

WATER SUPPLY, EMERGENCY AND CONSERVATION PLANS

Joint Water Commission

Submitted to the
Department of Natural Resources
&
Metropolitan Council

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INTRODUCTION

This Water Supply, Emergency and Conservation Plan has been prepared by the Joint Water Commission (JWC) to comply with Minnesota Statutes 473.859, which requires a water supply plan be adopted as a component of the Public Facilities Plan. The Laws of Minnesota mandated by Chapter 186 of the 1993 Legislative Session require Public Water Suppliers serving more than 1,000 persons to submit a Water Supply Plan to the Department of Natural Resources (DNR).

This plan is also submitted to the Metropolitan Council as an amendment to the local comprehensive plan (Minn. Statutes 473.859) for communities with municipal water supplies in the seven-county Twin Cities Metropolitan Area.

The Water Supply Plan for the City of Minneapolis Water Works referenced in this document has been prepared pursuant to Minnesota Statutes 103G.291, subdivision 3, and is organized in accordance with the guidelines established by the DNR - Division of Waters and the Metropolitan Council.

Acknowledgements

The following JWC staff contributed to the preparation of this Report.

- Jeannine Clancy, Director of Public Works, City of Golden Valley
- Tom Mathisen, City Engineer, City of Crystal
- Guy Johnson, Director of Public Works, City of New Hope
- Bert Tracy, Maintenance Manager, City of Golden Valley
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- Bernie Weber, Utility Supervisor, City of New Hope

This plan was prepared by Environmental Financial Group, Inc., 818 West 46th Street, Suite 204, Minneapolis, Minnesota 55419 under contract to the Joint Water Commission

Summary

This Plan is divided in to four sections, as follows.

- ⇒ *Section 1- Water Supply System Description and Evaluation.* Adequacy of existing water sources and supply systems to provide current and projected demands.
- ⇒ *Section 2 - Emergency Response Plan.* Emergency response procedures and actions necessary to improve emergency preparedness.
- ⇒ *Section 3 - Water Conservation Pan.* Programs for reducing unnecessary water demand, improving efficiency, and minimizing water losses and waste.
- ⇒ *Section 4 - Items for Metropolitan Area Service Providers.* Comprehensive plan requirements applicable to communities in the seven-county Twin Cities Metropolitan Area.

Contact Persons

Any questions or concerns regarding this plan should be directed to:

Jeannine Clancy, Director of Public Works, City of Golden Valley, 7800 Golden Valley Road, Golden Valley, Minnesota 55427

Email: jclancy@ci.golden-valley.mn.us

Telephone: 763-593-8035

Tom Mathisen, City Engineer, City of Crystal, 4141 Douglas Road, Crystal, Minnesota 55422

Email: tmathisen@ci.crystal.mn.us

Telephone: 763-531-1160

Guy Johnson, Director of Public Works, City of New Hope, 4401 Xylon Avenue North, New Hope, Minnesota 55428

Email: gjohnson@ci.new-hope.mn.us

Telephone: 763-592-6766

SECTION 1: WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

A. Analysis of Water Demand Within the JWC Service Area

A.1. Water Use over the Past 10 Years

Tables 1-1 through 1-3 present data for population, service connections, total water sold, and average daily water demand for the cities of Crystal, Golden Valley, and New Hope, from 1998 to 2007. Table 1-4 presents similar information for the entire JWC service area, defined by the corporate limits of the three cities. The data was obtained from JWC member city pumping and water billing records. The JWC does not sell any wholesale water to other public water providers.

Population, volume of water sold and number of service connections have shown little variability over the last ten years. The population of JWC member cities has held steady or decreased very slightly. Variations in water use over the last ten years have been due mainly to variations in rainfall patterns and summer temperatures.

A.2. *Per Capita* Water Use

Per capita water use and *per capita* residential water use for the JWC is presented in Table 1-5. *Per capita* water use is determined by dividing the total water usage per day (including residential, commercial and industrial classes) by the total service area population and is expressed as gallons *per capita* per day (gpcd). Total *per capita* water use has averaged 105.5 gpcd over the last ten years.

Residential *per capita* water consumption is calculated by dividing the average residential daily water demand by the total population. It has averaged 81.1 gpcd during this period. This falls within the range normally expected for residential water use and is slightly above the average for the Twin Cities Metropolitan Area.

A.3. Water Demand by Customer Category

Historical annual water sales data is reported in three customer categories: residential, commercial and industrial. This information is presented in Tables 1-6, 1-7 and 1-8 for the three JWC member cities and in Table 1-9 for the JWC as a whole. Residential water sales has been the largest demand category in the JWC, averaging 98 percent of total water use in Crystal, 63 percent in Golden Valley and 75 percent in New Hope. Total water use for the JWC has averaged 77 percent residential, 18 percent commercial and 5 percent industrial.

As in all water systems, some of the water purchased from Minneapolis is never sold to water system customers. The difference between the water produced and the water sold is referred to as unaccounted-for water. It can result from many factors including unidentified leaks in the distribution system, water main breaks, periodic fire hydrant flushing, fire fighting and training, unmetered hockey rink flooding, municipal pool uses,

storage tank maintenance, unauthorized use, unmetered services, and inaccurate meters. Unaccounted-for water use below 10 percent can be usually explained by normal system leakage and meter inaccuracies and is considered acceptable.

JWC unaccounted-for water use is estimated by comparing the average annual water purchased from the City of Minneapolis with the average annual metered consumption of the JWC customers and is shown in Table I-10. Unaccounted-for water use has ranged from 5 to 13 percent of the total water purchased from Minneapolis.

Historically, the JWC has identified some inconsistencies in purchased and sold water data. In some years, the volume of water purchased from Minneapolis is reported as lower than the volume of water billed to customers. To remedy this, all three cities have replaced water meters within the last few years. In 2007, the JWC purchased and installed new intake meters for Crystal and Golden Valley reservoirs. In 2008, Minneapolis overbilled the JWC for several months due to assumed low meter readings. This was later found to be an erroneous assumption. The JWC works with the City of Minneapolis to calibrate water supply meters regularly.

A.4. Large Volume Customers

High volume users are defined as water customers that use more than five percent of the total water consumption in a service area. There are currently no high volume water consumers in the JWC service area.

A.5. Seasonal and Peak Water Demands

Typically, summer use averages 150 percent of winter use. High summer water use is due to a seasonal increase in non-essential water uses such as lawn and garden watering and recreational uses.

A.6. Water Use Trends

Water use trends have been stable over the past ten years with some variability due to seasonal climatic conditions.

B. Treatment and Storage Capacity

B.1. Water Treatment Plant Capacity

The JWC currently purchases treated potable water from the City of Minneapolis and does not have a water treatment plant. As the supplier of treated water, Minneapolis must deliver water to the JWC that meets Primary Drinking Water Standards. Minneapolis owns and operates two water treatment plants. Almost all of the water purchased by the JWC from Minneapolis is treated at its Fridley water treatment facility. The Fridley facility provides lime softening, filtration, fluoridation, and chlorination. Minneapolis plans to initiate membrane ultra-filtration treatment at the Fridley facility in 2012. The Columbia Heights plant currently provides membrane ultra-filtration in addition to filtration and chlorination.

B.2. Storage Capacity

The JWC water system operates as one pressure zone. The Golden Valley ground reservoir system consists of two 4.5 million-gallon (MG) tanks. The reservoirs typically receive water from the City of Minneapolis during the night between 11 p.m. and 6 a.m. Water from the reservoirs is then pumped into the distribution system by five vertical turbine pumps, each with a rated capacity of 4,000 gallons per minute (gpm). The Crystal ground reservoir system consists of two 4.5-MG tanks and one 10-MG tank located just north of the Crystal Utility Department. Similarly, Minneapolis typically fills the Crystal reservoirs between 11 p.m. and 6 a.m. There are five vertical turbine pumps in the booster station, each rated at 4,500 gpm.

The JWC water system has three elevated water tanks, one in Golden Valley and two in New Hope. These tanks offer a total of 3.5 million-gallons of operating storage. They are used to store water during low demand periods and release water during high demand periods, fire events, and emergency situations.

If the JWC were to experience an interruption in the Minneapolis water supply, reliance would be on the 31.5 million gallons of maximum operating storage in the five ground reservoirs and three elevated water tanks. This storage can continue to support the average daily demands for over four days, assuming all of the reservoirs and elevated water tanks are full. To date, storage has been adequate to meet all demands.

B.3. Source of Water Supply

The JWC currently purchases treated potable water from the City of Minneapolis and has no wells or surface water intakes. The JWC receives all of its water through metered interconnections with the Minneapolis system. The City of Minneapolis withdraws water from the Mississippi River at an intake structure located in the City of Fridley. The water is conveyed to water treatment facilities where it is treated to potable standards. It is distributed to the Minneapolis service area and surrounding suburbs including the JWC.

B.4. Wholesale or Retail Interconnections

The JWC maintains no wholesale or retail interconnections with other public water providers.

B.5. Emergency Interconnections

The JWC maintains no emergency interconnections with other public water providers.

C. Demand Projections

C.1. Projected Growth

Located in Hennepin County, the cities of Crystal, Golden Valley, and New Hope are first tier suburbs of the City of Minneapolis. During the 1950's and 1960's, the JWC member cities grew rapidly due to the post-war housing boom. By 1970, development reached

build-out. Since then, population has declined very slightly, attributable to shrinking household size from children growing up and leaving home. There are only a very few vacant parcels scattered throughout the planning area that are suitable for development. Development of these remaining parcels is not expected to significantly effect the population.

Current population projections may underestimate the potential for future population increases due to large-scale redevelopment. One such redevelopment opportunity is the MAC's Crystal Regional Airport site. The Crystal Comprehensive Plan has identified this potential redevelopment opportunity.

In the City of Golden Valley, several redevelopment projects have been realized over the past five to ten years. Due to their size, these projects have not had a significant impact on the City's population and water consumption.

The City of New Hope currently has a few relatively small redevelopment opportunities. There are some undeveloped lots zoned for industrial, commercial, and residential development, but they are small in scale and have limited potential to effect the overall population.

C.2. Projected Demand

Water use projections are based on the following assumptions:

- Continued stable or slightly declining population in the JWC area in accordance with the Metropolitan Council's projections;
- Reduced per capita water consumption due to enhanced water conservation efforts;
- A steady maximum-day to average-day water demand ratio of 2.4; and,
- A steady ratio of peak hourly to maximum daily water demand.

Crystal, Golden Valley and New Hope have ordinances that call for restrictions in water use only when the City Minneapolis restricts water use. Historical data reflects unrestricted water demands. Assuming that effective water conservation policies are adopted by Minneapolis, Crystal, Golden Valley and New Hope, *per capita* water use could be reduced from 80 gpcd in 2008 to 75 gpcd by 2013.

Peak-day demands from 1998 to 2007 were used to develop peak-day to average-day ratios for future years. Peak-day demands in the JWC have all occurred during the summer. Because the JWC water use shows significant seasonal variability, reducing seasonal use and corresponding peak-day demands will be a target of the JWC conservation plan. Projected peak-day to average-day ratios are projected to be 2.5 from 2008 through 2013 and beyond.

Tables 1-11, 1-12, 1-13 and 1-14 present projected water demands in Crystal, Golden Valley, New Hope and the JWC as a whole for the next ten years. To confirm the adequacy of the existing system to meet the projected demands, the storage and pumping capacity were analyzed. Average demand is expected to be 6.7 - 7.0 mgd and

projected maximum-day demand is expected to reach 17.42 mgd in the year 2017. Table 1-15 provides a summary of the capacity of the water supply components of the water system.

Based on the demand projections, the existing water supply is expected to be adequate to meet projected water demands through 2017 and beyond.

C.3. Storage

Operating storage must be sufficient to meet peak domestic and fire flow demands simultaneously. Because Minneapolis delivers water to the JWC between 11 p.m. and 6 a.m., the JWC must meet all demand from storage during off-delivery times.

The Insurance Services Office (ISO) recommends that the JWC be able to supply a 3,500 gpm fire flow for three hours (0.63 MG). Therefore, a maximum day demand with a fire condition requires 18.1 MG of water. The JWC's total storage capacity of 31.5 MG is sufficient to meet the maximum day plus fire flow condition.

C.4. Pumping Capacity

In addition to having sufficient storage capacity, there must also be adequate pumping capacity to meet the peak hour demands. Although peak hour data was not available for this planning analysis, peak hour demands were estimated using a peak hour to maximum day ratio of 2.0. This is a value commonly used for design purposes. Using 2.0 times the maximum day demand of 17.47 results in a required pumping capacity of 34.94 mgd. The JWC's firm pumping capacity of 49 mgd is more than adequate to meet peak hour pumping capacity requirements, even with fire flow requirements taken into consideration. Therefore, the existing pumping capacities are adequate to meet the projected demand.

C.5. Plans to Expand or Modify the System

Since the current water system is adequate to provide both storage and firm pumping capacities during maximum day demand through 2017, the JWC has no current plans and does not anticipate any future plans to expand or modify the system. Repair and replacement of worn equipment will take place on a regular schedule and as needed.

D. Resource Sustainability

The JWC currently purchases treated water from the City of Minneapolis, which uses surface water from the Mississippi River as its raw water source. While the JWC does not have any data to determine the adequacy of the Mississippi River to sustain current and projected demands, the Minneapolis water supply plan (July 2008) states that flows currently are ample. River flow rates have been identified as triggers for implementing emergency responses in drought conditions, but it is noted that the chances of the river dropping to the first level is currently less than 5%. Neither the JWC nor Minneapolis has data for estimating the impact of climate change on the adequacy of the river to meet future demands.

E. Capital Improvement Plan

The JWC has adopted a capital improvement plan to make renewals and replacements of its water distribution and storage system. The plan is reviewed and updated as needed.

E.1. Adequacy of Water Supply System

The JWC water system is adequately maintained for long-term operation.

E.2. Proposed Water Sources

In 2002 - 2005, the JWC evaluated the efficacy of replacing its Minneapolis supply with groundwater to be withdrawn from the Prairie du Chien / Jordan aquifer. To support this effort, the JWC sought and obtained legislative approval to develop this groundwater source subject to final DNR approval.

The JWC subsequently deferred these plans and entered into a new 20-year water purchase agreement with the City of Minneapolis. However, the JWC believes that a backup or supplemental water supply may indeed be necessary some time in the future and reserves the right to develop such a source if needed.

E.3. Water Source Alternatives

The JWC has identified groundwater from the Prairie du Chien / Jordan aquifer to be a viable alternative water source to serve its customers, either as a replacement for its existing Minneapolis river supply or to supplement that supply on either an ongoing or emergency basis.

TABLE 1-1: Historical Water Service Information - Crystal

Year	Population	Service Connections	Total Water Sold, MG	Average Day Water Demand, mgd
1998	23,677	7,707	732	2.01
1999	23,662	7,702	710	1.94
2000	22,698	7,388	749	2.05
2001	22,748	7,405	759	2.08
2002	22,840	7,435	650	1.78
2003	23,012	7,491	760	2.08
2004	22,831	7,432	662	1.81
2005	22,595	7,355	647	1.77
2006	22,700	7,389	681	1.87
2007	22,800	7,422	677	1.85
Average			703	1.92

Notes: City of Crystal

TABLE 1-2: Historical Water Service Information - Golden Valley

Year	Population	Service Connections	Total Water Sold, MG	Average Day Water Demand, mgd
1998	21,001	7,093	985	2.70
1999	21,037	7,105	944	2.59
2000	20,281	6,850	1,023	2.80
2001	20,391	6,887	1,060	2.90
2002	20,636	6,970	959	2.63
2003	20,736	7,003	1,055	2.89
2004	20,674	6,983	974	2.67
2005	20,510	6,927	977	2.68
2006	20,700	6,991	1,009	2.77
2007	20,900	7,059	1,041	2.85
Average			1,003	2.75

Notes: Source – City of Golden Valley

Year	Population	Service Connections	Total Water Sold, MG	Average Day Water Demand, mgd
1998	21,610	5,394	817	2.24
1999	21,632	5,399	788	2.16
2000	20,873	5,210	821	2.25
2001	20,910	5,219	877	2.40
2002	20,910	5,219	742	2.03
2003	20,910	5,219	812	2.23
2004	20,748	5,179	710	1.94
2005	20,747	5,179	788	2.16
2006	20,900	5,217	744	2.04
2007	21,000	5,242	754	2.07
Average			785	2.15

TABLE 1-3: Historical Water Service Information - New Hope

Notes: Source - City of New Hope

TABLE 1-4: Historical Water Service Information - Total JWC

Year	Population	Service Connections	Total Water Sold, MG	Average Day Water Demand, mgd
1998	66,288	20,194	2,534	6.94
1999	66,331	20,207	2,442	6.69
2000	63,852	19,448	2,594	7.11
2001	64,049	19,511	2,696	7.39
2002	64,386	19,624	2,350	6.44
2003	64,658	19,713	2,628	7.20
2004	64,253	19,593	2,346	6.43
2005	63,852	19,461	2,412	6.61
2006	64,300	19,597	2,435	6.67
2007	64,700	19,722	2,472	6.77
Average			2,491	6.82

Notes: Compiled from all three cities

TABLE 1-5: Per Capita Water Consumption - JWC Totals

Year	Population	Total Water Sold, gallons	Residential Water Sold, gallons	Residential, gpcd	Total, gpcd
1998	66,288	2,534,433,352	1,956,908,870	80.9	104.7
1999	66,331	2,441,906,999	1,881,033,102	77.7	100.9
2000	63,852	2,593,693,190	1,992,727,285	85.5	111.3
2001	64,049	2,695,781,943	2,058,127,457	88.0	115.3
2002	64,386	2,350,147,868	1,801,990,216	76.7	100.0
2003	64,658	2,627,680,940	2,049,560,696	86.8	111.3
2004	64,253	2,345,746,072	1,816,041,059	77.4	100.0
2005	63,852	2,412,241,872	1,832,308,676	78.6	103.5
2006	64,300	2,434,561,020	1,858,794,019	79.2	103.7
2007	64,700	2,471,696,246	1,886,918,882	79.9	104.7
Average				81.1	105.5

TABLE 1-6: Annual Water Sales - Crystal

Year	Water Sold, Residential, gallons	Water Sold, Commercial, gallons	Water Sold, Industrial, gallons	Total
1998	733,722,170	12,369,670	13,523,840	732,291,252
1999	695,483,165	10,769,592	3,423,942	709,676,699
2000	735,482,687	11,235,190	2,246,163	748,964,040
2001	742,720,644	11,360,322	4,571,377	758,652,343
2002	635,442,123	9,751,165	4,456,680	649,649,968
2003	746,494,388	11,309,807	2,279,744	760,083,940
2004	650,569,725	9,935,465	1,315,486	661,820,676
2005	633,700,202	9,779,939	3,812,131	647,292,272
2006	667,268,738	10,209,963	3,406,819	680,885,520
2007	663,008,257	10,144,772	3,385,067	676,538,096
Average	690,389,210	10,686,589	4,242,125	702,585,481
Percentage	98.3%	1.5%	0.6%	100.0%

TABLE 1-7: Annual Water Sales - Golden Valley

Year	Water Sold, Residential, gallons	Water Sold, Commercial, gallons	Water Sold, Industrial, gallons	Total
1998	628,422,000	267,208,000	67,308,000	985,447,000
1999	593,916,009	245,639,329	104,470,662	944,026,000
2000	643,554,476	277,335,235	102,408,290	1,023,298,000
2001	659,784,270	290,559,423	109,710,407	1,060,054,100
2002	607,070,807	256,964,101	94,853,092	958,888,000
2003	701,168,000	266,348,000	87,789,000	1,055,305,000
2004	628,107,000	257,906,000	88,155,000	974,168,000
2005	612,975,000	257,995,000	106,001,000	976,971,000
2006	632,312,000	270,864,000	106,229,000	1,009,405,000
2007	654,717,115	270,786,223	115,165,662	1,040,669,000
Average	636,202,668	266,160,531	98,209,011	1,002,823,110
Percentage	63.4%	26.5%	9.8%	100.0%

Year	Water Sold, Residential, gallons	Water Sold, Commercial, gallons	Water Sold, Industrial, gallons	Total
1998	594,764,700	187,448,200	23,647,200	816,695,100
1999	591,633,928	180,562,619	16,007,753	788,204,300
2000	613,690,122	173,311,487	34,429,542	821,431,150
2001	655,622,543	185,269,161	36,183,795	877,075,500
2002	559,477,286	170,478,859	11,653,755	741,609,900
2003	601,898,308	187,629,083	22,764,610	812,292,000
2004	537,364,334	149,828,887	22,564,175	709,757,396
2005	585,633,474	181,065,852	21,279,274	787,978,600
2006	559,213,280	155,355,595	29,701,625	744,270,500
2007	569,193,510	173,439,499	11,856,141	754,489,150
Average	586,849,148	174,438,924	23,008,787	785,380,360
Percentage	74.7%	22.2%	2.9%	100.0%

TABLE 1-8: Annual Water Sales - New Hope

TABLE 1-9: Annual Water Sales - Total JWC

Year	Water Sold, Residential, gallons	Water Sold, Commercial, gallons	Water Sold, Industrial, gallons	Total
1998	1,956,908,870	467,025,870	104,479,040	2,534,433,352
1999	1,881,033,102	436,971,541	123,902,356	2,441,906,999
2000	1,992,727,285	461,881,911	139,083,994	2,593,693,190
2001	2,058,127,457	487,188,906	150,465,580	2,695,781,943
2002	1,801,990,216	437,194,124	110,963,527	2,350,147,868
2003	2,049,560,696	465,286,890	112,833,354	2,627,680,940
2004	1,816,041,059	417,670,352	112,034,662	2,345,746,072
2005	1,832,308,676	448,840,791	131,092,405	2,412,241,872
2006	1,858,794,019	436,429,558	139,337,444	2,434,561,020
2007	1,886,918,882	454,370,494	130,406,870	2,471,696,246
Average	1,913,441,026	451,286,044	125,459,923	2,490,788,950
Percentage	76.8%	18.1%	5.0%	100.0%

TABLE 1-10: Unaccounted for Water - JWC Total

Year	Total Water Sold, gallons	Total Water Purchased from Minneapolis, gallons	Unaccounted-for Water	% of Unaccounted- for Water
1998	2,534,433,352	2,780,344,424	245,911,072	9.7
1999	2,441,906,999	2,738,238,856	296,331,857	12.1
2000	2,593,693,190	2,906,259,000	312,565,810	12.1
2001	2,695,781,943	2,941,858,000	246,076,057	9.1
2002	2,350,147,868	2,578,580,000	228,432,132	9.7
2003	2,627,680,940	2,973,195,000	345,514,060	13.1
2004	2,344,746,072	2,635,414,000	290,667,928	12.4
2005	2,412,241,872	2,610,980,000	198,738,128	8.2
2006	2,435,191,020	2,632,546,000	197,354,980	8.1
2007	2,471,696,246	2,672,185,000	200,488,754	8.1
Average	2,243,582,326	2,479,741,528	236,159,202	10.5

TABLE 1-11: Projected Water Demand - Crystal

Year	Population Served	Per Capita Residential Use (gpcd)	Average Day Use (MG)	Maximum Day Use (MG)	Annual Water Use (MGal)
2008	22,700	80	1.9	4.75	676
2009	22,700	79	1.9	4.75	668
2010	22,700	78	1.9	4.75	660
2011	22,700	77	1.9	4.75	652
2012	22,700	76	1.9	4.75	643
2013	22,700	75	1.9	4.75	635
2014	22,700	75	1.9	4.75	635
2015	22,700	75	1.9	4.75	635
2016	22,700	75	1.9	4.75	635
2017	22,700	75	1.9	4.75	635

Year	Population Served	Per Capita Residential Use (gpcd)	Average Day Use (MG)	Maximum Day Use (MG)	Annual Water Use (MGal)
2008	20,800	86	2.8	7.00	1,032
2009	21,000	83	2.8	7.07	1,013
2010	21,200	80	2.9	7.13	996
2011	21,400	77	2.9	7.20	979
2012	21,600	75	2.9	7.27	968
2013	21,800	75	2.9	7.34	974
2014	22,000	75	3.0	7.40	979
2015	22,200	75	3.0	7.47	985
2016	22,500	75	3.0	7.57	993
2017	22,800	75	3.1	7.67	1,001

TABLE 1-12: Projected Water Demand - Golden Valley

TABLE 1-13: Projected Water Demand - New Hope

Year	Population Served	Per Capita Residential Use (gpcd)	Average Day Use (MG)	Maximum Day Use (MG)	Annual Water Use (MGal)
2008	21,000	73	2.0	5.00	745
2009	21,000	73	2.0	5.00	745
2010	21,000	74	2.0	5.00	752
2011	21,000	74	2.0	5.00	752
2012	21,000	74	2.0	5.00	752
2013	21,000	74	2.0	5.00	752
2014	21,000	74	2.0	5.00	752
2015	21,000	74	2.0	5.00	752
2016	21,000	74	2.0	5.00	752
2017	21,000	74	2.0	5.00	752

TABLE 1-14: Projected Water Demand - JWC Total

Year	Population Served	Per Capita Residential Use (gpcd)	Average Day Use (MG)	Maximum Day Use (MG)	Annual Water Use (MGal)
2008	64,500 	80	6.7	16.75	2,453
2009	64,700 	78	6.7	16.82	2,426
2010	64,900 	77	6.8	16.88	2,408
2011	65,100 	76	6.8	16.95	2,382
2012	65,300 	75	6.8	17.02	2,364
2013	65,500 	75	6.8	17.09	2,361
2014	65,700 	75	6.9	17.15	2,367
2015	65,900 	75	6.9	17.22	2,372
2016	66,200 	75	6.9	17.32	2,380
2017	66,500 	75	7.0	17.42	2,389

TABLE 1-15: Water Supply System Capacity

Water Supply System	Capacity (mgd)
Total Pumping Capacity	61.2
Firm Pumping Capacity*	49.0
Ground Reservoir System	28.0
Elevated Tank Storage Volume	3.5

Notes: *Firm Pumping Capacity = Pumping capacity when largest pump is out of service

SECTION 2: EMERGENCY RESPONSE PLAN

The purpose of the Emergency Plan is to increase emergency preparedness and to provide the Joint Water Commission (JWC) with a course of action to follow during conditions that require a curtailment of water service. Potential situations that could reduce water service include natural disasters such as drought, flood, tornado, contamination of the Mississippi River, or operational difficulties with JWC or Minneapolis treatment or distribution systems. The Emergency Plan for the public water system should be incorporated into an overall emergency plan for each of the member cities, which would also include the areas of electrical power, police, and fire departments. The plan should also be closely coordinated with the City of Minneapolis.

Emergency Response Plan	Contact Person	Contact Number
Emergency Response Lead	Jeannine Clancy	763-593-8035
Alternate Emergency Response Lead	Tom Mathisen/ Guy Johnson	763-531-1160 763-592-6766

A. Emergency Response Procedures

A.1 - Emergency Telephone List

In the event of an emergency, it is critical that the appropriate individuals and agencies are contacted. Emergency Telephone Lists, Table 2-1 and 2-2, have been created that provide information for all JWC staff, representatives from Minneapolis, and other agency officials that would need to be contacted in the event of a water emergency. The telephone lists should be posted conspicuously at key locations within the water supply and distribution system.

Table 2-3 lists individuals from the JWC member cities and the City of Minneapolis who are part of the Emergency Event Evaluation Team. During an emergency, these people will evaluate the condition, contact the appropriate agencies and determine the best response.

All of these tables should be reviewed and updated yearly by the JWC.

JWC and member city staff receiving phone calls from the public need to be trained to collect all necessary information when an individual contacts the JWC to report an

emergency condition. In addition, the JWC should have an emergency response form that is available to staff and operators. This form would ensure that all critical information is reported. Some items to be considered in the emergency form include the following:

1. Name, phone number, and address of individual reporting the emergency;
2. City staff member who recorded the information, and the date and time the emergency was reported;
3. Address or approximate location of the emergency site;
4. A brief description of the emergency;
5. Any conditions at the site of which emergency staff should be aware;
6. Others who might have been contacted regarding this emergency condition (including any actions being taken by them);
7. Any emergency personnel currently on site; and,
8. Any other critical information.

Table 2-4 lists items that need to be considered in the emergency form.

B. Current Water Sources and Service Area

The cities of Crystal, Golden Valley, and New Hope share a water system that is owned and operated by the JWC. The system serves a population of 66,000. The JWC purchases treated water from the City of Minneapolis, supplied through two metered connections to the Minneapolis water system. The JWC system provides 3.5 million gallons of elevated storage and 28.0 million gallons of ground storage. Water is pumped into the system by booster stations located in Crystal and Golden Valley.

C. Procedure for Augmenting Water Supplies

Potential sources of water that can be used to augment or replace existing sources have been examined and are presented below.

C.1 - Interconnections with Adjacent Communities.

The JWC receives their water from the City of Minneapolis. There are two separate connections to the Minneapolis system, a 36-inch connection in Crystal and a 48-inch connection in Golden Valley. The water purchase agreement between the JWC and the City of Minneapolis requires the JWC to receive prior written approval for any interconnections between the JWC system and those of its neighbors. Through the work of a 2005-2008 Joint Water Task Force comprised of Minneapolis and JWC elected officials, blanket approval for such interconnections was granted to the JWC. While the JWC currently has no interconnections with adjacent communities other than the Minneapolis connections, it has investigated interconnections with the cities of St. Louis Park, Plymouth, Brooklyn Park, and Robbinsdale. While St. Louis Park does not have adequate

water supply capacity to meet both its maximum daily demands and that of the JWC, the Cities of Brooklyn Park and Plymouth are interested in interconnections with the JWC system. Both of these water systems have sufficient excess capacity during average-demand conditions and Brooklyn Park has excess capacity during maximum-day conditions.

C.2 - Public Water Supply Systems

The JWC does not provide water to any other water systems.

New Hope. New Hope has a water supply well located adjacent to its north water tower. It is estimated to be able to produce up to 1.4 mgd and could be used by the JWC on a continuous basis. The JWC has developed preliminary engineering plans to utilize this well in an emergency.

The JWC has recently evaluated use of the Prairie du Chien / Jordan aquifer to provide a backup or supplemental water supply on an emergency basis. In addition to the private water supply sources described below, the JWC is also evaluating the development of Prairie du Chien / Jordan aquifer wells to provide either an interim source of emergency water supply and potential long-term permanent supply.

C.3 - Private Water Supply Sources

Connecting to private wells requires that the private-well owner has sufficient extra capacity to provide water to the JWC.

General Mills. General Mills has two office campus locations in Golden Valley: the Main Campus and the James Ford Bell (JFB) Technical Center. Over the past several months, the JWC has worked with General Mills on various plans to utilize these wells in an emergency. General Mills has granted preliminary approval to use two of the Main Campus wells and two of the JFB wells on an emergency basis, subject to a continued collaborative engineering planning and design effort.

General Mills has granted preliminary approve for the JWC to use its Main Campus well nos. 3 and 4 on an emergency basis, either short- or long-term. The JWC has developed engineering plans to connect those wells to its system. Based on recent engineering investigation, those wells can provide 3.4 mgd on a continuous basis during an emergency. The JWC has also recently evaluated JFB well nos. 2 and 3. General Mills has also granted preliminary approval for use of those wells by the JWC on an emergency basis, either short- or long-term. Based on recent engineering investigation, those wells can also provide 3.4 mgd on a continuous basis during an emergency. Total General Mills supply sources can therefore provide the JWC a total of 6.8 mgd on a continuous emergency basis. This is approximately equal to JWC average daily winter demands.

C.4 - Conjunctive Use of Surface Water and Groundwater

The JWC currently relies on surface water from the Mississippi River that has been treated and conveyed to the JWC by the City of Minneapolis. An interconnection with other contiguous public water providers would provide the JWC with a groundwater source that

could be used in the event of an emergency. Currently, there are no plans to develop such interconnections for anything other than an emergency source of supply.

C.5 - Alternative Sources of Water

Currently, there are no alternative sources of water available for the JWC to meet daily water demands. The JWC understands the risk that a sole river supply poses. The JWC has discussed both drought conditions and river water contamination as different shortage situations. In the event of a drought, it is likely that the Mississippi River would be maintained as a viable source because of river controls upstream of the Twin Cities. The JWC would also initiate demand reduction measures to reduce river withdrawals in this case.

Contamination of the Mississippi River presents a different emergency situation. In this case, it would be favorable to have interconnections with suppliers that provide water from an alternate source. In pursuing interconnections with public and private water providers, the JWC not only increases their potential water supply, but also adds alternative sources. While mixing groundwater and surface water can produce water that is aesthetically unpleasant, it would be acceptable in an emergency situation.

D. Demand Reduction Measures

Minnesota Statutes 103G.261 establishes priorities for water allocation during periods of limited water supply. These definitions are included in Section 2 part E. Based on these priorities, much of JWC water use is considered First Priority, or residential, use. Commercial and industrial users that consume less than 10,000 gallons per day are considered Second Priority users. The JWC has no Third or Fourth Priority water users. Commercial and industrial users who use more than 10,000 gallons per day are considered Fifth Priority users. Sixth Priority includes non-essential water uses such as lawn sprinkling, vehicle washing, and golf course and park irrigation.

In the event that a short-term demand reduction is deemed necessary, the JWC's Emergency Event Evaluation Team would meet and decide what measures to take. Following is a list of potential reduction measures.

Stage 1: Voluntary Reduction Measures: Contact the media including local television, radio stations and newspapers and issue a notice to the member cities that there is an imminent water shortage and request voluntary water use reduction by the residents. Voluntary reduction measures could include odd/even sprinkling, reducing vehicle washing, minimizing bath use, reducing shower length, and other measures to reduce water use, mainly among domestic users. The impacts of voluntary reductions in water use are difficult to determine, as data from conservation and non-conservation periods are not available. The amount saved will likely be minimal in the first years of use before public education efforts are realized. An average reduction in per capita use of 1 gallon per day would reduce demand by 0.07 mgd (one-percent of total daily demand).

Stage 2: Mandatory Bans: Sprinkling and vehicle washing bans would be implemented in an extreme emergency. The sprinkling ban ordinance makes violation of the sprinkling ban a petty misdemeanor that could result in a citation. People who do not pay their fines can be held in contempt of court. Theoretically, the sprinkling ban should nearly

eliminate 6th priority use which was estimated as 0.37 mgd (or five percent of the total daily water demand) based on 1994 water use data.

Stage 3: Mandatory Water Allocation Restrictions: Based on the length and severity of the emergency conditions, water use should be decreased based on the priorities defined in Part II.E.

E. Procedures for Water Allocation

The following procedure for water allocation is required by Minnesota Statute 103G.261.

First Priority. Domestic water supply, excluding industrial and commercial uses of municipal water supply, and use for power production that meets the contingency planning requirements. According to MN Rules 6115.0630, Subp. 9, domestic use is defined as use for general household purposes for human needs such as cooking, cleaning, drinking, washing, and waste disposal, and for on-farm livestock watering excluding commercial livestock operations which use more than 10,000 gallons per day.

Second Priority. Water uses involving consumption of less than 10,000 gallons per day.

Third Priority. Agricultural irrigation and processing of agricultural products involving consumption in excess of 10,000 gallons per day.

Fourth Priority. Power production in excess of the use provided for in the contingency plan developed under the first priority.

Fifth Priority. Uses, other than agricultural irrigation, processing of agricultural products, and power production, involving consumption in excess of 10,000 gallons per day.

Sixth Priority. Nonessential uses. These uses are defined by Minnesota Statutes 103G.291 as lawn sprinkling, vehicle washing, golf course and park irrigation, and other non-essential uses.

Allocation procedures should distribute water equitably within each water use priority and customer category. Non-essential uses of water are the lowest use priority and will be the first water use subject to allocation restrictions. Quick responses to restrict non-essential uses of water during periods of limited supplies will help protect domestic and economic uses of water.

Water used at hospitals, nursing homes, and similar types of facilities should be designated as high priority to be maintained in an emergency. Local water allocation should address water used for other human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. Domestic use must have priority over economic needs.

The JWC plans to inform all water customers of their water allocation priority classification and provide them with information on potential demand reduction procedures.

F. Triggers for Implementing Plan Components

An important part of reducing short-term demand is establishing triggers for implementing the various water reduction measures. The JWC is dependent on its storage reservoirs, pumping capacity, the connections with the Minneapolis distribution system and the Mississippi River source to meet water demands. During an emergency condition, the JWC could get water from the City of Minneapolis, the proposed interconnect with St. Louis Park, private wells, or under an extreme emergency, by bringing in portable water treatment plants to treat water from one of the local lakes or distributing bottled water.

The critical components of the JWC system are the total storage volume, operation of the ground storage pumping facilities and the availability of water from Minneapolis. Criteria for implementing short-term reduction measures are designed to reflect restrictions in these supply components due to high demand periods, equipment failure, or limited water source capacity. Table 2-4 presents guidelines to be considered by the Emergency Evaluation Team in the event of an emergency condition that warrants a short-term reduction in demand.

The combined storage of 31.5 MG can provide more than six times the current average winter-day demand of 5 mgd. During periods of limited supply from Minneapolis, the system would have adequate storage to supply average winter-day demand for up to six days, depending on how full the storage tanks were at the initiation of the event. Voluntary water use reductions should occur when storage falls below 12 MG. Mandatory reductions in non-essential uses should be implemented when demands cause storage to fall below 8 MG. Second and 5th-priority water use will be constrained when demands cause storage to remain below 7 MG.

The JWC and the City of Minneapolis will need to coordinate closely in the event of a water supply shortage. In the event of a long-term water shortage, such as contamination of the Mississippi River, the JWC would rely on a future interconnection or an alternative supply.

G. Enforcement

A critical factor in an effective reduction in short-term demand is enforcement. Police, JWC member city staff, and concerned citizens can provide monitoring to ensure that all residents comply.

Currently, Crystal and New Hope both have ordinances for controlling short-term water demand. The portion of the New Hope City Code that relates to short-term water demand is below:

5.08 Water Sprinkling Ban.

5.081 Purpose. The City Council has determined that in certain drought conditions it may become necessary for the protection of the health, welfare and safety of the citizens

of New Hope to conserve the water supply of the City by imposing a water sprinkling ban on all residential, commercial and industrial lawn and garden vegetation. Also, New Hope's contract with the City of Minneapolis for the purchase of water requires the imposition of a water-sprinkling ban at the direction of the City of Minneapolis. The purpose of this section is to set forth the nature and extent of the regulations controlling any sprinkling ban imposed by the Council.

5.082 Resolution Imposing Ban. All water sprinkling bans shall be imposed by adoption of a resolution at any regular or special meeting of the New Hope City Council. The resolution shall set forth the duration of the ban, whether the ban shall be partial or absolute, if a partial ban, whether it shall apply to lawns and boulevards only or also to gardens, new sod and/or new tree saplings, the days or schedule when sprinkling will be permitted under a partial ban, and any other regulations that the City Council deems reasonable and appropriate. Said ban shall become effective immediately upon the adoption of said resolution.

5.083 Notice of Ban. The resolution imposing the sprinkling ban shall be published once in the official newspaper of the City and conspicuously posted in four places throughout the City. Any deficiencies in this notice requirement shall invalidate the ban.

5.084 Enforcement. A violation of this section shall be a petty misdemeanor. However, a first offense shall not result in the issuance of a ticket. The owner, any occupant of legal age or party responsible for water billing shall be first issued a warning ticket upon the first violation of the water-sprinkling ban. A warning letter mailed to the occupant of the property or the individual responsible for the water billing at the violating property shall satisfy the warning notice requirement of this section. Each act of violation, and each day a violation occurs or continues, constitutes a separate offense.

Following is the portion of the Crystal City Code that relates to short-term water demand:

715.29 Restrictions against sprinkling; other limitations of water use. Water customers and consumers are governed by the applicable regulations promulgated by the City of Minneapolis as to the limitations in the time and manner of using water and such other applicable regulations promulgated by the JWC affecting the preservation, regulations and protection of the water supply. If the City Council determined that a shortage of water supply threatens the City, the council may by resolution limit the times and hours during which water may be used for anything other than in-home use during the period covered by the resolution. A daily penalty will be charged for this violation as provided in Appendix IV. Charges will be added to that person's next utility bill.

The City of Golden Valley does not have any ordinances regulating water use. Based on the water supply contract with Minneapolis, water restrictions are implemented in accordance with those of Minneapolis.

H. Water Supply Protection

H.1. Analysis of Previous Supply Problems

The JWC has not had any previous problems supplying its customers. Sprinkling bans have been implemented in compliance with the JWC's agreement with Minneapolis as necessary.

H.2. Wellhead Protection

Since the JWC does not use groundwater as a water source, they are not required by the Minnesota Department of Health to submit a Wellhead Protection Plan.

H.3. Resource Monitoring

The JWC does not maintain or collect information on water levels and withdrawals from the Mississippi River. Refer to the City of Minneapolis Water Supply Plan for more information.

TABLE 2-1: Emergency Response Telephone List (JWC Staff)

Individual	Title	Work Phone	FAX	Pager	Mobile
City of Crystal					
Randy Kloepper	Utility Supt.	763-531-1166	763-531-1100		763-274-8301
Tom Mathisen	City Engineer	763-531-1160	763-531-1188	952-235-1500	612-750-5566
Anne Norris	City Manager	763-531-1140	763-531-1188		612-270-4638
City of Golden Valley					
Dave Lemke	Utility Supervisor	763-593-8075	763-593-3988		763-286-8891
Bert Tracy	Maintenance Manager	763-593-3981	763-593-8024		763-286-7014
Jeannine Clancy	Dir. Pub. Works	763-593-8035	763-593-3988		763-286-8895
Tom Burt	City Manager	763-593-8003	763-593-8109		
City of New Hope					
Bernie Weber	Utility Supervisor	763-592-6762	763-592-6776		763-286-2796
Guy Johnson	Dir. Pub. Works	763-592-6766	763-592-6776	612-660-0987	763-286-0754
Kirk McDonald	City Manager	763-531-5112	763-531-5136		

TABLE 2-2: Emergency Response Telephone List (Adjacent Communities)

Organization	Contact	Title	Work Phone
ADJACENT COMMUNITIES			
City of Minneapolis	Chris Catlin	Minneapolis Public Works	612-661-4904
City of St. Louis Park	Scott Anderson	Water Superintendent	952-924-2557
LOCAL AGENCIES			
Hennepin County Office of Emergency Preparedness (OEP)	Notify for Stage 3 reduction measures and community disaster assistance	-	612-930-2525
Metropolitan Council	Chris Elvrum	Senior Planner	651-602-1066
MINNESOTA STATE AGENCIES			
Department of Health		District Engineer for the Metropolitan North District	651-215-0749
Department of Natural Resources	Jim Japs	Coordinator, Water Appropriation Permit Program	651-297-2835
Department of Public Safety	-	Minnesota Duty Officer	651-649-5451

TABLE 2-3: Emergency Event Evaluation Team

Person	Assignment*
Tom Mathisen - City of Crystal	Contact - St. Louis Park
Jeannine Clancy - City of Golden Valley	Contact - DNR
Guy Johnson - City of New Hope	Contact - Department of Health
Shahin Rezania or Chris Catlin - City of Minneapolis	Contact - Metropolitan Council

Notes: *Specific Assignments will be determined by the EEET.

TABLE 2-4: Triggers to Reduce Short-Term Demand

Short-Term Reduction Measure	Triggering Mechanism
Stage 1 - Voluntary odd/even sprinkling ban (will reduce 6 th priority water use)	When City of Minneapolis adopts Stage 1 reduction measure, or When total storage volume drops below 12 MG, or When it is anticipated that demand will exceed 90% of firm pumping capacity
Stage 2 - Mandatory sprinkling ban (will almost eliminate 6 th priority water use)	When City of Minneapolis adopts Stage 2 reduction measure, or When total storage volume drops below 8MG, or When it is anticipated that demand will exceed 100% of firm pumping capacity
Stage 3 - Mandatory water allocation restrictions - Eliminate 6 th priority and constrain 2 nd through 5 th priority allocation	When City of Minneapolis adopts Stage 3 reduction measure, or When mandatory sprinkling ban does not maintain storage levels above 7 MG, or When it is anticipated that demand will exceed 110% of firm pumping capacity

SECTION 3: WATER CONSERVATION PLAN

The purpose of this water conservation plan is to set forth goals to manage the use of water resources and programs to address them. Both short-term and long-term water demand reduction goals and measures are discussed in this plan. Short-term, emergency water demand reductions would be accomplished in part by implementing the emergency plan procedures presented in Part 2 of this Water Supply Plan. Longer-term water conservation measures that help to increase overall water use efficiencies and reduce the need for short-term measures in an emergency situation are presented in this part of the Water Supply Plan.

In developing this conservation plan, the JWC is focused on the impact of drought on Mississippi River water supplies and the need to address such a contingency through both short-term emergency measures and long-term water demand reduction efforts. This is of particular urgency due to the potential impact of climate change on long-term reliability of river flows. The City of Minneapolis, which provides all of the JWC's water, relies on the Mississippi River for its entire supply. There is no backup supply available, although Minneapolis has been in discussions with the City of St. Paul about the construction of an emergency interconnection that may provide some measure of temporary relief in the event of an emergency.

During 2007, the Mississippi River watershed upstream of St. Anthony Falls experienced drought conditions. In the event that it became necessary for the U.S. Army Corps of Engineers to request that Congress authorize releases from headwaters reservoirs, it would have been necessary for downstream users (including the JWC) to demonstrate that rigorous conservation measures had been implemented. The goals and measures described in this conservation plan are intended to address such situations. Through individual council action, the JWC cities intend to work together to establish water conservation programs in accordance with the goals and programs set forth in this plan.

A. Conservation Goals

The JWC has established the following water conservation goals:

- Limit per capita residential demand to 75 gallons per capita per day (gpcd).
- Limit peak daily demand to less than 2.5 times average daily demand,
- Limit total peak daily purchases from Minneapolis to less than 18 million gallons per day (mgd), and
- Limit unaccounted water to less than 9.75 percent.

These goals are within those guidelines set forth in the Phase I interim report submitted to the Minnesota Legislature by the Metropolitan Council as part of the Regional Water Supply Plan.

Water Demands. Total JWC water use is comprised of about 77 percent residential, 18 percent commercial, and 5 percent industrial uses. Average daily demand has averaged about 6.8 million gallons per day (mgd). In the summer months, average daily water use has historically increased to about 7 mgd, or 140 percent of the 5 mgd winter season average daily use. Summer peak daily demand has averaged less than 18 mgd over the past five years.

Reducing excessive discretionary summer water demand is the primary objective of this JWC conservation plan. Both residential and commercial water demands have the potential to be affected by water conservation programs, however residential demands have been assigned a slightly higher priority due to amount of water used and the potential for reducing peak use. The JWC's ten-year goal will be to maintain residential *per capita* at 75 gpcd. This will be accomplished through a formalized customer education program, conservation-oriented water rates, a meter maintenance program and efforts to increase the number of low-flow fixtures through education.

Commercial water demand is also assigned a high priority, in particular water usage related to commercial irrigation and sprinkling. The JWC's goal will be to reduce commercial peak water demands by 10 percent. This will be accomplished through a formalized customer education program, a new commercial irrigation ordinance, and conservation-oriented water rates.

Unaccounted for Water Use. Water main leaks, inaccurate meters, unmetered connections and fire department use all contribute to unaccounted-for water. Planned meter replacements and regular calibration, leak detection surveys, and maintenance programs will improve measurement of water use and help identify if there is a water loss problem. The JWC's goal is to maintain unaccounted-for-water at or below 9.75 percent of Minneapolis water purchases.

B. Water Conservation Programs

Water conservation goals will be met through programs focusing on short-term and long-term objectives. Long-term conservation is accomplished by improving water use efficiencies. Specific elements that should be considered in a long-term water conservation plan are:

Metering and Meter Testing. All JWC customers are metered. Table 3-1 presents the number of connections and meters in the three cities as well as testing schedules and average age. Table 3-2 presents water supply meter information. All three cities have completed meter replacement programs, replacing all meters with new ones equipped with radio-read technology.

The cities will be using similar radio-read technology and LOGIS billing software. The metering system has improved accuracy and efficiency, and will help to track water losses. The metering system also has the capability to detect water use violations when sprinkling bans are implemented.

TABLE 3-1: Customer Meters

	Number of Connections	Number of Metered Connections ¹	Meter Testing Schedule (Years)	Average Age / Meter Replacement Schedule ²
Residential	14,533	14,533	5	3 / 15
Institutional	436	426	5	3 / 15
Commercial	5,109	5,109	5	3 / 15
Industrial	113	113	5	3 / 15
Public Facilities	317	300	5	3 / 15
Other	0	0	5	3 / 15
TOTAL	20,508	20,481		

1 – Number of unmetered connections is estimated.

2 – Golden Valley and New Hope have recently completed meter replacement programs. Crystal is beginning a similar program this year and expects to finish it within 2 years.

TABLE 3-2: Water Supply Meters

	Number of Meters	Meter Testing Schedule (Years)	Average Age / Meter Replacement Schedule ¹
Golden Valley Reservoir	1	5	20 / 25
Crystal Reservoir	1	5	20 / 25

1 – The water supply meters at the reservoirs have been tested and rebuilt since initial installation.

Crystal conducts spot meter checks during the winter months when utility work has slowed. All three cities check meters when customers request that they be checked or when the meter readings indicate, as determined by the utility staff or by computer software, that the meter may be inaccurate.

Unaccounted-for-Water. In the past, the JWC has experienced some difficulty in measuring unaccounted-for water. Now that two of the three cities have recently replaced their water meters, better estimates are available. JWC cities annually review water billings and compare that with Minneapolis metered water delivery volumes to monitor unaccounted-for water use.

TABLE 3-3: Unaccounted for Water: Sources and Reduction Efforts

Source	Reduction Effort
Supply Reservoir Leaks	Ongoing testing and repair of leaks in Crystal Reservoir, periodic drawdown testing and evaluation at Golden Valley Reservoir
Water Main Leaks	Periodic leak detection efforts
Water Main Breaks	Prompt repair of water main breaks and documentation of amount of water lost
Un-metered Connections	Ongoing effort to identify un-metered connections and install meters
Fire Department Use	Documentation of fire department uses
Customer Water Meters	Recently completed water meter replacement program ¹ . Meter testing in response to customer inquiry.

1 – Crystal is expected to complete its water meter replacement program in 2010.

Water Audits, Leak Detection and Repair. The JWC does not have formal water audit and leak detection programs. It also recently repaired leaks in the Crystal Reservoir.

Water Conservation Rates. Each of the three member cities is planning to adopt water conserving rate structures. The 2008 rate structures are given in Table 3-4 below.

TABLE 3-4: 2008 Water Rate Structures

City	Billing Frequency	Minimum Charge, \$	Units	Units Included in Minimum Charge	Volume Charge, \$
Golden Valley	Quarterly	18.60	Gallons	5,000	3.72
Crystal	Quarterly	34.45	100 CF	0	2.65
New Hope	Monthly	5.51	Gallons	1,000	3.48

Notes:

Crystal charges its customers proportionally based on water use. Crystal has two basic charges, a minimum service charge based on meter size and the water use charge. The minimum service charge is based on meter size and is designed to cover the cost of meter maintenance, system maintenance, meter reading, and billing and collection of accounts. The minimum service charge is \$34.45 for meters less than 1-inch diameter (these are mostly residential customers). Senior citizens get a discounted minimum service charge of \$26.50 for meters less than 1-inch diameter. The charges are designed to cover the cost of water purchase, pumping, chemical costs, system maintenance, and capital expenditures (renewal and replacement). The City reviews water rates every year.

Golden Valley also charges its customers proportionally based on water use. There is a minimum quarterly fee of \$18.60 for water meter sizes up to and including 1-inch diameter. This quarterly fee includes up to 5,000 gallons of water use. Quarterly water use over 5,000 gallons is charged at a rate of \$3.72 per 1,000 gallons. The water rate is based on the volume of water consumed and is designed to cover all costs associated with operating and maintaining the water system.

New Hope also charges its customers proportionally based on water use. There is a minimum monthly fee of \$5.51 for water meter sizes up to and including 1-inch diameter. This fee includes up to 1,000 gallons of water use. Monthly water use over 1,000 gallons is charged at a rate of \$3.48 per 1,000 gallons. The water rate is based on the volume of water consumed and is designed to cover all costs associated with operating and maintaining the water system. The City reviews water rates every year.

Additional water demand reduction could be achieved through the use of water conserving rates that incorporate inclining pricing tiers. The uniform rates used by the JWC cities have some effect on water use because water bills increase with increasing usage. A stronger incentive to conserve water could involve the use of inclining pricing tiers that charge a higher unit rate as more water is used. Seasonal rates or surcharges that increase the cost of excess water use during the summer-peak usage season could also be implemented.

Water Use Regulations. The JWC is required to follow the water use regulation and enforcement policies of the City of Minneapolis, but may declare water emergencies and enact water-use regulations independent of Minneapolis if the situation warrants such actions. The JWC plans to adopt an ordinance governing the installation and operating of commercial sprinkling systems. The goals of the ordinance are to establish minimum design standards, link approvals for system designs to the development approvals process, focus on reducing peak-summer demands, minimize the wasting of water, and reduce overall landscape irrigation demand.

While still in development, the ordinance is planned to include the following measures:

- Require design standards to avoid overspray, runoff, and low head drainage;
- Require control equipment to include rain sensor, repeat cycles, battery backup and multiple program capabilities;
- Require control equipment to be calibrated and timed to deliver $\frac{3}{4}$ to 1 inch of water per cycle;
- Address sprinkler spacing and coverage diameter; and
- Separate turf-area zones from landscape zones.

It is expected that the JWC cities will consider adoption of this ordinance through separate council actions.

Education and Information Programs. The JWC or their member cities do not currently have formalized programs to regularly educate their customers about water use and water conservation. However, some efforts have been undertaken over the past five years.

The JWC plans to develop and implement an on-going education program to inform customers of how to improve water efficiency during everyday use. Education programs can explain to residents how to save water by reducing shower duration, turning off water while brushing their teeth, and running dishwashers and clothes washers only when full.

The program will also encourage residents to invest in low-flow fixtures as a means to reduce water use.

Peak water use in the summer months is attributed to lawn and garden sprinkling. An education program would inform people about how to sprinkle more efficiently. The JWC conservation education program is planned to include the following elements:

- Website information;
- Informational cable television announcements;
- Brochures on indoor water efficiency;
- Brochures describing water-saving sprinkling practices;
- Billing inserts; and
- Literature racks at city halls.

Water Fixture Retrofit Programs. The Energy Policy Act has changed the efficiency of various water fixtures manufactured after January 1994. The replacement of existing fixtures will occur gradually over the years as customers replace old, low-efficiency fixtures. Through various education media, the JWC plans to encourage its customers to install water-saving fixtures. Table 3-5 presents potential water savings by installing water-conserving devices.

Pressure Reduction. By decreasing the system pressure in a water system, the flow rate is decreased. Standard utility management practice recommends that the normal operating pressure in a water distribution system be approximately 60 pounds per square inch (psi), not less than 35 psi, and that under fire flow conditions, all parts of the system should maintain a minimum pressure of 20 psi. The normal operating pressure of the JWC water system ranges between 45 and 85 psi, indicating that the JWC is currently operating somewhat above the recommended pressures. It is not prudent to reduce water pressure system-wide, however, since there are some areas that currently experience low pressures.

TABLE 3-5: Potential Water Savings from Fixture Replacement Program

Item	Manufactured Before 1980	Manufactured 1980 to 1993	Manufactured after 1993
Toilet ¹			
Flush (gallons)	5	3.5	1.6
Water use (gpcd)	20	14	6.4
Faucet ²			
Flow (gpm)	3	2.8	2.5
Water use (gpcd)	9	8.4	7.5
Shower ³			
Flow (gpm)	4	2.8	2.5
Water use (gpcd)	20	14	12.5
Total Water Use Per Person (gpd)	49	36.4	26.4
Total Water Use Per Household (gpd) ⁴	127.4	94.6	68.6
Potential Savings if Retrofitted with New Fixtures	58.8	26	0

Notes:

- 1-Based on 4 flushes per person per day
- 2-Based on 3 minutes of faucet use per person per day
- 3-Based on 5 minutes of shower use per person per day
- 4-Based on 2.6 persons per household for low-density housing
- 5-Actual water use will vary by person and by household.

C. Plan Adoption

After the DNR has approved this plan, public hearings will be held in each of the member cities to allow community review of the plan. The plan will be adopted by each city council. The plan will be updated every ten years or as required by state legislation.

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SECTION 4: ITEMS FOR METROPOLITAN AREA PUBLIC SUPPLIERS

A. Description of the Municipal System

See Sections 1 and 2 of this report.

B. Water Utility Operations

B.1. Policies

The JWC endeavors to provide high quality water at affordable rates, while assuring that water supply is adequate to meet the demand of its customers. Water conservation measures developed through the conservation plan will be implemented to assure that water use does not create a long-term negative impact on the Mississippi River.

B.2. Objectives

The objectives of current water utility operations, such as repair of water main breaks and leaks, and initiation of a conservation plan, are to protect and wisely use JWC water resources.

B.3. Standards

Criteria that will be used in system operation are developed in Sections 1 through 3. The adequacy of the existing system and associated criteria are discussed in Section 1. Triggers for implementing short-term demand reduction measures are based on the storage volumes and pumping capacities of the JWC system and water availability from the Minneapolis system. These are discussed in Section 2. Section 3 discusses the Water Conservation Plan.

C. Conservation Program

Section 3 fulfills the requirements of this section.

D. Emergency Preparedness / Contingency Plan

Section 2 fulfills the requirements of this section.

E. Coordination of Planning Efforts with Other Suppliers and Public Agencies

E.1. Inter-Community Sharing

As discussed in Section 2, the JWC currently has no interconnections with adjacent public water providers other than the Minneapolis interconnections that provide the JWC water supply. The JWC is considering installation of emergency interconnections with contiguous communities and is in discussions with General Mills about the possibility of an emergency interconnection to their wells.

E.2. Joint Pursuit of Alternative Sources and Protection of Existing Sources

The JWC receives water from the City of Minneapolis. The City of Minneapolis draws its raw water supply from the Mississippi River. Should an oil spill or chemical spill occur upstream of Minneapolis' raw water intake, Minneapolis would likely shut down its intake until the spill passes. Minneapolis has storage facilities equivalent to approximately one day of average-day demand. If the raw water intake had to be shut down for longer than one day, the City of Minneapolis and the JWC would essentially be without water for the remainder of the event. Protection of the water supply source by the JWC alone is not feasible since a chemical spill could occur anywhere miles upstream of the Minneapolis raw water intake.

To mitigate the effect of a possible interruption of water supply due to a spill in the Mississippi River, the JWC is considering construction of emergency interconnections with the cities of St. Louis Park, Plymouth, Robbinsdale, and Brooklyn Park. St. Louis Park does not have adequate water supply capacity to meet both its maximum-day needs as well as that of the JWC.

The JWC is also considering connecting with its other neighbors. Both Plymouth and Brooklyn Park have sufficient excess capacity during average-demand conditions. Brooklyn Park, Plymouth, and St. Louis Park have all expressed interest in having emergency connections with the JWC.

F. Problems and Potential Solutions

The elements contained in Section 1 fulfill the requirements of this section.

G. Wellhead Protection Program

The JWC does not use groundwater wells as their source of water supply. Therefore, the JWC will not be required to prepare a Wellhead Protection Plan.

H. Implementation Program

H.1. Official Controls

As discussed in Section 3, the cities of Crystal and New Hope have ordinances for controlling short-term water demand. The City of Golden Valley does not have any ordinances regulating water use.

H.2. Capital Improvement Program (CIP)

A copy of the JWC's Five Year Capital Improvements Program (CIP) has been included in Appendix A. In general, the five-year CIP includes inspection, routine repair and replacement of old and worn equipment, and the upgrading of some equipment.

H.3. Impact on the Local Comprehensive Plan

The adoption of the Water Supply Plan will have minimal impact on each member City's Comprehensive Plan. Since the conservation plan will reduce water use, the volume of water withdrawn from the Mississippi River will be reduced. Future growth of the member cities should not be affected by this plan.

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APPENDIX A: CAPITAL IMPROVEMENT PLAN