SFTRMD Cistern Construction
And
Disinfection Procedure

The following standards are requirements for the construction, installation and disinfection of residential cisterns on the Santa Fe Trail Ranch. These standards include suggestions by the Colorado State Department of Public Health and Environment, Water Quality Control Division and the Colorado Rural Water Association. The intention of these standards is to provide customers of the SFTRMD with sufficient information about maintaining a potable water supply from their residential cistern.

Construction and Installation:

The material should be reinforced concrete allowed proper curing time to reduce residual chemicals such as ammonia. The cover should overlap the base and have a suitable, non-permeable sealant in between the base and the top. All inlets should be sealed with a substantial caulk to prevent ground water from entering the cistern. All air vents should be inverted and have a fine screen attached to prevent bugs and non-potable water from entering. The ability to drain the cistern as dry as possible will be of benefit when draining is required. There must be a water tight access portal on the top of the cistern for inspection and service of its' interior. A riser should be installed over this portal with a cover that overlaps the riser and is lockable. Cistern should be covered with soil to prevent freezing. Fencing around the cistern may be considered to prevent damage or contamination by livestock. The updated State requirements to prevent cross connection must be satisfied. (1)Either no direct connection to the Metro system, or (2) a 4 inch air gap between the maximum level of the water as controlled by a float valve, including a vent to daylight to prevent the water level rising above that maximum level in the event of float valve failure, or (3) a testable approved cross connect device, inspected annually by a certified inspector.

Disenfection:

All new and unused cisterns and water lines have a greater potential for bacteriological contamination and should be properly cleaned prior to use. The system should be flushed with potable water. The system should then be filled with potable water and sodium Hypo chlorite (bleach) to achieve a 50 mg/l (milligrams/liter) concentration of chlorine (the proportions may be calculated using the ratios usually found on the bleach bottles). Please remember to follow proper safe handling instructions of the bleach to prevent harm. The system should then sit dormant for at least 24 hours.

After 24 hours, test the system for free chlorine. Free chlorine is the amount of active or residual chlorine measured after the disinfection period. The test results must show a free chlorine level of 25mg/l or greater at the end of this 24 hour period (you may want to dilute your water sample by 10% to effectively use your test kit as the kits recommended have a maximum

test condition of 3.5 mg/l). If the results are greater than 25mg/l then you have cleaned the system and it is ready to be flushed completely with potable water. If it is below 25 mg/l then you must redo the disinfection process. Test for chlorine after refilling to verify your water is safe for consumption. Ideal free chlorine levels are 0.3-0.4 mg/l. The State requirements are 0.2 to 4.0 mg/l.

Note: Concrete cisterns, as do the concrete water distribution conduits used in most towns and cities, absorb chlorine until the concrete walls become saturated. You will want to test frequently to ensure free chlorine is available at the recommended working level in your concrete cistern.

Dormant Periods:

If you plan on leaving your cistern unused for an extended period of time you will want to drain your system as low as it will go. Add a cup of bleach to the remaining small amount of water left in the cistern. This should keep your cistern clean during the dormant period.

Upon your return add about 1000 gallons of potable water to the concentrate left in the cistern. Let this mixture sit for at least 30 minutes and test for free chlorine. If the test results are above 0.2 mg/l the water is clean. You will want to balance out the chlorine level with additional potable water to achieve your optimal 0.3-0.4 mg/l ratio for drinking. If the ratio is above 4.0 mg/l you will want to dilute the water in your cistern with fresh potable water to achieve the State recommended maximum of 4.0 mg/l. If the chlorine level is below 0.2 mg/l you will need to follow the disinfection procedure described under the **Disinfection** section of this document.

Testing Kits:

Testing kits are available from the Hach Company, PO Box 608, Loveland, Co. 80539-0608, phone 800-227-4224, E-mail quotes@hach.com, Web WWW.hach.com. The kit recommended is “Test Kit Chlorine Free - Total CN-66 low range 0-3.5 mg/l, color disc”. The price from Hach as of 6 July 07 is 44.40 plus applicable tax and freight. They will also be made available at cost from the SFTRMD where a quantity price purchase may reduce the price (see Checklist for more information).

Note: Free (active or residual) chlorine is the amount of active chlorine available in the water to disinfect contamination. Total chlorine is the concentration of chlorine was initially added, free plus expended chlorine. A high total chlorine level with a low free chlorine level is an indication of the contamination in the water that was disinfected by the added chlorine. Test results with both the free and total chlorine between 0.2 mg/l to 4.0 mg/l indicate a State acceptable chlorine level with 0.3 mg/l to 0.4 mg/l as an optimum condition for drinking water.