National Source Water Contamination Prevention Strategy

Seventh Draft for Discussion

The U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water
401 M Street S.W.
Washington, DC 20460
Mike Muse - 202-260-3874
muse.mike@epa.gov

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PREFACE

Most Americans enjoy high quality drinking water and, in general, the quality of the water produced by public water systems in the United States is very high. While a number of measures are in place to protect and retain the high quality of our drinking water, the sources of our drinking water are subject to a number of threats, including growing population, chemical use, and animal wastes. These all make protecting our drinking water sources important. Congress recognized this by elevating the prominence of preventive actions in the 1996 Amendments to the Safe Drinking Water Act through a multi-barrier protective net. This Strategy is an attempt to develop a coordinated series of outputs and activities that will accelerate the attainment of source water protection goals in a cost efficient manner.

Drinking water contamination prevention means different things to different people. This is a legitimate interpretation, because the threats to drinking water sources and the means to address those threats are site-specific and locally driven. However, amongst the locally driven and site-specific differences, common themes emerge. By establishing a common vision, coordinating efforts, establishing tangible goals and priorities, it is hoped that the common themes can expand to better serve program objectives.

To make drinking water contamination prevention a success, everyone needs to be involved. Federal and state agencies must provide a framework for and assistance with drinking water protection. Local and tribal decision makers must pass management measures that are acceptable to their citizens and effective in protecting water sources, and water system operators are on the front lines of delivering high quality drinking water to their customers. Business owners, farmers, interest groups, and the public must also take part in making drinking water protection a success.

This *Drinking Water Contamination Prevention Strategy* focuses on three areas. First, it provides an overview of the challenges to preserving and protecting sources of drinking water. Second, it provides a vision for prevention. Third, it presents the mission and goals of source water protection, and describes a strategic approach for meeting contamination prevention objectives. And four, the strategy establishes performance measures that can not only guide priorities but also determine whether adequate and timely progress is being made, and describes the important role of data and information systems in attaining the source water protection goal.

This strategy does not attempt to be the be-all-and-end-all for preventing drinking water source contamination. Rather, it is a road map to help federal, state, tribal, and local decision makers and ordinary citizens stay on track toward achieving safe drinking water for every American.

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INTRODUCTION

Man has known for millennia that if the water supply is not kept clean and safe, people get sick and die. As man began to gather in cities, communities were built around water resources. Early planners cautioned the people to treat water with respect. As far back as the Greek and Roman civilizations, protecting water for use in cities was a priority. That common-sense approach was as important then as ever.

Virtually every American relies on water—to drink, to conduct their business, or for recreation. Over 250 million Americans receive drinking water that is generally safe from approximately 170,000 public water supplies. Nonetheless, drinking water safety cannot be taken for granted. Drinking water that is not adequately treated or travels through a faulty distribution system can endanger the health of a community. However, in many cases, public health protection starts at the source. A community is automatically at higher risk if it relies on a source that is contaminated with micro-pathogens (organisms that can cause disease) or other harmful compounds. Improperly disposed chemicals, animal wastes, pesticides, human wastes, ~~wastes injected deep underground,~~ and naturally occurring minerals can all contaminate drinking water sources.

While the absolute need for safe drinking water has existed for generations, the threats we are facing today are more numerous and severe than in the past. This is why its important to develop cost-effective ways to deal with these threats.

In 1999, as part of the 25th Anniversary of the Safe Drinking Water Act (SDWA) celebration, the Environmental Protection Agency (EPA) hosted an open dialogue to discuss the future of safe drinking water from the source to the tap. During this Futures Forum dialogue, concern for the quality and quantity of the aquifers (natural underground layers of stone, sand or gravel that contain water), rivers and lakes serving as our nation's water supplies was high on everyone's agenda. There is concern that national trends of increasing population, urbanization and development are adding pressures to the water supplier's job of providing safe drinking water at the tap. Because of this widespread concern, it was recognized that protecting sources of drinking water should be a priority.

The Importance of Source Water Contamination Prevention

Source water contamination prevention is a common sense approach to safeguarding public health by taking action to protect each source of drinking water from contamination. Preventative actions are successful when they significantly lower the likelihood of contaminants entering drinking water sources. In many cases, contamination prevention is the primary safeguard to public health, particularly for water systems with less sophisticated treatment technologies and for privately owned wells.

Preventing source water contamination is important for three reasons: It makes good public health sense, good economic sense, and good environmental sense.

Public Health. When waterborne diseases occur due to contaminated drinking water, the burden of solving the problem falls on the community. Source water contamination prevention is the first barrier to the outbreak of waterborne illnesses: keeping contaminants out of the source water helps keep them out of the drinking water supply.

Economic Benefit. Dealing with the impact of drinking water contamination is not cheap. Not only can wages be lost and medical costs incurred, but alternative water supplies may be required in the short run. Over the long-term, treatment systems may have to be expanded, or new water sources found, to meet new regulatory requirements or to address new contaminant threats. Source water contamination prevention can keep such costs in check. An EPA analysis of a variety of communities showed that on average, dealing with contamination of their ground water supply may be 30 to 40 times more costly than to prevent contamination in the first place. As the old adage goes, "an ounce of prevention is worth a pound of cure."

Environmental Protection. Taking actions to protect drinking water sources also protects the water resource for aquatic ecosystems. Development pressures, polluted runoff from agricultural, commercial, and industrial sites, septic system leaching, and aging wastewater infrastructure are some of the threats to water quality that affect not just drinking water quality but aquatic habitat. Ground water also affects the health of aquatic ecosystems: in many areas of the country, depleted aquifers are causing reduced ground water contributions to surface water flow to the point that habitats are threatened. In other regions, polluted ground water can significantly degrade the quality of connected surface waters.

Successes to Implementing Source Water Contamination Prevention

We've come a long way towards preventing contamination of the nations drinking water supplies.

- Today, 49 states, Puerto Rico and Guam have EPA-approved Wellhead Protection Programs to help guide local drinking water protection efforts for ground water supplies. As of 1999, states report that over 3,000 communities are practicing wellhead protection, and others are partnering in local watershed protection initiatives to protect drinking water. Over 90 tribally-operated water systems out of 730 across the country have started wellhead protection efforts.

- Of the 23% of rivers and streams assessed in 1998, 38 states report that 87% of those used for drinking water are of good quality. Of the 43% of lakes and reservoirs assessed, 38 states report that 82% of those used for drinking water are of good quality.

- Since 1974, EPA has designated 71 Sole Source Aquifers, resulting in the review of an average of 200 federally-funded projects per year to ensure that they will not pollute these aquifers.

- Underground Injection Control programs nationwide regulate more than 850,000 injection wells and up to 89 percent of all hazardous waste that is land-disposed in the United States.

- Eleven states have comprehensive ground water protection programs to coordinate protection of ground water resources within the state and all fifty states report some degree of coordination between state programs to protect ground water resources.

- Fifty states, Puerto Rico, the District of Columbia, and two tribes have approved source water assessment programs and are committed to completing source water assessments by May 2003. Over 90 tribally owned water systems are on their way to completing assessments.

Source water protection is a reality, not a concept. While many concrete steps have been taken to protect source water, more needs to be done. We rely on older approaches, such as treatment and remediation, which may be expensive and whose need may not be apparent until it is too late for some.

In September 1999 hundreds of people who attended the Washington County (NY) Fair were sickened after drinking water contaminated with *E. coli* strain 0157:H7. Two people, including a three-year old girl, died as a result of the outbreak. Investigators determined that the *E. coli* entered the water supply when rainwater washed over cow manure from a cattle barn on the fair grounds and into the well that supplied drinking water to the fairgrounds. Had the vulnerability of the well to the animal waste been known, the tragedy could have been averted.

Threats to Source Water

While there are many successes to report, there is more to be done. According to the 1997 Community Water System Survey, more than 84 percent of all drinking water systems report having at least one potential source of contamination within 2 miles of their water intake or well. The 1997 Wellhead Protection Biennial Report indicates that only 10 percent of water suppliers have protection measures in place, ranging from local land use ordinances to public education efforts. State water quality programs claim that drinking water uses are a priority, but only 38 states report on drinking water uses in the 1998 Water Quality Inventory. Undocumented Class V wells are a major challenge facing ground water programs.

The threats to the safety of the drinking water supply increase each year. The population of the nation is increasing, as is the density of that population–more and more people are living in cities than ever before, and those cities are growing near rivers and water supply areas. Dense clusters of urban activities–construction, automobile use, chemical storage and disposal, and herbicide and pesticide use–pose increasing threats to water sources.

In this country, there are more chickens and cows than people. These animals are housed in dense feeding operations and pastures, which generate large quantities of manure. In fact, it is estimated that the quantity of animal waste is 13 times greater than human sanitary waste generation in the United States. Like human wastes, animal wastes contain pathogens, such as *E. coli*, that can sicken hundreds of people, and kill the very young and old, and people with weakened immune systems. These wastes can enter drinking water supplies in runoff from feedlots and pastures.

How can we protect public health and our water supplies? These are the challenges facing people involved on source water protection efforts.

Challenges to Source Water Contamination Prevention Implementation

What are the challenges to source water contamination prevention? Fragmented and incomplete programs and inconsistencies between programs, along with a lack of consensus on how to measure threats, and resource shortfalls are leading to incomplete data on and awareness of threats to source water.

Incomplete Data on Threats

As of November 2000, states reported less than 3,000 public water systems having completed source water assessments. It is difficult to adequately prevent contamination if the extent of threats has not been assessed. The intent is for states to complete a baseline assessment for every public water supply in the country by May 2003. This is a substantial challenge, given that there are nearly 170,000 public water systems, but the completion is critical as the first step to taking management actions to protect drinking water sources. Furthermore, contaminant occurrence data are incomplete, and source water assessment data are being compiled in a variety of computer and hard copy formats that may or may not be amenable to comparison or analysis.

Low Awareness Among Federal, State and Local Stakeholders

A significant and overarching challenge is increasing the awareness and participation of a diverse network of authorities and interests. Often, the necessary diversity of jurisdictional and social partnerships for effective protection creates difficult obstacles at national, regional, state and local levels.

For example, at the local level, the utility or township controls the output of the treatment facility. However, the utility or single township does not typically control the quality of its source of drinking water. This is why increasing awareness and creating partnerships across jurisdictional, governmental, and ownership lines are crucial to any community wishing to prevent contamination of source water.

To take another example, states and tribes are in the first full year of completing source water assessments, while at the same time continuing to implement Underground Injection Control (UIC) and Wellhead Protection Programs. States and tribes are also implementing prevention programs and initiatives under the Clean Water Act to identify high priority watersheds and impaired waters. Other parts of state and tribal programs are working to shut down leaky underground fuel storage tanks and develop state best management plan programs. These are only a few of the parts of a state or tribal government that play a part in protecting drinking water sources, but scarce resources often prevent cross-program goal setting or awareness.

Intent of This Strategy

This strategic plan for source water contamination prevention defines a common vision and common goals for implementation that all partners can use, and takes a first step to identify some tangible objectives to transition from source water assessments to contamination prevention. It begins the dialogue to:

- *Establish a national vision and goal* to guide future contamination prevention activities and allocation of resources to achieve the greatest level of public health protection;
- *Foster a consensus on a strategic approach* to set national program priorities by identifying key objectives and actions;
- *Develop a common understanding and establish national measures* for source water contamination prevention in order to track progress across the nation as to how successful local initiatives are at lowering the risks of source water contamination;
- *Clarify the roles and responsibilities* of EPA to further the source water contamination prevention vision; and
- *Identify emerging issues*. Since 1996, issues have come to the forefront that the present SDWA statute and prevention programs do not deal with, such as addressing privately-owned wells and linkages between water quantity and quality.

Scope of This Strategy

Given the time frame and the number of players that are necessary to make source water contamination prevention a reality, this strategy lays out a national vision and objectives, and defines the specific actions that EPA's Water Program proposes to take over the next five years. The Strategy is presented in four parts:

I *Long Term Goal, Vision, and Building Blocks:* Given no resource or time constraints, what is the long term goal of a national effort to achieve source water contamination prevention?

II *Shorter Term Strategic Approach:* How do we move closer to the vision, based on the realities of time, resources, and institutional barriers? The strategic approach attempts to

identify some key objectives that, if addressed, can help to nationally strengthen capacity across all of the partnership levels to move from assessments to protecting drinking water sources.

III *Measuring Progress:* If we have a national vision, how can we show national progress? This strategy begins to lay out the possibilities for the measures that EPA could use to show national progress of moving from assessments to actual contamination prevention, and options for how to collect and manage data.

IV *Emerging Issues:* If we are preparing for the future, what emerging issues do we need to start exploring for incorporation into a longer term comprehensive source water contamination prevention?

PART I: GOAL, VISION, AND BUILDING BLOCKS

The goal of source water contamination prevention is to:

Protect current and potential drinking water sources and the health of those who rely on those sources.

A proposed long-term vision for source water contamination prevention is that:

All interested stakeholders utilizing a variety of tools in a coordinated fashion, establish barriers that significantly lower the risk of contaminants entering current and potential drinking water resources.

Building Blocks for the Vision

This vision for source water contamination prevention builds upon 25 years of efforts to address the protection of underground sources of drinking water, aquifers, lakes, reservoirs and rivers through a community-based approach. The cornerstones to source water contamination prevention are the Safe Drinking Water Act and the Clean Water Act. These water pollution prevention programs described in more detail in Appendix A are:

Underground Injection Control (1974 SDWA)
Sole Source Aquifer Program (1974 SDWA)
Clean Water Act Programs (1977)
Wellhead Protection Program (1986 SDWA)
Comprehensive Ground Water Protection (1991 Initiative, 1996 SDWA)
Source Water Assessments Program (1996 SDWA)
Drinking Water State Revolving Fund Source Water Set-Asides (1996 SDWA)
Clean Water Action Initiative (1996)

In addition, there are a series of other federal pollution prevention, remediation and control stepping stones. How do all of these federal programs fit together with state and local initiatives, and how do we go beyond the scope of any single statute to most effectively prevent source water contamination? More importantly, how do we build on these steps to reach our vision of every drinking water source water actively protected by its community?

PART II: STRATEGIC APPROACH

Key National Source Water Contamination Prevention Objectives

The goal of source water contamination prevention is to reduce the risks to public health by preventing contamination of the nation's current and potential sources of drinking water. The vision described above is that contamination prevention is accomplished through management actions implemented by a web of interested stakeholders.

Yet achieving this vision means overcoming challenges such as incomplete information and low awareness. This source water contamination prevention strategy proposes five short term objectives to focus on in order to reach the vision. To provide for the long term reduction of source water contamination risk, EPA and stakeholders will:

1. ***Ensure strong and useful source water assessments for all public water supplies.***
2. ***Target relevant state and federal programs to address source water contamination prevention priorities.***
3. ***Increase awareness, education, and involvement by private industry, government, and the public.***
4. ***Foster local control and capacity.***
5. ***Document and report on risks identified and progress made on reducing those risks.***

Priority EPA Water Program Actions

This strategy focuses on some actions that the Water Program will take over the next five years to transition from source water assessments to source water contamination prevention. This is not the total solution to source water contamination prevention. Other partners – state, local, and other federal programs, private businesses and citizen groups – need to identify what they can do to promote contamination prevention based on the source water assessments and other local factors. EPA will further develop the specific nature of these actions and develop and execute work plans and budgets.

Action Areas for Objective One: Ensure Strong and Useful Source Water Assessments for All Public Water Supplies

Action priorities between now and 2003:

Assist states with implementation as needed

Analyze quality of assessments by reviewing each state's implementation relative to the EPA-approved program and assist in shoring up weak spots

Develop national data layer of source water assessment areas

Provide for wide availability of assessments for public use at the local level

Action Areas for Objective Two: Target Relevant State and Federal Programs to Address Source Water Contamination Prevention Priorities

One stakeholder put it well: source water assessments build the tracks for contamination prevention, but other programs are driving the trains. If the trains aren't running then the end destination will never be reached.

There is a two-year window to bolster the awareness of source water assessments and contamination prevention among key federal and state programs before the widespread completion of source water assessments in 2003. During this period EPA needs to be a leader to build a stronger pollution prevention program framework to take source water contamination prevention actions as more assessments are completed. EPA needs to encourage appropriate federal and state programs to begin now to include source water priorities into their management plans, so that they are best prepared to support locally driven source water contamination prevention priorities. Action priorities between now and 2003:

Increase the inventory of Class V wells and locate UIC wells with latitude/longitude data and ensure compliance and adequate management of injection wells.

Develop minimum standards and requirements for the national UIC Program, including Class V Phase II, for targeting prevention to protect current and potential water supplies. While the ideal goal would be to target all Class V wells, wells inside of SWPAs should be an initial priority.

Ensure 50-state adoption and application of adequate CWA Water Quality Standards to protect drinking water uses. As a first step EPA will conduct a fifty state analysis of the current water quality standards adopted by states to characterize how they address source water.

Form management level integration team to shore up CWA/SDWA integration in support of source water contamination prevention.

Develop formal understanding between EPA regulatory programs and the Water Program as to management actions within state and tribally-defined source water protection areas.

Increase awareness and adoption of source water management actions by federal land management agencies. Forest Service, Bureau of Land Management and Bureau of Reclamation are the first three priorities.

Increase awareness and adoption of source water management actions and outreach to their constituencies by other federal agency community assistance providers. As a start, USDA's Rural Utilities Service (RUS), USDA's Extension Service (CSREES), and HHS's Indian Health Service (IHS) are three national local assistance networks that could help promote and implement SWP with local communities.

Action Areas for Objective Three: Increase Awareness, Education, and Involvement by Private Industry, Government, and the Public

Source water assessments will guide decisions and actions to prevent contamination of the drinking water resource. This is based on the assumption that an interested public is ready for and receptive to the information that is being gathered. A lack of awareness will decrease immensely the rate of success and implementation of contamination prevention management actions.

In particular, private organizations can play a large role in promoting source water contamination prevention. Depending on the nature of the organization and its purpose, the role can range from increasing group members' awareness of contamination prevention efforts to providing technical assistance to communities or water suppliers. In many cases, simple changes in business practices can reduce the risk of contamination from a potential source managed by the business. Priority actions between now and 2003 include:

Create web page for accessing state and local source water assessment information through the national page.

Increase awareness among water suppliers of Consumer Confidence Report requirements for source water assessment information dissemination. The first round of water quality reports was released in October 1999. EPA will follow up on a national public service announcement campaign to promote awareness of drinking water and include more information on the upcoming source water assessments and protection.

Identify, target and inform key organizations. EPA's Source Water Program will shore up staff outreach to public health, environmental and industry groups to inform them about source water assessment and protection.

Develop voluntary source water contamination prevention standards for adoption by different industry groups (both water suppliers and potential contamination sources).

Promote throughout the country initiatives to outreach to businesses and work more closely with other EPA offices that are developing voluntary performance standards for prevention of contamination of sources of drinking water – such as the Design for Environment Initiative (led by the Office of Pollution Prevention). Need to expound on this approach. These types of programs disseminate information to businesses on best management practices to prevent contamination of local water supplies.

Action Areas for Objective Four: Foster Local Control and Capacity

Water suppliers, local governments and other local stakeholders will ultimately determine the success of prevention actions. No other stakeholders have more of a vested interest in reducing the risk of contaminants entering drinking water sources than the people who drink the water.
Branch Chiefs: broaden local community assistance.
However, not all communities or water suppliers have the resources or wherewithal to identify and implement contamination prevention measures. Furthermore, not all state drinking water programs have the resources to provide field support to water suppliers to plan and implement source water contamination prevention plans. EPA can help facilitate the growth of local control by taking action in two areas: 1) increasing in-the-field support and 2) providing clear national guidance on what constitutes adequate contamination prevention measures for a local water supply source and their economic and social benefits.

a) Increase in-the-field support

Currently EPA provides assistance to the National Rural Water Association (NRWA) to fund the work of wellhead protection technicians. Over 7,000 communities have received assistance from NRWA to develop local wellhead protection plans. EPA needs to continue to work with wellhead protection technicians to refine their wellhead protection circuit rider programs encompassing the larger sphere of source water contamination prevention, and coordinating with state source water contamination prevention programs.

However, there are 170,000 water supplies across the country, and water suppliers are not always the stakeholder that will drive source water contamination prevention actions at the local level. EPA will strengthen partnerships with other local rural community assistance providers and circuit riders such as the Public Health Extension Service's and USDA's extension services to offer different types of assistance to different sets of stakeholders that may have a role to play in protecting their local source waters. A wide mix of local assistance providers knowledgeable in source water issues will facilitate

the local spread of knowledge about source water contamination prevention, and increase the base of potential drivers.

In FY 2000 EPA awarded two grants totaling 1.424 million dollars to take innovative multi-system approaches to providing assistance to communities on a group basis rather than one at a time. The intent was to foster new ways of implementing source water contamination prevention management actions that might touch a base of communities that might not otherwise take an interest in source water contamination prevention.

EPA will continue to partner with PWS operators through associations such as the American Water Works Association (AWWA) and NRWA by providing technology transfer workshops and other assistance. One such example is EPA's Drinking Water Academy (DWA). The DWA provides classroom and Web-based training on SDWA implementation.

EPA will provide a grant in 2001 to establish another field assistance approach that addresses other "hot spots" that are of concern and need assistance.

b) Provide national BMP manual

There are a wide array of best management practices (BMPs) and tools available for different situations. The challenge is to decide which tools are appropriate for a given situation. In the coming year, EPA will develop a manual on which BMPs are appropriate for different situations. EPA will provide training to water suppliers on how to determine which management practices to implement. Furthermore, EPA will invest resources on an economic analysis of source water contamination prevention for use at the local level.

Action Areas for Objective Five: Document and Report on Risks Identified and Progress Made on Reducing Those Risks

Measuring and reporting on progress are needed to provide accountability to Congress for SDWA implementation, to promote the integration of source water contamination prevention policies into other national programs, and to increase public awareness and involvement. Additionally, EPA needs to be able to measure its own outputs and determine whether they are leading to the end goal of protecting current and potential sources of drinking water.

EPA intends to measure progress by answering four basic questions:

- Are state source water assessments and UIC inventories being completed?
- What did they find?
- How are current and potential drinking water supplies being protected?
- In the longer term, is source water contamination prevention making a difference?

Part III of this Strategy and Appendix B present how EPA plans to measure progress toward meeting its source water contamination prevention goals.

PART III: MEASURING PROGRESS

Measures provide guideposts for judging the success of the strategic approach described. How will we be able to tell if progress has been made on getting management actions in place to address current and potential source water concerns, and if these actions are reducing the risk to public health by reducing the likelihood of source water contamination?

The General Need for Measures

- Provide accountability to Congress for SDWA implementation
- Promote the integration of source water contamination prevention policies into other national programs
- Increase public awareness and involvement
- Internally: measure our own outputs - are they leading us to the end goal

History: The GPRA Measure

The Government Performance and Results Act (GPRA) source water contamination prevention goal adopted in 1997 was that by 2005, 60% of the population would be served by a water system with a source water contamination prevention plan in place.

Criticisms of this measure have pointed out that there is no necessary connection between a source water contamination prevention *plan* in place and having source water contamination prevention *measures* in place. Therefore, there could be little connection between the GPRA goal and a decreased risk to public health.

Potential Alternatives to the GPRA Measure

As part of this strategic plan development, EPA started a dialogue with state UIC and Source Water Programs as well as over one hundred other stakeholders to explore what should be the measures of progress for source water contamination prevention, trying to focus on measures linked to public health protection and risk reduction.

The accompanying chart in Appendix B proposes a tiered approach to measuring progress. These tiers are composed of four guiding questions, each with a different expected time frame for level of completeness of information available:

- Tier One: Are state source water assessments and UIC inventories being completed?
- Tier Two: What did they find?
- Tier Three: How are current and potential drinking water supplies being protected?

- Tier Four: Is source water contamination prevention making a difference?

In the near-term, the highest level of completeness of information would be to answer tier one. By 2003 significant information should be available to judge if assessments and UIC inventories have been completed and what progress has been made on the adoption of adequate state ambient water quality standards for source water designations. With each assessment completed, UIC wells inventoried, and additional source water monitored, more information should be available to answer the second question. Simultaneously, and measured over a longer period, the focus will be on the management actions taken to protect source waters. Finally, on a much longer scale, the measure of success would be to evaluate if the implemented management actions have lowered the susceptibility of source waters to contamination, and thereby lowered risks to public health. See Appendix B for more details.

PART IV: EMERGING ISSUES

The following topics are starting to play more of a significant role in shaping the future directions of source water contamination prevention: 1) water quantity, 2) private water well protection, 3) research needs to support source water integration with the SDWA regulatory approach, and 4) state-tribal relationships. These issues need to be the subject of some significant analysis across the source water community as to what role does source water contamination prevention have in being part of the solution to these conflicts.

Water Quantity and a Comprehensive Watershed Approach

The Safe Drinking Water Act provides a framework for decreasing the risk to public health from polluted source waters. It deals very little with the issue of water supply and the impacts of dwindling supplies on community health and economies. This issue is left to state and regional authorities. At the local level, all of these issues merge: how not only to provide safe drinking water at the tap, but maintain a reliable flow.

Discussions of source water contamination prevention inevitably touch on water quantity. Quality often depends on quantity. Decreased recharge rates of aquifers and low flows in rivers can lead to increased salt concentrations, among other contaminants. Some stakeholders are asking that a national source water program address quantity issues. While this strategy does not directly address water quantity, as source water contamination prevention initiatives are implemented, all parties will need to be aware of issues of water storage, sequestration, conservation, and future use.

Protecting the Health of Private Well Owners

Approximately 42 million people in the U.S. obtain water from their own private drinking water supplies (U.S. Geological Survey, 1995). Most of these supplies are drawn from ground water through wells, but some households also use water from streams or cisterns. EPA does not oversee private wells, although some state and local governments set rules to protect users of these wells. Because the focus of the SDWA is on public water systems, it is difficult for EPA to develop national-level initiatives

to assist private well owners to prevent contamination of their well water. However, there are other federal agencies that currently assist private well owners such as USDA's Rural Development Program, the Department of Housing and Urban Development and the Department of Health and Human Services. Additionally, some states and local governments currently regulate household drinking water systems. Seventeen states use voluntary certification programs for private water well examination licensing purposes.

EPA strongly encourages inclusion of private well owners and smaller public water systems in local source water contamination prevention efforts, and will target support for programs that provide a national framework for education of these groups.

SDWA Regulatory Framework and Source Water Research Needs

The SDWA authorizes the EPA to set national health-based standards to protect against both natural and anthropogenic contaminants that maybe found in drinking water. To regulate a contaminant, EPA must establish that 1) the contaminant may induce adverse health effects; 2) it is known or is likely to occur in public water supplies at levels of concern; and 3) in the Administrator's judgement, regulation presents a meaningful opportunity for health risk reduction. The 1996 Amendments emphasize the use of sound science in the regulatory decision making process. The 1996 Amendments also emphasize the importance of source water quality.

As knowledge about contaminant occurrence, fate and transport increase, what information is needed about the effects of source water contamination prevention management practices to make it scientifically defensible to include source water elements in the regulatory framework? The National Drinking Water Advisory Committee has convened a Research Strategy Workgroup to identify research needs that will help shape new regulatory directions. Their discussions will include source water issues, and will be a step in addressing this topic.

Tribes and Source Water Contamination Prevention

There are approximately 750 tribally-owned public water systems in the United States. EPA is committed to assisting all tribes interested in completing assessments and will continue to allocate resources for this purpose. There will be situations where mapping of source water protection areas by states or by tribes will cross state and tribal boundaries, and may identify contaminant sources of concern that are in a neighboring state or tribe's jurisdiction. In these cases the source water assessments can either be viewed as a seed for conflict, or as an opportunity for states and tribes to cooperatively protect the water resources. EPA and other federal agencies with responsibility in Indian Country can act as mediators to facilitate effective source water contamination prevention efforts across jurisdictional boundaries.

CONCLUSION

As stated earlier, the responsibility for a successful transition from source water assessments to source

water contamination prevention does not rest solely with the EPA or with federal programs. State agencies, trade groups, health and consumer advocates, environmentalists, land trusts and others have vital roles to play and can fill in critical gaps, particularly since this is a locally-based program. Also, in some cases, EPA's authority does not lend itself to dealing with a component of source water contamination prevention that may be very important at the local level, such as how to work with private well owners to lower source water contamination risks.

EPA's Water Program provides this strategy as a starting point and looks forward to implementing our key actions in concert with other partners over the next five years.

APPENDICES

Appendix A	Legislation Relevant to Source Water Contamination Prevention
Appendix B	Draft Source Water Contamination Prevention Measures of Progress
Appendix C	Original List of Ninety Potential Measures of Source Water Contamination Prevention

Appendix A:
Legislation Relevant to Source Water Contamination Prevention

There are cornerstones to source water that are grounded in two key statutes: the Safe Drinking Water Act and the Clean Water Act.

Underground Injection Control - 1974

The Underground Injection Control Program, mandated by the 1974 SDWA, was one of the first SDWA provisions created specifically to protect underground sources of drinking water. This program regulates wells that are used by various municipal, agricultural, commercial and industrial entities to inject fluids underground for the purpose of disposal, hydrocarbon production and storage, or mineral recovery. Fluids may also be injected into underground wells to replenish depleted aquifers with surface water for later retrieval, and to prevent salt water intrusion into underground sources of drinking water. Shallow drainage systems which discharge contaminants above or directly into underground sources of drinking water are additional examples of waste injection practices regulated under this program. Today, 36 states and territories have primacy for UIC programs and EPA directly implements 17 programs. These programs regulate more than 850,000 injection wells.

Class I wells are wells that inject large volumes of hazardous and non-hazardous wastes into deep, isolated rock formations that are separated from the lowermost underground source of drinking water by many layers of impermeable clay and rock.

Class II wells inject fluids associated with oil and natural gas production. Most of the injected fluid is brine (very salty water) that is produced when oil and gas are extracted from the earth (about 10 barrels for every barrel of oil).

Class III wells inject super-hot steam, water, or other fluids into mineral formations, which is then pumped to the surface and extracted. Generally, the fluid is treated and re-injected into the same formation. More than 50 percent of the salt and 80 percent of the uranium extracted in the U.S. is produced this way.

Class IV wells inject hazardous or radioactive wastes into or above underground sources of drinking water. These wells are banned under the Underground Injection Control program because they directly threaten the quality of underground sources of drinking water.

Class V wells use injection practices that are not included in the other classes. Some Class V wells are technologically advanced wastewater disposal systems used by industry, but most are low-tech holes in the ground. Generally, they are shallow and depend upon gravity to drain or inject liquid waste into the ground above or into underground sources of drinking water. Their simple construction provides little or no protection against possible ground water contamination, so it is important to control what goes into them.

Sole Source Aquifer Protection - 1974

Another ground water protection effort established by SDWA is the sole source aquifer protection program. Congress included this provision in the 1974 SDWA, and has not modified it since. The program allows communities, individuals, and organizations to petition EPA for protection of an aquifer that is the "sole" or principal source of drinking water for the local population. A region is eligible for sole source aquifer status if more than 50 percent of the population in the defined area relies on the designated aquifer as its primary source of drinking water. Once EPA designates a sole source aquifer through a public process, EPA has the authority to review federal financially-assisted projects that may potentially contaminate the aquifer. If the proposed project poses no threat, then the project continues as planned. However, if there is potential for contamination of the aquifer, EPA must work with the project leader and associated federal agency to recommend protective modifications. Examples of federally funded projects that EPA reviews because the activity may impact ground water quality include:

- transportation-related improvement and construction;
- infrastructure upgrades of public water supply systems and waste water facilities;
- agricultural projects which involve animal waste management concerns; and
- construction of multi-family housing, business centers, gasoline stations, and hospitals.

Since the first sole source aquifer designation in 1975, EPA has designated 71 aquifers in 25 states and territories.

The Clean Water Act - 1977 and 1987 Amendments

SDWA programs are not the only means by which drinking water sources are protected from pollution. The Clean Water Act established a national framework for regulating the discharge of pollutants to waters of the U.S. Aggressive use of this Clean Water Act authority can reduce the contaminant loading that might otherwise have to be removed by drinking water treatment facilities to protect public health.

The Clean Water Act requires states and authorized Native American tribes to set water quality standards which consist of two parts: 1) states and tribes assign "designated uses" to each of the waterbodies in their jurisdiction, such as serving as public drinking water sources, providing fish and shellfish for safe human consumption, and allowing recreational activities like swimming; then, 2) states and tribes set water quality criteria (e.g., maximum pollutant concentrations) to support the designated uses.

If water quality criteria are exceeded for a waterbody, the state must list that waterbody as impaired and establish a "total maximum daily load" (TMDL) for the pollutant. The TMDL is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL is allocated among point and nonpoint source dischargers of the pollutant.

The Clean Water Act requires that states survey, assess and report on the degree to which their surface waters support designated uses by attaining water quality standards for those water bodies. Some

Native American tribes also report this information. Thirty-eight states, tribes or territories submitted data to EPA in 1998 that address the support of public drinking water use. According to that data, the majority of waterbodies designated as public water supplies that have been assessed are fully supporting that use (87 percent of assessed rivers and streams, and 82 percent of assessed lakes and reservoirs).

In the early 1990s, only a small percentage of rivers, streams, lakes, and reservoirs were assessed for drinking water use. In 1996, EPA published state guidelines for assessing the extent to which waterbodies are of sufficient quality to support their use as drinking water supplies. EPA modified these guidelines in 1998 to give states more flexibility. That additional flexibility has resulted in an increasing number of states performing drinking water use assessments under the Clean Water Act. The number of states that are reporting data on how they classify waterbodies for drinking water use, and on the sources of water contamination, is also increasing.

However, many challenges remain. In 1998, twelve states did not report on whether, or how, their water quality standards support drinking water use and many of the 38 states that reported water quality data did not explain how they classify waterbodies to support drinking water use, or on the sources of contamination affecting those waterbodies. The source water assessments that are required by SDWA to be completed no later than 2003 should help strengthen this reporting from the states.

Wellhead Protection - 1986

The 1986 SDWA Amendments required each state to establish a program to protect the land areas around water supply wells from contaminants that may enter the ground water and adversely affect human health.

EPA approves state wellhead protection programs and provides technical support to state and local governments to implement the programs. Working primarily with the assistance of EPA regional offices, the number of states obtaining federal approval for their wellhead protection programs has increased steadily since 1990. Today, 49 states, Puerto Rico, and two tribes have approved wellhead protection programs in place.

Every two years, EPA reports to Congress on the progress of wellhead protection implementation. The five steps are: 1) Getting started (this usually means that a community planning or work team has been established); 2) Delineation of the land area to be protected; 3) Identification of potential contaminant sources within the delineated area; 4) Implementation of a source water contamination prevention plan to adequately manage potential sources of contamination; and 5) Development of a contingency plan to protect the water source in case of an accidental spill of hazardous materials or some other emergency.

State Comprehensive Ground Water Protection Programs - 1991

In July 1991, EPA released a ground water protection strategy which encourages states to develop comprehensive ground water protection programs that establish state-wide priorities for prevention and remediation activities. In 1992, EPA published national guidance detailing the exact program a state would have to implement in order to be endorsed by EPA as being comprehensive, and in 1999 EPA published a Ground Water Report to Congress reporting on the progress of states to implement this comprehensive approach. These voluntary programs encourage federal and state programs to set common priorities for protective and remedial actions and to coordinate all programs to achieve common ground water protection and remediation goals. Programs to protect current and reasonably expected future drinking water supplies include wellhead protection, hazardous and other waste management, pesticides, underground storage tanks, and wetlands programs. Today, eleven states have EPA-endorsed comprehensive ground water protection programs.

Each state has made progress in comprehensive program development, but many states still have fragmented and incomplete programs. Current data show that localized contamination still exists in every state from sources such as septic systems, underground storage tanks, animal feeding operations, agriculture and manufacturing industries.

Source Water Assessments - 1996

Building upon the Wellhead Protection Program, the 1996 SDWA Amendments mandates that states complete source water assessments for the 270,000 public water supplies in the United States. Each source water assessment will consist of a map of a source water contamination prevention area, an inventory of the significant potential contaminant sources in the area, and an analysis of how susceptible the source water is to contamination. The intent is that the information from assessments can help communities take actions to lower the risk of potential contaminants posing a problem to the drinking water resource. These assessments provide a tool for further contamination prevention efforts, and are not a complete preventative plan in and of themselves. States will make the results of each assessment available to the public. Also, EPA is working with tribally owned drinking water systems to complete source water assessments. Then, each state, tribe, public water system, and locality can decide what preventive actions to take based upon the findings.

Water Conservation Planning - 1996

As mandated by the 1996 Amendments, on August 6, 1998, EPA issued guidelines for water conservation plans for public water systems. States may require water systems to submit a water conservation plan consistent with the EPA or any other guidelines as a condition of receiving a loan under the Drinking Water State Revolving Fund (DWSRF). The guidelines contain step-by-step approaches and conservation measures that can be used by water system planners to develop and implement plans for water conservation. Strategic use of water conservation can help extend the value and life of infrastructure assets used in both water supply and wastewater treatment, while also extending the beneficial investment of public funds through the DWSRF and other programs.

Drinking Water State Revolving Fund - 1996

The DWSRF program was established by the SDWA Amendments of 1996. The program authorizes grants to states to capitalize revolving loan funds. States use funds to provide loan assistance to eligible public water systems for infrastructure improvements needed to continue to ensure safe drinking water. The program also emphasizes preventing drinking water contamination by allowing states to reserve a portion of their grants to fund activities that encourage enhanced water system management and source water contamination prevention. Under SDWA §1452(g)(2), states may use up to 10 percent of their DWSRF allotment to administer or provide technical assistance through source water contamination prevention programs, excluding enforcement actions. Under SDWA §1452(k), states may use up to 15 percent of their capitalization grants to fund several types of source water contamination prevention activities. States may provide loans for acquiring land or conservation easements and to fund voluntary, incentive-based source water quality protection measures. States may also make expenditures under this set-aside for establishing and implementing wellhead protection programs. States were allowed to reserve funds from fiscal year 1997 grants to conduct activities related to the SDWA §1453 requirements to delineate and assess sources of drinking water.

Also, in 1996, EPA started emphasizing the availability of Clean Water State Revolving Funds (CWSRF) to address drinking water source quality issues. Nationally, the CWSRF has in excess of $30 billion in assets and has issued $26 billion in loans since 1988. The CWSRF currently is funding nearly $3 billion worth of water quality projects annually. Clearly, the CWSRF can be a powerful financial resource for funding source water contamination prevention projects.

Clean Water Action Plan - 1998

The Clean Water Action Plan (CWAP) provided a focal point for federal agencies to develop strategies and build upon existing programs to address water quality problems in watersheds identified by states and tribes as most in need of attention. In order to attain the end goal of clean water, it is essential to use a *comprehensive watershed framework* that integrates public health and aquatic habitat agendas when managing water quality. For example, the Forest Service's roadless initiative, the Department of Interior's abandoned mine clean up, or EPA's total maximum daily load rule reflect this comprehensive framework by setting restoration and protection priorities based on a combination of criteria including public health and aquatic ecosystem concerns.

Critical to implementing restoration and protection measures under this comprehensive approach is knowing the locations of the water bodies that supply drinking water to U.S. communities, and the potential threats to these sources. The responsibility for collecting this information lies with the state and participating tribal governments, who are working to complete source water assessments by 2003. Because the federal agencies see the value in having this information to strengthen their comprehensive watershed planning and evaluate risks to public health at the national, regional, and local levels, all of the CWAP federal partners and the U.S. Postal Service signed an agreement in support of drinking water source assessment and protection. The goals of the agreement were to encourage field offices to continue or begin partnering with states, tribes and local communities to complete these assessments or

to protect local water supplies; and increase awareness and encourage field offices to use the results of the assessments when developing relevant watershed management plans.

Other Laws

The following laws work in concert with SDWA by reducing the release of pollutants that can affect water and/or instituting policies that positively impact sources of drinking water:

The Coastal Zone Management Act (CZMA)

The goal of this law is to protect natural resources, including wetlands, flood plains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within coastal zones. The Act also aims to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Under this law, EPA regulates hazardous substances and establishes limits for the quantities of hazardous substances released to the environment. By law, a National Response Center is available to respond to emergency situations regarding hazardous waste accidents. A National Priority List of hazardous waste sites is maintained indicating the order in which sites in the U.S. are to be cleaned up. Priority is given to those sites that have contributed to the closing of drinking water wells or the contamination of a public drinking water supply.

The Emergency Planning and Community Right-to-Know Act (EPCRA)

Enacted in 1986 as part of CERCLA, this law has two major purposes: 1) to increase public knowledge of, and access to, information on the presence of toxic chemicals in communities, releases of toxic chemicals into the environment, and waste management activities involving toxic chemicals; and 2) to encourage and support planning for responding to environmental emergencies.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

As required by this statute, EPA registers pesticides for general, restricted, or prohibited use. To prevent unreasonable risk to the natural environment, EPA can restrict distribution, sale, or use of any pesticide. This law is helpful to SDWA because it seeks to prevent any pesticide of unreasonable risk from seeping into ground water supplies or running off land into surface water supplies.

The National Environmental Policy Act (NEPA)

NEPA requires that proposed projects that use federal land or federal dollars be evaluated to determine their potential impact on the environment. Environmental impact assessments are conducted to evaluate the proposed action and alternatives to ensure that measures are taken to reduce or

eliminate impacts on the natural environment.

The Pollution Prevention Act

Passed in 1990, the Pollution Prevention Act focused industry, government, and public attention on reducing the amount of pollution entering the environment through cost-effective changes in production, operation, and raw materials use. Opportunities for preventing pollution at its source (source reduction) are often not realized because of existing regulations, and the industrial resources required for compliance focus mostly on treatment and disposal. Source reduction is fundamentally different and more desirable than waste management or pollution control. Pollution prevention also includes other practices that increase efficiency in the use of energy, water, or other natural resources, and protect our resource base through conservation. These practices include recycling, source reduction, and sustainable agriculture.

Resource Conservation and Recovery Act (RCRA)

In 1976, Congress enacted this comprehensive law which covers the generation, transportation, storage, and disposal of hazardous materials and waste. RCRA requires the cleanup of hazardous releases (such as chemical spills, or landfills containing hazardous waste) at facilities permitted under RCRA and facilities applying for a permit under RCRA's corrective action rules. Restoring hazardous sites is often also covered under CERCLA. Many states have primacy for RCRA programs.

The Toxic Substances Control Act (TSCA)

This statute calls for the development of research and the accumulation of data on chemical substances and their effect on public health and the environment. EPA can regulate chemicals that present an unreasonable risk of injury to health or the environment if there is no other statute to provide that authority. This Act helps SDWA by contributing to source water contamination prevention.

Appendix B:
Draft Source Water Contamination Prevention Measures of Progress

Ultimate Goal of Source Water Contamination Prevention: Protect current and potential drinking water sources and the health of those who rely on those sources.

Vision of the Source Water Program: All interested stakeholders utilizing a variety of tools in a coordinated fashion, establish barriers that significantly lower the risk of contaminants entering current and potential drinking water resources.

Intended Outcome: Public Water Systems that are at decreased risk from contamination due to management actions taken.

The General Need for National Measures and Other Information

Provide accountability to Congress for SDWA implementation
Promote the integration of source water contamination prevention policies into other national programs
Increase public awareness and involvement
Internally: measure our own outputs - are they leading us to the end goal

Proposed Source Water Contamination Prevention Measures, Information Elements, and Key Activities

The measures presented in the accompanying chart propose a tiered approach to looking at the progress of source water contamination prevention over time. For the first period of time, the highest level of expected completeness would be on "the foundation" pieces: assessments, UIC inventorying and ambient water quality standards. The next tier would focus on what those foundation pieces say about the risks to existing drinking water sources. The third tier examines what is being done to address potential threats to drinking water sources.

The intent **is not** to focus on any one tier at the exclusion of all others at a given moment in time. However, it is the expectation that the level of completeness would shift with time. For example in 2002, we would expect that tier one would show much progress, but there would be less completeness in tiers two and three. It is understood that management actions will be taken and UIC management will be ongoing at the same time as necessary, but in the short term, these tiers would be less complete.

Tier I : Are State Source Water Assessments & UIC Inventories Being Completed ?

A1 – *National GIS locational data layer of Source Water Protection Areas (SWPAs*)

- EPA would compile all of the source water protection areas delineated by states and tribes into one GIS data layer that could be compared to the location of potential sources of contamination *e.g.*, NPDES, RCRA, UST, UIC, federal facilities and lands.
- To facilitate a prioritization of pollution control and management programs on national, state and local scales *i.e.*, the locations of NPDES permittees, RCRA TSDs, USTs and other regulated polluters could be cross referenced to determine whether they are within a SWPA.
- To allow easier public access to source water protection area information relative to other environmental protection data available (*e.g*., through the developing interactive WATERS site).
- To help illustrate to federal and state decision makers the nature or extent of potential source water contamination by overlaying SWPA's with PSC locations.

A1 – *Percentage of state and tribal source water assessments completed*

- This is an estimate of progress and a count toward completing source water assessments for all public water systems.
- EPA is accountable for progress on the SDWA Amendments. States are collecting this information because they are accountable for their use of DWSRF set asides.

B1 – *Analysis of quality of assessments for moving to prevention*

- This peer review or federal review would compare state assessments with the approved state source water assessment programs and identify opportunities to enhance future assessments.
- These reviews would help state program managers identify and address opportunities to improve the efficiency and effectiveness of conducting assessments sooner rather than later.
- These reviews would help assure interested parties that state assessments are listing the major potential contamination risks to public drinking water resources

C1 – *Inventory of Class I-III & V, UIC wells, including latitude/longitude data*

- This means maintaining complete and fully documented inventories of injection wells as prescribed by federal regulations.
- These inventories, including the latitude and longitude, would facilitate: [a] analysis of the risk UIC wells pose to drinking water resources; and [b] the closure, or regulation, of UIC wells to protect drinking water sources.
- Some location data, usually maps, is mandatory in the UIC program; where available or practical, latitude and longitude are preferred to facilitate GIS mapping. States have jurisdiction over these injection wells whether they are on Federal, state or private lands.

D1 – *Inventory Federal & State Programs to Protect Public Water Supplies*

- This means cataloguing each state's water quality standards to protect surface water intakes and ground water programs to protect drinking water wells *e.g.*, ground water quality standards, ground water permit programs.
- Since water quality standards and related programs (*e.g.*, FIFRA, UST, RCRA) regulate water pollution, source water contamination prevention depends on how well these programs work.

Tier II : What did they find ?

A2 – *Highest priority areas within each state for source water protection actions*

- Each state would identify the watershed(s), aquifer(s) or source water protection areas to which it assigns the highest priority for implementing source water contamination prevention.
- This baseline answers, or helps to answer, the question – what are the assessments finding ?
- This information may be useful in explaining to federal and state decision makers where, geographically, funding and staffing resources need to be increased to address source water contamination prevention needs *i.e.*, part of the ‹message'.
- This provides a focus for initial prevention actions which would establish a base of experience potentially allowing correlation of management actions with reduced susceptibility.

A2 – *High priority potential sources of contamination & types of contaminants*

- This would establish, on a national scale, a prioritized list of sources from the assessment results in 2003 that would either identify risks for each CWS, or summarize the most prevalent risks within each state *e.g.*, a survey of state directors' best professional judgement of the top ten risks.
- The most prevalent types of contaminants causing problems could be developed from the compliance monitoring detection rates reported to the National Contaminant Occurrence Database (NCOD).
- This is an opportunity to convey a message to state and federal decision makers *i.e.*, the extent of the contamination risk defines a major part of the resource need – the message's effectiveness will depend mainly on its credibility.
- This information would help EPA target tools, policy and guidance to those sources reported most frequently by states as challenges to reducing the susceptibility of PWSs.
- Possible Proxy Measures: # CWSs w/ one or more PSCs in the delineated area; or # CWSs w/ one or more contaminant detections.

B2 – *Identify opportunities to enhance the quality of state assessments*

- This would identify, aggregated nationally, over time, changes in state approaches to assessments to improve the information needed for targeting prevention efforts efficiently.
- This would benefit individual states through program improvement, all states through the sharing of experience and the nation through an ongoing quality assurance effort.

C2 – *Compliance reviews of Class I-III & V, UIC wells in SWPAs and other high priority areas*

- This would identify which injection wells are higher priority risks to public drinking water resources by virtue of their location within SWPAs, or other high priority areas, given their compliance records and their management practices.
- These analyses would provide an action list for Tier III actions to guide the allocation of limited state and regional program, compliance and enforcement resources.
- Inventories and compliance reviews should be statewide, the priority for action would be based on which wells are found to be more likely to threaten current and potential water supplies.

D2 – *Identify Program & Policy Gaps in Source Water Protection Relative to Federal and State Programs*

- This means analyzing the inventory of federal and state programs to identify inadequate source water contamination prevention *e.g.*, a waterbody used as a public drinking water resource, but not so designated by the state WQSs.
- Local protection efforts in certain areas will have marginal effect if there are federal or state program policy or implementation gaps *e.g.*, failure to implement NPDES effluent limits to protect public water supplies.

Tier III : How are current and potential drinking water supplies being protected ?

A3 – *# CWSs and NTNCWSs covered by SWP plans*

- Each state would count the systems that are covered by source water contamination prevention plans *i.e.*, community water systems and, possibly, selected non-transient, non-community water systems *e.g*., schools. The definition of what constitutes a plan would be developed in guidance.

A3 – *Scope & types of source water protection*

- Each state would list the types of local or program management actions, or other forms of source water contamination prevention, being implemented to address threats in each of the priority areas listed under A2.
- This would help explain what is being done about what has been found by the state source water assessments *e.g.*, the purchase of land easements to prevent or mitigate atrazine runoff

from farm land.

- High priority risks that are identified under A1, but unaddressed here, would help to illustrate the resource shortfall in the nation's ability to collectively address source water contamination.
- Possible Proxy Measures:
  - [1] List the most prevalent prevention measures implemented in high priority areas, and the PSCs to which they apply; or
  - [2] % high priority areas w/ management actions *vs*. % lower priority areas w/ management actions; or
  - [3] # CWSs w/ state certified SWP plans; or # CWSs that have implemented SWP actions

B3 – *States implement program enhancements in the next iteration of assessments.*

- States would describe how they have updated the procedures by which they will conduct future source water assessments *e.g.*, the updated assessments described in the narrative for B2.
- States would also describe how frequently they update the CWS assessments and whether, as a result of updated assessments, the state profile of CWS contamination risks has increased, decreased or stayed about the same.
- Improved assessment procedures should result in more accurate and useful assessment results for prevention actions, as well as a more complete and credible source water contamination prevention message for state and federal decision makers.

C3 – *High compliance and timely and appropriate return to compliance for Class I-III & V; closure of Class IV*

- For Class I - III injection wells, states and regions would track both [a] the general compliance rates; and [b] the violations, enforcement actions and return to compliance (RTC)
- For Class IV injection wells, states and regions would track their efforts to locate and close prohibited wells that endanger underground sources of drinking water (USDWs)
- For Class V injection wells, state and regions would track the status of high risk wells located within source water protection areas and other high risk areas.
- These program performance measures provide a state specific and national picture of the extent to which injection wells endanger USDWs.

D3 – *Enhance Federal & State Programs and Policies to Protect Source Water*

- Significant gaps would be targeted for federal or state action *e.g.*, updating federal regulations and guidance through work groups, updating state nonpoint source management plans through regional oversight.
- These enhanced provisions would provide the legal basis to enlist the federal and state programs with primary authority over water polluters to actively address, or redress, source water contamination prevention.

Longer Term Tier IV: Is source water protection making a difference?

- Assessment updates and qualitative reviews of the assessment results would help provide a state-specific and national picture of how successfully source water contamination prevention is proceeding.

Tier IV – *# or % of CWSs with lower susceptibility or maintained low susceptibility due to management actions taken*

- Based on assessment updates about every 5 - 10 years, each state would count CWSs with increased or decreased overall susceptibility due to management measures such as BMPs. This would provide a system-by-system analysis of whether we're making progress at the state and national levels.

Tier IV – *# of PWSs with reduced threats from high priority PSCs due to management actions taken*

- Based on assessment updates about every 5 - 10 years, each state would count CWS with reduced threats due to management measures such as BMPs. This would provide a system-by-system analysis of whether we're making progress at the state and national levels.
- This assumes [a] that all states develop and maintain an inter-system ranking of CWS susceptibility and [b] that a causal connection can be inferred, by professional judgement or actual data, between management actions and lower susceptibility.
- There may be state or national surface water measures for high quality water bodies that are maintained, or that are down graded.
- This measure would give credit for maintaining high quality waters free of contamination in the face of growth and other challenges.
- Possible Proxy Measures: see the alternative state index measure described on the next page.

Tier IV – *Trends in ambient source water quality*

- This would consolidate data for drinking water contaminants from §305(b) monitoring, USGS monitoring, compliance monitoring by water polluters (*e.g.*, NPDES permittees) and PWSS compliance monitoring (NCOD).
- This is the best surrogate for trends in public health attributable to drinking water contaminants, and would provide a partial picture of source water quality improvements and challenges across the country.
- This will increase the value, and scrutiny, of quality assurance procedures in collecting, analyzing and presenting water quality monitoring data.
- Because the state and national reports will (necessarily) be patch works of data collected from various sources, the reports will be as much about what we don't know because of data gaps as about what we think we know.
- Documenting the patch work nature of the reports, their data gaps and the cost of filling in those gaps will provide part of the resource needs message to state and federal decision makers.

Tier IV – *Trends in public awareness of, and involvement in, source water contamination prevention actions' effectiveness*

- Through professional polling, this would periodically (biennially?) measure public sentiment on the status of source water quality.
- An EPA / State WG, with assistance from public information professionals, could fashion the substance of the specifics that we would want to measure.
- It is difficult to imagine how the nation can maintain effective source water contamination prevention actions into the future without sustained grass roots involvement.

Tier IV – *Alternative Measure of Changes in PWS Susceptibility using a State Susceptibility Index*

What is a state susceptibility index and how might it work ?

- States would track the change from one susceptibility status to another for each CWS based on a national framework of susceptibility status levels developed by a state-EPA work group, the aggregation of which would comprise a state susceptibility index.
- CWSs that retain a low susceptibility status would help keep the index low, as would CWSs that move from a high susceptibility status to a low status. CWSs that move from a low susceptibility status to a higher status and CWSs that remain in a high status would help keep the state index high.
- A "detect" would be considered a concentration equal to or greater than half of the MCL for a contaminant. A PSC under management would be one with measures adequate to reasonably prevent contaminant release to source water.
- An example of how a state susceptibility index (SSI) could be built is :

INDEX COMPONENT		WEIGHT		AGGREGATION	RESULT
# CWSs w/ No PSCs & No Detects:	×	0.5	÷	total # of CWSs	= index component # 1
# CWSs w/ $ 1 PSC & No Detects:	×	1.5	÷	total # of CWSs	= index component # 2
# CWSs w/ $ 1 Detect:	×	3	÷	total # of CWSs	= index component # 3
# CWSs w/ all PSCs under Management & No Detects:	×	1	÷	total # of CWSs	= index component # 4
				3 of index components :	**State Susceptibility Index [SSI]**

What are the advantages and disadvantages of a susceptibility index compared to tracking high priority management actions ?

ADVANTAGES

- This would convey three nationally coherent messages : [1] what the assessments found initially and over time as they're updated; [2] what needs to be done in terms of the number of CWSs involved *i.e.*, those that need management of PSCs and those that need remediation of

contamination; and [3] extent of progress as witnessed by trends in the SSI's.

- This would provide a relatively objective, and therefore relatively credible, analysis of source water susceptibility, and avoids the trap of trying to explain the disparate state schemes of classifying susceptibility.
- This susceptibility index concept would give each state credit for both maintaining low susceptibility where it already exists, and for reducing high susceptibility.
- Does not interfere with state schemes of classifying, or not classifying, individual water systems as high, medium or low because it uses objective 'national' bins that states can internally disavow.

DISADVANTAGES

- Limits state flexibility in how susceptibility is reported, although supplementary analyses could accompany the SSI.
- States would need to accept a national set of susceptibility components; not necessarily the examples shown above.
- There would be some re-work for competed assessments to count the CWSs that fall into each bin but detections could be handled through the National Contaminant Occurrence Database (NCOD) for regulated contaminants.

Source Water Contamination Prevention Measures, Information Elements, and Key Activities

	ASSESSMENT & PREVENTION	QUALITY ASSESSMENT S	UIC-SPECIFIC ASSESSMENT & PREVENTION	FEDERAL & STATE PROGRAM COORDINATION
	A	**B**	**C**	**D**
Tier One: Are the state and tribal source water assessments and UIC inventories being completed?				
1	¼ National location data layer of source water protection areas ¼ % state source water assessments completed (*i.e.*, areas delineated, PSC inventories, susceptibility analyses & public availability)	Review assessments based on approved state program	Class I-III; V - Baseline inventory of injection wells, including latitude and longitude	Inventory state ambient water quality standards and ground water program elements (*e.g.*, groundwater water quality standards, groundwater permit programs) to protect public water supplies
Tier Two: What did they find?				
2	¼ Highest priority areas w/in each state for source water contamination prevention actions. ¼ List of most prevalent high priority PSCs & types of contaminants	Identify opportunities to enhance the quality of state assessments	Class I-III; V - Compliance review data in source water protection areas & other high priority areas	Identify policy gaps in SWP in federal and state water programs and other pollution management programs*e.g.*, WQSs, §305(b), NPS, RCRA, FIFRA
Tier Three: How are current and potential drinking water supplies being protected?				
3	¼ # CWSs and (selected) NTNCWSs covered by SWP Plans ¼ Scope & types of SWP taken in all areas of the state (*e.g.*, federal/state program management actions, local management actions such as zoning land easements)	¼ Ongoing state implementation of assessment program enhancements ¼ Program & technology transfer among states and others of program enhancement issues	Class I-III; V - Compliance and timely & appropriate return to compliance Class IV - # of prohibited wells closed	Enhance and implement management actions in Clean Water Act and other federal and state programs to support source water contamination prevention
Longest Term Tier Four: Are source water contamination prevention actions making a difference to public health protection?				
4	¼ Based on 5 - 10 year assessment updates of delineated areas and inventories of potential sources of contamination: • # PWSs with reduced overall risk due to implementation of management actions • # PWSs with reduced threats from high priority PSCs due to implementation of management actions ¼ Trends in source water quality *e.g.*, §305(b) and U.S. Geological Survey ambient water quality data; compliance monitoring by public water systems; discharge monitoring reports and other compliance monitoring by regulated polluters. ¼ Trends in public sentiment for source water contamination prevention as measured by biennial Roper poll [outreach]			

CWS: community water system; **FIFRA:** Federal Insecticide, Fungicide & Rodenticide Act; **NPS:** nonpoint source; **NTNCWS**: non-transient non-community water system; **PSC:** potential source of contamination; **PWS:** public water system; **RCRA:** Resource Conservation & Recovery Act; **SWAI** source water assessment program; **SWP:** source water contamination prevention; **SWPA:** source water protection area; **TMDL:** Total Maximum Daily Load; **WQSs:** Water Quality Standards; **§305(b):** ambient water quality monitoring for attainment of state WQS.

DRAFT SUMMARY CHART
Specifics to the UIC "Maintaining Adequate Management"

Are Source Water Contamination Prevention Measures Making A Difference to Public Health?			
1. Maintain low risk of contamination to USDWs from Class I – III injection wells through adequate management		**2. Maintain low risk of contamination to USDWs from Class IV wells**	**3. Reduce risk of contamination from currently inventoried Class V wells through adequate management, and from non-inventoried Class V wells by locating them and then adequately managing them**
Tier Three	1.2 Percentage of Class I – III wells properly permitted and/or ruled authorized 1.3 Percentage of Class I hazardous waste wells with approved no-migration petitions 1.4 Percentage (# ?) of Class I – III wells that pass MIT & is witnessed by regulatory authorities 1.5 # of properly abandoned wells in the AOR of Class I – III wells 1.6 # of injection wells in hydrocarbon/mineral bearing aquifers **[Enforcement and Compliance (???)]** 1.7 # Class I – III wells addressed by enforcement & returned to compliance (includes SNC data) 1.8 # of civil & criminal actions against Class I – III wells 1.9 # of administrative orders issued by States/Tribes/DI Programs to Class I -- III wells o/o (includes SNC) 1.10 # of contamination investigations linked to Class I -- III wells	2.2 Close all Class IV wells after location	3.3 # of large capacity cesspools closed 3.4 # of MVWDW wells closed and/or permitted in GWPAs & other sensitive areas 3.5 # of field inspections of Class V wells in SWPAs & other high-priority areas of States and Tribal lands **[Enforcement and Compliance (???)]** 3.6 # Class V wells addressed by enforcement & returned to compliance (includes SNC data) 3.7 # of civil & criminal actions against Class V well o/o 3.8 # of administrative orders issued by States/Tribes/DI Programs to Class V o/o (includes SNC) 3.9 # of contamination investigations linked to Class V wells

Appendix C:
Original List of Ninety Potential Measures of Source Water Contamination Prevention

Program Management/Program Tracking

- Statutory /regulatory reporting requirements, e.g., WHP biennial reports, UIC inventory
- Self-assessment/outside evaluation
- Outputs/inputs, i.e., what are we doing? (With qualifiers)
- Budget planning/justification, including resource allocation, tracking expenditures, and DWSRF grants
- Trends
- Water budget/resource accounting
- Modeling

Compliance, Enforcement, and Litigation Support

- Violations.
- Enforcement actions/tracking, e.g., groundwater standards violations
- Location and program linkages
- State rule adoption implementation tracking and progress
- Facility-specific information
- Inputs/outputs, including litigation support and referrals to/from other programs
- Compliance assistance/inspections, i.e., a demonstration that outreach is working
- Economic benefit data
- SEPs

Regulatory Planning

- Facilities information: total numbers of facilities, location, and type
- Injectate quality
- Susceptibility status
- Contaminant source occurrence (potential and known)
- Contamination incidents: number and severity
- Cost to comply/abate, including compliance technology, BMPs
- Delineated source water protection areas
- State controls (nature and adequacy)
- Assessment of past/existing approaches: what has and has not worked
- Contaminant health effects
- Monitoring results: PWS and groundwater
- Benefits

Public Education and Outreach

- Locational data
- Frequency of education/outreach
- Water quality data: ambient and drinking water
- Susceptibility status
- Benefits of preventive action
- Cost of outreach
- Facility information
- Participating agencies: who they are, what they are doing, program information
- Effectiveness of outreach and degree of satisfaction
- Health effects data and risk communication
- Enforcement/compliance status
- Types of outreach: web, other media used
- Water budget /resource accounting
- Audience demographics

Congress

- Categories from all other needs
- Delineated congressional districts and the ability to link to/overlay source water information
- Contamination incidents/severity
- Benefits of prevention
- Compliance costs
- Success stories: State, federal, and local
- Identification and justification of overlapping authority
- Budget information: funds received, spent, and needed
- Sensitive areas and populations
- Available funding resources
- Inventory of regulated entities
- Tribal activities
- Projection of future needs: financial and programmatic, e.g., gap analysis, program needs, geographic issues (Colonias, karst issues)
- Trend analysis: national, district, and State-specific
- Identification of priority risks
- Quality of data
- Cross-boundary issues: State and national