ALTERNATIVE WATER SUPPLY SOURCES FOR DALLAS

Meeting Dallas' Water Needs

Taking the current water supply for the Dallas-Fort Worth Metroplex, then adding the 360,000 acre-feet per year (AFY) of future reuse of return flows that the 2001 Region C Water Plan predicts for the area and the 150,000 AFY reallocation of water supply from Texoma that has already been authorized by Congress nets an aggregate supply for the DFW area of more than 2,000,000 AFY *without building a new reservoir or bringing additional water from any existing reservoir.*

If the Metroplex were to bring its per capita water use down to the 160 gallons per capita per day (gpcd) that other Texas cities are reporting, then the current supply plus planned reuse would be sufficient to supply more than 11 million people, twice the current population for the Metroplex.

This example clearly illustrates the impressive potential for conservation to supply much of the future water demand for Dallas and the DFW area.

For any demand that is not met by conservation, there are numerous alternative sources of water supply that would cost Dallas less money and would have much less overall negative impact than building Marvin Nichols Reservoir. The costs of building Marvin Nichols have already been estimated and extensive engineering and environmental studies have been done. What is needed now is to do similar studies of other options that preliminary calculations indicate would cost less than building a new reservoir.

Increased Reuse of Return Flows

The first is reuse of return flows. More than 50% of water supplied by a water utility is returned as wastewater for treatment before being discharged into a stream or reservoir. All or part of that return is potential water supply. Direct reuse of that water entails using treated effluent directly on lawns, golf courses, or for other applications that do not require potable water. Indirect reuse entails discharging treated wastewater to a body of water from which water supply is drawn.

Dallas is already getting 44 million gallons per day of its supply from reuse. As noted above, Dallas and all North Texas planners have included an 360,000 AFY of reuse as a future water supply. This is a source of supply that is reliable and well understood.

Reuse can be highly cost-effective. The water is already near the demand center and, in most cases, requires little or no additional treatment beyond routine secondary wastewater treatment. The reuse projects in place or planned for the Dallas-Fort Worth area are limited in size by the amount of nutrient-rich water that can be added to surface water supply reservoirs without causing problems of eutrophication. Because of this limit, Dallas and the rest of Region C are planning no more than 360,000 AFY of reuse by 2050. Water from secondary treatment can be further purified by chemical precipitation of nutrients and ultrafiltration at a reasonable cost, thereby making the entire

effluent suitable for discharge to a surface reservoir. Region C, including Dallas, could supply a large percentage of their future water needs by this method.

Water from Lake Texoma

Lake Texoma, a U.S. Army Corps of Engineers project on the Texas-Oklahoma state line, is often dismissed as a water supply source because it is more saline than most reservoirs. But three facts put these concerns in perspective:

1. Texoma is only *slightly* saline. Total dissolved solids tend to be about 1,000 parts per million, as compared to 35,000 ppm for sea water. The state and federal recommendations (not requirements) for drinking water are 500 parts per million total dissolved solids. The recommendation for chlorides is 250 ppm. Texoma, by contrast, tends to be 300 to 350.

   There are many communities in Texas today using groundwater that is more saline than Texoma as their sole source of water supply.

2. Texoma is very close to Dallas. Since the majority of the cost of Marvin Nichols is for pipeline costs ($1.2 billion of the $1.7 billion estimated for the whole project), this close proximity is a huge cost saver – less than half as much for conveyance of an equal amount of water.

3. Texoma is a huge reservoir with three times the yield of Marvin Nichols. Much of that yield is currently allocated to hydroelectric power generation, but hydropower is a very low economic use of water, worth a few dollars per acre-foot for hydropower compared to a few hundred dollars per acre-foot for water supply.

   In the 1980's Congress allocated about 150,000 acre-feet.per year of Texoma water to water supply. The Corps of Engineers is currently studying reallocation of an additional 300,000 AFY of hydropower to water supply, expected to be available in 2005, half of which is earmarked for use in Texas. The Texas' portion of the remaining firm yield, which is currently allocated to hydropower, is roughly 500,000 AFY.

Three Ways to Use Lake Texoma Water

1. Blend with Water from Other Supply Sources, Without Desalination

Texoma water can be blended with other water being pumped by the City of Dallas. The short pipeline needed and the fact that the reservoir is already built would make this very cost effective.

North Texas Municipal Water District is currently blending Texoma water at a ratio of one part Texoma water to four parts water from other sources.

If Dallas were to divert 100 million gallons (MGD) per day from the nearest arm of Texoma to augment the firm yield in the Ray Roberts/Lewisville system, the natural mixing would affect the same 4 to 1 blending ratio. The primary cost of this option would be approximately 20 miles of pipeline, costing only about $50 million.

A similar blending operation could be developed for bringing water from Texoma to Lake Ray Hubbard, to mix Texoma water with the water from Hubbard and from Tawakoni and Lake Fork. (Water from these two reservoirs is either pumped to Ray Hubbard for storage or will be in the future).

There is also considerable potential for Lake Texoma water to be used without desalination for cooling applications of manufacturing and steam electric generation, which together constitute at least 10% of Dallas' projected future water use.

In addition, this slightly saline water can be used for golf courses and other outdoor large-lawn type applications without treatment. As new development occurs, there is the potential for new construction to have dual delivery systems of treated and untreated water for lawn watering and other non-personal uses. The economics of this option should be examined.

2. Reduce the Salinity of Lake Texoma by Suppressing Salt Sources Flowing into Lake Texoma

The salinity of LakeTexoma could be reduced by suppressing salt sources feeding the Red River upstream and into Texoma. The U.S. Army Corps of Engineers has an authorized chloride control project to accomplish this. With support from the City of Dallas and/or other water users in the area, federal funding would be more likely for the Corps to proceed. There have been some environmental concerns expressed about conducting this project, but a portion of it is currently proceeding and there are technical alternatives that have been studied that have lower impacts.

In 1983 the Corps of Engineers estimated it would take $117 million to complete the Red River Chloride Control Project and bring the total dissolved solids, chlorides, and sulfate concentrations within the state and federal guidelines for water supply. Obviously these figures would need to be reassessed to adjust for any changes in situation. But, to get a ballpark figure, if we assume that inflation has doubled the Corps' number and that further expense would be needed to address environmental issues, we can estimate that the cost to complete the Project would be about $300 million to produce a supply potentially larger than Marvin Nichols. When costs are added for pipelines the size that are planned for Marvin Nichols, this option would be about half the cost of Nichols.

An obvious advantage for the City of Dallas of supporting this option is that much of the cost would be paid for with federal funding.

In the Economic Appendix to the Wichita River Basin Project Evaluation of the Red River Chloride Control Project, the Corps of Engineers concludes that "…water from

Texoma (with their Project in place) appears to be more economical than other alternative sources…" for the Dallas region.

3. Desalinate Water from Lake Texoma

Cost analysis of desalinating Lake Texoma water indicates that it would be a lower-cost alternative than Marvin Nichols Reservoir.

According to John Herring, Houston Area Manager for Ionics, Inc., an international company specializing in desalination, desalinating water with a dissolved solids content equal to Texama's would add $35/AF to the costs of treatment. When conveyance from Texoma and standard treatment costs are added, the cost for water to Dallas would be about $245/AF. The 2001 Region C Water Plan calculates a unit cost for water piped to Lake Lavon from Phase 1 of Marvin Nichols of $289 per acre-foot *before* treatment. Adding treatment costs to Marvin Nichols to obtain an apples-to-apples comparison, the $245/AF for Texoma water would compare to $414/AF for treated water from Marvin Nichols

A significant advantage of desalinating water from an existing lake over building a new reservoir is that increased desal capacity can be installed incrementally and rapidly as the demand increases, without the need to plan years or decades in advance or to invest capital costs years in the future. Using desalination would also avoid the political problems of permitting and building an extremely unpopular reservoir.

Water from the Sulphur River Basin Without Building Marvin Nichols Reservoir

Lake Wright Patman is immediately downstream of the proposed Marvin Nichols site. Patman has a huge storage capacity (2½ million acre-feet if filled to its full volume) and receives roughly twice the inflow that Marvin Nichols would receive, resulting in a much higher potential yield for Patman.

System Operation Assessment of Lake Wright Patman and Lake Jim Chapman, a study by the Fort Worth District of the U.S. Army Corps of Engineers released in January 2003, lists various approaches for increasing the amount of water available from the Sulphur Basin through the operation of Jim Chapman and Wright Patman Lakes as a system, without building Marvin Nichols Reservoir. A presentation by the Corps of Engineers based on the study indicates that up to 368,000 additional acre-feet per year could be made available with the most productive of these approaches.

The Corps concluded from this study that the greatest gains in water supply would come from reallocation of flood storage in Wright Patman, rather than from back-pumping Lake Patman water to Lake Jim Chapman.

Probably the most cost-effective alternative would combine operating Wright Patman under the operating rule that the Corps' refers to as the "ultimate curve" with conveying the water to Dallas through Lake Fork and Tawakoni to Lake Ray Hubbard (rather than through Lake Chapman to Lake Lavon). This route would reduce the pipeline length and

pumping costs. Use of the storage capacity of Lake Fork and Tawakoni would result in a higher additional firm yield for the system. Analysis of the 1951 to 1956 drought period indicates that this option would produce an added firm yield for the system of about 225,000 AFY, while maintaining the 180,000 AFY of firm yield in Wright Patman for which the City of Texarkana has diversion rights.