

**Source Water Protection Plan for  
Pagosa Area Water & Sanitation District  
PWSID # CO0104300**



**Formerly PWSID #'s (CO0104300 and CO0104500) at time of 2004 SWAP**

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## EXECUTIVE SUMMARY

In addition to the required Source Water Assessment and Protection (SWAP) program provided by the Colorado Department of Public Health and Environment (CDPHE), the Pagosa Area Water and Sanitation District (PAWSD) has taken the following approach to protection and emergency planning tasks. In partnership with state, local, and federal agencies, we have identified where our source water supplies are vulnerable in an attempt to protect our water supplies and customers. Also, we have taken the real life lessons learned in recent years and added them to the mix of potential vulnerabilities. The next logical step is to analyze each potential hazard and customize a plan to either prevent it or work around it for the period of time it is a risk.

It is important to note that when the SWAP was done in 2004, PAWSD consisted of two separate Public Water System Identification (PWSID) numbers. Since that time, those two systems have merged into one PWSID, which is CO0104300. This document has been prepared with the single PWSID number concept and therefore data may differ from the SWAP dated November 8, 2004 in that regard.

The financial and water supply risks related to the potential contamination of one or more of the community's untreated water sources are a concern to PAWSD. As a result, we believe the development and implementation of a source water protection plan and subsequent emergency response plan for PAWSD can help to reduce the risks posed by potential contamination of its water sources. This plan has been developed to:

- Prioritize source water protection concerns;
- Identify local source water management approaches that can be implemented to protect the source water;
- Lay out a plan of action in the event of a contamination event.

The source water assessment results supplied by the Colorado Department of Public Health and Environment were used as a starting point in developing the source water protection plan with additional data derived from local sources. PAWSD recommends adopting a source water protection area that is similar to the source water assessment area defined by the Colorado Department of Public Health and Environment in November of 2004. The source water protection area defines the region where PAWSD has chosen to implement its source water protection measures in an attempt to manage the susceptibility of their source water to potential contamination.

PAWSD has chosen a two-step strategy for prioritizing the water sources and potential contaminant sources on which source water protection measures will be focused. The first step of the strategy is to identify all of the realistic vulnerabilities based on available data. The second step will involve rating these vulnerabilities with the goal of producing a realistic list of potential threats for which PAWSD should be prepared. In applying this strategy, PAWSD initially recommends focusing source water protection measures on the San Juan River, based on the potential for storms, floods, major mechanical and electrical failures, wild fires, landslides, and chemical spills. Although other sources and hazards have been identified, they are not high risks and these mentioned have been prioritized as the most likely to occur.

PAWSD reviewed and discussed several possible source water management approaches that could be implemented within its source water protection areas. These management approaches may help reduce the risks of potential contamination from the prioritized contaminant sources. The purpose of voluntarily implementing source water management approaches is to apply an additional level of protection to the drinking water supply by taking preventive measures at the local level (i.e., county and municipal level) to protect the source water. PAWSD considered certain criteria as part of identifying and selecting the most feasible source water management approaches to implement locally. PAWSD recommends the following source water management tools to be implemented:

- Involvement in a source water protection committee formation and implementation process.
- Proactively participate in the town & county planning groups and revise/adopt technical specifications that are “source water friendly”.
- Work with other local entities, i.e. HOA’s, schools, committees, etc. to educate them on the importance of source water protection and their important role in it.
- Involve local agencies (law enforcement, fire, medical, transportation, etc.) in the emergency planning processes to increase available assistance during an emergency.
- Ensure that our alternate raw water supplies are always available.

PAWSD realizes that there will be an investment in time and materials to implement these management approaches. Funding to cover these costs will come from general operating revenue of the annual budget. Implementation of these management approaches began in 2003 and will be ongoing following their establishment.

This protection plan includes a number of voluntary commitments by PAWSD through involvement with the Stollsteimer Creek Watershed Protection Project, and partnering with other permitting agencies and consultants for informed placement of new sources and discharges.

## INTRODUCTION

### ***Protection Plan Process Guidance***

The following table has been supplied as a reference to effectively plan and develop a Source Water Protection Plan and subsequent Emergency Response Plan for our public water supply system. The table below is an overview of the planning process.

#### **PROCESS STEPS FOR PLANNING**

<b>Objective</b>	<b>Task</b>	<b>Output</b>	<b>Responsible Party</b>
Develop protection/response plan	Review CDPHE SWAP assessment results	Report of findings & recommend changes and begin SWPP process	PAWSD staff, committee
	Report findings to decision makers	Formal presentation to decision makers at Board meeting and request any input	PAWSD Board, staff,
	Incorporate any changes or input from Board	Revise SWPP	Staff, committees
	Develop schedule for planning process	Planning Schedule	Staff
	Produce and distribute plan	Approved SWPP	Staff

### ***Public Participation and Steering Committee Establishment***

Public participation has been important to the overall success of Colorado’s SWAP program. Source water protection was founded on the concept that informed citizens, equipped with fundamental knowledge about their drinking water source and the threats to it, will be the most effective advocates for protecting this valuable resource. The state successfully used voluntary citizen advisory groups in the development of both the wellhead protection and source water assessment and protection program plans.

Effective public participation requires a well-organized effort to raise public awareness, to identify groups and individuals interested in helping, and to define and implement the necessary tasks. PAWSD used this public participation principle and encouraged the involvement of all types of stakeholders – individuals, groups, organizations and local decision-makers affected by or concerned with the community’s drinking water – in the local source water protection planning effort. PAWSD believes that the efforts put forth by the very active Stollsteimer Creek Watershed Committee will be replicated in our other watershed areas. Local support and acceptance of the plan is more likely when local stakeholders have been actively recruited and encouraged to participate in the development and implementation of the plan.

### ***Steering Committee and Participants***

PAWSD assisted in the funding of the Stollsteimer Creek Watershed Committee. This committee has become a local leader in the watershed protection area, providing advice to PAWSD and local planning agencies on the design and development of source water protection options. The table below lists the members of the Committee that was established and their affiliation.

#### **Steering Committee**

<b>Name</b>	<b>Role/Responsibility</b>	<b>Title</b>	<b>Affiliation</b>
Larry Lynch	Chairman	Environmental Mgr	PLPOA (HOA)
Jerry Archuleta	Participant	Conservation Dist. Mgr	Natural Resources Conservation District
Mike Reid	Participant	Wildlife Officer	Colorado Div. of Wildlife
Ronnie Zaday	Participant	County Commissioner	Archuleta County
Becca Smith	Participant	Hydrologist	US Forest Service
Gene Tautges	Participant	Assistant Manager	PAWSD
Dan Wand	Participant		Colorado State Forest Service
Windsor Chacey	Participant	Board Member	San Juan Water Conservancy District
Doug Ramsey	Participant	Manager	San Juan Resource Conservation & Development
Chris Philips	Participant	P.E	Riverbend Engineering
Cynthia Purcell	Participant	Administrative Assistant	Natural Resource Conservation District
Larry Garcia	Participant	Chair, County Planning Commission	Archuleta County Planning Commission

The benefits seen from this committee have been substantial. For example, the application for and subsequent awarding of 319 Nonpoint Source Project funding was obtained in 2004. There have been numerous educational programs and tours since then. The committee has held a strong presence in the town and county planning community assuring source water-friendly decisions are the norm, not the exception.

#### **Other Participants**

The source water protection planning process attracted interest and participation from several other key individuals as well. Input by these individuals was greatly appreciated and was instrumental in developing the plan. The following is a partial list of other participants who were involved in this source water protection planning effort.

Colorado Department of Public Health and Environment  
 Archuleta County government (e.g., long-range planner)  
 San Juan Basin Health Department  
 Colorado Department of Transportation  
 EPA Region VIII  
 Bureau of Land Management

## ***Protection Plan Development Process***

The source water protection planning effort consisted of a process of committee meetings followed by a public meeting process. The committee's recommendations were solicited to further establish the goals and objectives of the protection plan, evaluate the source water assessment results and establish protection priorities, and evaluate source water management approaches. Ultimately, the committee's recommendations were incorporated into this source water protection plan and presented at a public board meeting for comment and discussion. A summary of the meetings that were held is presented below.

### **Public Meetings**

<b>Date</b>	<b>Location</b>	<b>Purpose / Description</b>
6/10/08	PAWSD Board Room	Meeting to Discuss initial concepts and goals of the Source Water Protection Plan
7/7/08	Vista Clubhouse	Meeting to Discuss Draft Source Water Protection Plan
7/08/08	PAWSD Board Room	Meeting to solicit final public comment and Board of Directors approval

The general public was notified of the public meeting schedule – location, dates and times via the PAWSD internet website, and physical posting at three community sites prior to each meeting. An invitation to attend and participate in these public meetings is always extended to the entire community, and to residents of unincorporated Archuleta County served by PAWSD or potentially affected by the source water protection plan.

### ***Purpose of Source Water Protection Plan Development***

The purpose of developing a protection plan is to reduce the risks associated with the potential contamination of the untreated source water by implementing preventive measures and to prepare for emergency measures in the event of a contamination event. This objective is typically achieved through a collaborative water system evaluation effort by water system staff, local agency representatives and Board Members. This action ensures that the governing body is knowledgeable about and supportive of the proposal to develop a protection plan.

PAWSD and the Pagosa Springs community recognize the potential financial and water supply risks related to the potential contamination of one or more of the community's water sources. In an effort to address the potential problems that could affect its untreated source water, PAWSD, with guidance from the Water Quality Control Division (WQCD), the Colorado Rural Water Authority (CRWA), Archuleta County Planning and other agencies, has worked closely to identify local source water management approaches that can be voluntarily implemented to reduce the risks of potential contamination of the untreated source water, and to plan emergency efforts to implement in the event of a local source water disaster.

The primary reason for developing and implementing source water management and emergency response approaches is to apply an additional level of protection and planning to the drinking water supply resource. Preventive measures at the local level may aid in the protection and temporary replacement of the source water in an emergency. These preventive measures and emergency actions will compliment existing regulatory protection measures implemented at the state and federal governmental levels by filling protection gaps that can only be addressed at the local level.

The source water protection and response plans identify the source water protection areas and emergency actions that the community has chosen to act upon. In addition, the plan establishes a strategy for prioritizing the water sources, potential contaminant sources, and emergency actions to which the source water management approaches will be applied. The strategy is based in part on using the source water assessment results provided to PAWSD by CDPHE as a starting point. The protection/emergency plan also identifies the source water management approaches and associated tasks that will be implemented within the source water protection areas. The funding

source to sustain these approaches and tasks is also identified. Finally, a separate emergency response plan or contingency plan has been developed by PAWSD as part of the overall source water management effort. This document specifies a coordinated plan for responding rapidly, effectively, and efficiently to any identified emergency incident that threatens or disrupts the community water supply. It is recommended that a copy of the emergency response plan not be included in this protection plan due to security concerns, and therefore it has been purposely left out of this document.

## OVERVIEW OF THE COLORADO SWAP PROGRAM

Source water assessment and protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. The 1996 amendments required each state to develop a source water assessment and protection (SWAP) program. The Water Quality Control Division, an agency of the Colorado Department of Public Health and Environment, assumed the responsibility of developing Colorado's SWAP program. The SWAP plan will be integrated with the existing Colorado Wellhead Protection Program that was established in amendments made to the federal Safe Drinking Water Act (SDWA, Section 1428) in 1986. Wellhead protection is a preventative concept that aims to protect public groundwater wells from contamination. The Wellhead Protection Program and the SWAP program have similar goals and will combine protection efforts in one merged program plan.

Colorado's SWAP program is an iterative, two-phased process (Figure 1) designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies. The two phases include the Assessment Phase and the Protection Phase as depicted in the upper and lower portions of Figure 1, respectively.

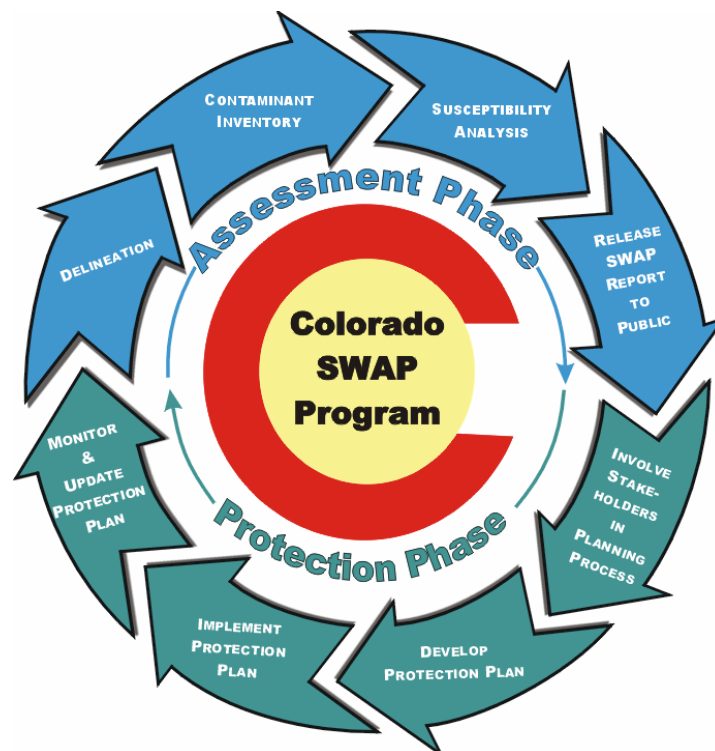


Figure 1. Source Water Assessment and Protection Process.

## ***Source Water Assessment Phase***

As depicted in the upper portion of Figure 1, the Assessment Phase for all public water systems consists of four primary elements:

1. Delineating the source water assessment area for each drinking water source;
2. Conducting a contaminant source inventory to identify potential sources of contamination within each of the source water assessment areas;
3. Conducting a susceptibility analysis to determine the potential susceptibility of each public drinking water source to the different sources of contamination; and
4. Reporting the results of the source water assessment to the public water systems and the general public.

The Assessment Phase involves understanding where PAWSD source water comes from, what contaminant sources potentially threaten the water source(s), and how susceptible each water source is to potential contamination. The susceptibility of an individual water source is analyzed by examining the properties of its physical setting and potential contaminant source threats. The resulting analysis calculations are used to report an estimate of how susceptible each water source is to potential contamination.

## ***Source Water Protection Phase***

The Protection Phase is a voluntary, ongoing process. Public water distribution agencies such as PAWSD are encouraged to employ preventive measures to protect their water supply from the potential sources of contamination to which they may be most susceptible. The Protection Phase can be used to prevent unnecessary treatment or replacement costs associated with potential contamination of the untreated water supply. Source water protection begins at the local level when decision-makers use the source water assessment results and other pertinent information as a starting point to develop a protection plan. As depicted in the lower portion of Figure 1, the source water protection phase for all public water systems consists of four primary elements:

1. Involving local stakeholders in the planning process;
2. Developing a comprehensive protection plan for all of their drinking water sources;
3. Implementing the protection plan on a continuous basis to reduce the risk of potential contamination of the drinking water sources; and
4. Monitoring the effectiveness of the protection plan and updating it accordingly as future assessment results indicate.

PAWSD and the community recognize that the Safe Drinking Water Act grants no statutory authority to the Colorado Department of Public Health and Environment or to any other state or federal agency to force the adoption or implementation of source water protection measures. This authority rests solely with local communities and governments. The source water protection phase is an iterative process as indicated in Figure 1. The SWAP program will evolve by incorporating any new assessment information provided by the public water supply systems and updating the protection plan accordingly.



## **WATER SUPPLY SETTING**

### ***Hydrogeographic and Water Quality Setting***

#### **Surface Water Systems**

PAWSD supplies drinking water to the residents of the Pagosa Springs area, which is located in Archuleta County, Colorado. The water distribution area has a permanent population of approximately 10,000 people and is predominantly a tourist based community with significantly higher transient populations at certain times of the year.

The areas for PAWSD surface water sources are contained within the Upper San Juan and Piedra River Watersheds. PAWSD obtains its water supply directly from the San Juan River at two different points and from Four Mile Creek. Elevations within the source water area(s) range from approximately 7420 feet near the Lake Forest spillway to 10,900 feet near the top of Wolf Creek Pass. The climate within the source water areas is generally arid with an average annual precipitation amount of approximately 36 inches.

The quality of the untreated source water is measured against various use classifications and water quality standards that are established and periodically re-assessed by the Colorado Department of Public Health and Environment and the Water Quality Control Commission for Colorado's rivers and streams. Currently, all of the stream segments located above PAWSD intakes are classified to protect drinking water use. For the stream segments with a drinking water use classification, drinking water standards have been established for the contaminants listed in Exhibit B. These stream standards are a reflection of known water quality conditions, as well as historic land uses within the watersheds. Drinking water classifications and associated water quality standards provide public water systems and communities with a mechanism for monitoring and protecting the quality of their source water. The purpose of including this information is to raise the reader's awareness to useful protection elements under the Clean Water Act that can be integrated into the source water protection plan. Information on the current drinking water standards can be obtained from the various surface water quality classifications and standards regulations, which can be viewed and downloaded from the Water Quality Control Commission's web site located at: [www.cdphe.state.co.us/op/regs/waterqualityregs.asp](http://www.cdphe.state.co.us/op/regs/waterqualityregs.asp)

#### ***Drinking Water Supply Operation***

PAWSD is a community water system that serves the Pagosa Springs area, located in Archuleta County, Colorado. The water system is operated by the Board of Directors through the employees of the Pagosa Area Water and Sanitation District.

The water supply consists of three surface water sources and two watersheds which are located in portions of Archuleta and Mineral Counties in Colorado. The water diverted from the surface water sources is sent to one of three water treatment plants (depending on location and season) to be treated prior to distributing the drinking water to the system's customers. The treatment systems have the maximum capacity to treat approximately six million gallons of drinking water per day. In some cases, PAWSD stores its untreated source water in reservoirs or settling ponds prior to treatment and stores its treated water in eleven storage tanks prior to distributing the drinking water to the water system's customers. PAWSD has the maximum capacity to store 5.53 million gallons of treated drinking water in covered potable storage tanks. A generic schematic illustrating the general configuration of the water source intakes and the water storage facilities is attached as Exhibit C, which is intentionally vague for security reasons.

## ***Water Supply Demands/Analysis***

The water system serves an estimated 5210 connections and approximately 10,000 residents (transient population much higher) in the service area annually (data as of 2008). The water system currently has the capacity of meeting a peak daily demand of approximately six million gallons per day.

Current estimates by PAWSD indicate that the annual average daily demand by the water system's customers is approximately 1.5 million gallons per day (2007 water production divided by 365 days), and that the annual average peak daily demand is approximately 4.1 million gallons per day. (July 2007 production from the three WTP's, highest day each and totaled) Using these estimates, the water system has a surplus annual average daily demand capacity of 4.5 million gallons per day (6-1.5) and a surplus annual average peak daily demand capacity of 1.9 (6-4.1) million gallons per day. These calculations assume 24/7 WTP operation, which is not optimal, and make no allowances for differing hydraulic/pressure zones.

Using the surplus estimates above, PAWSD has evaluated its ability to meet the annual average daily demand and the annual average peak daily demand of its customers in the event the water supply from one or more of its water sources becomes disabled for an extended period of time due to potential contamination. The evaluation indicated that PAWSD may not be able to meet the average peak daily demand of its customers if as few as one of the water sources became disabled for an extended period of time. (See Water Demand Estimator, Exhibit D) The ability of PAWSD to meet either of these demands for an extended period of time in the case that one water source becomes disabled is also affected by the amount of treated water the water system has in storage at the time this water source becomes disabled.

PAWSD recognizes that potential contamination of its surface water sources could possibly result in having to transfer treated water to different hydraulic/pressure zones within its service area. PAWSD has three different raw water sources, two of which originate from the San Juan River. To meet the requirements associated with a contamination event at any one of the sources, infrastructure has been put in place to essentially replace any given source with an alternate source for a period of time. A series of pressure reducing stations, booster stations, and zone valves has been installed by PAWSD that could, under very urgent circumstances and strict guidelines, provide drinking water to most of its customers.

The potential financial and water supply risks related to the long-term disablement of one or more of the community's water sources are a concern to PAWSD. As a result, PAWSD believes the development and implementation of a source water protection plan and subsequent emergency response plan can help to reduce the risks posed by potential contamination of its water sources.

## ***Growth and Land Use Projections***

The latest census information and Colorado State Demography Office estimates a population of 12,208 (2006) for Archuleta County. Exact population figures for the PAWSD service area are not available officially but can be extrapolated from a number of other sources. A significant transient population must be assumed due to the tourist based economy. Based on the recent and previous official census information, the area has been experiencing an increase in growth within the community over the last 10 years. Future projections estimate that growth may remain steady or increase at a lower rate than in recent years.

Currently, PAWSD estimates that the majority of the land area within the proposed source water protection areas for its water sources is currently undeveloped. This undeveloped land is currently zoned for agricultural or public land (USFS). A significant portion is public land where development will not likely occur but where forest fires are a concern.

There are source water related concerns in this community as the generally rural setting we live in changes over time. Large residential and commercial developments are a possibility in the future on undeveloped properties and continued land use planning and zoning are tools that may assist in the protection of our raw water sources. The local population is generally very informed and supportive of "smart growth" that protects all aspects of our mountain community.

## **SOURCE WATER ASSESSMENT RESULTS**

The Colorado Department of Public Health and Environment assumed the lead role in conducting the source water assessments for public water systems in Colorado. PAWSD received their source water assessment report in November 2004 and has reviewed the report. PAWSD is committed to using these assessment results as a starting point to guide the development of appropriate management approaches to protect their source water from potential contamination. A copy of the source water assessment summary report for PAWSD can be obtained by contacting the PAWSD office or by downloading a copy from the Colorado Department of Public Health and Environment's SWAP program web site located at: [www.cdphe.state.co.us/wq/sw/swaphom.html](http://www.cdphe.state.co.us/wq/sw/swaphom.html). The following sections provide a brief summary of the main findings from the three component phases of the assessment.

### ***Source Water Assessment Area Delineation***

#### **Surface Water Systems**

The source water assessment areas for the three surface water sources of PAWSD consist of approximately 360 square miles draining the Upper San Juan and Piedra River Basins above the areas in which the PAWSD water intakes are located. The specific water assessment square mileage area for each water source is: Dutton, 5 acres; San Juan River (both West Fork & main stem), 329 acres; and Stollsteimer, 26 acres. The Dutton Ditch/Four Mile Creek water source is a trans basin diversion from the Upper San Juan River Basin to the Piedra River Basin.

The Colorado Department of Public Health and Environment provided PAWSD with a draft map of its source water assessment areas and asked staff to voluntarily review and comment on its accuracy. This map is intentionally not included in this report for security reasons. The delineated source water assessment areas not only provide the basis for understanding where the community's source water and potential contaminant threats originate, but also provide the basis for establishing the source water protection areas under this source water protection and emergency response plan. Further discussion is provided in the section titled "Source Water Priority Protection Strategy" on the source water protection areas that were established under this plan.

### ***Contaminant Source Inventory***

The contaminant source inventory was conducted to identify whether or not selected potential sources of contamination might be present within the source water assessment areas. The Colorado Department of Public Health and Environment inventoried discrete contaminant sources using selected state and federal regulatory databases. Dispersed contaminant sources were inventoried using a recent land use/ land cover and transportation maps of Colorado, along with selected state regulatory databases. The contaminant inventory was completed by mapping the potential contaminant sources with the aid of a Geographic Information System (GIS).

The Colorado Department of Public Health and Environment provided PAWSD with a draft map, a summary of the discrete contaminant sources mapped within their source water assessment areas, and a summary of the dispersed contaminant sources inventoried within the source water assessment areas. PAWSD was asked to voluntarily review the inventory information, field verify selected information about existing and new discrete contaminant sources, and provide feedback on the accuracy of the inventory.

**It should be noted that the following information on contaminant sources, and any other contaminant source information contained in this Source Water Protection Plan, is limited to that available from public records and PAWSD local knowledge. Other "potential contaminant sites" or threats to the water supply may exist in the source water assessment area that are not identified in this Plan. Identification of a site as a "potential contaminant site" should not be interpreted as one that will necessarily cause contamination of the water supply.**

### **Discrete Potential Sources of Contamination**

The contaminant source inventory results provided by CDPHE for PAWSD identified the following types of discrete contaminant sources within the source water assessment areas for all of the surface water sources analyzed:

- Permitted Wastewater Discharge Sites
- Aboveground, Underground and Leaking Storage Tank Sites
- Solid Waste Sites
- Existing/Abandoned Mine Sites
- Other Facilities

### **Dispersed Potential Sources of Contamination**

The contaminant source inventory results provided by CDPHE for PAWSD identified the following types of dispersed contaminant sources within the source water assessment areas for all of the surface water sources analyzed:

Land Uses:

- Commercial / Industrial / Transportation
- High Intensity Residential
- Low Intensity Residential
- Urban Recreational Grasses
- Row Crops
- Pasture / Hay
- Deciduous Forest
- Evergreen Forest
- Mixed Forest

Other Types:

- Septic Systems
- Oil & Gas Wells
- Road Miles

### ***Source Water Protection Priority Strategy***

The CDPHE source water assessment report outlines options for prioritizing source water protection measures based on source water susceptibility to discrete and dispersed potential contaminants. These options include prioritizing source water protection measures based on:

Option 1: Most prevalent contaminant sources. Under this option, protection measures would be focused on the discrete and dispersed contaminant sources that occur most frequently in the water system's source water protection areas, regardless of the individual susceptibility ratings they may have received.

Option 2: Most threatening contaminant sources. Under this option, protection measures would be focused on the individual discrete and dispersed contaminant sources in the water system's source water protection areas to which the water sources are most susceptible. The most threatening contaminant sources are defined as any potential contaminant source receiving a Moderately High or High individual susceptibility rating.

Option 3: Most prevalent and threatening contaminant sources. Under this option, protection measures would be focused on the most frequently occurring discrete and dispersed contaminant sources in the water system's source water protection areas that received a Moderately High or High individual susceptibility rating.

After reviewing the CDPHE source water assessment results, PAWSD adopted a strategy using Option 3 for prioritizing the water sources and potential contaminant sources on which source water protection measures will be focused. The strategy calls for categorizing the susceptibility of water resources by reviewing and prioritizing contaminant sources based on their prevalence and threat and the watershed committee recommendations.

In applying this strategy, PAWSD recommends focusing source water protection measures and emergency planning on contaminant sources associated with all three of its raw water sources, and recommends focusing on the most prevalent and threatening dispersed contaminant sources contained in the source water protection areas for these water sources.

## ***Susceptibility Analysis***

### **Notice**

**The susceptibility analysis provides a screening-level evaluation of the likelihood that a potential contamination problem could occur rather than an indication that a potential contamination problem has or will occur. The analysis is NOT a reflection of the current quality of the untreated source water, nor is it a reflection of the quality of the treated drinking water that is supplied to the public.**

The susceptibility analysis was conducted by the Colorado Department of Public Health and Environment to identify how susceptible an untreated water source could be to contamination from potential sources of contamination inventoried within its source water assessment area. The analysis looked at the susceptibility posed by individual potential contaminant sources and the collective or total susceptibility posed by all of the potential contaminant sources in the source water assessment area. The Colorado Department of Public Health and Environment developed a susceptibility analysis model for surface water sources and ground water sources under the influence of surface water, and another model for ground water sources. Both models provided an objective analysis based on the best available information at the time of the analysis. The Colorado Department of Public Health and Environment provided PAWSD with a final source water assessment report and supporting analysis information. Exhibit A, Table A-1 presents the Susceptibility Results as provided by CDPHE.

Exhibit A, Table A-2 presents results for selected water sources for PAWSD as revised and identified by the committee and PAWSD staff. The table summarizes the contaminant sources associated with each of the water sources that have been prioritized for source water protection measures under this plan.

## **SOURCE WATER PROTECTION MEASURES**

### **Defining the Source Water Protection Areas**

The source water protection area defines the watershed region where the community has chosen to implement its source water protection measures. PAWSD and the committee agree with and are using the state's source water assessment area delineation. Three general areas of concern have been identified. They include the West Fork of the San Juan River, the East Fork and main stem of the San Juan River and the Stollsteimer Creek source water areas. The main concern in these areas is the threat of contamination by wild fire. This threat was experienced in the Durango area a few years ago due to the Missionary Ridge Fire. A great portion of the property surrounding the source water areas of concern is public land under the administration of the US Forest Service. Another concern in the San Juan River source water areas is that of a major highway and mountain pass in close proximity to the raw water intake. The types and volumes of toxic chemicals transported on US Highway 160 are of concern in the event of an accident that could leak contaminants into the river and subsequently into the PAWSD source water intakes. Additionally, there is a geologically unstable region near the Jackson Mountain area on US Highway 160. The raw water transmission line from the West Fork of the San Juan River intake to the Snowball

WTP runs through this area. A slide in this vicinity could render the raw water source unusable for a period of time. Finally, although not a contaminant, drought conditions could render water supplies unusable for periods of time as well. (See Exhibit C, Generic watershed and potable storage facility map)

## **Identifying the Categories of Contaminants for Discrete Contaminant Sources**

The most common categories of contaminants that are most likely associated with the most prevalent and threatening discrete contaminant sources identified in Exhibit A, Table A-2 include:

Acute Health Concern Contaminants: (for potential chemical spills)

- Semi-volatile organic compounds (SVOCs)
- Volatile organic compounds (VOCs)

Acute health concern contaminants include individual contaminants and categories of constituents that pose the most serious immediate health concerns resulting from short-term exposure to the constituent. Many of these acute health concern contaminants are classified as potential cancer-causing (i.e., carcinogenic) constituents or have a Maximum Contaminant Level Goal (MCLG) set at zero (0).

Chronic Health Concern Contaminants:

- Volatile organic compounds (VOCs)
- Non-metal inorganic compounds
- Radionuclides
- Other inorganic compounds
- Other organic compounds

Chronic health concern contaminants include categories of constituents that pose potential serious health concerns due to long-term exposure to the constituent. Most of these chronic health concern contaminants include the remaining primary drinking water contaminants.

Aesthetic Concern Contaminants:

- Secondary drinking water contaminants

Aesthetic contaminants include the secondary drinking water contaminants, which do not pose serious health concerns, but cause aesthetic problems such as odor, taste or appearance.

## **Identifying the Categories of Contaminants for Dispersed Contaminant Sources**

The most common categories of contaminants that are most likely associated with the most prevalent and threatening dispersed contaminant sources identified in Exhibit A, Table A-2 include:

Acute Health Concern Contaminants: (for potential chemical spills)

- Nitrate/Nitrite
- Semi-volatile organic compounds (SVOCs)
- Volatile organic compounds (VOCs)

Acute health concern contaminants include individual contaminants and categories of constituents that pose the most serious immediate health concerns resulting from short-term exposure to the constituent. Many of these acute health concern contaminants are classified as potential cancer-causing (i.e., carcinogenic) constituents or have a Maximum Contaminant Level Goal (MCLG) set at zero (0).

Chronic Health Concern Contaminants: (for chemical spills, forest fires, landslides and severe drought)

- Herbicides
- Pesticides

- Volatile organic compounds (VOCs)
- Non-metal inorganic compounds
- Metals – Primary Drinking Water (other than lead)
- Radionuclides
- Turbidity
- Other inorganic compounds
- Other organic compounds

Chronic health concern contaminants include categories of constituents that pose potential serious health concerns due to long-term exposure to the constituent. Most of these chronic health concern contaminants include the remaining primary drinking water contaminants.

Aesthetic Concern Contaminants:

- Secondary drinking water contaminants

Aesthetic contaminants include the secondary drinking water contaminants, which do not pose serious health concerns, but cause aesthetic problems such as odor, taste or appearance.

The groups of acute, chronic and aesthetic concern contaminants are analogous to the Class A, Class B and Class C contaminant hazards, respectively, that were used in the Colorado Department of Public Health and Environment’s source water assessment.

**Source Water Protection Area Management and Commitment**

PAWSD and the committee reviewed and discussed several possible source water management approaches that could be implemented within the source water protection areas to help reduce the potential risks of contamination of the community’s source water. The purpose of voluntarily implementing source water management approaches is to apply an additional level of protection to the drinking water supply by taking preventive measures at the local level to protect the source water. These local preventive measures will compliment regulatory protection measures already being implemented at the state and federal governmental levels by filling protection gaps that can only be addressed at the local level. PAWSD is confident that applying these management approaches is a cost-effective and common sense approach in helping to reduce the risks of costly service disruptions resulting from potential contamination of the source water.

Potential contaminant sources regarding wastewater treatment facilities within the watershed area that were discussed and determined not to be of high priority were the following:

Entity	Permit #	Notes	Comments
Pagosa Springs Sanitation District	Permit # CO0022845 Currently being upgraded under Site Application #4991	Mechanical screening, SBR plant with BNR, decant EQ basin, sludge handling facility, and UV disinfection	Approved Site Application approved 06/16/2008
San Juan River Village Metropolitan District	Permit # COG588013		

Staff reviewed both facilities and discussed with the operators and also reviewed the site application referenced above for permit # CO0022845 and determined that the facilities were well operated and managed. They should pose no high priority threat to the main stem of the San Juan River source. Staff agreed that a close eye should be kept on regulations in the future especially as they pertain to Endocrine Precursors.

PAWSD recommends the following **Table 1. Source Water Protection Priorities and Best Management Practices** to be implemented by PAWSD, the Town of Pagosa Springs and Archuleta County where applicable in the source water protection areas. The list is prioritized in the order of importance to PAWSD. Additionally, the priority issues mentioned are further identified and implemented in priority issues one through six below.

**Table 1. Source Water Protection Priorities and Best Management Practices**

<b>Issue Number</b>	<b>Priority Issue</b>	<b>Best Management Practice</b>	<b>Water Sources Applied To</b>	<b>Potential Contaminant Sources Applied To</b>	<b>Implementation Responsibility</b>	<b>Implementation Schedule</b>	<b>Estimated Cost</b>	<b>Funding Sources</b>
1	Chemical Spills	Ensure alternate sources are available. Diversify supplies and have redundant interconnections between potable sources.	All sources within CO0104300	Most prevalent & threatening	PAWSD	Completed in 2006 and ongoing	already completed	PAWSD Capital Improvement Fees
2	Forest Fires	Ensure alternate sources are available. Diversify supplies and have redundant interconnections between potable sources.	All sources within CO0104300	Most prevalent & threatening	PAWSD	Completed in 2001 and ongoing	already completed	PAWSD Annual operations budget
3	Landslide	Ensure alternate sources are available. Diversify supplies and have redundant interconnections between potable sources.	CO0104300-019	Most prevalent & threatening	PAWSD	Completed in 2006 and ongoing	already completed	PAWSD Capital Improvement Fees
4	Drought	Implement Drought Management Plan. Implement a community education/outreach campaign on water conservation and planning for future storage.	All sources within CO0104300	Most prevalent & threatening	PAWSD	In place and ongoing	\$32,140 to date	Annual operations budget, Grants
5	Increase community awareness to source water protection	Implement a community education/outreach campaign on source water protection.	All sources within CO0104300	Most prevalent & threatening	PAWSD	Completed in 2005 and ongoing	unknown	Annual operations budget, Grants
6	Land Use Controls	Land Management	All sources within CO0104300	Most prevalent & threatening	PAWSD, Town, County, Community	In place and ongoing	unknown	Annual operations budget, Grants



## Priority ISSUE #1

### **Priority Issue:** Chemical spills

Many spills occur in Colorado each year on the highways and local roads. Chemicals from accidental spills are often diluted with water, potentially washing the chemicals into the soil or nearby surface water and increasing the potential for contamination. The committee is concerned with vehicular spills contaminating the San Juan River and recommends educating the public on how to respond to a hazardous spill as well as working with local emergency response teams to ensure that any spills within the protection areas be effectively contained.

**Management Approach:** Interconnect potable sources

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Major US Highway 160 along San Juan River

**Implementation Plan:** The following primary tasks have been identified as possible solutions to mitigating the possibilities of hazardous chemical spills into the San Juan River that may affect the quality and quantity of source water available.

Task 1: A strong collaboration with all local law enforcement, fire, medical, and transportation officials is of great importance. Since this issue is typically out of the control of the water provider, PAWSD has chosen to plan for it instead of preventing it. Once an incident involving a chemical spill has occurred, quick action to minimize the effects can be paramount to protecting a water source. Having good relationships with these entities puts more eyes and ears on the street to reach this goal. In 2008, PAWSD strengthened this collaboration by joining the Archuleta County Multi-Agency Coordination Group. This group is comprised of representatives from local law enforcement, emergency and utility agencies. PAWSD will be responsible for the success of this ongoing collaboration which can be measured by the successful exchange of data and resources resulting in a higher level of protection for many aspects in the community.

Task 2: Interconnect raw and potable sources. This task involves identifying the most practical and economical ways to interconnect raw and potable sources to sustain the weakest source in the event of a chemical spill emergency. PAWSD has looked at a number of alternatives with the assistance of staff and engineering and has identified the best solutions based on a number of different criteria including but not limited to practicality, cost, water quality, and benefit. Since this issue is typically out of the control of the water provider, PAWSD has chosen to mitigate its impacts instead of preventing it. PAWSD must ensure that the financial and physical resources are in place to be prepared for this event before it happens. This includes an analysis of where the best locations are to construct redundant connections in the potable system to keep the community in water. This analysis should include hydraulics, water modeling, and water quality aspects as a minimum.

PAWSD staff will be responsible for the outcome of these tasks. It will be difficult to measure the actual outcome of Task 2 as a mock event would have to be performed to test the infrastructure. The District has chosen to install and pressure check all the infrastructure at this time without performing a mock incident due to the fact that the incident itself has inherent challenges regarding water quality, pressure, infrastructure, and manpower. As of April 2008 this task had been completed. It included the interconnection of the Hatcher WTP potable supply to the Snowball WTP service area. In the event of a chemical spill in one watershed, changing to another potable supply several miles away may potentially buy some time. Appropriate mapping and training of staff will be critical to the success of this task and is well underway at PAWSD as part of the PAWSD Emergency Response Plan.

## Priority ISSUE #2

### **Priority Issue:** Forest Fires

The largest landowner in the watershed is the federal government with lands managed by the U.S. Department of Agriculture. The US Forest Service Office is located at 180 Pagosa Street, Pagosa Springs, Colorado, 81147. The following have been identified as items of concern regarding potential degradation of water quality: forest fires, chemical spills, and livestock grazing.

**Management Approach:** Interconnect potable sources

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Forest Lands

**Implementation Plan:** The following primary task has been identified as part of establishing a solution to the issue of the potential contamination caused by large forest fires in the watershed areas.

Task 1: Interconnect raw and potable sources. Once again, this task involves identifying the most practical and economical ways to interconnect raw and potable sources to sustain the weakest source in the event of an emergency. PAWSD has looked at a number of alternatives with the assistance of staff and engineering and has identified the best solutions based on a number of different criteria including but not limited to practicality, cost, water quality, and benefit. Since this issue is typically out of the control of the water provider, PAWSD has chosen to plan for mitigating its impacts instead of preventing it. As in the chemical spill issue noted above, the same collaborations with emergency service agencies will be paramount to the success of this BMP. Again, PAWSD must ensure that the financial and physical resources are in place to be prepared for this event before it happens. This includes an analysis of where the best locations are to construct redundant connections in the potable system to keep the community in water. This analysis should include hydraulics, water modeling, and water quality aspects as a minimum.

PAWSD staff will be responsible for the outcome of this task. It will be difficult to measure the actual outcome of this task as a mock event would have to be performed to test the infrastructure. The District has chosen to install and pressure check all the infrastructure at this time without performing a mock incident due to the fact that the incident itself has inherent challenges regarding water quality, pressure, infrastructure, and manpower. As of this writing (April 2008), this task had been completed. It included the interconnection of the Hatcher WTP potable supply to the Snowball WTP service area. In the event of a forest fire in one watershed, changing to another several miles away may potentially buy some time. Appropriate mapping and training of staff will be critical to the success of this task and is well underway at PAWSD as part of the PAWSD Emergency Response Plan.

### Priority ISSUE #3

**Priority Issue:** Landslide

**Management Approach:** Interconnect Potable Sources

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Most prevalent and threatening contaminant sources.

**Implementation Plan:** The following primary task has been identified as part of the plan to mitigate or reduce the effect a catastrophic landslide that cannot be prevented but must be prepared for.

Task 1: Preparation. PAWSD must ensure that the financial and physical resources are in place to be prepared for this event before it happens. This includes an analysis of where the best locations are to construct redundant connections in the potable system to keep the community in water. This analysis should include hydraulics, water modeling, and water quality aspects as a minimum.

Task 2: Once again, a strong collaboration with all local law enforcement, fire, medical, and transportation officials is of great importance. Since this issue is typically not manageable initially or out of the control of the water provider, PAWSD has chosen to mitigate its impacts instead of prevent it. Once an incident involving a landslide has occurred, quick action to minimize the effects can be paramount to protecting a water source. Having good relationships with these entities will insure good communication and the collaboration necessary to reach this goal. In 2008, PAWSD strengthened this collaboration by joining the Archuleta County Multi-Agency Coordination Group. PAWSD will be responsible for the success of this ongoing collaboration which can be measured by the successful exchange of data and resources resulting in a higher level of protection for many aspects in the community.

## Priority ISSUE #4

**Priority Issue:** Drought

**Management Approach:** Implement a community education/outreach campaign on water conservation and planning for future water storage.

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Most prevalent and threatening contaminant sources.

**Implementation Plan:** PAWSD has a Drought Management Plan in place. The PAWSD Board of Directors may implement this plan at their discretion and in response to this priority issue. In addition, the following primary tasks have been identified as part of the comprehensive community education/outreach campaign that will be implemented in the Pagosa Springs Area.

Task 1: Form a committee whose purpose is to formulate and implement an educational program. This task goes hand in hand with the expected success of the program. A well educated community will better understand and take ownership in conserving its water supplies. This process should trickle down the demographic stream of elected leaders and community members that make up the committees and commissions responsible for making decisions regarding planning. Initially PAWSD, but eventually a broader base of citizens will be responsible for the outcome of this task. The success will be measured over time by the long and short term planning decisions made by the community and by continued monitoring of conservation efforts over time as growth occurs.

Task 2: Encumber the committee to also study, identify, and make recommendations for future water storage needs for Archuleta County. The committee itself should monitor its success based on community involvement and acceptance. Success of this project can be measured subjectively over time by the receipt of a plan meeting all the goals and needs of the community and the watershed being protected.

## Priority ISSUE #5

**Priority Issue:** Increase community awareness to source water protection

**Management Approach:** Implement a community education/outreach campaign on source water protection

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Most prevalent and threatening contaminant sources.

**Implementation Plan:** The following primary tasks have been identified as part of the comprehensive community education/outreach campaign that will be implemented in the Pagosa Springs Area.

Task 1: Form a committee whose purpose is to formulate and implement an educational program. This task goes hand in hand with the expected success of the program. A well educated community will better understand and take ownership in protecting its source water supplies. This process should trickle down the demographic stream of elected leaders and community members that make up the committees and commissions responsible for making decisions regarding planning. Initially PAWSD, but eventually a broader base of citizens will be responsible for the outcome of this task. The success will be measured over time by the long and short term planning decisions made by the community and by continued monitoring of source water quality over time as growth occurs. Formation of the Stollsteimer Creek Watershed Committee in 2005 was a good step in the right direction with funding from a broad base of governmental entities and grant money.

Task 2: With community participation, encumber the committee to also study, identify, and recommend a source water protection model for localized areas within the larger watershed. The committee itself should monitor its success based on community involvement and acceptance. Success of this project can be measured subjectively over time by the receipt of a plan meeting all the goals and needs of the community and the watershed being protected.

## Priority ISSUE #6

### **Priority Issue:** Land Use Controls

Future land use and growth within the water sheds and the potential of water quality impacts from these changes are a concern to the committee. As mentioned previously, portions of three different counties lie within the watershed protection area, approximately 66% of which is lies within the San Juan National Forest managed by the US Forest Service. The remainder of the watershed is privately owned and regulated by land use decisions made in these counties counties. It is projected that the population of these counties, especially Archuleta County, will increase and result in increased development, especially in the unincorporated areas. The single largest land use trend within Colorado is the conversion of working agricultural parcels – principally livestock grazing lands – into low-density residential lots and the development of housing on those lots. The committee has recommended that decision makers within Archuleta county be encouraged to consider source water protection a high priority when making land use decisions and that these decisions minimize the impacts to the water quality of the local watersheds.

**Management Approach:** Land management and planning

**Applicable Water Sources:** All within CO0104300.

**Applicable Contaminant Sources:** Most prevalent and threatening contaminant sources.

**Implementation Plan:** The following primary tasks have been identified to address the issue of Land Use Controls.

Task 1: Continue to foster good working relationships with the Town of Pagosa Springs and Archuleta County Land Use staff and planning departments, CDPHE, and other applicable state agencies to assure appropriate planning occurs. These relationships over the years have produced the added benefits of parking lot detention ponds and adequate water needs studies just to name a few. As this community grows it will be vital to have good lines of communication open at all times and keep pace with ever changing regulations at all levels.

## ***Additional Commitments***

PAWSD is committed to developing a tracking and reporting system to gauge the effectiveness of the various source water management approaches that have been implemented. The purpose of tracking and reporting the effectiveness of the source water management approaches is to update water system managers, consumers, and other interested entities on whether or not the intended outcomes of the various source water management approaches are being achieved, and if not, what adjustments to the protection plan will be taken in order to achieve the intended outcomes. PAWSD will monitor the progress of this plan, post it on its website and make it available to customers at its office as well as publishing periodic updates in its bi-annual newsletter.

PAWSD is committed to voluntarily applying source water assessment and protection principles to siting and protecting new water sources in the future. To every extent possible, PAWSD is committed to local government planning staffs to ensure fully-informed decisions that could potentially affect source water quality. This is part of the larger ongoing commitment to providing the highest quality drinking water to PAWSD consumers.

PAWSD is committed to voluntarily assisting the Colorado Department of Public Health and Environment in making future refinements to its source water assessment report and to revising the PAWSD source water protection plan accordingly based on any major refinements. By making this commitment, PAWSD is assuring that future assessment results are consistent with the available data and that source water management approaches are appropriate for the susceptibility concerns.

## Exhibit A

### Table A-1

**Source Water Assessment Priority Strategy and Susceptibility Results as provided by CDPHE**

SOURCE ID	CO0104300-001	CO0104300-019
Source Name	Dutton Ditch /Four Mile Creek	San Juan River
Source Type	SW	SW
Total Susceptibility Rating	Moderate	Moderately High
Physical Setting Vulnerability Rating	Moderate	Moderately High
EPA Superfund Sites	0	0
EPA Abandoned Contaminated Sites	0	0
EPA Hazardous Waste Sites	0	0
EPA Chemical Inventory/Storage Sites	0	0
EPA Toxic Release Inventory Sites	0	0
Permitted Wastewater Discharge Sites	0	3
Aboveground, Underground and Leaking Storage Tank Sites	0	8
Solid Waste Sites	0	1
Existing/Abandoned Mine Sites	0	6
Confined Animal Feeding Operations	0	0
Other Facilities of Concern	1	6
<b>TOTAL</b>	1	24
Commercial/Industrial/Transportation	0	0
High Intensity Residential	0	0
Low Intensity Residential	0	0
Urban Recreational Grasses	0	0
Quarries/Strip Mines/Gravel Pits	0	0
Row Crops	0	0
Fallow	0	0
Small Grains	0	0
Pasture/Hay	1	1
Orchards/Vineyards/Other	0	0
Deciduous Forest	1	1
Evergreen Forest	1	1
Mixed Forest	1	1
<b>OTHER TYPES:</b>		
Septic Systems	1	1
Oil/Gas Wells	0	0
Road Miles	0	1
<b>TOTAL</b>	5	6



## Table A-2

### Source Water Assessment and Susceptibility (PAWSD)

The table below outlines the water sources that PAWSD feels should be prioritized based on the assessment susceptibility results. The potential contaminant sources for each water source are listed according to the adopted priority strategy (i.e.: most prevalent, most threatening, most prevalent and threatening).

San Juan River, West Fork	Forest Fire	Chemical Spill	Landslide	Drought	Moderately High
San Juan River, Main Stem	Forest Fire	Chemical Spill	Landslide	Drought	Moderately High
Stollsteimer Creek	Forest Fire			Drought	Moderately High
Dutton Ditch/Four Mile Creek	Forest Fire			Drought	Moderate

## Exhibit B

Table 1 and Table 2, list of drinking water standards

### Tables

**Table 1. National Primary Drinking Water Standards**

Contaminant	Maximum level	Contaminant	Maximum level
<i>Inorganics</i>		<i>Organics (cont.)</i>	
Antimony	0.006 mg/L	Diquat	0.02 mg/L
Arsenic	0.05 mg/L	Endothall	0.1 mg/L
Asbestos	7 million fibers/L	Endrin	0.002 mg/L
Barium	2 mg/L	Epichlorohydrin	TT5
Beryllium	0.004 mg/L	Ethylbenzene	0.7 mg/L
Cadmium	0.005 mg/L	Ethylene dibromide	0.00005 mg/L
Chromium (total)	0.1 mg/L	Glyphosphate	0.7 mg/L
Copper	1.3 mg/L TT6	Heptachlor	0.0004 mg/L
Cyanide (as free cyanide)	0.2 mg/L	Heptachlor epoxide	0.0002 mg/L
Flouride	4.0 mg/L	Hexachlorobenzene	0.001 mg/L
Lead	0.015 mg/L	Hexachlorocyclopentadiene	0.05 mg/L

	TT6		
Mercury (Inorganic)	0.002 mg/L	Lindane	0.0002 mg/L
Nitrate (as N)	10 mg/L	Methoxychlor	0.04 mg/L
Nitrite (as N)	1 mg/L	Oxamyl (Vydate)	0.2 mg/L
Selenium	0.05 mg/l	Polychlorinated biphenyls (PCBs)	0.0005 mg/L
Thallium	0.002 mg/L	Pentachlorophenol	0.001 mg/L
<i>Organics</i>		Picloram	0.5 mg/L
Acrylamide	TT5	Simazine	0.004 mg/L
Alachlor	0.002 mg/L	Styrene	0.1 mg/L
Atrazine	0.003 mg/L	Tetrachloroethylene	0.005 mg/L
Benzene	0.005 mg/L	Toluene	1 mg/L
Benzo(a)pyrene	0.0002 mg/L	Total Trihalomethanes (TTHMs)	0.10 mg/L
Carbofuran	0.04 mg/L	Toxaphene	0.003 mg/L
Carbon tetrachloride	0.005 mg/L	2,4,5-TP (Silvex)	0.05 mg/L
Chlordane	0.002 mg/L	1,2,4-Trichlorobenzene	0.07 mg/L
Chlorobenzene	0.1 mg/L	1,1,1-Trichloroethane	0.2 mg/L

2,4-D	0.07 mg/L	1,1,2-Trichloroethane	0.005 mg/L
Dalapon	0.2 mg/L	Trichloroethylene	0.005 mg/L
1,2-Dibrom-3-chloropropane (DBCP)	0.0002 mg/L	Vinyl chloride	0.002 mg/L
o-Dichlorobenzene	0.6 mg/L	Xylenes (total)	10 mg/L
p-Dichlorobenzene	0.075 mg/L	<b>Radionuclides</b>	
1,2-Dichloroethane	0.005 mg/L	Beta particles and photon emitters	4 millirems /yr
1,1-Dichloroethylene	0.007 mg/L	Gross alpha particle activity	15 picocuries/ liter (pCi/L)
cis-1,2-Dichloroethylene	0.07 mg/L	Radium 226 and radium 228 (combined)	5 pCi/L
trans-1,2-Dichloroethylene	0.1 mg/L	<b>Microorganisms</b>	
Dichloromethane	0.005 mg/L	<i>Giardia lamblia</i>	TT8
1-2-Dichloropropane	0.005 mg/L	Heterotropic Plate count	TT8
Di(2-ethylhexyl)adipate	0.4 mg/L	<i>Legionella</i>	TT8
Di(2-ethylhexyl)phthalate	0.006 mg/L	<i>Total Coliforms (including fecal coliform and E. coli)</i>	5.0%10
Dinoseb	0.007 mg/L	Turbidity	TT8
Dioxin (2,3,7,8-TCDD)	0.00000003 mg/L	Viruses (enteric)	TT8

**Table 2. Secondary Drinking Water Standards.**

<b>Contaminant</b>	<b>Contaminant level</b>
Aluminum	0.05-0.2 mg/L*
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	noncorrosive
Flouride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 (threshold odor #)
pH	6.5-8.5
Silver	0.1 mg/L
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L

# Exhibit C

Generic watershed and potable storage facility map



## Exhibit D WATER DEMAND ESTIMATOR

[A]	[B]	[C]	[D]	[E]	
Water Source ID	Permitted Water Supply (ac-ft/yr)	Permitted Peak Daily Capacity (gals/day)	Average Daily Demand (gals/day)	Average Peak Daily Demand (gals/day)	Comments
CO0104300-003	2,240	1,999,743	610,085	1,513,846	WTP has a 2 mgd capacity, water rights much more
CO0104300-006	3,360	2,999,615	915,127	2,270,769	WTP has a 3 mgd capacity, water rights much more
CO0104300-020	1,680	1,499,807	457,563	1,135,385	WTP has a 1.5 mgd capacity, water rights much more
<b>Total</b>	<b>7,280</b>	<b>6,499,165</b>	<b>1,982,775</b>	<b>4,920,000</b>	Avg. Daily = 2221 ac ft (2007 produced) from Shellie, X 325,850 / by 365 days to get avg daily produced. (includes 275 ac ft of irrigation water)
<b>Estimated Surplus (+) or Deficit (-) Capacity:</b>			<b>4,516,390</b>	<b>1,579,165</b>	Avg. Peak = 2.23 mgd for SJWTP (6/25/06), 1.65 mgd (6/00) for Hatcher WTP and 1.04 mgd for SBWTP in 6/01 = 4.920 mgd max during different times.
					4 scenarios ran to determine vulnerability (2 showed neg. #'s only during peak daily demand)

**INSTRUCTIONS:**

- 1) Enter the water source ID number for each of your water sources in Column A. See the example above in red text.  
As needed, insert additional rows into the spreadsheet above the row titled Total to cover the total number of water sources you have. Be sure to copy the cell formulas contained in Columns C, D and E into the new cells that are created in these same columns by the insertion of new rows into the spreadsheet.
- 2) Enter the permitted water supply amount (in acre-feet/year) in Column B that the State Engineers Office has granted for each of your water sources. This total is shown on the well/water permit that comes from the State Engineers Office. See the examples above in red text. This is the maximum amount of water that you are allowed to extract annually from each of your water sources. The spreadsheet automatically converts these permitted amounts into equivalent Permitted Peak Daily Capacity amounts (see Column C) for each water source, and it automatically sums the total amounts in Columns B and C (see row titled Total).
- 3) Enter the Average Daily Demand total for your water system in Column D in the row titled Total. See the example above in red text. The Average Daily Demand total is the historic daily demand of water on your water system averaged over a period of years. The spreadsheet automatically apportions this amount among each of your water sources based on the percentage that each water source contributes to the total Permitted Peak Daily Capacity amount shown in Column C. For example, the portion of the total Average Daily Demand amount that water source CO0XXXXXX-001 contributes is calculated as follows:  
 $(89,274 \text{ gals/day} / 892,742 \text{ gals/day}) * 750,000 \text{ gals/day} = 75,000 \text{ gals/day}$
- 4) Enter the Average Peak Daily Demand total for your water system in Column D in the row titled Total. See the example above in red text. The Average Peak Daily Demand total is the historic daily demand of water on your water system during periods of peak useage and averaged over a period of years. The spreadsheet automatically apportions this amount among each of your water sources based on the percentage that each water source contributes to the total Permitted Peak Daily Capacity amount shown in Column C. For example, the portion of the total Average Peak Daily Demand amount that water source CO0XXXXXX-001 contributes is calculated as follows:  
 $(89,274 \text{ gals/day} / 892,742 \text{ gals/day}) * 850,000 \text{ gals/day} = 85,000 \text{ gals/day}$
- 5) The spreadsheet automatically estimates the current surplus or deficit capacity that your water system has in meeting the Average Daily Demand and the Average Peak Daily Demand based on the values that you entered into the spreadsheet in Steps 2 - 4 above. These values are shown above in blue text in Columns D and E. A surplus capacity is represented by a positive value while a deficit capacity is represented by a negative value. In most cases, water systems should have a surplus capacity if they have planned well.
- 6) To determine if your water system is vulnerable to meeting either of these demands in the event one or more of your water sources become disabled due to accidental contamination, delete one of the water sources from the spreadsheet by temporarily deleting the whole row. Check the resulting surplus or deficit estimates in the spreadsheet (shown in blue text) for Average Daily Demand and Average Peak Daily Demand. If either of these estimates are negative values, it indicates that you may not have the ability to meet this demand over an extended period. For example, if water source CO0XXXXXX-004 were disabled (i.e., deleted from the spreadsheet), deficit capacities of - 80,443 gals/day and -180,443 gals/day would result for the Average Daily Demand and the Average Peak Daily Demand, respectively. This means the water system may not be able to meet either demand if this water source were disabled for an extended period of time based on the Permitted Peak Daily Capacities for the remaining water sources.
- 7) To check this vulnerability for your other water sources, undelete the row you just removed from the spreadsheet in Step 6. Select another water source and temporarily delete it from the spreadsheet like you did in Step 6 and check the resulting surplus or deficit estimates in the spreadsheet for Average Daily Demand and Average Peak