least four consecutive quarterly sampling events will be conducted for a newly installed monitoring well. Future sampling frequencies will be scheduled depending upon the LTMO study recommendations (see **Appendix E**).

Dataloggers and transducers will be installed at selected on-post monitoring wells. Additional transducers may be installed in future wells. Each data-logger is Supervisory Control and Data Acquisition compatible and continuously collects and stores information regarding static water level, water temperature, and/or conductivity.

Upon completion of well development, dedicated low-flow pumps will be purchased and installed in each new monitoring well. The pumps will be pneumatically operated bladder pumps consistent with the monitoring system already existing at CSSA. Water levels, construction, and survey data for wells will be collected for the CSM Update, for incorporation into the groundwater model and any future risk assessments.