WATER CONSERVATION & DROUGHT CONTIGENCY PLAN
City of Wichita Falls, Texas
December 2008

I. INTRODUCTION & OBJECTIVES

Wichita Falls is a city of approximately 107,000 people located in a semi-arid, somewhat sparse area. The city is the largest in a radius of about 100 miles, and the closer communities and towns are economically and culturally tied to Wichita Falls. The major industries of the area are agriculture, cattle, oil, and government and military facilities. Several small to medium manufacturing industries are located in the city and its environs.

Water resources are an important element in the quality of life and economic well being of the city and its citizens. Local bodies of water serve municipal, industrial, agricultural and recreational purposes. Within the urban areas, water is used extensively for landscape irrigation. "Green" is not the prevailing state of the region and healthy, green landscapes are viewed by the majority of citizens as important to the overall quality of life.

Water as a natural resource is not limited for the current population. Most citizens recognize intuitively that water is a finite resource, but this recognition is not translated into conservation as a natural form of behavior.

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation and fire protection,

and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other emergency water supply conditions, the City of Wichita Falls (the “City”) establishes the following Water Conservation and Drought Contingency Plan (subsequently referred to as the “Plan”). The purpose of this Plan is as follows:

- To protect and preserve public health, welfare, and safety
- To maintain supplies for domestic water use, sanitation, and fire protection
- To minimize the adverse impacts of water supply shortages
- To conserve the available water supply in times of drought and emergency
- To minimize the adverse impacts of emergency water supply conditions.

II. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

For the purpose of these rules, a drought contingency plan is defined as *"a strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water."*

The TCEQ rules governing development of Water Conservation Plan for Municipal Water Uses by Public Water Suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix 1.

Minimum Requirements

TCEQ's minimum requirements for water conservation plans for municipal water uses are addressed in the following subsections of this report:

288.2(a)(1)(A) – Utility Profile – Section III

288.2(a)(1)(C) – 5 & 10 Year Conservation Goals – Section III – E

288.2(a)(1)(D) – Water Accounting – Section IV – D

288.2(a)(1)(E) – Universal Metering – Section IV – D

288.2(a)(1)(F) – Water Loss Control – Section IV – E

288.2(a)(1)(G) – Public Education Program – Section IV – B

288.2(a)(1)(H) – Rate Structure – Section IV – C

288.2(A)(1)(I) – Reservoir Operations Plan – Section IV – O

288.2(a)(1)(J) – Implementation & Enforcement – Section IV – L

288.2(a)(1)(K) – Regional Coordination – Section IV – M

288.2(a)(2)(A) – Leak Detection/Repair Program – Section IV – E

288.2(a)(2)(B) – Records Management System – Sections IV – Q

288.2(a)(2)(C) – Wholesale Water Supply Contract Requirements – Section IV – N

288.2(a)(3) – Additional Conservation Strategies – Sections IV – F, G, H, I, J, K

288.2(b) – TWDB Requirements – Section II

288.2(c) – Review and Update of Plan – Section IV – P

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.5, and Subchapter B, Rule 288.22, downloaded from http://www.tceq.state.tx.us/assets/public/legal/rules/rules/pdflib/288a.pdf, March 2007.

Furthermore, the TCEQ rules governing development of Water Conservation Plans for Industrial/Mining Water Suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.3 of the Texas Administrative Code, which is included in Appendix 2.

Minimum Requirements

TCEQ's minimum requirements for water conservation plans for industrial/mining water suppliers are addressed in the following subsections of this report:

288.3(a)(1) – Description of Use – Section V – A

288.3(a)(3) – 5 & 10 Year Conservation Goals – Section V – B

288.3(a)(4) – Water Accounting – Section V – C

288.20(a)(5) – Leak Detection/Repair – Section V – D

288.20(a)(6) – State of the Art Equipment/Processes – Section V – C, E

288.20(a)(7) – Other Practices, Methods or Techniques – Section V – E

288.20(b) – Review and Update of Plan – Section IV – P

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.7, and Subchapter B, Rule 288.22, downloaded from http://www.tceq.state.tx.us/assets/public/legal/rules/rules/pdflib/288a.pdf, December 2008.

III. UTILITY SYSTEM PROFILE

A. Water Supply System

Wichita Falls is located in the drainage basin of the Red River, and uses the watersheds of the Big Wichita and Little Wichita Rivers as the principal sources of water. Other than a few relatively small natural ponds, reservoirs in the area are man made. The City of Wichita Falls is sole owner or co-owner of five lakes (see Appendix 4).

Lake Wichita

Lake Wichita is closest to the City and is an impoundment of the Holliday Creek. The lake was built in 1901, and was used for a number of years as the principal source of drinking water. The quality of the water is generally poor for drinking purposes. The lake has silted badly and does not offer a reliable, significant yield to meet the city's requirements. Its major uses today are recreation and flood control. The dam and spillway has undergone a major renovation in 1992-93 as part of the larger Holliday Creek Flood Control Project, a joint federal/local project.

Lakes Kemp & Diversion

Lakes Kemp and Diversion are jointly owned by the City of Wichita Falls and Wichita County Water Improvement District #2. Both lakes are located on the Big Wichita River watershed and are very high in chlorides, sulfates and total suspended solids. The water does not meet generally accepted standards of quality for drinking purposes, although the City of Wichita Falls used Lake Kemp as a supplementary source of water until the mid-1940's to mix with and extend the primary source, Lake Wichita. A federally funded project, The Red River Chloride Control Project, to reduce the flow of

chlorides into Lake Kemp is partially complete. The results achieved on the South Fork of the Big Wichita River promise a fairly substantial reduction in the future chloride levels in Lake Kemp, improving the potential for greater use of the water for drinking. Some quality problems, e.g. sulfates, will remain.

Lake Kemp has a conservation pool storage capacity of 245,434 acre feet (according to the Texas Water Development Board) and an estimated safe yield of 70,000 acre feet per year or 62.5 million gallons per day. Construction of the lake was completed in 1923, and the dam and spillway were reconstructed for flood control purposes in 1973. The U.S. Army Corps of Engineers controls the release of waters above the conservation pool level. The major purposes of the lake are recreation, flood control and source of supply for the downstream, smaller Lake Diversion. The City of Wichita Falls has an annual municipal water right of 31,000 acre-feet for Lake Kemp.

Lake Diversion was completed in 1924 and has a conservation pool storage capacity of 45,000 acre feet. Its principal purpose is to raise the elevation of the water to allow the water to flow into a series of irrigation canals between the Diversion dam site and east of Wichita Falls, a distance of about 35 miles. The earthen dam was substantially modified in 1992 and 1993 to meet current state and federal regulations.

Lakes Arrowhead & Kickapoo

Lakes Arrowhead and Kickapoo are the primary sources of drinking water supply for Wichita Falls and several local towns and communities. The two lakes are on the Little Wichita River watershed and offer a reliable, high quality source of water. In addition to their primary purpose of providing a municipal water supply, Lakes Arrowhead and

Kickapoo are important regional recreational facilities. Lake Arrowhead has a conservation pool storage capacity of 235,997 acre feet and Lake Kickapoo has a conservation pool storage capacity of 85,825 acre feet. The City of Wichita Falls has water rights of 45,000 acre-feet from Lake Arrowhead and 40,000 acre-feet from Lake Kickapoo. The safe yield from Lake Arrowhead is 26.3 million gallons per day and the safe yield from Lake Kickapoo is 14.3 million gallons per day.

Raw water is transmitted from Lake Kickapoo to the Secondary Reservoir in Wichita Falls via a 39-inch concrete pipe. The main pump station at the dam has two pumps, each rated at a capacity of 15 million gallons per day. There are three booster stations along the length of the transmission line that must be operated to achieve the maximum withdrawal of about 28 million gallons per day from the lake. Each booster station also has two pumps, each pump rated at 15 million gallons per day. Lake Kickapoo is at a higher elevation than the City, so water can be withdrawn by gravity during months that require lower flows.

The transmission line from Lake Arrowhead to the secondary reservoir is 54 inches in diameter. The Lake Arrowhead pump station has two pumps, each rated at 35 million gallons per day, and can pump a combined total of about 55 million gallons per day. Water from the two lakes is mixed in the 110 million gallon capacity Secondary Reservoir and then moved to the treatment plants. Water moves to the Jasper Street Water Treatment Plant by gravity and is pumped to the Cypress Street Water Treatment Plant.

All diversions from the lakes are metered at the point of discharge by devices with an accuracy of + or – 5 percent. The metering devices are calibrated by an independent contractor, annually.

B. Water Treatment System

Wichita Falls currently has a treatment capacity in excess of 56.0 million gallons per day, being provided by two water treatment plants. The Jasper Street Water Treatment Facility, has a capacity of 24.0 million gallons per day. It utilizes 2 upflow clarifiers and a series of 12 dual media (anthracite/sand) filters to process drinking water. The Cypress Water Treatment Facility has a treatment capacity of 32 million gallons per day. Cypress also uses the upflow clarifier technology, but also has a conventional in-line basin system. Once the water is treated in these systems, it is passed through filters, of which there are 12 at Cypress. Both treatment facilities possess a total of 23 million gallons worth of storage tanks that store the drinking water on site before it is pumped to the public for consumption.

The City of Wichita Falls has constructed a 10 million gallon per day Reverse Osmosis Treatment Plant at the Cypress facility to process the Lake Kemp water into drinking water that meets Federal and State water quality parameters. Additionally, a new 10 million gallon per day upflow clarifier plant is to be constructed at the Cypress facility over the course of the next 2 years. With the addition of these two new plants at Cypress, its treatment capacity will be expanded to 52 million gallons per day. The progressive construction projects that the City has undertaken will bring the overall

treatment capacity within the City to 66 million gallons per day by late 2008, and ultimately to 76 million gallons per day sometime in 2011.

C. Water Distribution System

The distribution system consists of 720 miles of water lines that range in size from 1-inch to 30-inch in diameter. In addition to the hundreds of miles of pipeline, the distribution system also consists of 2,264 fire hydrants and 11,600 valves. On average, the City repairs 1,200 main leaks, replaces 3,300 meters and handles 7,800 customer inquiries, annually.

There are four pressure planes, each with independent pumping and storage facilities. The North pressure plane is served by a pumping station and ground storage tanks at North Beverly, as well as a pumping station and 1.0 million gallon elevated storage tank at 287 West. The East Pressure Plane is served by a single pump station and ground storage tank at 287 East and the West Pressure Plane is served directly from the Cypress Water Treatment Facility. The majority of the Distribution System, however, lies within the Central Pressure Plane, which is served by both Cypress and Jasper Water Treatment Facilities.

The City has a total storage capacity of 21 million gallons comprised of 16.0 million gallons ground storage and 5.0 million gallons of elevated storage. The City is currently constructing a 5.0 million gallon and 10 million gallon ground storage tank at the Jasper Treatment Facility and Cypress Treatment Facility, respectively; as well as a 1.5 million

gallon elevated storage tank to create/serve the West Pressure Plane. All treatment, pumping, transmission and storage facilities have redundancy to insure reliability of water service to the various pressure planes.

As of 2008, there were 34, 687 connections in the system, including 34 industrial, 30,421 residential, 531 public and 3,701 commercial connections. The City has entered into contracts with 11 other municipalities to supply them with treated drinking water. All of the connections to the City's water supply are metered. The City's utilities staff is responsible for the periodic inspection, testing and replacement of the large (1.5 inch and larger) metering equipment. The City currently does not regularly test its 5/8 inch and 1 inch meters, but rather adheres to a 10 year change-out of these meters. All meters utilized by the City operate within a +/- 5 % accuracy, or they are repaired/replaced.

D. Historical Water Use Patterns and Trends.

An understanding of the historical use patterns and trends is necessary to determine how best to use water efficiently. The City of Wichita Falls provides water service to 100% of its population. According to the U.S. Census Bureau, the City's population in 2000 was 104,197. The City's total water use in 2000 was 6,752.7 million gallons. Table 1 shows the monthly volume of water treated by the City's plants for the last 10 years.

Table 1 Monthly Volume of Surface Water Treated (Million Gallons)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
January	586.327	622.901	626.255	582.034	563.050	536.067	568.269	494.474	549.937	514.789
February	492.767	554.208	584.167	520.885	501.136	460.805	485.617	430.033	523.982	470.183
March	557.120	619.719	660.306	578.667	589.700	557.652	555.207	518.110	548.912	549.828
April	683.364	691.459	692.046	604.672	560.504	662.225	574.676	679.867	633.835	558.689
May	1002.945	807.804	909.817	742.475	740.456	763.648	680.102	715.126	719.647	582.540
June	1260.171	842.070	812.760	969.613	790.483	657.012	649.734	772.635	952.542	588.982
July	1458.604	1402.722	935.130	1287.270	813.327	1113.032	760.648	934.406	1163.506	707.773
August	1210.525	1345.068	1126.829	1121.495	1010.945	1080.358	710.984	806.451	1139.607	876.462
September	1203.672	1102.740	992.521	776.147	872.151	703.295	736.330	755.975	679.182	763.480
October	836.970	846.273	794.746	724.106	641.586	761.179	591.566	606.373	674.855	722.822
November	648.890	747.053	633.017	613.416	550.338	578.088	488.611	580.062	549.038	607.459
December	630.460	607.780	594.621	567.667	506.679	579.674	532.041	579.947	535.306	521.080
Total	10571.815	10189.797	9362.215	9088.447	8140.355	8453.035	7333.785	7873.459	8670.349	7464.087

Source: City of Wichita Falls

Table 2 shows the total annual water discharged from the plants into the City's Distribution System, as well as the unaccounted for water for the years 2000-2007. A 15% water loss has been the long term goal, in an effort to keep the unaccounted for water volumes within an acceptable range for a municipal water system. Although the table indicates a few years with water losses above this goal, the overall average for the period was 12.3%.

Table 2 Historical Yearly Water Use (Million Gallons)

	Water Discharged from Plants	Water Metered Sold	Percent Unaccounted
2000	8975.757	6752.677	24.8 %
2001	8700.714	7839.875	9.9 %
2002	7806.448	7673.868	1.7 %
2003	8219.207	7308.152	11.1 %
2004	7123.979	6234.110	12.5 %
2005	7643.444	6376.669	16.6 %
2006	8578.426	7254.563	15.4 %
2007	7353.168	6852.594	6.8 %

Wichita Falls sells water to two principal categories of customer: retail and wholesale. Retail customers buy only treated water while wholesale customers purchase both

treated and raw water. Figures 1 and 2 below indicate the average amount of water used by each customer in both raw and treated water categories.

Figure 1

Use of Raw Water

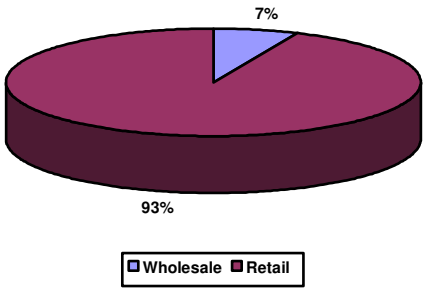
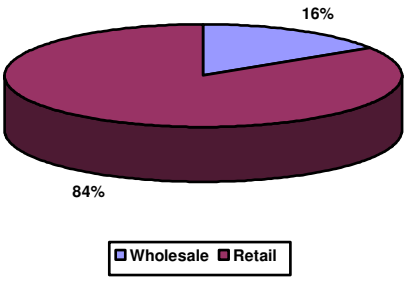


Figure 2

Use of Treated Water



The typical retail customer lives within the city limits of Wichita Falls and takes treated water from City-owned facilities. The retail customer may be of a residential classification or commercial/industrial classification. The City has a larger number of residential customers than commercial/industrial as shown in Figure 3. However, as shown in Figure 4 the commercial/industrial consume more water.

Figure 3

Retail Meters

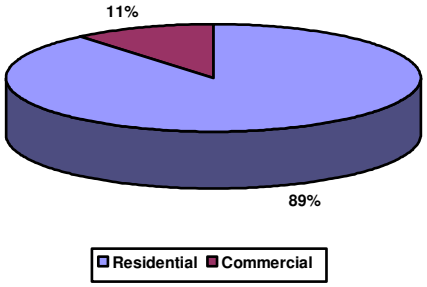


Figure 4

Water Consumption

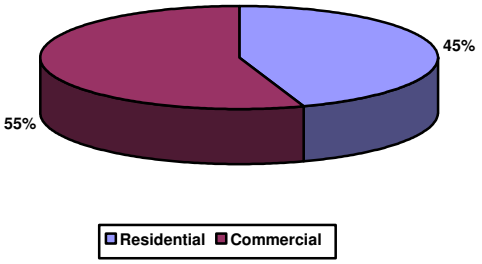


Table 3 shows the City's five largest treated water customers for the period of January 2007 through December 2007. Water consumption for each customer will generally vary from year to year, and rankings of large water customers change over time.

Table 3 Top Five High Volume Water Customers (Million Gallons)

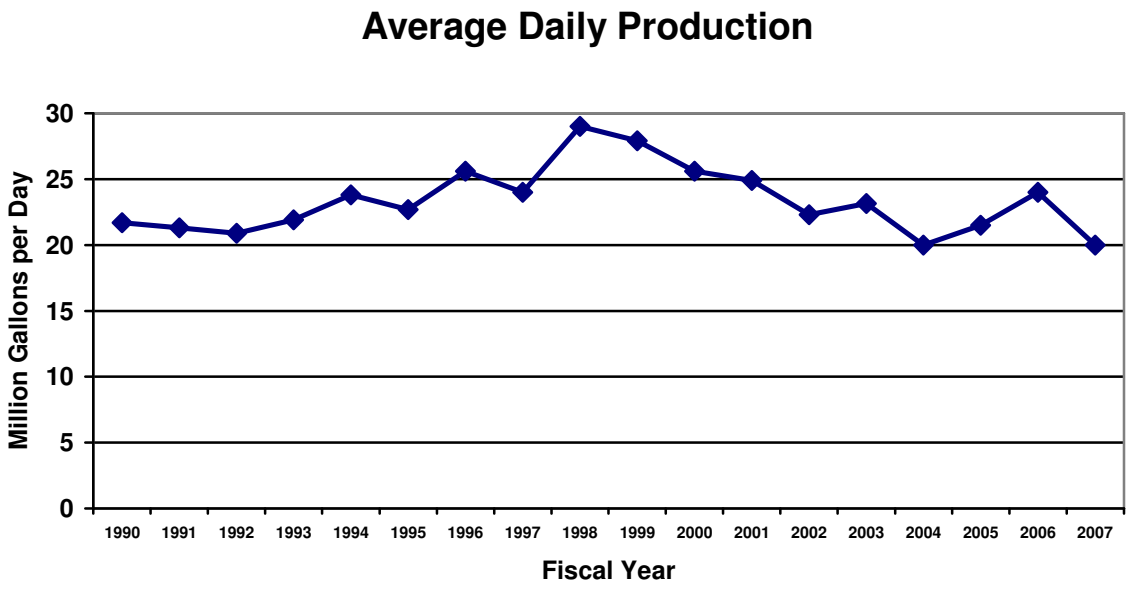
Customer	Jan to Dec 2007
Sheppard Air Force Base	413.411
Allred Prison	214.148
Vetrotex	108.610
PPG	100.175
United Regional	54.700

The typical wholesale customer purchases water under special contract arrangement with the City of Wichita Falls. For rate-setting purposes, the wholesale customers are classified as "raw water only", those who purchase raw water and transmit it to their treatment facilities by their own pumping and raw water transmission systems; "raw water transmitted" designates those wholesale customers who depend on the City pumping and transmission system to convey raw water to a designated delivery point; "treated water only" includes the customers who have exclusive use of an express pipeline from a treatment plant to their own storage and distribution facilities; and "treated water transmitted", the customer who purchases treated water from the City distribution system. Appendix 5 is a list of the current wholesale customers by rate category.

Water management includes both the supply of water and the demand for water. As supply and demand are balanced, the needs of the community are being met. A severe imbalance on either side indicates insufficient planning and/or investment.

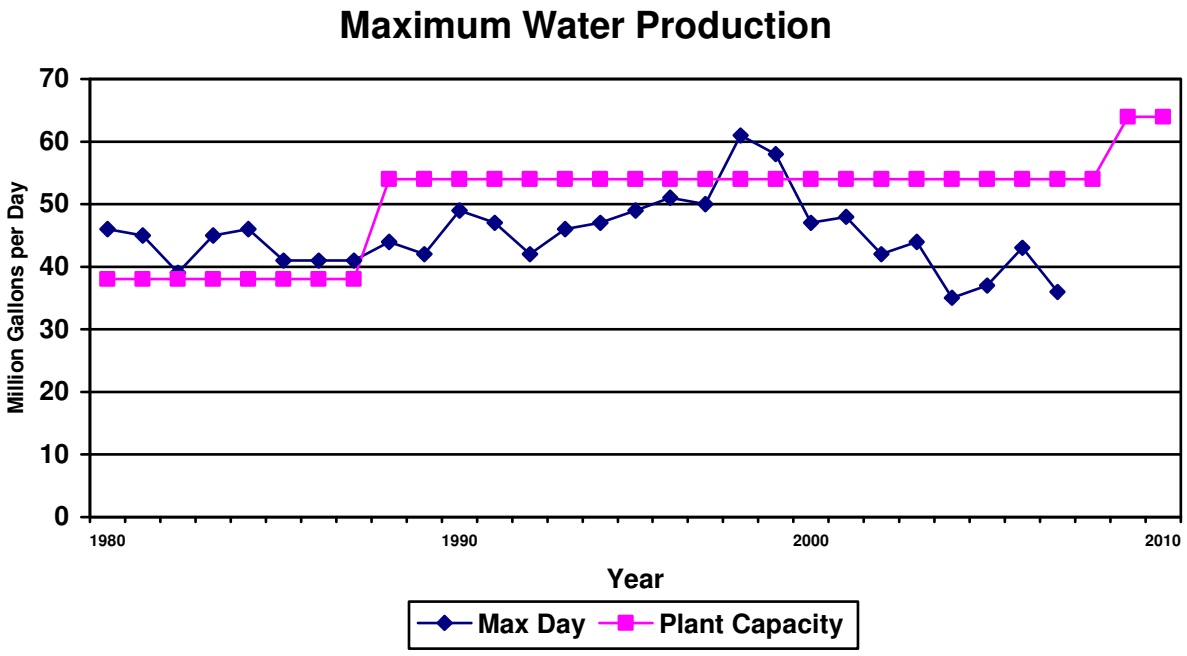
The City is treating an average of more than 23 million gallons per day for both retail and wholesale customers with a peak daily production rate of about 50 million gallons per day. The annual average production level fluctuates widely in response to weather, as the chart for the decades of 1990 to 2007 (Figure 5) shows, and there is no apparent pattern.

Figure 5



The pattern formed by the peak production rate is clearer, however, and it is a general pattern of rising demand although recently there has been a decline as seen in Figure 6.

Figure 6



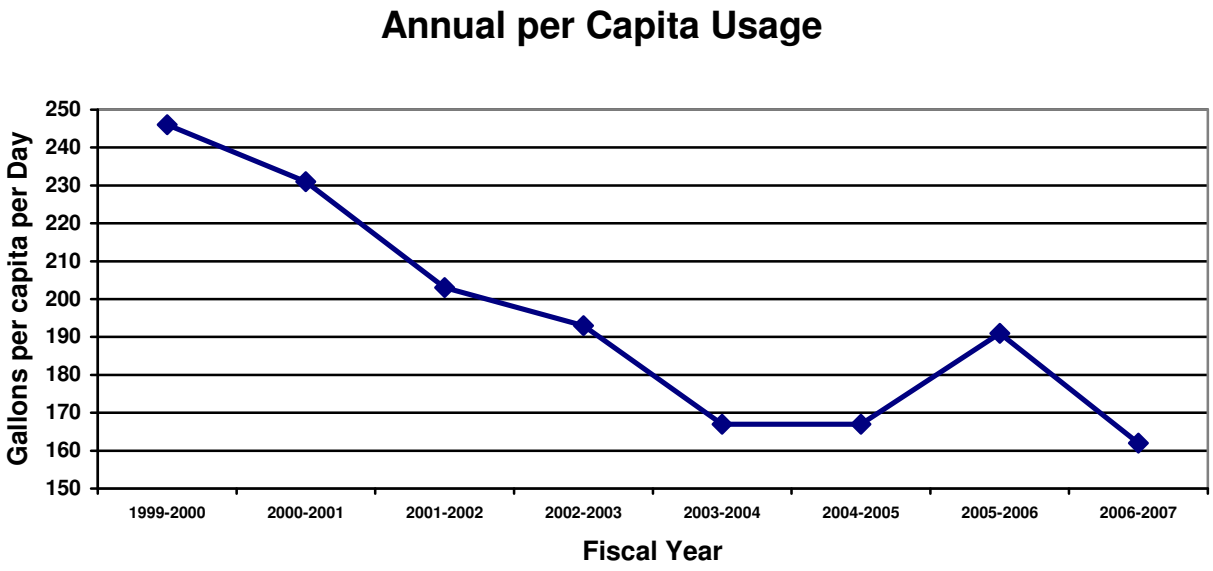
E. Population Trends and Projections.

Growth of the demand for water is a function of the per capita consumption and population. The projected population within the City over the next decade to the year 2020 is approximately 114,576 persons, according to the Region B Water Planning Group. An additional growth of 1,550 persons is anticipated in the next decade in the Wichita County area outside the City of Wichita Falls. Since the City provides water to the majority of the county residents plus additional counties, we can anticipate serving a population increase of approximately 10,000 persons over the next few years to the year 2020. On the assumption the per capita use has reached its maximum growth, the

population increase represents an increase in the annual average daily use of water of about 2.4 million gallons.

The City of Wichita Falls has seen a small but steady growth. Figure 7 shows the historical per capita use.

Figure 7



Very little can be concluded about the growth (or lack thereof) of the per capita consumption when viewing a short decade. A longer look (Table 4), however, is more revealing as these comparative data show:

Table 4 Sixty Year Historical Per Capita Water Use

	1940	1951	1991	2000
Population	46,000 *	66,500 *	88,000 *	97,028*
Gallons per Capita per Day	82	119	194	246
Treatment Capacity (MGD)	9.5	21.7	56.0	56.0

* without SAFB

Some of the growth in the treatment capacity shown in the data above is a result of increasing wholesale sales of water. None of the population of wholesale towns and communities is included, however, in the per capita consumption shown; therefore the per capita use of water by residents has more than doubled in just less than 50 years. The growth in the per capita consumption is a direct result of increasing demand to fulfill lifestyle expectations.

There have been many discussions at the State and throughout the State's Regional Planning Groups about goals for per capita consumption. However, to date, neither a State nor Region B per capita consumption goal has been forth-coming. In the interim, the City of Wichita Falls has adopted a goal for per capita consumption of 155 gal/cap/day by the year 2030 for both wholesale and retail accounts. The City has also adopted a short-term 5 year goal for per capita consumption of 165 gal/cap/day by 2015 and a 10 year goal of 160 gal/cap/day by 2020. Based on the recent trends, the City of Wichita Falls will have no problem meeting these goals. The TWDB defines municipal

water use as residential and commercial water use. Residential use includes single and multi-family residential household water use. Commercial use includes water used by business establishments, public offices, and institutions, but does not include industrial water use. As a result, per capita consumption will be calculated based upon the census population and the water use of the residential and commercial accounts.

The per capita consumption of water is a key indicator of the effect of increasing demands. For example, the budget for the Utilities Department in 1951/52 was about $700,000 or $10.53 per capita. Inflated to 1992 dollars, the 1951/52 budget is just over $3,842,000, a per capita level of $57.70. Compare this to the 1991-92 budget which has risen to approximately $13.6 million, a per capita value of about $153.41. Comparing this to the 2007-2008 fiscal year budget, the budget had risen to $34.2 million with a per capita value of $310.06. It is apparent that retarding the growth of the per capita consumption of water will result in a delayed requirement for additional storage, treatment and distribution facilities, perhaps avoiding the requirement for these facilities at all. A primary incentive, therefore, for conservation is the direct and indirect monetary savings that accrue to the customer.

F. Projected Water Requirements.

An engineering study on the adequacy of the supply of water from Lakes Kickapoo and Arrowhead was conducted in 1981 by the engineering firm of Freese and Nichols, Incorporated. The study was conducted to determine the feasibility and necessity for a new reservoir site, commonly called Lake Ringgold, near the confluence of the Little

Wichita and Red Rivers at Ringgold, Texas. Based on certain parameters of population growth, use rates and safe yields of the lakes, the study concluded that Wichita Falls had an adequate supply of water until at least the year 2010. The two lakes have a combined safe maximum yield of 42.6 million gallons per day.

The TWDB Region B Planning Group conducted the latest authoritative engineering study on the adequacy of the supply of water from Lakes Kickapoo and Arrowhead in 2000. The study was conducted to determine the feasibility and necessity for new water supply sources for the Region B, of which Wichita Falls is included. Based on certain parameters of population growth, use rates and safe yields of the lakes, the study concluded that Wichita Falls will have a supply shortage (safe supply) of 2,057 acre feet by the year 2060. As a result, three alternatives for new water sources were proposed. These alternatives are; reuse of wastewater effluent, constructing a Reverse Osmosis treatment plant to treat Lake Kemp water and construction of Lake Ringgold. In addition, water conservation was recommended to delay the need for the construction of Lake Ringgold.

The City of Wichita Falls has constructed the Reverse Osmosis plant and is currently evaluating further the reuse of the wastewater effluent. The estimated construction cost of Lake Ringgold and its associated pipeline at this time has made it a low priority with regards to a future water source. However, it remains within the Region B Water Planning Group as an alternative water strategy.

With the 2010 completion of the 20-mgd addition to the Cypress Water Treatment Facility, by the construction of the 10-mgd Reverse Osmosis plant and the 10-mgd

conventional plant, the City will have the capacity to meet the projected demand for treated water, plus some capacity for growth in the future. During the drought of 1995-2002, the City did on occasion exceed the maximum treatment capacity of the existing plants. Thus far, the growth of the demand has been slower than predicted by a previous study, although the demand trend has risen. But, even with the estimated population growth to the year 2020, the City should have adequate treatment capacity. Water Conservation, including the use of reclaimed water, can retard the growth of demand for potable water, and delay the requirement for additional new facilities.

With the addition of a new 1.5 million gallon elevated storage tank and new ground storage tanks at the treatment facilities, the distribution and storage system is adequate to meet current needs, but some additional storage and selected transmission lines will be required as the population and demand shifts to undeveloped areas of the City.

G. Wastewater System

The flow to wastewater collection and treatment facilities has a direct correlation with the use of water. Conservation therefore not only will delay the requirement for additional water supply and treatment facilities, but also more wastewater collection and treatment facilities.

The wastewater collection system consists of some 650 miles of collection pipe and 55 lift stations of various sizes and capacities. Deficiencies still exist in the system now, and conservation is not a factor in their correction.

Wichita Falls has two wastewater treatment plants. The newer and smaller of the two is located north of the City and was built principally to attract and serve major industries. The plant treats about 40% of the Sheppard Air Force Base sewage. The plant uses oxidation ditches for treatment, and has a capacity of 1.5 million gallons per day.

The latest state-of-the art technology was incorporated into a major renovation and expansion of the River Road Wastewater Treatment Plant in 1992. This renovation brought the plant capacity to 19.91 million gallons per day. This has been projected to provide sufficient wastewater treatment capacity for population growth perhaps to the year 2015 and possibly beyond.

Figures 8 and 9, below, indicate the average daily use (shaded area titled "Daily") of the existing Northside Wastewater Treatment Plant and the capacity of the River Road Plant. The area of the pie chart titled "Capacity" indicates the unused, available capacity of the plant. Sheppard Air Force Base (SAFB), a military establishment within the city limits of the City of Wichita Falls, has phased out their wastewater treatment plant, and the City is now accepting their flows. Therefore, data for the Northside Plant include the addition of those flows from SAFB. Approximately 40% of the SAFB flow began at the Northside Plant in September 1990. The remaining 60% flows to the River Road Plant.

Figure 8

River Road WWTP Flows

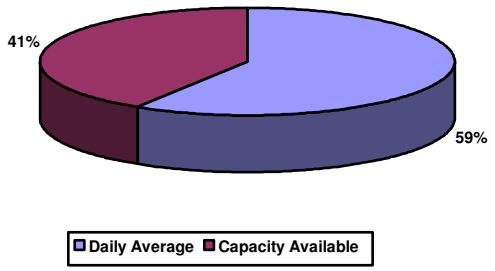
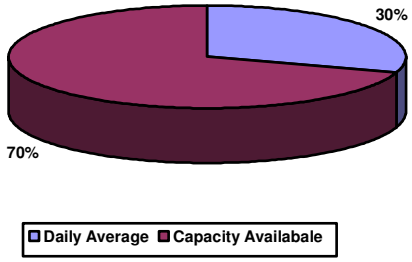


Figure 9

Northside WWTP Flows



The City of Wichita Falls has prepared a Master Wastewater Plan that calls for the eventual construction of a new wastewater treatment plant at the time the maximum capacity of the River Road Wastewater Treatment Plant is neared. Conservation of water can play a major role in delaying the need for further expansion of collection and treatment facilities.

H. Use of Reclaimed Water

The River Road and Northside Wastewater Treatment Plants currently utilize their treated effluent for on-site irrigation, thereby diminishing their need for potable water to irrigate. Both plants use an approximate total of 539,000 gallons of treated effluent per month. Also, Sheppard Air Force Base (SAFB) is currently using effluent water from the Northside Wastewater Treatment Plant to water an eighteen-hole golf course. SAFB uses approximately 40 million gallons per year to irrigate their golf course. These two irrigation practices alone use approximately 46 million gallons of treated effluent per year, which would have otherwise had to come from the potable water supply.

The City of Wichita Falls is evaluating the use of reclaimed water from its River Road Wastewater Treatment Plant. The City of Wichita Falls has received permission to treat this water via nanofiltration and blend this water with its existing raw water for treatment at its two water plants. This project is still being evaluated as to its financial and social impacts.

Additionally, the City of Wichita Falls has recently requested authorization form the TCEQ, in accordance with Title 30, Chapter 210 of the Texas Administrative Code, for the use of reclaimed Type I and Type II effluent water by the City (see Appendix 16). The request is for a Chapter 210 reuse that is as "global" as possible. The categories of usages will be; irrigation of sports complexes, athletic fields, golf courses, ball parks, schools, parks, hospitals, industrial centers, apartment complexes, commercial properties, industrial and manufacturing properties, home lawn watering, food crops, pasture lands, road medians, cooling tower makeup water, process water for owners and operators of oil and gas wells, fire fighting, industrial and manufacturing processing, maintenance of impoundments, toilet and urinal flush water, road construction, construction activities, dust control, use at airports, oil and gas exploration activities, and water for government and military facilities.

IV. WATER CONSERVATION PLAN FOR MUNICIPAL WATER USES

A. General Discussion of Conservation Goals

The City Council of the City of Wichita Falls recognizes it has a responsibility to assure an adequate and safe supply of water for the commercial and residential use of the current population of the city as well as future generations. The Council addressed the supply side of the water balance equation in past years, and has provided an adequate and safe water supply by increasing the water treatment capacity and water distribution system capacity, and by initiating action to assure a long-term source of water by developing Lake Kemp as an additional raw water source and evaluating the reuse of wastewater effluent.

The Council is now striving to complement the water supply management achievements by managing the demand for water. The long-term objectives of demand management is to control the per capita consumption of the vital natural resource and to prolong the use of existing water reservoirs, treatment facilities and distribution networks, and sewage collection and treatment facilities. The Council formed a Water Resources Commission and charged the Commission with the responsibility to analyze strategies and recommend programs for the efficient use of water and the management of water demand. This Water Conservation Plan coordinates existing policies and procedures for conservation efforts. The objectives being sought are to:

- Reduce waste of water to slow or halt the growth of per capita consumption

- Make better use of available water resources.
- Educate the public on water saving techniques and the desirability of water conservation as a principle of human behavior.

B. Public Awareness and Education Program

The foundation of a water conservation effort is public awareness of and appreciation for the need to conserve a finite resource. Community education must be a continuing process and directed at all aspects of community life. The ultimate result of the education effort must be to change behavior. There are two distinct community groups to address:

- School-age children in the Wichita Falls Independent School District and other local school districts require a long-term program, at all possible grade levels, in the essential subject elements of "Water and Man", "Water Resources Education", and possibly others.
- The general adult population education is more short-term, targeted at making specific changes in current attitudes and practices.

The goals of the water conservation program need to be made clear to the public as well as the need for the goals. All educational efforts should relate to the local area -- using local statistics, costs, availability, ease of care or use, etc. Since people often infer the term "conservation" to mean a limitation of their desired lifestyle, education

efforts should whenever possible use terms that do not convey such implications, for example "efficient use" of water and "efficiency".

The community should be made aware of the effect of the general conservation measures that can be taken, most at relatively small expense. Education programs should be directed toward advertising these general conservation measures. The best approach is cost, emphasizing how the efficient use of water can save dollars indirectly for the customer by lowering municipal bond costs and operations and maintenance expenses, thereby reducing the rate to the customer, and through direct savings on monthly water bills, energy to heat water, and sewer costs. The education program should emphasize the cost of leaks in faucets, toilets, and other household fixtures. Clear, straightforward data should be presented that allow the customer to understand the direct application of water savings, for example the amount of water used for bathing, the amount of water used for showering with various types of shower heads, toilet flushing, etc.

The customer should be told to check for leaks in the toilet using food coloring or special purpose detection tablets. This can be accompanied by simple, straightforward explanations with diagrams of the toilet flapper and other valve replacement in the tanks of the toilet. Customers should be shown that dams can be used in toilet tanks to lower water use, yet maintain adequate flow for the flushing action. Kits or packets can be developed and made available for community distribution. These kits or packets may include dams, bags, literature, flow restricters, etc., all directed toward a "do-it-yourself" water conserving effort. The kits or packets may be distributed free to the full population or at a nominal charge to voluntary customers. Claim coupons can be used

to control free distribution to those customers who express interest by redeeming the coupon.

The community should be educated on the types of water saving devices that are available on the market so they can become more informed buyers. They need to understand through community education measures how to examine their existing facilities to determine whether they already have water-saving toilets, shower heads, etc.

While community efforts are going on, the City of Wichita Falls should be advertising the measures taken by the City for the efficient use of water, e.g. rate strategies, meter replacement and repair programs, leak detection and maintenance programs, plumbing ordinances, landscaping practices, water audits, etc.

The seasonal use of water for landscaping and irrigation is the single greatest cause of the large peaks and require the construction, maintenance and operation of large capacity supply systems. The City of Wichita Falls has, for example, water treatment facilities to treat 56 million gallons per day even though the annual average requirement is just over 23 million gallons per day. The reason is the summer peak use of water that must be met. State law requires the public water system to provide treatment and distribution facilities adequate to meet the largest single day of demand in the year. This area then is a major topic for public education and falls in three general areas: correct watering and efficient water devices; yard preparation and mulches; and appropriate plantings. Specific education measures that should be accomplished are:

- Education should avoid creating an impression of crisis, and should instead emphasize that efficient use of water means less cost to the customer.
- Develop and distribute information on correct watering, watering devices, and yard preparation and mulches.
- Encourage off-peak watering of landscapes.
- Prepare a local directory of appropriate plants based on the A & M Extension Services publication, “Xeriscape Bulletin B-1584-7-98” and a publication from the Texas Water Development Board, “A Directory of Water Saving Plants and Trees for Texas”.
- Create water wise demonstration areas in city parks, as well as areas of buffalo grass. Emphasize that water wise is not cactus gardens as may be commonly perceived.
- Get local nurseries to stock plants fitting the above requirements, and have lists and displays available in their stores.
- Conduct contest(s) featuring water wise landscaping with nominal prizes.
- Make sure all libraries have updated materials available.

Another major area of water efficiency is the reuse of water from wastewater treatment plants ("reclaimed water"). The main public education effort for this should be directed toward greater public acceptance of the use of reclaimed water in future years. Public attention should be drawn to the successful local reuse of water, for example the use of reclaimed water for irrigating the golf course at Sheppard Air Force Base. A great opportunity for successful education in water reuse is with school children, making them comfortable with the use of reclaimed water as part of the water cycle.

Community education on water conservation should be a joint effort of several public and private partners. The Wichita Falls Independent School District and other local school districts are vitally important in the partnership approach to community education and their active support of the program should be encouraged and sought. Jointly developed materials should allow teachers to easily incorporate local information on the value of water; how to save water in the home; how best to water outside; the constant reuse of water and how it can be reused locally; what plants and trees grow best in Wichita Falls and local environs. The school system is also an avenue through which information can be distributed to homes. "Energy patrols" in school systems have educational and practical value. Sundry materials can be made available to the school systems in limited quantities from the Texas Water Development Board, A & M Extension Service, Water Education Committee of the Texas Society of Engineers, and others.

The education program should seek support and participation from local foundations, garden clubs, nurseries and organizations such as Sierra Club, League of Women Voters, River Bend Nature Works Center, service clubs, etc. Very important will be youth organizations such as Girl Scouts and Boy Scouts.

Some additional techniques for public education include:

- Informational sentences on each water bill sent by the City.
- Preparation of video tapes, slides, short programs for community presentations at clubs, on TV and radio, news articles, etc. Use of materials

from the American Water Works Association, and the Texas Water Development Board should be promoted for this.

The Director of Public Works of the City of Wichita Falls should plan and adopt a community education program and should budget annually for the program.

C. Conservation Type Rate Structure

The City formerly used a declining block rate structure which reduces the cost of water at the higher levels of use. In recognition that this type rate structure is a disincentive to water conservation, the City adopted in September 2004, for residential customers an increasing block structure as a conservation method. For commercial customers, the City adopted a flat rate structure in 2008.

The City will continue to periodically review these rate structures as to their possible impact on water conservation, in the meantime balancing the economic impact on the customers and the City.

D. Universal Metering and Meter Repair and Replacement Program

One of the most positive incentives for conservation of any product is cost. For this and other reasons, an aggressive metering and meter repair and replacement program is vital to the City. Such a program is one aspect of the efficient business operation of water and sewer service as a government function and it preserves the financial

integrity of the utility. The individual customer has a right to expect that he is not paying more or less than another customer similarly situated and that all are sharing an equal load. From the conservation perspective, universal metering ensures that the customer is paying for services received and is sensitive to the waste of a product for which he has paid.

The City meters all service connections and operates a comprehensive meter repair and replacement program. Through a central data base system, the City maintains a record of the installation and or calibration date of all meters, regardless of size or class of customer served. The Director of Public Works insures that a new meter is installed or the old meter is calibrated on prescribed anniversary dates, according to the size meter indicated below:

Meter Size	Test Interval	Change Out Interval
5/8" and 1"		10 Years
1 1/2" and 2"	4 Years	
3" and 4"	4 Years	
6" and larger	1 Year	

Any meter of any size is changed when it is determined the meter is inaccurate and cannot be economically repaired, regardless of age or anniversary date. Master production meters at the raw water sources and at the treatment plants are calibrated annually and repaired/replaced as necessary.

Damaged or defective meters are reported by meter readers as they take daily readings. Through predetermined codes, their reports of meter repairs needed are converted to specific work orders by computer. The work orders are then managed, accounted and accomplished by a meter repair section in the Public Works Department. Defective meters can also be reported by citizens/customers, by utility work crews and other sundry persons. These reports are also recorded as work orders and processed as indicated. Finally, defective meters are often found by review of customer use patterns and the analysis of computer summary data on individual accounts.

The City also aggressively pursues the illegal use of water through "straight-line" connections. Such instances are filed with the Municipal Court for prosecution and recovery of revenue.

This metering and meter replacement and repair program is programmed and budgeted annually. Public Works management monitors the accomplishment of the program through submission of tailored monthly reports.

E. Leak Detection and Maintenance Program

To achieve the objective of reducing the waste of water, the Director of Public Works maintains adequate reporting and compiling of data to determine that the total sales of finished water compares favorably with the quantity of water produced and pumped from the plants to the distribution system. The water industry refers to the difference between the two quantities as "unaccounted" water, and we should seek to achieve the

standard of the American Water Work Association for an efficiently operated utility of not more than 15% unaccounted water.

One of the principal ways of controlling the amount of unaccounted water is an aggressive leak detection and repair program. So long as the quantity of unaccounted water does not exceed 15% of the total water produced, the City uses a visual leak detection concept. When the total unaccounted water exceeds the stated percentage, the City will begin weighing the cost benefit of more sophisticated means of leak detection, particularly the use of electronic detection equipments and techniques, and of consultants for comprehensive audits.

F. Plumbing Codes for Water Conservation Devices

Representatives of the engineering and plumbing professions serve on the City Plumbing Board, and the Board advises the City Council on matters relating to the Plumbing Code. The Board and Council mutually recognize the desirability of conserving water. This recognition resulted in 1987 in the amendment of the Plumbing Code to add restrictions on the maximum volume of water for certain plumbing facilities and devices.

The City Plumbing Code, integral to the Code of Ordinances, specifies that water conserving plumbing facilities and devices shall be used for construction and remodeling. Urinals must be adequately flushed with no more than one gallon of water per flush and automatic flushing devices of the siphonic design shall not be used to

operate urinals. Water closets (toilets), either flush tank or flushometer operated, shall be designed, manufactured and installed to be operable and adequately flushed with no more than 1.6 gallons of water per flushing cycle. Faucets for public lavatories shall be equipped with outlet devices which limit the flow of water to a maximum of one-half gallon per minute or be equipped with self-closing valves that limit the delivery of water to a maximum of one-quarter gallon per minute of hot water for recirculating systems and to a maximum of one-half gallon per minute per non-recirculating systems. Shower heads for private use shall be designed, manufactured and installed to deliver water at a flow rate not to exceed three gallons per minute; sink faucets, not to exceed 2.5 gallons per minute.

G. Retrofit Program to Improve Water Use Efficiency

A mandated retrofit program is not considered necessary nor desirable because there is not a general shortage of water for citizens. Nonetheless, it is recognized that retrofitting wasteful plumbing devices is a valid means of conserving a finite natural resource. The City of Wichita Falls should stress to its citizens the importance and cumulative effect of various water conservation techniques, including the use of restricted flow plumbing devices. Education programs should provide information to the public on flow rates and cost savings; the individual citizen can then consider the cost benefits of retrofitting with water saving plumbing devices.

H. Water Recycling and Reuse

Water reuse affects both the supply and demand side of the water balance equation. Demand for potable water is reduced by water reuse even though the total consumption of water may not be reduced. The reduced demand from reuse affects the supply system in the same way as other conservation measures: a reduced requirement for storage, treatment and distribution facilities. Water reuse may vary from very limited application, such as residential reuse of "gray water," to large scale applications of irrigation with wastewater treatment plant effluent ("reclaimed water").

Industry is on the vanguard of water reuse through recycling. Several local industries have found it advantageous to install treatment facilities that allow recycling of water used in the manufacturing processes, taking only the additional water required for makeup. The reuse of water by industry not only reduces the demand for water, but also reduces the total flow to wastewater treatment plants, often precluding the concentration of chemicals from the manufacturing process.

At this time, the use of gray water in residential areas does not appear to be an area of significant impact. It is, however, an area where the individual customer can be made more sensitive to the potential for water conservation. Therefore, the reuse of water by residential customers should be stressed by the City through various educational initiatives.

Two major non-industrial generators of gray water are commercial laundries and commercial car washes. Commercial laundries are not realistic candidates for reuse

because of the expense to process gray water adequately to the required quality. Commercial car washes offer greater potential. Some local car washes now recycle, and technology is being rapidly developed that appears to provide more lucrative returns for the operators to consider water reuse.

The major effort of the City in gray water reuse should be to educate the public on the safe use of gray water and to encourage non-industrial generators of gray water to consider the cost benefits of developing technology for recycling. The City should continue to applaud the leadership of industry and should support industry in the recycling of process water.

An area of considerable potential for conservation of water is the use of effluent ("reclaimed water") from wastewater treatment plants. Sheppard Air Force Base is currently using treatment plant effluent to water an eighteen-hole golf course. This is a prime example of water reuse and of conservation effort. While the effluent must be used within the guidelines of federal and state regulatory agencies, there are several applications that may be cost beneficial in the future. See Section III – H for a complete discussion of the use of reclaimed water in substitution for potable water.

I. Water Conserving Landscaping

As has been indicated, the seasonal use of water for landscape irrigation and other outside uses is the primary reason for the peaks that is the basis for construction, maintenance and operation of large treatment and distribution systems. It follows then,

that efficient use of water in this area can have a pronounced effect on water bills for the consumer and the peak demand on water supply facilities; the health of plants and grasses in the landscape is also improved by the efficient use. Through education of the public to certain proven techniques, water can be used more efficiently without any lessening of the concurrent City goals of landscape beautification and industrial recruitment.

There are several efficiencies that will conserve water. Foremost is the method used for irrigation of landscape. It is a tendency to water too often, sometimes too spasmodically, and for too long a period of time to be efficient. Plants and grasses that are watered too often and/or too superficially develop a shallow root system that demands more frequent watering for the adequate health of the plants and grasses. Thorough deep watering draws roots down deep to get the moisture, and the deeper root system is healthier, requires less frequent waterings, and can better withstand long dry spells.

The soil in Wichita Falls and its environs is of rather tight texture and does not absorb water readily. Water running down the curbs is a possible signal of too much water being put on too quickly for the ground to absorb. Water sprinklers that put out water more slowly, or shorter watering periods can relieve this. Lawn aerators that plug small holes in the lawn aid greatly in the absorption rate.

An important aspect of efficient watering of landscapes is the type sprinkling device used. There are hundreds of watering devices on the market. Some are prone to huge evaporation losses because the water is broken up into too fine a mist or because the

water is thrown too high into the air. Sprinklers should be chosen and placed carefully to cover the areas needing water, but avoid placing water on driveways, walks, streets, etc. Local merchants should be encouraged to carry, advertise and otherwise promote the more efficient watering devices.

The public should be constantly reminded that the most efficient use of water on plants is by drip irrigation. Water is put at the base of the plant slowly and only where it is needed. This method needs to be greatly expanded through education and by encouraging local merchants to stock and promote drip irrigation systems.

The installation of a complete lawn sprinkler system is a convenient way to maintain a healthy lawn, and the use of automatic electronic timers should be encouraged. The timers prevent leaving water on for too long a period through forgetfulness, and facilitate using the water at the best time of day when there is the greatest effect for the plants and the least evaporation. Technology such as rain sensors should be used in conjunction with electronic timers to prevent the irrigation system from being turned on when adequate moisture is available in the soil. The technology of these devices is adequately proven, the City should consider requiring the devices on all new irrigation system installation and possibly the retrofitting of the existing system over a period of time.

The automatic timers offer flexibility. For example a sloped area that cannot absorb water before runoff can be watered several times each day at selected intervals. This prevents wasted water running down the curb.

The public should also be made aware that water timers are available to hook to a faucet to set watering time; some of these timers are programmable. These devices are fairly new to the market, but they are available at some local suppliers and offer the customer without an irrigation system the opportunity to make more efficient use of hose sprinkling systems.

The use of water wise landscaping techniques should be stressed. This is the use of native grasses and plants that do not have a high water demand. Local nurseries are already stocking and selling a great many of these and many more are coming onto the market. Local nurseries and other landscape dealers and installers should be encouraged to continue and increase their stock of these more efficient plants and to participate in informing the public to the availability and use of the native plants. Sensible water use through drip irrigation and water-efficient plants can achieve a near perfect balance between wise water use and attractive landscaping. The City Parks and Recreation Department should undertake Xeriscape projects to make more efficient use of water and to show the public the attractiveness of this form of landscaping. Wide public attention should be drawn to such Xeriscape projects.

Large customers who are located near raw water transmission systems should be encouraged to use raw water rather than treated. Such programs can save money for the customer and will reduce the load on City treatment facilities and treated water distribution systems. The savings and cost of chemical treating and filtering and additional pumping and distribution is substantial, and more importantly, in the sense of conservation the use of these facilities is prolonged.

Beyond the use of natural landscaping and water conserving irrigation, the use of "water harvesting" could be practiced by capturing rainfall runoff from the property. There are numerous sources for this information available via the internet. This can reduce the need for potable water for landscaping.

J. Other Initiatives for Efficient Water Resource Use

The emphasis of this water conservation plan is on conserving the use of water. However, one of the acknowledged goals of water conservation is to reduce the flow of water to wastewater treatment plants, thereby reducing or delaying the requirement for new collection and treatment facilities or expansion of existing facilities. Another means of achieving this same objective of conserving wastewater facilities is to reduce the invasion of ground and surface waters into the sewage collection system. The City of Wichita Falls has an aggressive program to find and repair the source of invasion of these waters into the system.

The City makes extensive use of smoke generation in sewer collection lines to detect leaks. In 1983-1985, a commercial contractor smoked all of the major collection basins in the City. An extensive and focused program was conducted to repair the leaks detected by the smoke program. In addition, City crews use smoke to find leaks in the collection system. All collection line leaks are repaired as soon as detected.

Manholes are a known source of infiltration and inflow of external water. Manhole leaks are detected by smoke and are repaired immediately. Some manholes are in low areas

and are subject to being covered by runoff waters. Special plastic rainguard devices are used in these manholes to prevent the entry of water from the surface.

The City annually conducts a Budget Utility Improvements Project that includes the rehabilitation of aged and deteriorated sewer lines. These old, structurally unsound sewer lines are often major sources of water invasion. The lines are rehabilitated by slip lining with a polyethelene pipe or by replacement of the line.

Another technique to detect the source of water invasion is television of sewer lines. The City of Wichita Falls makes frequent use of this technique to determine the need for rehabilitation of a line and to find sources of water invasion. The City also uses sophisticated electronic flow measuring equipment to isolate areas of potential inflow so leak detection measures can be used in the area.

Another initiative by the City to preclude entry of rainwater into the sewage collection system is an ordinance prohibiting any plumbing installation that admits storm or groundwater to enter the sanitary sewer. When such installations are detected by inspection or by smoke injection, the property owner is required to make repairs under supervision of the City plumbing inspector.

The initiatives to control the unnecessary flow of waters through the collection system to the wastewater treatment plants are conducted on a continuous basis by utilities managers and crews.

K. Permanent Conservation Measures

The City of Wichita Falls has implemented permanent conservation measures. These measures were adopted by ordinance by the City Council. There are four components to this ordinance.

The first is that spray irrigation use is prohibited from 11:00 A.M. to 6:00 P.M.. Non-spray type irrigation systems such as drip or soaker hoses are allowed, as is hand watering.

The second measure is that if washing a car at any location other than a commercial car wash, car dealership, detail shop or automotive shop is prohibited, unless the hose has a positive shutoff nozzle attached.

The third measure is that all new irrigation systems shall be designed by a licensed professional, recognized by the State of Texas. In addition, the design must include water saving devices such as automatic timers and moisture detection devices.

The final measure is that no water shall be served at a restaurant, bar or club unless the customer requests water.

L. Implementation of Plan and Enforcement

Implementation of the Water Conservation Plan is a matter of cooperative effort between the various departments of the City and a permanent Water Resources Commission. The Director of Public Works should coordinate the implementation and enforcement of the plan through existing ordinances and adopted budgets.

The Water Resources Commission advises the staff, participates in the periodic update of the plan and assures the Council that water resources are being managed judiciously in accordance with the Conservation Plan. The Commission consists of five members appointed by the Council to alternating two-year terms. Each citizen member shall have a professional interest in the efficient use of water. The Commission is to meet at least quarterly and a report with observations and recommendations should be submitted to the City Council.

The universal metering and meter repair and replacement program is in effect now and requires no modification or additional implementation. The same is true of the leak detection and maintenance program.

Water conservation landscaping on a routine basis is principally a matter of educating the public and of coordinating and working with local landscape architects and nursery owners. A xeriscape pilot project by the City Parks Department should be installed as a demonstration to the public. This project should be located in an easily accessible area and should be marked with appropriate signs to highlight the water conservation aspects of the landscaping.

The plumbing code for water conservation is adequate at this time and no further implementation is required. However, the Council is receptive to new initiatives from the Plumbing Board.

Reuse and recycling offer potential for significant water savings in the future when costs and regulatory controls make the use more attractive to the typical customer.

M. Regional Coordination

The service area of the City of Wichita Falls is located within the Region B Water Planning Group. To coordinate developing the Plan with the Regional Water Planning Group, the City staff has continuous correspondence with Biggs & Mathews and the Red River Authority representatives of the Region B Water Planning Group, as well as participating on the Region B Planning Board. In addition, a letter was sent to the Region B Water Planning Group providing them a copy of the plan, as submitted to the City Council for approval. Documents verifying this coordination are included in Appendix 6.

N. Retail/Wholesale Water Supply Contract Requirements

The City of Wichita Falls has reviewed all of its retail/wholesale water customer contracts and has ensured that all contracts have additional conservation requirements, as required pursuant to 30 TAC, Chapter 288. If the City's retail/wholesale customer intends to sell the water to another water retailer, then the contract for resale must also include water conservation requirements.

Additionally, all retail/wholesale contracts with the City include a provision that in the case of a shortage of water resulting from a drought, the water to be distributed shall be divided in accordance with Texas Water Code § 11.039 (Appendix 7).

O. Reservoir Systems Operation Plan

The City of Wichita Falls owns Lake Arrowhead, Lake Kickapoo and Lake Wichita and therefore does not coordinate the operation of these reservoirs with other entities which would require an operating plan. However, the City does operate and maintain these three reservoirs in accordance with State and Federal guidelines and coordinates regularly with the appropriate agencies. The City has the following water rights:

14.663 billion gallons (45,000 acre feet) per year from Lake Arrowhead

13.034 billion gallons (40,000 acre feet) per year from Lake Kickapoo

2.375 billion gallons (7,289 acre feet) per year from Lake Wichita

The City jointly owns the Lake Kemp & Diversion water system with Wichita County Water Improvement District #2 (WCWID2). The City coordinates the operation of this lake system with the WCWID2, and has the following water rights:

10.101 billion gallons (31,000 acre feet) per year from Lake Kemp

Under agreement with Wichita County Water Improvement District #2, once Lake Kemp reaches 50% of its storage capacity, all irrigation activities are suspended and water is held in reserve for use by the City for drinking water purposes.

P. Review and Update of Water Conservation and Drought Contingency Plans

The Water Conservation and Drought Contingency Plans will be reviewed annually by City staff and the Water Resource Commission, to ensure that City Ordinances and programs remain current and progressive for water conservation. As required by TCEQ rules, the Water Conservation and Drought Contingency Plans will be reviewed every five years. The plans will be updated as appropriate, based on new or updated information.

Q. Record Management System

The City upgraded its water accounting software system in the late 1990's. This system allows for the identification of residential, commercial, industrial, and public users. The City's Utility Collections Division now identifies and tracks the different categories of water consumption.

All information obtained from the review and evaluation of this data will assist in future planning of conservation strategies.

V. WATER CONSERVATION PLAN FOR INDUSTRIAL / MINING WATER USES

A. Description of Water Use

The City has requested authority to divert and use water associated with both industrial and mining purposes and to do so within the existing diversion rates authorized for Lakes Arrowhead and Kickapoo (see Appendix 8). The majority of use is expected to be towards the development of natural gas, including hydraulic fracturing activities, and is not expected to exceed more than 1,200 acre-feet per year. Water will be diverted from the perimeter of the reservoir and metered prior to delivery by pipeline or trucked to the point of use.

B. Conservation Goals

The water conservation goal for the industrial/mining operations is to reach a specific percentage of water reused by the operation. Reuse of recovered/flowback water from hydraulic fracturing operations will be used to the extent it can feasibly be treated to remove significant chloride concentrations. The City has established a five-year target goal of 2.5% (by 2013) and a ten-year target goal of 5.0% (by 2018). In an attempt to meet these goals, the City has developed the following actions to achieve the goals set in the Water Projections found in Section III (Utility System Profile). The conservation goals of this plan include the following:

- Install, by contract, a flow metering device that can measure the amount of water utilized with a minimum accuracy of +/- 5%. Specific quantitative goals can be determined once the actual amount of water usage is quantified.
- Maintain a program for leak detection and repair of the water supply system.

C. Practices and Devices to Measure Diversions

Devices, such as mechanical or Doppler meters, and methods will be installed and instituted to ensure that all diversions of water are measured and accounted for within an accuracy of +/- 5%. All diversions must be performed, monitored, and recorded in a manner that is consistent with the City's withdrawal and accounting plan authorized pursuant to the Certificate of Adjudication, or any subsequent amendments thereto.

D. Leak Detection, Repair and Water Loss Accounting

The City has a standard policy for leak detection and water loss accounting. This policy is part of the Water Conservation Plan found in Section IV. However, the efforts to detect and repair leaks will largely be the responsibility of the user of the industrial/mining water, whose approaches shall be documented to the City, as part of its loss accounting policy.

E. Means to Improve Water Use Efficiency

Any additional water conservation practices, methods and techniques that are feasible and appropriate to achieve the stated goals of the water conservation plan will be instituted. This includes, but is not limited to, the application of state-of-the-art equipment and-or process modifications to improve water use efficiency.

VI. DROUGHT CONTINGENCY PLAN

A. General

Wichita Falls has adequate water to sustain it through the longest recorded drought in history (safe maximum yield). One has to question, however, whether a drought being experienced is a record-setting drought. Prudence dictates that the safe yields are treated as statistical values and that reasonable contingency plans to be in place to deal with a shortage of water. This drought contingency plan is predicated on maintaining a minimum reservoir storage capacity and a finite treatment capacity by using pre-planned, progressive measures to alter demand and to augment supply. The total objective is to keep the level of Lakes Kickapoo and Arrowhead at more than 25% of the conservation storage capacity, and treatment levels within capacity limits.

The City constructed the Reverse Osmosis (RO) plant to develop the Lake Kemp system into a drinking water supply. However, the RO plant was designed to provide 10 million gallons of drinking water each day (13% of total treatment capacity), which is the amount required to sustain basic sanitary needs during a summer drought condition. Therefore, based on the facts that the RO treatment capacity is such a small contributor to the overall City treatment capacity, and that Lake Kemp is the only “fall back” source of drinking water when all other lakes are below 25%, the City has elected not to utilize the Lake Kemp storage capacity in its calculation for the triggering of the various drought stages. It is felt that this is a more conservative approach to maintaining an adequate supply of source water for the citizens of Wichita Falls.

The Director of Public Works is the responsible official for the coordination, expansion and implementation of this drought contingency plan. All other City departments provide support as requested by the Director of Public Works.

B. Texas Commission on Environmental Quality Rules

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code, which is included in Appendix 9. For the purpose of these rules, a drought contingency plan is defined as *"a strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies".*

Minimum Requirements

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

288.20(a)(1)(A) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section VI – C

288.20(a)(1)(B) – Provisions for Continuing Public Education and Information – Section VI – C

288.20(a)(1)(C) – Coordination with the Regional Water Planning Group – Section IV – M

288.20(a)(1)(D) – Criteria for Initiation and Termination of Drought Stages – Section VI – E

288.20(a)(1)(E) – Drought and Emergency Response Stages – Section VI – D

288.20(a)(1)(F) – Quantified Water Use Reduction Targets During Periods of Water Shortage and Drought – Section VI – F

288.20(a)(1)(G) – Water Supply and Demand Management Measures for Each Stage – Section VI – D

288.20(a)(1)(H) – Procedures for Initiation and Termination of Drought Stages – Section VI – E

288.20(a)(1)(I) – Procedures for Granting Variances – Section VI – G

288.20(a)(1)(J) – Procedures for Enforcement of Mandatory Restrictions – Section VI – H

288.20(a)(3) – Consultation with Wholesale Supplier – Sections IV – N

288.20(b) – Notification of Implementation of Mandatory Measures – Section VI – D

288.20(c) – Review and Update of Plan – Section IV – P

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.5, and Subchapter B, Rule 288.22, downloaded from http://www.tceq.state.tx.us/assets/public/legal/rules/rules/pdflib/288a.pdf, March 2007.

C. Public Involvement, Education and Regional Coordination

The City will provide opportunity for public input in the development of this drought contingency plan by the following means:

- Providing written notice of the proposed plan and the opportunity to comment on the plan by posted notice and notice on the City of Wichita Falls Web site (www.cwftx.net)
- Making the draft plan available on the City of Wichita Falls Web site (www.cwftx.net)
- Providing the draft plan to anyone requesting a copy.

The Region B Water Planning Group was invited to comment and have received a copy of the Plan for coordination with the Region B Regional Water Plan. Public education of drought contingency issues may include public reference materials at the Utility Collections Offices and the Wichita Falls Library, the annual Consumer Confidence Report, press releases to the local media and public service announcements on the City's public access channel.

D. Drought Management Programs.

1. Stage 1: "Drought Watch":

A **drought watch** will be initiated when

i) the combined storage of Lakes Kickapoo and Arrowhead declines to 60% of the conservation pool storage capacity, or

ii) demand exceeds design treatment capacity for 3 consecutive days (or exceeds 105% of design), or

iii) the water supply system is unable to deliver water due to mechanical failure or damage of major water system components which will require more than 72 hours to repair when dry weather conditions exist and continued dry weather are expected over the course of the repair period.

The purpose of declaring a drought watch is to heighten public sensitivity. The following actions should occur under the direction of the Director of Public Works in this phase.

a. The City Council and other City departments will be notified of the impending problem and the proposed immediate and future actions.

b. In conjunction with the Public Information Office, initiate an education program through all available media to:

- Alert the public to the depletion of the reservoirs; current rate of withdrawals and the effect of such withdrawals; current meteorological conditions; and a long range forecast from the National Weather Service.

- Alert the public to the drought management program, the various stages and measures, and the possibility of implementation.

- Keep a constant flow of information to the public to condition them for more stringent measures.

c. Notify Parks Department to reduce their watering scheduling to twice per week.

d. Coordinate with other departments on the structure to conduct a voluntary and nonvoluntary water restriction program (see Appendix 10).

d. Conduct training necessary to implement the water restriction program.

e. Prepare all administrative processes (forms, affidavits, maps, offices, etc.) for the restriction program.

2. Stage 2: "Drought Warning":

A **Drought Warning** phase will be issued when;

i) the combined storage level of Lakes Kickapoo and Arrowhead declines to 50% total storage capacity, or

ii) demand exceeds design treatment capacity for 3 days after a drought watch has been declared (or exceeds 110% of design), or

iii) the water supply system is unable to deliver water due to mechanical failure or damage of major water system components which will require more than 48 hours to repair, if a Drought Watch is in progress.

This phase will consist of the first stage of conservation and supply augmentation measures. If the warning is the result of treatment capacity limitations, Stages 1-3 of the Plan will be implemented, as appropriate.

When a **Drought Warning** is declared, a number of actions will commence. The purpose of this stage of action is to reduce the current net withdrawal from the reservoirs by at least 15%.

The Director of Public Works will cause the following actions to be taken:

a. Mail a copy of the Conservation Ordinance (Appendix 11) and the Water Rationing Zone Map (Appendix 12), with a cover letter describing the drought conditions, to each water account.

It shall be unlawful for any person, firm, corporation or entity to:

- Run outside irrigation systems (including sprinklers, automatic sprinkler systems and unattended water hoses) except on the day of the week permitted for the area as identified on the attached water rationing zone map (Appendix 12).
- Run any type of outside watering on any day of the week between 11:00 a.m. and 6:00 p.m., except as authorized by subsection (d)(1) of the Conservation Ordinance.
- Wash any motor vehicle at any location other than a commercial car wash, car dealership, detail shop or automotive shop.
- Conduct fundraising car washes during the time of the drought warning.
- Wash sidewalks, driveways, or concrete slabs unless an immediate health or safety risk is present.

b. Form a Drought Emergency Task Force to guide the remainder of this drought emergency plan and to interface with the public.

c. Every available forum will be used to continue to educate the general public regarding the status of our water supply and to make pleas for water conservation. This can be accomplished by various means including, but not limited to news letters; the electronic and printed media; billing statements; closed circuit television bulletin board; eliciting the aid of civic organizations such as service clubs, scouting organizations, etc; working through the public school districts to ask the full support of all classroom teachers.

d. All leaks in the raw water and treated water system will be repaired immediately, without waiting for the most cost effective time.

e. Water pressure from the treatment plants will be reduced to the minimum to maintain 35 pounds per square inch pressure in the distribution system and to provide adequate pressure and flow for fire fighting.

f. All citizens will be encouraged to immediately alter water use habits using the techniques indicated at Appendix 13.

g. Non-essential operational uses of water by City crews should be suspended (for example the flushing of water mains and fire hydrants; street sweeping; water jet cleaning of sanitary sewer mains; training of fire fighters; watering by Parks Dept.).

h. Notify Parks Department to reduce watering to once per week. Only enough water to support the trees. Parks Department will allow grass to turn brown.

i. Encourage competitive challenges between neighborhoods, sectors of the society, industries, and other groups for reduction of water consumption.

j. Adopt a reduced schedule for outside uses of water for irrigation and other ascetic purposes. Appendix 13 has the framework of such a program that has been developed from previous experience.

k. Notify all wholesale customers of the situation and ask each to adopt similar reduction goals for their systems in accordance with their individual contracts with the City of Wichita Falls. Pro rata curtailment by wholesale customers will be based upon their contractual limits as provided in Texas Water Code § 11.039.

l. Implement water conservation surcharge for excessive use.

3. Stage 3: "Drought Emergency":

A **Drought Emergency** will be declared when;

i) the combined storage level of Lakes Kickapoo and Arrowhead drops to 40% of the total conservation pool storage capacity, or

ii) demand exceeds design capacity for 4 weeks (or exceeds design capacity by 115%), or

iii) the water supply system is unable to deliver water due to mechanical failure or damage of major water system components which will require more than 24 hours to repair, if a Drought Warning is in progress.

The drought emergency will remain in effect until the drought has been broken and sufficient water has been captured in the reservoirs to exceed the 40% level with a reasonable expectation that the drought is permanently broken. This phase consists of the imposition of non-voluntary and restrictive measures.

When a **Drought Emergency** is declared, action will be taken to reduce the current net withdrawals from the reservoirs by an additional 20% or more.

The Director of Public Works will initiate these actions:

a. Continue all Stage 2 actions as supplemented and amplified by the Stage 3 requirements below.

b. Tighten the restriction on non-essential outdoor uses of water (sprinkling; gardening; washing of cars; filling of public or private swimming pools) to fewer days per week. A program for

implementing and enforcing a restriction on outdoor use of water is at Appendix 10.

c. Monitor all Fire Hydrant Meters that are for contractor use, to determine what conservation can be achieved through this type of water usage.

d. Specify and impose the additional mandatory reductions on wholesale (raw or treated) customers.

e. Renew and increase public education and conservation plea efforts.

f. Establish a program for Stage 4 which will allow restriction on the essential uses of water and prepare for implementation.

g. Implement increased surcharges for excessive use.

4. Stage 4: Drought Disaster.

A **Drought Disaster** will be declared when;

i) the mandatory restrictions on non-essential uses does not adequately slow the withdrawal, and when the combined capacity of Lakes Arrowhead and Kickapoo reaches 30% of the storage, or

ii) the demand exceeds 120% of design capacity, or

iii) the water supply system is unable to deliver water due to mechanical failure or damage of major water system components which will require more than 12 hours to repair, if a Drought Emergency is in progress, or

iv) the water system is contaminated either accidentally or intentionally, or

v) the water system fails from acts of nature (tornadoes, electrical storms, etc.) or man.

The Director of Public Works shall impose mandatory restrictions on essential uses of water and take the following actions to include, but not limited to:

a. Place a total ban on the outdoor use of water for nonessential uses. This shall include the possible removal of all irrigation meters from residences and businesses.

b. Suspend service to and pull all Fire Hydrant Meters for contractor use, until conditions return to a Drought Emergency status.

c. Continue an aggressive public relations and education program.

d. Implement enforceable restrictions on essential uses as developed in Stage 3.

E. System Priorities

During the planning portions of Stages 2, 3 & 4 the following system priorities will be established and utilized in decision making processes during drought conditions. Those users with the highest priority will be the last to have their water use restricted. The system priority is as follows:

1. Hospitals and essential Health Care Facilities
2. Residential
3. Educational Institutions (Schools, Colleges, Universities, etc.)
4. Industrial
5. Commercial
6. Irrigation
7. Recreational

F. Initiation and Termination of Drought Stages

The Director of Public Works shall declare that each “trigger level” has been reached and that the water use restrictions for each respective stage are in effect. The water restrictions will remain in effect until the lakes fill to a level that when combined with the long-term forecast, assures the City an adequate supply of water.

Once an adequate supply of water is available, the City Council, by majority vote, and after consultation with the Director of Publics Works, shall announce the end to each respective stage of the restrictions.

G. Goals for Use Reduction

The goals for water use reduction vary according to the stage of the drought condition and have been detailed in Section VI – D, above.

If circumstances warrant, the City Manager or his/her official designee can set a goal for greater water use reduction.

H. Procedures for Granting Variances/Exemptions

There are exemptions/variances from water restrictions provided for in the City's Code of Ordinances (see Appendix 11). These exemptions primarily apply to the commercial home building for the installation of new yards. The applicant must follow a permitting process that includes;

1. Making application to the City Public Works Department (see Appendix 14).
2. Pay a $50.00 non-refundable fee.
3. Agree to pay a water rate three (3) times the normal rate.
4. Display the brightly colored permit in a location that is easily seen from the street.

Patrolling employees are provided a list of permits, so they are not issued a citation for restricted water usage.

I. Procedures for Enforcement

Adoption of the Plan and Drought Contingency Ordinance has enabled the City to implement and carry out enforcement of enacted ordinances to make the Plan effective and workable. The Ordinance adopting the Water Conservation Plan/Drought Contingency Plan and the Ordinance allowing for enforcement of the Plan are included in Appendix 11. Users of City water who do not comply with the requirements of the drought contingency measures will be subject to a penalty and fine as described in the City Code of Ordinances for each day of non-compliance. These users will also be subject to disconnection or discontinuance of City water services.

VII. SUMMARY AND CONCLUSIONS

The demand for water, as for other natural resources, has grown substantially. The per capita consumption in the City of Wichita Falls has doubled in the past fifty years. This increase, coupled with the increase in population and sales to local towns and communities, has required the construction of new lakes, water treatment plants, water distribution systems, elevated and ground storage tanks, wastewater collection lines, and wastewater treatment plants. The construction of water and wastewater facilities becomes more and more expensive each year as federal and state regulatory agencies increase the standards of performance of all of the facilities involved. These increased standards require increasingly expensive technology, maintenance and operation.

The City of Wichita Falls is fortunate that it has enough water to meet current demands and reasonable future demands. Nonetheless, the natural resource and various facilities necessary to produce high quality water are finite and expensive. It is in the interest of each citizen that all of these resources be managed and used as efficiently as possible.

Conservation makes sense. This Water Conservation & Drought Contingency Plan contains programs that can slow or even halt the growth of the per capita consumption of water, reduce the waste of water, and make better use of the water resources available to the citizens, and at the same time, allow the City to continue to progress in important projects of beautification and industrial development to improve the overall quality of life of its citizens.