

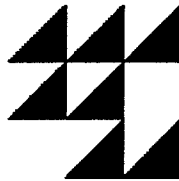
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# **THE INSTITUTIONAL FRAMEWORK FOR WATER SUPPLY MANAGEMENT:**

**Working Paper No. 8  
for the Long-Term  
Water Supply Plan**

July 1991

By Gary Oberts



**METROPOLITAN COUNCIL**

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## ABOUT THIS REPORT

This report is Working Paper No. 8 in a series of eight. The reports are being prepared as background technical studies for the preparation of a long-term water supply plan for the Metropolitan Area. The long-term plan preparation was required by the 1989 legislature and must be presented to the legislature on February 1, 1992.

The other technical reports in the series are:

- No. 1      Alternative Sources of Water for the Twin Cities Metropolitan Area.  
Metropolitan Council Report No. 590-91-011.
- No. 2      Water Demand in the Twin Cities Metropolitan Area. Council Report No.  
590-91-009.
- No. 3      Water Availability in the Twin Cities Metropolitan Area: The Water  
Balance. Council Report No. 590-91-008.
- No. 4      The Public Water Supply System: Inventory and the Possibility of  
Subregional Connections. Council Report No. 590-91-010.
- No. 5      Water Conservation in the Twin Cities Metropolitan Area. Council Report  
No. 590-91-020.
- No. 6      The Effects of Low Flow on Water Quality in the Metropolitan Area.  
Council Report No. 590-91-054.
- No. 7      The Economic Value of Water. Council Report No. 590-91-065.

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# INTRODUCTION

The legislation on water planning referred to in the previous section requires, among other things, an analysis of water supply problems and possible solutions to them. By necessity, this includes a look at the institutions that are in place to manage water and the effectiveness of these institutions to address problems as they arise. The analysis presented in this study draws upon the series of technical papers noted in the first section of this report.

The technical findings thus far do not point to a water supply system in total disarray and unable to meet demand, but rather to a system that has successfully met two recent challenges, luckily avoiding major difficulties by a change in climatic conditions. Although no community or major user suffered without water in the droughts of 1976 or the late 1980s, a marked lack of overall planning for water shortages still exists in spite of repeated calls for the preparation of such plans.

It is clear in evaluating the institutional structure of water management in the region that numerous laws and rules exist to affect good water supply planning, yet no agency is "in charge" of assuring that the programs are implemented in a future-looking manner. Our approach to water can still be characterized as reactive to problems as they arise, rather than proactive in anticipation of problems before they occur. Even though adequate laws and rules exist, the resources necessary to implement them have generally not been allocated by the state or by the water users and suppliers. That is, new authorities would not be needed if suppliers and users chose to be prepared for a water shortage and if the regulatory agencies had sufficient staff to aggressively pursue conservation planning. A very clear need exists to formalize a unified regional approach to water supply planning in which water users and suppliers decide ahead of time how they will react to diminishing supplies.

Previous technical reports in this series have indicated that the first step toward good water planning is for the region to become more water self-sufficient so that we do not have to look to such places as the Mississippi River Headwaters Reservoirs and Lake Superior for answers to our supply problems. This evaluation will look at possible methods to achieve that self-sufficiency in a manner that allows us to control our regional destiny rather than waiting for events to be underway before reacting. Only after solutions from within the region are exhausted should we begin to explore outside of the Metropolitan Area for additional sources of water.

As noted again in the technical series, the Twin Cities water supply is not only threatened by drought, but also by contamination of its surface and ground water supplies. This point was dramatically shown when 1.7 million gallons of crude oil spilled from a Lakehead Pipeline pipe near Grand Rapids. The movement of large quantities of this oil into the Prairie River and then to the Mississippi River could have created a serious contamination threat to the drinking water intakes of Minneapolis and St. Paul, as well as to the intakes of the city of St. Cloud and NSP. Fortunately, due to a tremendous amount of luck, chiefly from the weather, only 400,000 gallons of oil reached the Prairie River and only a small, undetermined volume actually reached the Mississippi River. Response to the spill was reactive, with some flaws evident in the emergency response procedures that should have been in place. For example, the spill was "detected" by some citizens because of its odor, not by any equipment that Lakehead Pipeline had installed;



sufficient equipment to handle large spills is simply not available; and, notification of an alert status to water suppliers in the Twin Cities did not occur.

Further incentive to move towards a well planned emergency response program for the region occurred on July 8, 1991, when 29 cars of a train derailed at Fountain City, Wisconsin, and spilled the contents of some of the cars and fuel from the train into the Mississippi River. Although downstream of the Metropolitan Area, this incident exemplified the jeopardy that water suppliers are in relative to the protection of their supply source. Only eight days after this spill, a similar incident occurred in California, where the supply to millions of Californians was contaminated by a toxic agent apparently not hazardous unless mixed with water.

The health and economic well-being of the Metropolitan Area depends a great deal upon the availability of an adequate supply of good quality water. One of the principal advantages this region has had over the arid Southwest and West, and over the heavily industrialized East has been its readily available supply of good quality water and the lifestyle it supports. It is imperative that we put together an aggressive program to protect that water and access to it, if we are to continue our prosperous growth and remain a viable Midwest urban center. The goal of our water planning efforts, therefore, should be to effectively manage the water resources of the region to ensure sustainable growth and continued maintenance of a high quality environment.

## **SUPPLY PROBLEMS THAT NEED TO BE ADDRESSED**

In order to assess the institutional aspects of water management, it is necessary to look at the problems that cause such government institutions and water suppliers/users to act. Recent climatic history has provided us with two such chances in 1976 and in the late 1980s--most notably, the summer of 1988. We have also had some rather dramatic water quality problems arise that provide yet another insight into how our institutions function to prevent and solve contamination problems.

### **Drought Response**

The response scenario for both of the recent droughts was nearly identical. In both cases, the drought seemed to catch the region ill-prepared, leading to a reactive flurry of activity to solve problems that should have been anticipated. As all discussions of drought illustrate, periods of extremely dry weather occur cyclically and can be anticipated in the same way as floods. Yet, lessons learned from the 1976 drought were quickly forgotten and very few emergency water supply plans were formalized in anticipation of the next drought, which began to surface a short decade later.

Even at this time in 1991, relatively few municipal water suppliers have emergency water supply plans that would meet any criteria at all for good planning. Many suppliers in a Metropolitan Council survey of the 111 municipal water suppliers indicated that they do have "emergency contingency" plans. However, when these plans are scrutinized, they typically are found to include such things as maintenance plans for a failed pump, use of hydrant-to-hydrant water feeds from an adjacent community (which often times does not know that they are part of their neighbor's plan), use of electrical generators for power loss, or initiation of sprinkling bans on an "as-needed" basis. Most plans are not even written down, but are rather informal procedures to be followed when conditions dictate. Legislative proposals to address this problem are discussed later in this report.

The problems of regional drought response become further complicated when competing uses for limited water arise. Perhaps the largest problem to arise in 1988, and the most unnecessary, was the arguing between Metropolitan Area citizens and those from the Headwaters area over whose water was in the reservoirs. The root of this problem is really quite simple--no plan existed for phasing-down demand in the Metropolitan Area and for determining what conditions would lead to a request for the release of additional water from the Headwaters Reservoirs. Once the press got involved in the Mississippi River flow watch and began to cover the "us versus them" debate, state officials were subjected to a tremendous amount of pressure to do something like ask for release of additional water from the Headwaters Reservoirs even though the cities of Minneapolis and St. Paul felt such emergency releases were not warranted. The perception when the state, the Corps of Engineers, the Metropolitan Area water suppliers and upstream users all have conflicting positions is that no one is "in charge"; that is, there is a perceived lack of leadership in addressing the problems arising from the drought situation. Trying to establish the lines of responsibility as conditions unfolded further fed the appearance of discordance among the various governmental agencies and water users, even though all of the parties were participating in the governor's Drought Task Force, which was convened by the Minnesota Department of Natural Resources (DNR).

Discussion later in this report will focus on the many aspects of drought response and try to identify where some improvements can be made in order to respond in a prescribed fashion as water shortage problems arise.

## **Water Quality**

Water quality problems associated with water supply are two-fold: first, problems exist with the contamination of supplies; and, secondly, river water quality problems develop when there is increased use of water upstream of wastewater discharges. Contamination of a water supply can occur at any time, not just under dry weather conditions. It has become markedly evident that those who rely on the surface water system in the region are most vulnerable to closure of intakes because of contamination. This fact has led to studies of alternative water supplies by both the city of Minneapolis and the Metropolitan Council. The city of St. Paul Water Utility responded to the drought of 1976 by adding a ground water source to their surface water system, thus furthering the back-up capabilities provided by the Rice Creek and Vadnais chains of lakes. However, even this diversified system is vulnerable to contamination, since several surface inflows and diversions feed the St. Paul reservoir system. Reference to the previously mentioned oil spill in Grand Rapids shows exactly the scenario that could lead to closure of intakes on any water body.

Just because a water supplier does not rely on surface water does not assure that a good quality source will always be available. The large number of ground water contamination sites in the Metropolitan Area are evidence of the widespread and often unknown nature of contamination events in the region (see also Working Paper No. 3). Major municipal water impacts have been documented from sources ranging from intentional disposal of waste down a multi-aquifer well or into a highly permeable surficial sand, to leakage from old dumps and newer "sanitary" landfills that were thought to be well sealed against seepage of leachate. Continued vigilance is needed by ground water users whose supply might be jeopardized by unseen, yet dangerous, inputs.

Perhaps the biggest success story of the summer of 1988 was the maintenance of dissolved oxygen levels in the Mississippi River as it flowed past the Metropolitan Waste Control Commission's (MWCC) Metro Plant (Pig's Eye). Artificial aeration by the MWCC, at a cost of approximately \$1200 per day, resulted in river oxygen conditions actually improving as supersaturated effluent mixed with the river water. MWCC has instituted this approach as part of its routine response to extremely low river flows, and plans to continue the effort as long as treatment plant design allows them to do so. Consideration of MWCC's continued ability to conduct this aeration should be a part of any permit issuance discussions among MWCC, the Metropolitan Council, MPCA and the Environmental Protection Agency (EPA).

## **Solutions to Water Supply Problems**

The real purpose of undertaking a long-term water supply plan is to develop solutions to the problems experienced previously so that we do not repeat the problems during the next drought or contamination event. As obvious as this seems, it has not nearly been accomplished for the Metropolitan Area. Instead, we become forgetful as dry weather abates, and quickly slip into our old habits.

This section of the study examines the institutional response we have experienced when facing water supply problems. We will examine both what was and was not done, and what institutional changes might help us the next time we face a similar problem.

### **Drought/Emergency Definition**

Before any corrective actions can begin, a clear statement is needed that a drought or an emergency related to contamination exists. The state of Minnesota has never had an official definition of drought, as evidenced in 1988 when a somewhat arbitrary Mississippi River flow of 1,000 cubic feet per second (cfs) at Anoka became the default definition that triggered action. This figure was arrived at by the Governor's Drought Task Force and served to define the flow at which the governor would request additional releases from the Headwaters Reservoirs. The 1,000 cfs level was thought sufficient to allow for the over 20-day travel time for released water to arrive at the Twin Cities before critical shortages occurred.

Drought can be defined in numerous ways, from soil moisture to precipitation to river flow to ground water levels. From a water supply standpoint, the most appropriate measures look at flow in the river and at lowered ground water levels. Critical river flow on the Mississippi River was defined in the short-term water supply plan according to the matrix shown in Table 1. The parties affected by the matrix agreed that they would respond according to the trigger levels presented in the matrix. This matrix, therefore, should be included in the long-term plan as the conditions under which response actions are pursued; adoption of the long-term plan will then legitimize this matrix and let the participants know with certainty what is expected of them in a drought. Tying the matrix into the appropriation permits issued to the users would add further credence to the actions expected of them.

As shown in the matrix, movement toward a drought condition would be quite visible since the governor's Drought Task Force would convene well in advance of critical low flows. The DNR would convene the group whenever flows at Anoka drop below 2,000 cfs and appear to be continuing downward. The task force at that time will convene to discuss likely drought severity and response.

A definition of drought for ground water users is far more difficult because of the artesian conditions under which most suppliers withdraw water. Ground water depletion is measured more in terms of pressure loss than in "lowered" water. Ground water is also slower to react to climatic conditions and might lag behind other indicators of dryness such as precipitation or river flow. As such, the region could be very deeply into a drought situation before ground water levels would reflect a shortage. For this reason, we are not suggesting that a separate definition of drought be

developed for ground water conditions, but rather that ground water suppliers and users remain attuned to the climatic conditions and to the surficial indicators of drought, and that they respond accordingly by using water wisely well in advance of detrimental system impact. Actions suggested later in this report might be triggered by some criteria related to the potential seriousness of drought to ground water levels.

Emergency conditions for water quality develop much more quickly than drought. Critical conditions can occur immediately after a spill incident, leaving absolutely no time for a semantic definition. There is a tremendous need for a much better defined emergency response function designed to initiate immediate action once an incident is discovered. There also is a similar need to institute a detection system for spills of contaminating material into the Mississippi River. The institutional aspects of spill response will be addressed later in this report.

TABLE 1.  
DROUGHT RESPONSE PLAN

72 Hour Flow at Anoka

Participant	Median Monthly Flow*	2000 cfs	1200 cfs	1000 cfs	750 cfs
DNR - Division of Waters	Monitor flows including tributaries; notify affected parties in matrix that river flows have dropped below median for month	Intensify flow monitoring and commence low flow predictions; initiate awareness program among users; convene meeting of Drought Task Force** to develop strategy	Continue flow monitoring and predictions; begin intensive public information program; meet with Drought Task Force to implement strategy	Continue all activities with emphasis on prediction of flow and movement toward critical" flow; explore need to limit appropriations	Continue all activities; evaluate the need for upstream supplements and other alternatives based on conditions and future outlook
Minneapolis Water Works	Verify that flows have dropped below average for summer conditions	Continue normal use while alert to low flow potential	Institute voluntary*** conservation program in order to reduce demand from river; begin coordination with St. Paul on river withdrawals	Institute sprinkling restrictions*** and reduce demand to 85 mgd	Institute mandatory*** conservation program and reduce demand to 75 mgd; work with Drought Task Force to define critical supply needs
St. Paul Water Utility	Verify that flows have dropped below average for summer conditions; in anticipation of low flows, begin to pump surplus river flow into reservoir system	Continue normal use while alert to low flow potential	Institute voluntary*** conservation program in order to reduce demand from river; begin coordination with Minneapolis on river withdrawals	Institute sprinkling restrictions*** and reduce demand to 56 mgd; begin consideration of shift from river source to reservoir system and groundwater supplements as required to optimize use of river	Continue optimizing river versus supplemental source use; institute mandatory** conservation program and reduce demand to 45 mgd; work with Drought Task Force to define critical supply needs
Metropolitan Waste Control Commission (MWCC)	Maintain treatment levels to assure compliance with water quality standards; begin aeration protocol at flows <7,000 cfs	Maintain treatment levels to assure compliance with water quality standards; continue aeration protocol	Continue program from 2,000 cfs level	Continue program from 2,000 cfs level	Continue program from 2,000 cfs level

TABLE 1.(continued)  
DROUGHT RESPONSE PLAN

72 Hour Flow at Anoka

Participant	Median Monthly Flow*	2000 cfs	1200 cfs	1000 cfs	750 cfs
Northern States Power (NSP)	Withdrawals as specified by permit conditions; begin public energy conservation program	Withdrawals as specified by permit conditions; continue public conservation program	Withdrawals as specified by permit conditions; as dictated by electrical demand: -interrupt oil customers -obtain power from most reliable and economic sources (includes purchases)	Withdrawals as specified by permit conditions; continue program from 1200 cfs level; as dictated by electrical demand: -implement water savings programs inside plants -reduce water appropriation rates at Monticello	Withdrawals as specified by permit conditions; respond to energy demand by implementing voluntary and emergency measures to conserve energy and keep plants operating at as high a level as possible; continue activities from previous flow levels
Mississippi Headwaters Board	Verify that flows have dropped below average for summer conditions	Begin contacts with headwaters interests in anticipation of low flows; serve as information liason between upstream interests and Drought Task Force	Continue in liason position	Continue in liason position	Continue in liason position

\* From USGS data (cfs); subject to annual revision:

January - 4080	July - 6173
February - 4069	August - 4416
March - 5624	September - 4666
April - 15560	October - 5137
May - 11990	November - 4971
June - 10770	December - 4419

\*\* The Drought Task Force is an officially constituted DNR advisory committee comprised of representatives of DNR-Division of Waters, NSP, St. Paul Water Utility, Minneapolis Water Works, Metropolitan Council, Mississippi Headwaters Board, MWCC and MPCA. Coordination with the Corps of Engineers is also assumed.

\*\*\* Voluntary conservation would typically involve a request by the supplier for its customers to limit the discretionary use of water. Sprinkling restrictions could vary from an odd-even system of use to a total ban. Mandatory conservation would likely include a ban on all outside and discretionary uses of water, including possible limits on industrial/commercial uses.

## **Assessment of Problem and Proposal of Solutions**

As with the drought/emergency definition noted above, there was not a formalized mechanism in place in 1976 or 1988 to begin previously defined remedial actions to solve the problems once they developed. Instead, actions were rather spontaneous and were often driven by a perceived need to "do something" in response to increased press coverage. Reference to an adopted plan that clearly spells out the expectations of various parties in advance could prevent a reactive approach driven by emotional pleas to take action. The problems were quite evident during the last drought and were discussed at a series of Governor's Drought Task Force meetings convened by DNR.

There is some existing legislation that should lay the framework for a coordinated statewide response to drought; however, the application of the legislation is limited and has not led to many results. Minnesota Statutes, Section 103G gives DNR rather substantial authority to institute conservation efforts within the state as part of its water appropriation authorities. Section 103G.101 authorizes the commissioner of DNR to develop a water resources conservation program for the state, including conservation, allocation and development of waters for the best interests of the citizens. DNR implements this charge through its rules and does not have a document that could be easily identified as "The State Conservation Program." This approach makes it difficult to identify DNR's effort for other than those intimately aware of DNR activities. The preparation of a document spelling-out exactly how DNR is meeting its legislative charge would lend some much needed visibility to DNR's efforts in conservation.

This is not to say, however, that DNR's effort through the rules is entirely inappropriate. DNR staff has indicated that they are satisfied that they are meeting the intent of the law. An examination of rules in Part 6115 shows that DNR has included a number of provisions aimed at achieving a more efficient use of the waters of the state. Part 6115.0770, for example, states:

In order to maintain water conservation practices in the water appropriation and use regulatory program, it is necessary that existing and proposed appropriators and users of waters of the state employ the best available means and practices based on economic considerations for assuring wise use and development of the waters of the state in the most practical and feasible manner possible to promote the efficient use of waters.

Based on the data submitted by applicants and permittees and current information on best available water conservation technology and practice, the commissioner, in cooperation with the owners of water supply systems, may analyze the water use practices and procedures and may require a more efficient use of water to be employed by the permittee or applicant, subject to notice and opportunity for hearing.

This effort is accompanied in rules by a quite detailed list of data that DNR can request from any applicant in order to evaluate their proposed use of the water and attempts to conserve. There is additional information that can be requested of public water suppliers through Parts 6115.0670 and 6115.0690 of the rules. Although a fair amount of authority is available to DNR, it is limited by its application to "applicants" (new and amended permits) and by the limited amount of staff time available to manage the program. Because of the small staff in the Division of Waters that actually writes and follows-up on appropriation permits, there is very little time to actually seek



the submittal of detailed information on the individual uses and consumption of water and to analyze that data. The appropriation laws currently apply to applications for new use or for amendments in existing use. If a user is not causing a problem, DNR does not require periodic review of the appropriation permit or require conservation language. The best intentions are meaningless if the laws and resources are not available to implement a program. Legislation is proposed later in this section to require DNR to periodically reissue permits to existing large-volume water users and to include water conservation measures as part of their permit conditions.

DNR has instituted a legislatively-mandated graduated rate schedule for water use fees that bases amount paid on actual amount of water used (that is, withdrawn), gradually increasing in per unit cost as volume used increases. A flat fee structure of \$0.20/1,000 gallons was placed in effect for most once-through heating and cooling systems using over five million gallons annually until the systems are eventually phased out by the year 2010 (Minn. Statutes, Section 103G.271, subd. 5 and 6). This movement by the legislature to better reflect the actual value of water in the fee structure is very positive and will likely do more to save water than passage of legislation without concomitant staff resources. The legislature supported this new law by also requiring that all appropriations have to be metered (Sec. 103G.281, subd. 2), a law that should be amended to require metering of all municipal water customers in the Metropolitan Area.

The Minnesota legislature gave DNR some additional authority to request the preparation of contingency plans when application for surface water appropriation is made through Section 103G.285. This legislation requires these surface water appropriators to prepare plans outlining where they will get an alternative supply of water if flow drops to the point where water cannot be obtained. Of special note is that the law does not apply unless application is made for a new or amended water use permit, a condition that markedly limits its applicability. In addition, a large loophole in the law exists allowing an appropriator to sign a waiver that says he/she will "...withstand the results of not being able to appropriate water." This potentially powerful piece of legislation should be expanded to obtain emergency contingency plans from all existing and new public water suppliers, whether supplied by ground water or surface water. The law should also be amended by dropping the clause that allows a supplier to ignore their responsibility for contingency planning by stating they will live with the consequences and by requiring the supplier to explore not just alternative sources, but also demand reduction. The law as written gets us no closer to being prepared for a water supply emergency and actually works against it by accepting complacency.

The Minnesota Department of Health (MDH) has a similar authority through the federal Safe Drinking Water Act (SDWA), under which MDH has "primacy" or principal authority on behalf of EPA. The SDWA has a provision that requires municipal water suppliers to adopt an emergency contingency plan. MDH has not enforced this provision of the federal law and has assigned it a "low priority". MDH staff was not aware of any municipal supplier who had in fact prepared one of these plans.

DNR was also authorized by the 1990 legislature to prepare a statewide drought plan, which must consider the water supply plans prepared by the Metropolitan Council (Sec. 103G.293). This provision reinforces Section 103G.271, subd. 2, which requires the commissioner to issue permits in conformance with state, regional and local water resource management plans. Similarly, the law requiring the Council to prepare the long-term water supply plan for the region (Sec. 473.156) requires it to prepare the plan to be consistent with the state's drought plan. As with

the state conservation program, however, DNR does not have a document that could be identified as the state "Drought Plan." Rather, they intend to use the "Drought Contingency Plan for 1989", which is the matrix that formed the basis for Table 1 from the Council's short-term water supply plan. The original DNR matrix was developed as part of the governor's Drought Task Force deliberations in the summer of 1988.

We do not believe that merely adopting a matrix keyed to flow at Anoka and embellished with some explanation really meets the needs of the state for a statewide drought plan. The legislation requiring this DNR plan called for a "statewide framework" in order "to respond to drought-related emergencies." The use of the DNR matrix certainly accomplishes a small portion of the legislative charge, that being response of surface water users for the Mississippi River, but it clearly does not provide a planning framework for statewide response to problems. It does not, for example, say anything about ground water users, or surface water users not listed in the matrix, or about the institutional needs of implementing drought response so that a repeat of reactive behavior similar to the last two droughts does not occur. Development of an identifiable, readily available plan that spells out how DNR intends to respond to droughts would help the state in its drought preparedness.

Institutional response to an emergency water quality condition is a situation that everyone seems to think is covered, but in fact, there are few mechanisms in place to identify problems quickly and respond accordingly. Again, the recent oil spill in Grand Rapids by the Lakehead Pipeline Company provides a great study in how the system operates at present. The spill of 1.7 million gallons of crude oil (400,000 gallons of which actually flowed into the Prairie River) was first detected not by the pipeline company or any detection system they had in place, but rather by citizens in the area who smelled oil. Once the spill was detected, action to contain the oil and prevent it from traveling the few miles to the Mississippi River began with cooperation from the pipeline company, MPCA and DNR. The actual move to begin containment appeared to be relatively fast and well directed. It was, however, predicated on someone other than the responsible party detecting the spill and notifying authorities.

In a rather timely report, MPCA (1990) warned that the state is ill-prepared to deal with a spill of contaminants along the Mississippi River. MPCA states that "There is little doubt that a major river spill would pose a serious environmental threat, since at present industry's response to such a major incident would likely be slow, under-staffed, and lacking in specialized equipment." Even when combined with governmental resources, Minnesota would be unable to respond well to a large spill, due primarily to the "...absence of statewide efforts at contingency planning and resource coordination." The report noted that threats are posed by refineries, chemical plants, product transfer facilities, rail and highway crossings and parallel lines, barges and pipelines. A preliminary inventory of the Mississippi River corridor upstream of the Minneapolis and St. Paul water intakes shows that 35 roads, eight rail lines and an oil pipeline cross the river, with the Lakehead pipeline also crossing just above the confluence of the Mississippi and Prairie Rivers. Additionally, there are nine locations where rail lines pass within one-quarter mile of the river, a particularly pertinent finding given the recent Fountain City train derailment into the river. There are also two large sanitary sewer crossings within the Metropolitan Area upstream of the intakes. This preliminary inventory does not include crossings and storage areas on tributary streams.

MPCA goes on to report that laws requiring spill prevention and response for potential industrial or transportation sources are inadequate and do not usually address downstream environmental aspects. Emergency planning is limited in the law to "on-site or near-site" protection, and is more oriented to public safety than to environmental protection. While this priority is certainly well placed, the environmental consequences of a major spill could be very significant, and in the case of drinking water intakes, could also relate directly to human health if not corrected. MPCA notes that adequate federal and state staff are not available to check plans even if they are prepared, and that the state and its industries are "ill-prepared" to handle a medium-sized or major spill. Part of this ill-preparedness relates to the lack of adequate emergency response personnel and equipment.

Another apparent flaw in the existing response efforts is the lack of any kind of notification procedure for downstream users. Although the Lakehead pipeline spill in Grand Rapids did not pose an imminent threat to the Minneapolis and St. Paul water utilities, an alert for them to be prepared for the movement of oil in their direction was never sounded. A spill at a closer location and comprised of a contaminant more difficult to detect might lead to severe repercussions for the nearly one million people who rely on the Mississippi River for their water. Clearly, a better detection system and more detailed lines of communication are needed to alert downstream water suppliers that at least the potential for contaminant movement toward them exists.

MPCA also presents 15 recommendations that should be pursued to improve spill prevention and cleanup. These recommendations include suggested changes and additions to state law to achieve such things as preparation of spill prevention and cleanup plans, enhanced capabilities within the state to respond to emergencies, improved response communications, development of a River Defense Network to detect and respond to spills, an improved communication scheme to alert affected parties of a spill and enhanced follow-ups on spill remediation. The report includes excerpts from Governor Rudy Perpich's Executive Order 90-2, which assigns emergency responsibilities to state agencies. The 1991 Legislature passed a law (Ch. 305 of the session laws) addressing some of the problems noted by MPCA. At this date, implementation of the 1991 law is just beginning, so judgements on its effectiveness cannot yet be made.

A joint effort to address other aspects of the readiness problem is underway by the state Environmental Quality Board (EQB), the city of Minneapolis, the U.S. Army Corps of Engineers (Corps) and the Metropolitan Council through the federal Section 22 (Water Resources Development Act of 1974, PL 93-251, as amended) water planning assistance program. The purpose of this effort is to identify potential contaminant sources, such as river crossings and chemical/oil storage facilities, and to define the scenarios under which a spill at any of these locations would move toward water intakes. The effort will terminate in the preparation of a response plan that lays out in detail the response actions that should occur when a spill is detected; one of the additional products that hopefully will be included in the effort is an instream system of pollution detection that would automatically signal the occurrence of any spilled pollutant. This effort has begun (summer, 1991) and, if properly funded, will last for about eighteen months.

In addition to this preliminary fact-finding effort and state legislative action, MPCA notes that the federal Oil Pollution Act of 1990 holds some promise of solving response problems related to transportation facilities. On an interstate basis, the Upper Mississippi River Basin Association has

prepared an Upper Mississippi River Spill Response Plan and Resource Manual (1991) that details a five-state (including Minnesota), four-federal agency response plan for spills on the river. Unfortunately, this document does not extend upstream of the Twin Cities area, but the framework which it provides can certainly be built upon by any effort that results from the Section 22 study. We encourage the state to increase the geographic scope of this document above the current limit at the I-694 bridge.

Also of note is the Mississippi Headwaters Board Riverwatch Program that uses educational institutions to collect water quality data on the Mississippi River upstream of the Metropolitan Area. Although not specifically geared to spill detection, this program would undoubtedly discover any large-scale problems on the river.

Finally, to incorporate these different efforts, we think it would make a great deal of sense to formalize an upper Mississippi River basin protection effort. Following completion of the Section 22 study and some experience with implementing the 1991 state law, it will be necessary to evaluate the technical and institutional aspects of river protection to see if the problems noted herein have been addressed. Part of the solution might be to establish some specific institutional response on a basin-wide basis and to begin some type of continual monitoring to detect accidental contamination of the river. Since this protection effort affects so many users in the state, the legislature should mandate and fund the study as soon as some of the remaining gaps can be evaluated.

## **Demand Reduction**

One of the more surprising findings of the municipal water supply survey that the Metropolitan Council undertook in 1990 was the large number of systems that have no emergency plans or means of reducing demand in an emergency situation. Sixty-four of the 111 suppliers surveyed indicated they have no formal emergency contingency plan. Of the remaining suppliers that indicated they have some sort of contingency plan, most merely involve the institution of a sprinkling ban on an as-needed basis. Very few municipalities have a well defined set of actions that they will pursue in response to pre-defined emergency conditions.

The reasons for the failure of most municipal suppliers to have emergency contingency plans or demand reduction plans are numerous. One of the primary reasons is that the suppliers rely on the revenue generated by water sales to pay the operating expenses and debt service for the utility. Obviously, the best time to sell water is in a shortage when demand is highest, but this is also the time when the need is greatest to reduce use. This dichotomy could be overcome through the institution of seasonal or conservation water pricing wherein the price of water, and thus the revenue generated, increases during periods of high demand. The result of this pricing system would be collection of the same amount of revenue as used to be collected during drought periods, even though water use declines.

Other suppliers note that they do not initiate conservation because the citizens do not like it. The drought of 1988 showed very clearly that the public is far ahead of government in their willingness to do their share to cut water use. The Minneapolis and St. Paul water reduction experience is ample proof that the public will gladly respond to a need if asked to do so.

Another argument raised by suppliers against conservation is that there has always been plenty of water, so there really is no proven need to conserve. This series of technical studies has shown that supply problems do in fact occur now and that the likelihood of these problems becoming more widespread and serious exists. Also, the unprepared manner in which we have historically responded to emergencies dictates a better response by all parties. Changes in legislation requiring conservation programs, with perhaps some sort of conservation pricing, will be proposed in this report.

As noted previously, Minnesota Statutes, Section 103G.285, subd. 6 requiring contingency planning for water appropriation applicants obtaining their water from surface waters allows users to escape responsibility for doing a good plan by simply signing a clause. This allows complacency and spawns the reactive response typical of the last droughts. Also, Section 103G.285 does not apply to a significant number of the state's water users, those being ground water users. The law should be changed to apply to all large users, whether obtaining water from surface or ground water sources. Additionally, the law should be changed to eliminate the provision that allows a user to opt out of their responsibility to prepare a contingency plan. Minimum content for user contingency plans essentially exists in the state rules (Parts 6115.0670 and 6115.0690).

There exists a provision in Minnesota Statutes, Section 103G.291 for the governor to declare by executive order that a "critical water deficiency" exists. This provision of the law then calls for public water suppliers to "...adopt and enforce water conservation restrictions within their jurisdictions..." that "...must limit lawn sprinkling, vehicle washing, golf course and park irrigation, and other nonessential uses, and have appropriate penalties for failure to comply with the restrictions." Failure to respond to the governor's order is grounds for modification of the user's permit. This law, although never used, could provide the state a very strong means to immediately curtail the use of nonessential water during a deficiency. Even during the drought of 1988, when surface water withdrawals were restricted on numerous Mississippi River tributaries, the governor did not invoke a "water deficiency" declaration. Rather, reductions from large Twin Cities users, such as Minneapolis and St. Paul, were prompted by feelings of civic responsibility and by the urging of DNR and the governor's Drought Task Force. Substantial reductions occurred voluntarily without the use of Section 103G.291, but Minneapolis and St. Paul each eventually imposed mandatory conservation measures to further reduce demand.

Again, the actions surrounding the demand reductions noted above were reactive and not according to any pre-determined plan or course of action. The laws of Minnesota have provided a very strong tool to the governor, yet even severe drought did not lead to the use of the authority in conformance with a plan in 1988. Criteria for use of the deficiency declaration and the means through which it can be used should be part of the DNR statewide conservation program prepared under Section 103G.101.

The short-term plan that was presented to the legislature in 1990 contains a matrix (see Table 1 of this report) of flow at Anoka versus response actions by DNR (Division of Waters), Minneapolis Water Works, St. Paul Water Utility, MWCC, NSP and the Mississippi Headwaters Board. Although this matrix has no force of law, the parties listed agreed in principle with the Council that they would respond according to the matrix until such time as a long-term plan is adopted by the legislature, thus putting in place an institutional framework for responding to surface water shortages. This matrix was prepared from a base put together by DNR and is similar in most respects to a Corps of Engineers matrix in their study of the Headwaters

Reservoirs. The institutional framework established in this matrix should be formalized in the long-term plan in order to protect the Mississippi River users in the event of extreme low flows. This matrix will not, however, address the problems of ground water supply occurring during a drought.

## **Obtaining Alternative Sources of Water Supply**

One of the papers prepared previously for the long-term water supply plan background series (Working Paper No. 1) looked at possible alternatives that are available in the event our current supplies become unusable. A number of alternative sources appeared to be quite promising, but there is a need to examine the institutional means through which the various alternatives can be pursued.

The first question that has to be answered in looking at alternatives is who the beneficiary of the action will be. That is, will the region as a whole benefit from the use of a particular alternative, or will only one community or a limited population benefit? The institutional approaches to these different alternatives will certainly vary depending upon the answer to this question.

## **Conservation**

The report on alternatives concluded that prior to the use of any alternative source of water from within or outside of the region, a "wise use" or conservation plan must be put in place. The municipal water suppliers were asked if they had conservation plans in effect, and if so, what the nature of those plans was. Twenty-three of the 111 suppliers responded that they have no program for conservation. Of the remaining positive responses, 70 (note that the totals are not additive because of more than one approach used by some cities) relied upon sprinkling restrictions on an as-needed basis. Twenty-three cities use some kind of public education effort; 19 use leak detection and repair to cut treated water losses; and, 15 claim to use pricing, although an examination of their pricing schemes does not support most of the claims. Less than 10 each responded that they use recycling, pressure reduction, plumbing codes, low water landscaping (no details offered) and some program with no details given. Recall also that 64 of the 111 suppliers indicated that they have no formal emergency contingency plans, meaning many of the suppliers use their conservation efforts independent of any formal program.

The first step in instituting any conservation measures is to install customer water meters so that the customer knows the volume of water they use. Meters also enable a municipality to determine the amount of water that they lose in their system. Five of the municipalities in the region do not meter their water. Mandatory metering of Metropolitan Area communities should be the first action by the legislature to assure wise use in the region. This mandate should not only include the installation of meters, but also mandatory reading of meters, a practice that has apparently been cut by some cities trying to reduce their personnel expenses (verbal communication, MDH).

Conservation requirements for other water users were addressed previously in this report and shown to be essentially non-existent (see Demand Reduction discussion), although DNR has the authority and wants to do a better job of staffing a conservation program. Information on water

conservation exists, but there is no focal point for information on conservation programs and no agency that is a clear leader in efforts to get conservation going throughout the region. The Metropolitan Council has issued reports on water conservation (including the newest effort in Working Paper No. 5), but has never assumed a primary promotion role. Undertaking conservation on a wide scale would require that some agency devote a good deal of time to collection and dispersal of information on conservation techniques, and that some mandate occurs within the region to take conservation seriously. This approach is now particularly critical since linkage to any supplemental sources will depend upon first reducing demand within the region. The matrix prepared for the short-term water supply plan in 1990 asks the cities of Minneapolis and St. Paul and NSP to conserve water, but no requirement currently exists for them to honor the matrix if for some reason they disagree on its use. Perhaps more difficult to address is the fact that no organized program exists for the institution of use reduction plans for existing municipal users of the ground water system or for non-municipal water users. However, new and amended permit applicants and those systems experiencing or causing difficulties can be addressed through the DNR permit process. The long-term plan will contain proposals for the legislature to expand the appropriation law to more effectively address conservation.

Perhaps the biggest factor preventing large-scale implementation of conservation by municipal water suppliers is the dependence upon the communities for the revenue generated from the sale of water. Although we have few facts on this topic, both DNR and MDH claim that water conservation efforts will be extremely difficult to undertake because municipal water suppliers will be unwilling to reduce the sale of water during water shortages when their sales are highest. Only those communities with real source or storage problems will be willing to entertain conservation programs. This fact argues for the institution of a legislatively mandated conservation program instituted on a regional basis and begun when a set of pre-conceived criteria are met. This approach would also address the problem of communities complaining that they try hard to conserve water while their neighboring communities continue to allow unlimited use of water. The best means to address the loss of revenue from conservation could be through the use of a conservation pricing scheme in which per unit costs increase during a declared water shortage or a seasonal scheme in which prices rise in the peak use summer season (discussed previously).

In short, any effort to obtain water from other than currently used sources will require some formal institutional means to begin conservation in earnest. The immediate beneficiaries of conservation efforts are usually the local or industrial/commercial suppliers, but again, conservation might imply to some communities a loss of revenue from water sales. However, any attempt to supplement current regional supplies will require first and foremost that conservation efforts are underway within the region in order to reduce our overall water demand. This clearly delineates a regional benefit resulting from conservation, but no such regionally coordinated effort currently exists.

### **Improved Ground Water Withdrawal**

Another alternative that is completely within our own means to implement is more efficient use of the regional ground water system. We learned in the recent drought that the ground water system is not infinite and that we must use it more efficiently if we want to keep using it in the long-term. The question again, however, is who is in charge of making sure we move towards more efficient use? The answer to this question is a little more clear than the conservation question because we have a state agency--DNR--that has clearly been charged with the regulatory

authority to make sure ground water is used appropriately. The problem is that DNR is usually in a reactive position, responding to applications for water appropriation after wells have been drilled. This sequence removes DNR from the capability of assisting users in the optimum use of the ground water system.

The typical sequence of events for the development of a large municipal well, for example, starts with a desire by a municipality to serve an area of population or industrial/commercial growth. The community designs a well and distribution lines close to the area in need in order to minimize costs. The well is drilled, with permission from the Minnesota Department of Health (MDH), and once its capacity is determined through pumping tests, a permit for appropriation of water is applied for from DNR, which now sees a request for water after a tremendous expenditure from the municipality. Any permit constraints by DNR would likely cause quite a hardship for the community that has spent the money for the well. A similar sequence exists for industrial/commercial wells, generally without the need for MDH approval, however. The sequence for well approval is clearly not oriented towards promotion of a well planned ground water withdrawal system. Instead, we have a condition under which each user/supplier is on their own to identify a water source, drill a well, and then seek a permit to use water.

The previously suggested new legislation on water appropriation could be the key to assuring that DNR reviews well proposals before the well is installed. A requirement for approved DNR contingency plans under a revised Section 103G.285 prior to well installation would put the state in a proactive position and eliminate "boxing" DNR into a corner when an appropriation permit is submitted after a well is drilled. This requirement could also be placed on other MDH functions relative to municipal suppliers, such as watermain extensions, treatment system development and well-house repair. Other options include a preliminary check-off by DNR prior to review by MDH for municipal systems and a similar review prior to drilling by any industrial or commercial user. Possibly the state permitting functions relating to well placement and appropriation of ground water could be placed in a single water agency rather than split as they are now. Another option could involve a regional water planning agency that would prepare a system plan and provide technical assistance information for ground water users in an effort to direct the use of ground water in a more efficient manner. This type of approach could help to guide regional growth toward portions of the seven counties where water sources are better able to support growth. This would address one of the supply problems that threatens to become among the most serious we will face in the coming years. An approach that focuses on regional water planning places emphasis on the regional benefits that derive from good supply planning, and could thus spread the costs of providing this assistance across the region.

## **Reservoirs**

The series report on alternatives (Working Paper No.1) identifies several possibilities for the development of water supply reservoirs. Options that serve to meet only the needs of Minneapolis are identified in the alternatives of the Rice Creek and Minneapolis chains of lakes, ground water development and artificial reservoirs constructed to hold water. Minneapolis could act, on behalf of the city and the suburbs it supplies, to pursue any of these options, thus avoiding any prolonged debate over how best to obtain an immediate alternative source. However, it can be easily argued that any emergency shortage that Minneapolis faced would indeed be a regional emergency affecting the economic and social health of the entire region. In that case, perhaps the solution should be a regional effort rather than a Minneapolis effort. As pointed out by the



Metropolitan Council many times in the course of looking at the regional water situation, any severe shortage of water experienced by Minneapolis and its suburbs would dramatically impact a large segment of the Metropolitan Area population that lives in, does business within, or is in any fashion associated with Minneapolis.

There are other reservoir possibilities identified in the alternatives report. The feasibility of using the Headwaters Reservoirs for emergency supply is quite limited both in the U.S. Army Corps of Engineer's priority system and in practical application because of the varied interests of those who might view the reservoir water as "theirs." The release of Headwaters Reservoir water under extreme emergency conditions has, however, been assured by the Corps, after certain conservation actions occur in the Metropolitan Area (U.S. Army Corps of Engineers, 1990). The benefits of any releases beyond the routine low flows from the Headwaters would be felt by the entire region because of the water supply, wastewater assimilation, power plant cooling and navigational uses to which this water would be put. The institutional aspects that would lead to increased release are in place in the short-term water plan and the Corps of Engineers routine low flow operation scheme. Under the short-term plan, a flow of 750 cfs at Anoka would trigger consideration for requesting additional flow releases by DNR, acting as the agent for the state. As flow drops further towards a "critical" flow of 554 cfs at Anoka, the Corps will evaluate the situation and determine the need for additional releases, considering at the same time its federally mandated priorities for water from the Headwaters Reservoirs. Although the two flow scenarios do not exactly match, they really do say the same thing: that is, as flow appears to be heading towards extremely low levels, the Corps and DNR will evaluate the need to respond with additional releases from the Headwaters and act accordingly.

Any attempt to formalize an agreement between Minnesota and the Corps of Engineers on emergency releases would require a change in the federal authorities under which the Corps operates. The current authority was adopted in a series of actions stretching from the latter part of last century through the 1940s. Although the need to assure flow from the Headwaters for navigation was reduced substantially in the 1930s with the installation of the lock and dam system, there continues to be a need to maintain a flow of approximately 350 cfs through the Metropolitan Area for navigation purposes. The subsequent Corps' priorities of Native American rights and local public welfare certainly continue to merit attention by the Corps, but a fourth priority recognizing the potential for emergency releases to get water to a population of over two million people could be formally added through Congressional action. This amended priority system would not attempt to detract from the original priorities, but would rather attempt to update the priority system to better reflect the changes in demographics and use of the river since the current system was adopted.

Another option for flow releases from upstream of the Metropolitan Area is the use of abandoned Mesabi Iron Range pits. Several pits that are no longer used for active mining hold very large volumes of extremely clean water. Although some potential exists for use of these water bodies for recreation, the pits pose serious safety concerns for large-scale usage. In short, the pits remain a resource that is not being used to its full potential, assuming that use of the water for potable reasons in the Metropolitan Area is a higher priority than occasional, small-scale recreational use. The use of these pits will, however, present an institutional challenge because there is currently no institution in place to pursue the acquisition of abandoned pits to assure their use for supplementing Mississippi River flow. Also, any release of water to the river at present could not be assured to flow in its entirety all of the way to the downstream users.

Direct beneficiaries of any pit release would include Minneapolis, St. Paul and the suburbs each supply, plus NSP, St. Cloud, the MWCC and several smaller communities along the river. Of course, any of these entities could take it upon themselves or in a consortium to negotiate the means necessary to preserve the pits for river flow augmentation and construct the necessary conveyance system to move the water to the river. Means would have to be explored to assure that the volume of water released would reach the participating parties downstream. The potential costs involved and the number of other beneficiaries work against a single party taking a lead, but a consortium of users could put together a combined effort to accomplish a common goal. An agency such as the Metropolitan Council could act on behalf of "the region" and attempt to negotiate an agreement, but a legislative amendment in our authority would be required since we are limited in our capability to expend any "regional" money on facilities of this sort located outside of our legally defined jurisdiction and in our ability to acquire any property. The Council could, however, bond for a regional water authority functioning in a manner similar to any of the regional commissions (MWCC, MTC, MAC, RTB, MSFC). If such a regional commission was created by the legislature, the Council could then provide a funding mechanism to accomplish regional goals through acquisition of upstream facilities. Other options include state operation of the diversion system and privatization by some entity willing to develop and operate the system.

The final alternative given serious consideration in the Council report was the optimization of water use through regional management. "Optimization" is the process of obtaining the best possible mix of water sources and providing water to users in the best, most efficient possible manner. It was pointed out in the alternatives report, as in this one, that much regulatory authority exists for water use, but little is done to plan for the long-term use and management of water supplies for the region. The alternatives report presents arguments for and against the establishment of municipal supply interconnections, and concludes that interconnecting parts of the supply system make a great deal of sense, particularly those parts of the system that might experience shortages as rapid growth occurs. The report also introduces the concept of optimizing surface water use while adequate flows are available, with ground water reserves held in most cases until needed to supplement surface water. The current method of operation within the municipal system would mean that each individual supplier would have to negotiate separately with its neighboring community(ies) in order to interconnect in some fashion for some pre-determined set of circumstances to obtain an alternate source of water. This approach fosters the attitude that each supplier must act alone, and works against the notion that we should be moving towards a planned system if we hope to avoid problems associated with growth and drought.

Again this divergent approach by each supplier suggests a need for a coordinated regional strategy under which a plan for optimization of water use and distribution is developed. An institution charged with accomplishing this optimization would need to quantify the resource available and the degree to which it is used, and then coordinate its use so as to minimize adverse impacts. This approach would also mean that major new infrastructure development would be needed to connect users with sources and with other users willing to cooperate in joint supply systems. A major venture of this sort could be explored in a regional water planning effort. In concept, the figures on available water and on future use support subregional distribution systems, but an institutional framework must be in place first to evaluate the practical feasibility of such a system, and to develop the concept and direct the effort.

## **Monitoring Actions for Effectiveness**

In order to keep abreast of the use and management of water within the region, it is essential to have a good database of information on water users, volumes used, and locations where the water is used. The information that the Metropolitan Council uses in its various evaluations of regional water use comes from DNR (Division of Waters), MDH or from surveys of the users. DNR collects data as part of its responsibilities to issue water appropriation permits and receive reports from users on the amount of water they use. MDH receives reports from public water suppliers on the basic design of their systems and periodically receives updates on water demand. The Council's data collection has been oriented around filling data gaps and verifying data obtained from the state.

We have found that major strides have been made by DNR in its compilation of data. The data are now available from a computerized system, but obtaining the data still relies upon the good graces of DNR staff, who have to drop routine responsibilities to retrieve requested data. However, the staff have been most cooperative and have customized data retrievals for us on several occasions. The only problems encountered have been the length of time required to obtain the data (a function of workload and priorities) and the revisions that commonly follow based on auditing of the data. The MDH data have been equally as good, although accessible only by hand from paper files and often out-of-date in areas experiencing rapid growth.

In both of the cases noted above the data are collected by the state agencies, but in neither case is a routine Metropolitan Area sub-base put together and analyzed for how water is being used in the region. The two agencies collecting the data are regulatory agencies not charged with planning for the use of water, but rather with regulating its use. Special studies seem to be the only reason for compiling the regional water use data and evaluating it on an irregular basis. Thus, examining the regional water use situation occurs on a snapshot basis rather than as part of any long-term planning function--another argument for some agency being charged with responsibility for water planning in the region. The logical outcome of this responsibility would be routine periodic reports of how water is being used, definition of potential problems before they occur and assessment of the water resource available for use. This program would place us in a position to attack our problems proactively instead of reactively.

Maintaining an up-to-date regional database of water use is a relatively simple, yet crucial task. However, if we add to this the need to also document water availability, the situation becomes more complicated. In order to properly document availability, we must do a more effective job of collecting and assimilating data on the occurrence of water in the region. This task is not particularly difficult for surface inflows, but does become potentially very complex when ground water needs are considered. Although state, county and local resource managers are continually upgrading the amount and quality of ground water data available, one is usually faced with a shortage of data in most parts of the region for most of the ground water system.

Making sense of the available data is another need that arises when dealing particularly with ground water. The best way to approach the extreme complexity of the ground water system is through a model that performs the analytical functions that otherwise would be too cumbersome to accomplish. The U.S. Geological Survey (USGS) released a ground water model that it developed for the region in cooperation with the Metropolitan Council, DNR and the Minnesota

Geological Survey (MGS). Unfortunately, operation of this model is so complex and requires so much computer time that using the model for day-to-day problem solving is not feasible. Additionally, USGS has developed newer models that they support rather than the one just recently finished for the region. Clearly, other functions of a regional water planning agency could include the development and continuing operation of a regional water database and the preparation, or cooperation in the preparation of, regional water models.

## **Operational Refinements and Plan Formulation**

The real bottom line in evaluating the institutional aspects of water supply in the region is to see if we can readily apply the lessons learned from such things as drought and contamination events. All parties involved in using, supplying, and evaluating water learned some valuable lessons from the most recent drought, and it now becomes imperative for us to address those problems so that they do not repeat themselves. Many water users and suppliers have taken it upon themselves to correct their own problems, and this is certainly in accord with their responsibilities to obtain and provide water. However, the most apparent institutional problem that we have as a region is that we have well over 100 municipal suppliers, over 400 commercial/industrial/institutional users, and over 800 agricultural and miscellaneous users who are all pursuing their own sources of water and developing their systems without looking at the overall regional availability of water. Each individual user looks at their own need and responds accordingly. Riparian water law allows individual users the right to reasonable use of their water resources, so dictating where water must be withdrawn is not possible unless it can be shown that a conflict will result if a user proceeds with well development in a particular location or aquifer. The state has done the job assigned by the legislature and regulated the appropriation of water so that users do not conflict with each other, but regulation is not analogous to planning. If we are serious about avoiding problems in the future, a forward-looking approach is needed that guides users to the best source available, as opposed to responding to the likely presence of a problem.

There are several options for putting together an institutional framework for regional water planning. The Council will not make a recommendation on this until it further examines the background information and gathers input from the public. However, a presentation of options follows so that possibilities can be examined and opinions rendered on how best to pursue regional water planning, if indeed it is deemed to be a need by the legislature.

The easiest framework to pursue under the existing conditions would be for the state regulatory agencies to add a planning function to their current workloads. The positive aspects of this option include the familiarity of the staff with the issues, the authoritarian role that the agencies play in the eyes of most users and the maintenance of "institutional status quo" in a time of limited state funds. As pointed out previously in this report, the authority to address many of the problems that have been identified with water supply and demand exists if the state chooses to pursue them aggressively. However, resources devoted to the state's programs have not managed to keep up with the workload demand, with the result being very limited state staff available to address a mix of regulatory and planning functions.

It becomes far more difficult in these times of severe limitations on governmental programs to propose new programs that would require some additional expenditure by someone. Nonetheless, there are options that should be considered outside of the current framework. Adding a major water planning function to a non-regulatory state agency is one such possibility. Agencies such as the Environmental Quality Board (located within the Office of Strategic and Long Range Planning) or the Board of Water and Soil Resources (BWSR) are state agencies that have various water management functions. Both EQB and BWSR have legislative mandates to coordinate water activities in some manner, so they are more oriented to planning functions. EQB's orientation is toward state agency coordination, while BWSR's is more toward local soil and water management. Neither of these agencies, however, has worked in detail with water supply issues pertaining to the Metropolitan Area, although EQB has certainly addressed them in the context of overall state issues, and BWSR has become quite active in regional watershed issues. As of this writing, the legislature is examining the state water agency roles to determine if there should be a reduction in the number of agencies. This uncertainty should not affect the overall option, since a water planning function could just as easily be added as a separate component within a single water agency.

Historically, planning for any aspects of growth or resource need in the Metropolitan Area has been done by the Metropolitan Council, with implementation of the plans carried out by one of the regional commissions, or by local or special units of government. Since its creation by the 1967 legislature, the Council has been interested in water issues and has undertaken several studies to address water supply topics. We have adopted water supply policies in our Metropolitan Development Guide, but until the passage of Section 473.156, it had not been in the Council's purview to prepare a regional plan for the use of water. Legislatively, the Council is authorized in various parts of Minnesota Statutes, Section 473 to plan for the "orderly and economic" development of the region and to implement these plans through the operation of "regional systems" for sewer, transportation, airports and parks, and much less authoritatively for other aspects related to growth, including water. Addition of water as a fifth regional "system" would accord it a far more important status, with implementation likely occurring through the existing supply framework and the local comprehensive planning process. The planning and/or implementation activities of a regional water system could also be conducted by the MWCC, which currently implements regional water quality plans within a framework prepared by the Metropolitan Council and the MPCA. The Metropolitan Council is required under Minnesota Statutes, Sec. 473.156 to periodically update the regional water supply plan currently being developed. In accordance with this charge, the Council will examine the water supply system as often as needed to make the users and the legislature aware of the state of the resource. This periodic review authority could be enhanced with amended legislation to an ongoing "system" planning function under which the Council could actively implement many of the suggested actions contained in this institutional evaluation.

Another regional approach could be through a newly created regional water commission. Such a commission could operate in a manner similar to MWCC, with its focus instead on water supply. Creation of such a commission would require new legislation and some thought on the kind of functions that the commission would perform. The success of regional commissions like the MWCC in providing services and overall system operation illustrates the benefits of having an agency with a single focus. On the negative side, there would be a need to create a new agency, or create a new function within an existing agency, each of these complete with the establishment of a new bureaucracy designed to address a myriad of tasks. This process could be made a little

easier by placing the process within the Metropolitan Council's policy/system plan structure, which would require making water supply a "Metropolitan system" in Section 473. Establishment of a regional water commission should be a long-term consideration that would be addressed only after a specific need is determined in accord with a broader regional water supply planning effort.

Counties were given an enhanced emphasis for water planning in Greater Minnesota with the adoption of "110B" planning language by the 1985 legislature. Under this legislation, counties are able to prepare water plans alone or in unison with other counties. Adoption of similar legislation charging the Metropolitan Area counties with developing water supply plans is an institutional option that would lead to an overall regional plan if the seven counties cooperated in its preparation. To achieve this level of planning, some historic differences between cities and the counties in which they lay would have to be overcome. There are also some limitations on the ability of counties to conduct planning activities that impact cities, so a change in legislation would likely be required. As with several of the other institutions evaluated, there is not much of a history of counties participating in water supply issues. Another argument against this approach is the fact that seven entities are involved, but this could be overcome if the counties agreed on some form of cooperation to develop a single plan.

Continuation of the current water supply situation is certainly an option, given the fact that we have not experienced major supply problems even during the extended drought of the late 1980s. Following this course, however, would mean that we continue to "react" to problems--a situation the legislature hoped to avoid starting with their charge to the Metropolitan Council to prepare a long-term water supply plan. The material presented previously in this report suggests that a larger-scale plan should indeed be done for the region. However, implementation of the plan could occur in any number of different ways, including through local water suppliers or through commercial/industrial/agricultural users as part of their permit requirements. Another option that would keep the local suppliers as direct implementors of any plan would be joint powers agreements or less formal arrangements under which various groups of suppliers could cooperatively develop a water supply system.

The municipal water supply management component of the regional plan could be carried out through the local comprehensive planning program. Minnesota Statutes, Section 473.851-.872 (Metropolitan Land Use Planning Act) lays out a framework for the preparation of forward-looking development plans for every local unit of government within the Metropolitan Area. The legislation requires communities to adopt a plan that contains "...objectives, policies, standards and programs to guide public and private land use, development, redevelopment and preservation for all lands and waters..." within the jurisdiction of the local unit of government (M.S., Sec. 473.859, subd. 1). The plan must also "...designate the existing and proposed location, intensity and extent of use of land and water for agricultural, residential, commercial, industrial and other public and private purposes..." (M.S., Sec. 473.859, subd. 2). Among the required elements of a local comprehensive plan is a public facilities plan that describes "...the character, location, timing, sequence, function, use and capacity of existing and future public utilities" (M.S., Sec. 473.859, subd. 3). To implement this plan, the local unit must adopt an implementation program describing "...public programs, fiscal devices, and other specific actions to be undertaken...to implement the comprehensive plan."

The comprehensive planning approach outlined above lends itself quite well to the development of a regional water supply plan, with subsequent implementation by the local water suppliers. The Land Use Planning Act, however, is not explicit as far as water supply is concerned, although water is mentioned frequently throughout the law. In order to place direct emphasis on the water supply issue, the legislature could amend the law and make direct reference to water supply and the expectations that it has for the water supply effort. This process could be given added emphasis by making water a fifth regional system under the planning authority given the Metropolitan Council under Section 473. This action, if desired by the legislature, would charge the Council with the preparation of an overall regional water supply "system plan" within which water suppliers would operate. Implementation could be undertaken by the local suppliers in accordance with the regional plan. This approach would be the most direct means of coordinating local comprehensive planning with water supply planning on a regional basis.

The greatest benefit of a regional system approach is the development of a framework under which optimum use of available resources can be made through continued evaluation of the occurrence and use of both surface water and ground water in the region. Other benefits include development of drought and emergency contingency plans to avoid "reacting" to events as they occur; potential development of a regional financing mechanism to develop an optimum use system and alternative sources of supply; and positive movement toward assuring the orderly development of the region through the provision of a supply system that can meet the needs of a growing region. The negative aspects include additional responsibilities for some agency in a time when resources are limited, an additional element of planning that communities must incorporate into their planning framework, and possible infrastructure changes to distribute water in a different manner. However, costs of some of these efforts could be off-set by imposing a very small surcharge on water use (see also Working Report No. 1).

Non-municipal users would not be subject to the planning provisions outlined above, since they are not part of the comprehensive planning process in Ch. 473. Industrial, commercial, agricultural and other miscellaneous users would perhaps better be covered within a regional approach through their DNR permits or through some sort of local/watershed water allocation (permitting) approach. Under this scenario, DNR would proceed as noted previously in this report with an aggressive conservation program, which incidentally could also be done for municipal users as part of the regional plan. This approach would allow DNR to incorporate up-to-date information on conservation techniques and legislative desires into its routine permitting scheme. As noted before, however, DNR would need additional staff resources to devote the time necessary to undertake this endeavor. This implies the addition of staff or the reorientation of work programs of existing staff. Local or watershed efforts would make a great deal of sense in light of the new wellhead protection initiatives likely to be implemented in the near future.

## Survey Response for Council Action

The Metropolitan Council surveyed the 111 municipal water suppliers in the summer of 1990. One of the questions asked what the suppliers thought the Council should do in implementing this water supply plan to ensure a good water supply in the region. Table 2 summarizes the responses received. Note that the responses in total are not additive because respondents often gave more than one response.

**Table 2**  
**RESULTS OF MUNICIPAL WATER SURVEY**  
**ON METROPOLITAN COUNCIL EFFORTS**

SUPPLIER RESPONSE	NUMBER OF RESPONSES
Protect ground water	15
Regulate the use of water, including the elimination of once-through air conditioning	13
Adopt a metro-wide water conservation program	12
Secure and protect supply sources	8
Do nothing; leave to local suppliers	8
Provide funds for local efforts, such as infrastructure improvement	5
Provide educational materials to officials and public	5
Continue to provide information and studies	3
No response to this question	49

The rather large number of respondents in the last entry of the table is puzzling. We would have preferred to see some response, even if negative, to let us know how the community is thinking. Does the lack of a response mean that the community sees no need for a regional approach? Or that they do not want the Council involved in "local affairs" and were too polite to tell us? Or that everything is fine and they see no need for any action?

The rest of the responses reported in Table 2 give us a hint as to how some of the communities perceive Council participation in a regional planning effort. Clearly, many of the communities want stronger protection for their source of water. Thirty-six indicated that they want to "protect, regulate and secure" water supplies. An additional 12 want some kind of metro-wide, uniform conservation program. Another group of 13 want the Council to provide funds, educational material and studies in support of the water system, while eight urged us to stay out of the effort altogether and let the communities solve their own problems.



In total, 61 responses (again, note that the data are not additive) suggested some level of effort in regional water planning, while 49 apparently had no opinion that they were willing to share and eight suggested that they solve their own problems without Council interference. There obviously is no overwhelming mandate to the Council from the municipal water suppliers. There is, however, an indication that the suppliers who responded see a need for better protection and regulation of their sources and for additional information/programs on the use and availability of water. It seems as though the general findings of this study lead to the same conclusion, and that the best way to meet the needs identified by the respondents is to move toward a regional water supply plan that would address the needs expressed in Table 2.

## SUMMARY AND CONCLUSIONS

The following comments and conclusions summarize our findings on the institutional aspects of water supply planning in the Metropolitan Area:

1. The most apparent institutional problem we have in the region is that there are 111 municipal suppliers, and hundreds of commercial, industrial, agricultural and miscellaneous users who are all pursuing their own sources of water and developing their own systems without looking at the overall regional availability of water. Clearly, a forward-looking planning approach is needed to provide coordination so that the region can continue to prosper without growth-related water problems. A mix of options are possible for accomplishing this, including the use of existing and new state agency authorities, creation of a new regional water supply planning function, intercounty cooperative planning, and/or amended and strengthened local comprehensive planning.
2. The response to water supply problems by users and institutions has historically been "reactive" rather than "proactive." Although water users in the region have not experienced major shortages, we typically enter a reactive phase when shortages threaten, during which time decisions are made outside of any pre-conceived response plan. A regional water supply plan with an emergency response component is needed for the Metropolitan Area so that we know well in advance how we will address problems related to water shortages caused by drought or contamination.
3. Numerous laws and authorities exist to affect good water supply planning, yet no agency is "in charge" of assuring that the programs are implemented in a forward-looking manner and resources necessary to proceed on such a course have not been devoted to the cause. DNR has been hindered in its efforts to apply conservation language to water appropriation permits by the fact that action on the permits is limited by law to applications for new or amended permits, or to situations in which a documented water use conflict exists. A legislative change allowing DNR to apply its conservation rule provisions to existing permits would assist in bringing the region closer to being prepared for emergency drought and contamination events. However, DNR would also need additional resources to absorb the increased work load that would be required to respond to this initiative.
4. We need to become more self-sufficient in the region so that we do not have to look elsewhere for solutions to our supply problems. Pursuing supplemental supplies of water from within the Metropolitan Area and particularly from outside of the region should occur only after instituting a wise use/conservation program for the region.
5. Water supply problems in need of institutional solutions include both drought related shortages and water quality contamination. While the causes of these categorical problems are distinctly different, our response to each could be addressed through the preparation of response plans. Our economic vitality and ability to compete with other urban centers in the country depend a great deal on our ability to maintain an adequate supply of good quality water.

6. The matrix (Table 1) for user response to Mississippi River low flow conditions contained in the 1990 short-term water supply plan was agreed upon by all parties in the matrix. This plan, or one closely related to it, needs to be part of the long-term plan so that water users relying on the river know what is expected of them when shortages are imminent. Formalizing this plan for the river will also help the state water agencies and the agency responsible for the regional water supply planning function, if this option is pursued. The state should consider a request to the federal government through our congressional representatives to reflect the water supply and water quality needs of the Metropolitan Area in the priority scheme of the Headwaters Reservoirs.
7. Inadequate institutional measures are available to define "drought" relative to water supply, to begin predefined remedial actions to solve supply problems as they develop during a water shortage, or to efficiently distribute available water around the region to users in need.
8. Legislation exists giving DNR authority in many aspects of water supply management, but the regulatory functions at the agency have taken precedence over planning functions. This approach by DNR is driven by a shortage of staff and by DNR's principal charge to regulate the use of water in the state. Regional water supply planning functions that should be undertaken include, among other things, projection of future water use, quantification of water availability, modeling of water resource systems, preparation of plans to conserve water, continual tracking of water use and consumption on a regional basis, and development of response plans for emergency conditions resulting from contamination. DNR's legislatively mandated plans for statewide conservation and drought preparedness are currently implemented through rules and internal agency directives rather than being explicitly defined in a document available to the public: this limits visibility and makes it difficult for those outside of the agency to determine whether anything has really been done.
9. There is a need to supplement existing legislative language to require water supply contingency plans from all large-scale permittees. Similarly, the current ability of a user to opt-out of responsibility during a water supply emergency by signing an agreement to live with the results of their shortage is not in the best interests of supply preparedness and should be eliminated from the legislation.
10. The state is ill-prepared to deal with a spill of contaminants along or into the Mississippi River. Recent events associated with the Lakehead Pipeline spill near Grand Rapids and the train derailment at Fountain City, Wisconsin, exemplify the vulnerability of Mississippi River water users to accidental spills. Continued efforts to tighten-up the federal and state regulations for emergency preparedness and response, and to plan within the state for response actions are needed.
11. A survey of municipal water suppliers in the Metropolitan Area has shown that a large number of these suppliers have no emergency plans or means of reducing demand in an emergency situation. Additionally, many of the plans that do exist involve little more than the initiation of sprinkling restrictions on an as-needed basis. We also found that several communities do not meter water use, and we have had reported to us that some communities with meters do not read them. The situation outlined here places the region's municipal supply system in a reactive position relative to potential water supply shortages, and should thus be corrected through legislation requiring contingency planning, mandatory metering and meter reading.

12. There is no focal point for information on water conservation programs, and no agency that is a leader in efforts to get conservation underway in the Metropolitan Area. The need to institute a regional conservation initiative is an essential first step in any effort to reduce overall regional water demand, and must be undertaken prior to any effort to obtain alternative sources. Currently, the only ways to accomplish a regional program are through a governor's emergency declaration or through public requests for water use reductions by all users.

13. DNR is denied a role in planning ground water withdrawals by a regulatory system that issues water appropriation permits after wells are drilled. Any permit constraints that DNR would issue after a well is drilled would likely place a substantial financial hardship on the well owner. DNR review prior to drilling a well would place DNR in a position to direct rather than respond to proposals for water use. A regional ground water plan component could also be used to direct users in an optimum manner. Legislation should be considered that requires the adoption of a DNR approved contingency plan (as noted above) before MDH can issue a permit for installation of any municipal supply component, including a well, a treatment facility, or watermain.

14. Any large-scale shortage affecting a significant water user, such as Minneapolis, St. Paul, or any large city, commerce, or industry, will have regional impacts. Therefore, regional solutions to water shortages need to be sought. However, there is not a regional entity in place that can represent the interests of regional water users in any attempts to supplement supplies, nor is there an entity that can attempt to move the region toward a system of interconnected water users sharing their sources within a regional framework.

15. Compilation of regional water use and availability data has been done on a project-by-project basis without development of a continually updated regional database. Data are collected and progress has been made by DNR and MDH in addressing data shortcomings, but a need exists to monitor specific regional water use and availability patterns more effectively. This approach would increase our chances of detecting problems before they occur, and head us in the proactive direction. This activity could be performed as part of a regional water supply planning function.

16. An attempt to gather consensus from municipal suppliers on how the Metropolitan Council can address water supply problems through the preparation of the long-term water supply plan drew limited response. Many of the respondents want better protection of their supply source, with lesser numbers desiring regional water conservation, and assistance in funding, education and fact-finding.

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