

Wyoming's Source Water Assessment and Protection Program

**Wyoming Department of Environmental Quality
Water Quality Division**

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DRAFT

Wyoming's Source Water Assessment and Protection Program

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Jim Case	Geological Survey of Wyoming
Tom Clayson	Petroleum Association of Wyoming
Jim Cochran	Wyoming Association of Conservation Districts
Maggie Davison	DEQ, Water Quality Division
Thom Edgar	University of Wyoming, Civil Engineering
Joe Evans	Wyoming County Commissioners Association
Floyd Field	Wyoming Association of Rural Water Systems
Kevin Frederick	DEQ, Water Quality Division
John Giedt	EPA, Region VIII
Curtis Grandstaff	Town of LaGrange
Mike Hackett	Wyoming Water Development Commission
Ken Hamilton	Wyoming Farm Bureau
Charles Harnish	DEQ, Water Quality Division
Marcella Hutchinson	EPA, Region VIII
Chris Jessen	Wyoming State Geological Survey
Drew Johnson	University of Wyoming, Civil Engineering
Karen Larsen	League of Women Voters
Gus Lopez	City/County Health Department
Jeff Lundberg	Wyoming Ag-Business
Larry Martin	National Park Service
Brian Mark	DEQ, Water Quality Division
Larry Meuli	City/County Health Department
Wes Nash	Wyoming Mining Association/FMC Corporation
Phil Ogle	DEQ, Water Quality Division
Mark Opitz	Natural Resources Conservation Service
George Parks	Wyoming Association of Municipalities
Kim Parker	DEQ, Water Quality Division
Larry Robinson	DEQ, Water Quality Division
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David Schmidt	EPA, Region VIII
Rick Schuler	US Bureau of Land Management
Bud Spillman	Cheyenne Board of Public Utilities
Jack States	Non-Point Source Task Force
Carol Stearns	Wyoming Association of Municipalities
Dick Stockdale	Wyoming State Engineer's Office
Jake Strohman	DEQ, Water Quality Division
Michael Stull	Wyoming Association of Municipalities
Phil Stump	DEQ, Water Quality Division
Jack Theis	EPA, Region VIII
Jim VanDorn	Cheyenne Board of Public Utilities
Rod Weyrick	Town of Yoder
Mike Wireman	EPA, Region VIII
David Zelenka	Wyoming Water Development Commission

Executive Summary

People who live in or visit the state of Wyoming enjoy pristine natural resources. One of the most important of these resources is water. The Wyoming legislature passed the Environmental Quality Act in order to protect its valuable water resources in 1973. This act directed the Wyoming Department of Environmental Quality (DEQ) to preserve the waters of the state and to prevent, reduce, and eliminate water pollution. Both surface and groundwater sources must be protected by either remediation activities or preventative measures. To this end, the state of Wyoming is currently developing a program that will protect both surface and groundwater drinking water supplies.

In 1996, the United States Congress passed legislation requiring the development of Source Water Assessment and Protection Programs. Sections 1453 and 1428(b) of the Safe Drinking Water Act Amendments require all states having “primacy” to develop a Source Water Assessment and Protection Program. States which have primacy have the responsibility for administering the federal rules and regulations of the Safe Drinking Water Act. Although Wyoming is the only state that has elected not to take primacy, the value and benefit of the Source Water Assessment and Protection Program was recognized. During the 1998 legislative session, the Wyoming Legislature authorized DEQ to set aside 10%, or \$1.2 million, of the 1997 federal Drinking Water State Revolving Fund monies to develop a Source Water Assessment and Protection Program and complete Source Water Assessments.

Similar to the Wellhead Protection Program which preceded it, the United States Congress intended the Source Water Assessment and Protection Program to compliment the more traditional drinking water quality programs. Unlike the Wellhead Protection Program, however, Source Water Assessment and Protection applies to drinking water supplies using any combination of surface water and groundwater.

The Source Water Assessment and Protection Program was intended to encourage the development and implementation of drinking water protection programs on a local level. Information collected during the source water assessments can be used by local governments, public water systems, and citizens to develop plans to safeguard their water supplies. In order to be effective at the local level, the public must be able to understand, participate in, and benefit from the program. Public participation was therefore encouraged in all stages of Wyoming’s Source Water Assessment and Protection Program development.

As required by the 1996 Safe Drinking Water Act Amendments, each state must write a Source Water Assessment and Protection document. These documents will be reviewed and approved by the United States Environmental Protection Agency (EPA). The EPA published some general guidelines to assist the states with the development of their Source Water Assessment and Protection programs. Per these guidelines, each state program must indicate how the public was involved in the design process, how the source water assessments will be done, and how the assessment results will be communicated to the public.

Due to Wyoming's unique primacy status, the completion of source water assessments for all public water systems is not mandatory. Instead, Source Water Assessment and Protection is a voluntary program. Public water systems that choose to participate will be ranked by factors such as water supply type, population served, and past compliance history. Public water systems that use surface water, have poor compliance histories, or serve large populations will be the highest priority systems. High priority systems will be assessed first, ensuring the completion of source water assessments for systems with the greatest need for source water protection.

Each source water assessment will involve four steps. The first step is to determine the area which contributes water to the well or intake. The second step will be to inventory potential sources of contamination within this area that could affect the water supply. The third step is to complete an analysis of the susceptibility of the well or intake to contamination from these sources. The fourth step will be to publish a report summarizing the findings of the assessment. All four steps need to be completed by June of 2004.

Source Water Area Delineation

The first step in completing a source water assessment is to delineate, or determine, the source water area. The source water area is the area which contributes water to the well or intake. In surface water systems, the source water area will be the entire watershed upstream from the intake. In cases where water is diverted from one watershed to another to augment a public water system's supply, the source water area will include all watersheds which contribute water to the intake. In groundwater systems, a distance from the wellhead equivalent to a five year time of travel will be determined. Time of travel boundaries can be determined by using the calculated fixed radius method, analytical models, or hydrogeological mapping. The method used will depend on the type of aquifer and the water flow pattern. Some wells or intakes use a combination of groundwater and surface water. In these situations, the source water area will be determined using both groundwater and surface water delineation techniques.

Contaminant Inventory

The second step in conducting a source water assessment is to complete an inventory of potential sources of contamination within the source water area. Potential sources of contamination are contaminant sources that have the potential to impact the quality of the water supply. One of two types of contaminant inventory will be conducted based on proximity to the wellhead or intake.

The most detailed type of inventory, called a comprehensive inventory, will be conducted in the areas closest to the wellhead or intake. A comprehensive inventory will include a database search as well as a local inventory efforts. State and federal regulatory databases contain information on permitted facilities, land uses, and other activities that could affect the water supply. Information about other potential sources of contamination, such as historic landfill or gas station sites and septic systems is not readily available in state or federal databases. These potential sources of contamination are best identified on the local level. Comprehensive inventories will be conducted within the two year time of travel boundary for wells. For surface water intakes, a comprehensive inventory will be done within a 1000 foot zone on either side of

all perennial streams tributary to the intake for a distance of 15 valley miles upstream from the intake. Alternatively, a distance upstream from the intake equivalent to an eight hour time of travel can be used if this information is available.

A less detailed, limited contaminant inventory will be conducted in the areas farthest from the wellhead or surface water intake. Limited contaminant inventories will include only a state and federal database search to identify the most serious potential sources of contamination. Limited inventories will be conducted in the portions of the source water area not listed above.

Susceptibility Analysis

The third step in the source water assessments is to complete a susceptibility analysis. The potential for each of the contaminant sources identified in the inventory step to impact the water supply will be analyzed. Several factors will be examined when determining the susceptibility of the water supply to contamination. The first is the integrity of the well or intake structure. Well constructed and maintained wells and intakes reduce the ability of contaminants to enter the water supply. The second is the sensitivity of the area over or through which contaminants must move to reach the well or intake. Physical, geologic, and hydrologic factors will be evaluated to determine how easily contaminants can move through the aquifer or watershed. The nature of the contaminant involved is the third factor which determines susceptibility. The type of contaminant, the proximity of the contaminant source to the well or intake, and whether or not a contaminant release has been confirmed will be considered. These factors will be combined in a series of matrices to determine the susceptibility of the water supply to each contaminant source.

A summary of the susceptibility of a well or intake to all contaminants and contaminant sources will be produced. This summary will allow a public water system to identify the most serious threats to the water supply. Susceptibility summaries will also include a discussion of how the contaminant sources may affect the water supply. Potential management options for controlling contaminant sources or improving the water treatment capabilities may also be discussed.

Source Water Assessment Reports

The fourth and final step in completing a source water assessment is the preparation of a source water assessment report. This report will summarize all the information collected during the assessment. Each report will include a map illustrating the source water area and the locations of potential sources of contamination in relation to the well or intake. A summary of well or intake susceptibility will be presented in a combination of tables and narratives.

The availability of these source water assessment reports will be publicized. As source water assessment reports are completed, the DEQ will publish a notice of availability in its quarterly newsletter. DEQ will also encourage public water systems to send out notices in monthly billings or newsletters or post notices in conspicuous locations. Community water systems will also include a brief summary of assessment findings and a notice of how to obtain a copy of the report in their annual Consumer Confidence Reports.

Copies of the assessment reports will be kept in locations convenient to the public. For example, one copy will be given to the public water system. Other copies of the assessment report will be kept at the DEQ state office and DEQ district offices. Assessment reports will also be available over the Internet.

Source Water Protection Plans

DEQ will encourage public water systems that have participated in source water assessments to develop Source Water Protection plans. The key to preventing contamination of Wyoming's public drinking water supplies is to develop protection plans. DEQ considers the development of Source Water Protection plans to be the ultimate goal of the Source Water Assessment and Protection Program. The protection of drinking water resources will play an important part in Wyoming's future.

Chapter 1

Introduction To The Source Water Assessment And Protection Program

1.1 The Background For Source Water Assessment And Protection

Comprehensive regulations designed to protect public drinking water supplies in the United States began with the enactment of the Safe Drinking Water Act in 1974. The United States Environmental Protection Agency (EPA), established in 1970, was the federal agency charged with administering the Safe Drinking Water Act.

The 1986 Amendments to the Safe Drinking Water Act strengthened the protection of groundwater by requiring states to develop Wellhead Protection Programs. The Wellhead Protection Programs provided guidelines to public water systems for protecting their groundwater supplies from contamination. Wyoming's Wellhead Protection Program was approved by the EPA in September, 1997. Wyoming is the 46th state to have an approved program in place.

The Safe Drinking Water Act was further strengthened in 1996 with the passage of additional amendments requiring states to develop Source Water Assessment and Protection Programs. The Source Water Assessment and Protection Program builds upon the Wellhead Protection Program and expands the concept to protect all sources of drinking water. Source Water Assessment and Protection applies to public water systems using surface water, groundwater, or combinations of surface water and groundwater.

1.2 Wyoming's Goals For The Source Water Assessment and Protection Program

The Source Water Assessment and Protection Program is a two-part program. First, assessments of public drinking water supplies will be completed. Secondly, Source Water Protection Plans can be developed with the information provided by the assessments. This enables the public water systems to protect the water supply.

The Department of Environmental Quality (DEQ) views Source Water Protection Plans as a means to ensure the long-term safety of drinking water resources in Wyoming. In addition to protecting public health, Source Water Protection Plans may reduce monitoring requirements for public water systems. DEQ is currently working with the EPA to develop a monitoring waiver

program for Wyoming public water systems. A Source Water Assessment will likely be required for most waivers.

The first part of the Source Water Assessment and Protection Program is to complete a source water assessment for all public water systems. Wyoming is the only state that does not have primacy, or responsibility, for administering the federal rules and regulations governing public drinking water systems under the Safe Drinking Water Act. Consequently, Wyoming is the only state not required to complete a source water assessment on all public water systems within the state. The DEQ is committed to completing a source water assessment for each public water system that requests one. However, assessing all public water systems that serve communities or rely on surface water will be the highest priorities.

The completion of a source water assessment involves four steps. The first step is to determine a source water area for each public water system. Second, sources of contamination within this source water area that have the potential to affect the drinking water supply will be identified. Third, the susceptibility of the water supply to contamination by each of these potential sources of contamination will be evaluated. The fourth step is to write an assessment report. Assessment reports contain a summary of all the information gathered during the assessment in a format that is useful to the public. Each public water system that requested an assessment will receive a copy of the assessment report for their system. Availability of these assessment reports will be publicized.

The second part of the Source Water Assessment and Protection Program promotes the development of Source Water Protection Plans. These plans will be similar to Wellhead Protection Plans. A Source Water Protection Plan is developed by community members and outlines the measures that the community or public water system believe are appropriate to protect their drinking water supply. These measures may include management plans, clean up efforts, or zoning changes. Source Water Protection Plans will be approved by DEQ in a manner similar to the process currently used to approve Wellhead Protection Plans. DEQ will strongly encourage public water systems to request assessments and develop Source Water Protection Plans.

1.3 Timetable For The Source Water Assessment And Protection Program

The final State Source Water Assessment and Protection Program Guidance was published by the EPA in August of 1997. The state guidance document indicated that all states must submit a draft Source Water Assessment and Protection Program Plan within 18 months of August 1997. DEQ submitted a draft Source Water Assessment and Protection Program Plan to the EPA for approval in early February, 1999.

The EPA is allowed nine months to review and approve all draft program plans. Once the program plans are approved, each state will have two years to complete all source water

assessments. The EPA state guidance, however, allows states to request an 18 month extension. DEQ is requesting the 18 month extension, as are most states, due to the limited financial and personnel resources available. With the 18 month extension, source water assessments in Wyoming must be completed by June of 2004.

Chapter 2

Public Participation In Source Water Assessment And Protection

2.1 Introduction

The United States Congress envisioned a program that would provide the American public with information about their drinking water. It was hoped that this information would inspire the public to become interested and involved with local water quality issues. Congress also felt that the public should play a significant part in the development of this program on the state level. The Source Water Assessment and Protection Program was designed to accomplish these goals.

DEQ also believes that public participation is critical when developing a program for the protection of the public. Involving the public in Source Water Assessment and Protection is the only way that public concerns, needs, and comments can be fully addressed. The success of Source Water Assessment and Protection relies upon public awareness, understanding, and support. This cannot be accomplished without the involvement of the public throughout the entire process.

2.2 Initial Questionnaire and Fact Sheet

The DEQ has encouraged public participation since the development of the Source Water Assessment and Protection Program began. A fact sheet and questionnaire was sent to all non-profit and non-federal public water supply systems in the Fall of 1997. The questionnaire was used to gauge public water system interest in source water assessments. Approximately one quarter of the public water systems responded. All of the public water systems which responded indicated that they would be interested in participating. The responses of this questionnaire were used to successfully lobby the Wyoming State Legislature to obtain the funds necessary for conducting source water assessments. A copy of the fact sheet and a summary of the questionnaire responses are included as pages 53 through 57 of **Appendix A**.

2.3 Advisory Committee

Another key role that public participation played in the Source Water Assessment and Protection Program was the Advisory Committee. DEQ convened a committee to aid in the development of both technical and practical aspects of the program plan. This committee functioned as both a citizen's and technical advisory committee. The Advisory Committee was composed of Wyoming citizens with widely varied interests and areas of expertise. The Advisory Committee

met seven times beginning October 2, 1997. Meeting notes and identification of major points of discussion appear in **Appendix A**.

The procedure used to develop the Wellhead Protection Program Committee was used as a template for the Source Water Assessment and Protection Advisory Committee. In addition, DEQ extended an invitation to other groups identified in the EPA State Guidance Document which were not represented on the Wellhead Committee. An attempt was made to convene a committee which could represent the diverse interests of Wyoming's population. Representation was provided for local, state, and federal government agencies; industry; agriculture; water suppliers; and citizen's groups. Individuals representing special interest groups or vulnerable populations as suggested by the EPA guidance document were invited to participate. A list of participating Advisory Committee members and their affiliations appears as **Table 2.1**. In addition to the committee members listed in **Table 2.1**, representatives of DEQ and the EPA also attended. **Table 2.2** lists these attendees, the agency which they represented, and the program with which each person is affiliated.

The Advisory Committee provided invaluable assistance to DEQ in several areas. For example, the Advisory Committee refined the procedure used to rank public water systems applying for assessments. This is an important aspect of the Wyoming Program because funding may not allow the completion of an assessment for each applicant. The Advisory Committee assisted in ensuring that no one industry or interest would be singled out during the contaminant inventory process. The Advisory Committee was also instrumental in reviewing and approving delineation methods.

Table 2.1 Advisory Committee members and affiliations.

Name	Affiliation
John Barnes	Wyoming State Engineer's Office
Ted Bartke	US Geological Survey
Jim Bigelow	Wyoming Dept. of Agriculture
Myron Brooks	US Geological Survey
Jim Case	Geological Survey of Wyoming
Tom Clayson	Petroleum Association of Wyoming
Jim Cochran	Wyoming Association of Conservation Districts
Joe Evans	Wyoming County Commissioners Association
Floyd Field	Wyoming Association of Rural Water Systems
Curtis Grandstaff	Town of LaGrange
Mike Hackett	Wyoming Water Development Commission
Ken Hamilton	Wyoming Farm Bureau
Chris Jessen	Wyoming State Geological Survey
Karen Larsen	League of Women Voters
Gus Lopez	City/County Health Department
Jeff Lundberg	Wyoming Ag-Business
Larry Martin	National Park Service
Larry Meuli	City/County Health Department
Wes Nash	Wyoming Mining Association/FMC Corporation
Mark Opitz	Natural Resources Conservation Service
George Parks	Wyoming Association of Municipalities
Rick Schuler	US Bureau of Land Management
Bud Spillman	Cheyenne Board of Public Utilities
Jack States	Non-Point Source Task Force
Carol Stearns	Wyoming Association of Municipalities
Michael Stull	Wyoming Association of Municipalities
Jim VanDorn	Cheyenne Board of Public Utilities
Rod Weyrick	Town of Yoder
David Zelenka	Wyoming Water Development Commission

The Advisory Committee also helped define the role of Source Water Assessment and Protection Program for the state of Wyoming. The committee was given a questionnaire in the Fall of 1997. Questions were asked concerning the relationship between the Source Water Assessment and Protection Program and other water quality programs; who will benefit from it and how; and how the delineations, contaminant inventories, and susceptibility analyses should be done. This questionnaire and a summary of the responses can be found beginning on page 59 in **Appendix A**.

Table 2.2 Wyoming Department of Environmental Quality and United States Environmental Protection Agency employees which attended the Advisory Committee meetings.

Agency	Name	Program
DEQ, Water Quality Division	Gary Beach	Water Quality Division Administrator
DEQ, Water Quality Division	Maggie Davison	Groundwater Pollution Control
DEQ, Water Quality Division	Kevin Frederick	Groundwater Pollution Control
DEQ, Water Quality Division	Charles Harnish	Watershed Management
DEQ, Water Quality Division	Brian Mark	State Revolving Funds
DEQ, Water Quality Division	Phil Ogle	Grant Administration/Watershed Management
DEQ, Water Quality Division	Larry Robinson	Water And Wastewater Program Manager
DEQ, Water Quality Division	Jake Strohmman	Groundwater Program Manager
DEQ, Water Quality Division	Phil Stump	Groundwater Pollution Control
EPA, Region VIII	John Giedt	Source Water Protection Team
EPA, Region VIII	Marcella Hutchinson	Source Water Protection Team
EPA, Region VIII	Chad Root	Source Water Protection Team
EPA, Region VIII	David Schmidt	Direct Implementation, Municipal Systems
EPA, Region VIII	Jack Theis	State Revolving Funds, Municipal Systems
EPA, Region VIII	Mike Wireman	Source Water Protection Team

2.4 Public Meetings

All of the Advisory Committee meetings were open to the public. Outside of the Advisory Committee meetings, the first public meeting at which Source Water Assessment and Protection was addressed was the Wyoming Association of Municipalities meeting held in Laramie in 1997. Source Water Assessment and Protection was also presented at seven Wellhead Protection Program training sessions put on by the Wyoming Association of Rural Water Systems. A memo documenting the total attendance of one hundred and thirty five people at these training sessions is included in **Appendix A**.

State-wide attendance was encouraged when the Source Water Assessment and Protection document was reviewed and approved by the Water and Wastewater Advisory Board on February 8, 1999. Two paid advertisements announcing the availability of the draft Source Water Assessment and Protection document were printed in the Casper Star Tribune. One advertisement was printed one month prior to the Water and Wastewater Advisory Board meeting. The other advertisement was printed the week before the meeting. The Casper Star Tribune is Wyoming's largest circulation newspaper. Notice of this meeting was also mailed to the DEQ newsletter mailing list and posted on the DEQ web page. A copy of the Water and Wastewater Advisory Board meeting notes and the open public discussion on the Source Water Assessment and Protection document is included in **Appendix A**.

2.5 Newsletters and Letters

The DEQ Quarterly Newsletter ran articles discussing Source Water Assessment and Protection. Articles describing various aspects of the Source Water Assessment and Protection Program and the development process were printed in five issues of the Newsletter. The DEQ Newsletter mailing list is quite extensive. It is distributed to over 7,000 addresses, including those for individuals, private organizations, businesses, and local governments. Copies of the newsletter articles are included in **Appendix A**.

The DEQ also received several letters addressing issues in the Source Water Assessment and Protection document. These letters are included in **Appendix A**. In addition, a couple of individuals provided DEQ with copies of the Source Water Assessment and Protection document marked with both conceptual and editorial suggestions. These comments were considered when preparing the final draft of the document.

2.6 Web Page

The draft Source Water Assessment and Protection Program document was available over the Internet beginning January 1, 1999. Information on the Wellhead Protection Program and Source Water Assessment and Protection Programs can currently be obtained from both the Groundwater Program page at <http://deq.state.wy.us/wqd/groundpg.htm> and the Source Water Assessment and Protection page at <http://deq.state.wy.us/wqd/w&ww/swap.htm>. The use of the web page will soon be expanded to encompass current activities for both programs. Copies of program documents, current newsletters and fact sheets, assessment applications, and assessment results will be posted on the web page.

The University of Wyoming, Wyoming Resources Data Systems also maintains a Source Water Assessment and Protection web page which provides a brief summary of the program and a copy of the document. This page will most likely serve as a pointer to the main Source Water Assessment and Protection web page in the future.

Chapter 3

Source Water Delineation Approaches

3.1 Data Available for Delineations

The most important information needed to accurately delineate a source water assessment area is the location of the wells or intakes. DEQ, with assistance from the EPA, has located approximately half of the wells and intakes using Global Positioning System equipment. One of the first tasks will be to locate the remaining wells and intakes.

The Wyoming Geologic Survey has completed wellhead delineations and related Susceptibility Assessment Forms for approximately half of the 630 wells supplying noncommunity public water systems in the state. Susceptibility Assessment Forms were developed for use in the Wellhead Protection Program and will contain information useful during the contaminant inventory step of Source Water Assessment and Protection. The Susceptibility Assessment Form is included as Appendix F of the Wellhead Protection Program Guidance Document. Geologic and water resource studies for many Wyoming cities and towns are also available through work performed under the direction of Wyoming's Water Development Office. These studies contain information organized by county on the geology, lithology, water quality, water levels, and aquifer characteristics.

Another information resource is Geographic Information Systems (GIS) maps of groundwater sensitivity and vulnerability to pesticides for each county within the state. A well characteristic information database has also been completed and contains information, such as location, well depth, and permit numbers, for approximately 340 public water supply wells. This database can be queried at <http://www.wrds.uwyo.edu/wrds/dbms/hydro/pws.html>. These sources of information, in combination with those listed above, will enable the accurate delineation of source water areas.

3.2 Assessments in Wyoming

The development of a Source Water Assessment and Protection program and the assessment of all public water systems are mandatory in states which have primacy for administering the Safe Drinking Water Act rules and regulations within that state. Wyoming is the only state which does not have primacy. Consequently, Wyoming is not required to develop a Source Water Assessment and Protection program or complete source water assessments. DEQ and the Wyoming State Legislature, however, felt that a Source Water Assessment and Protection program could greatly benefit the citizens of and visitors to the state of Wyoming. The Wyoming legislature provided DEQ with the authority to set aside 10% of the federal Drinking Water State Revolving Fund to be used for conducting source water assessments.

It is not mandatory that DEQ complete source water assessments for all public water systems in the state because of Wyoming's unique non-primacy status. Alternatively, DEQ intends to conduct an assessment for any public water system which requests one. Funding and personnel shortages, however, may limit the number of assessments which can be completed. For this reason, public water systems requesting assessments will be ranked according to a prioritization scheme based on public water system type, population, water source type, and water quality history. A copy of the ranking sheet is included as **Appendix B**.

DEQ has made a commitment to conduct as many assessments as possible. As a first priority, DEQ will encourage all community and nontransient noncommunity systems to apply for assessments. These public water systems serve water to people which could be exposed to any contaminants in the water over a long period of time. These public water systems also account for the large majority of people being served by public water systems in Wyoming. All public water systems which use inherently vulnerable water sources will also be a high priority. These include systems using surface water or groundwater under the direct influence of surface water. Additionally, any public water system that has had contaminants detected in the finished water will be assigned a high priority.

3.3 Public Water Supply System Types

A public water system is any water system that serves 15 connections or 25 people per day for a minimum of 60 days per year. There are two basic types of public water systems: community and noncommunity systems. Noncommunity systems can be described as either transient or nontransient systems. Public water systems which purchase water from another water source are considered consecutive water systems. The definitions for each public water system type are listed below:

- **Community public water systems** are water systems that have at least 15 service connections used year-round by residents or that regularly provide water to at least 25 residents year-round. Examples include municipalities, water districts, and housing developments.
- **Nontransient noncommunity public water systems** are water systems that are not a community water system and which regularly provide service to at least 25 of the same persons for more than six months of the year where those persons are not full-time residents. Examples include schools, factories, mines, and office buildings.
- **Transient noncommunity public water systems** are water systems that serve a transient, non-residential population of at least 25 different people over a period of at least sixty days per year. Examples include campgrounds, rest stops, and resorts.

- **Consecutive public water systems** have no water source of their own, but obtain their water from another public water system. Mobile home parks, trailer courts, or municipalities being served by a pipeline company are common examples of consecutive public water systems.

3.4 Groundwater Systems

In order to protect groundwater supplies, community leaders and planners must have information regarding the surface and subsurface area surrounding a well or wellfield that contributes water to the public water system supply. Hydrogeologic conditions vary across the state and well depths range from tens to thousands of feet. The types and thicknesses of overlying materials that may protect the aquifer from contamination also vary. Because of the great range in hydrogeologic settings across Wyoming, the intrinsic sensitivity of groundwater to contamination varies greatly.

Methods and criteria used to delineate individual groundwater sources will reflect these hydrogeologic variations. Glacial till and alluvial aquifers adjacent to rivers and streams, bedrock aquifers exposed at or near the surface, karst, or fractured bedrock aquifers are the most sensitive to contamination from activities at the land surface. Conversely, deep or confined aquifers are less sensitive to contamination from surface activities. The delineation method used for each groundwater source will reflect the sensitivity of the aquifer. Groundwater sources that have the greatest need for protection will use the most conservative delineation methods. A public water system may always elect to use a more conservative delineation method in subsequent assessment efforts.

Delineation Methods for Groundwater Systems

Wyoming will use the delineation methods presented in the EPA-approved Wyoming Wellhead Protection Program Guidance Document to delineate groundwater source water assessment areas. Professional geologists working as DEQ contractors will consider aquifer type (confined, unconfined, alluvial, etc.) and flow system type (porous, diffuse, or conduit) to determine which delineation method is appropriate for each well. A brief description of the most commonly used delineation methods follows. More detailed descriptions may be found in the Wyoming Wellhead Protection Program Guidance Document.

- **Hydrogeologic and Aquifer Vulnerability Mapping:** This method will be used where flow within the aquifer is primarily via conduits, which is typical in karst or fractured bedrock aquifers. Hydrogeologic mapping techniques use surface observations in combination with subsurface geologic data to identify aquifer boundaries and areas that may contribute water to the aquifer. Conduit flow aquifers have extremely variable flow patterns and rates, making times of travel difficult to predict. The entire aquifer may be delineated as the source water area if groundwater flow divides are not present.

Aquifer vulnerability mapping techniques identify and delineate vulnerable areas (faults, fractures, exposed bedrock, etc.) where groundwater within the aquifer may be more susceptible to the rapid infiltration of contaminants released at the ground surface. Many aquifer boundaries and vulnerable areas have been identified and mapped by the United States and Wyoming Geological Surveys and are available in county reports.

- **Analytical Models:** Using models such as Simplified Variable Shapes, Wellhead Protection Area Model, and Wellhead Analytical Element Model will be the preferred method of delineation for wells in aquifers with either diffuse or porous flow conditions. These models require information on well pumping rate and screen length, aquifer hydraulic conductivity and gradient, and the saturated thickness of the aquifer. Calculations will be completed for both a two and a five year time of travel. A time of travel is the time that it will take for water to move from a specific location to the well. Analytical models should use as much site specific information as is possible.
- **Calculated Fixed Radius:** Another acceptable method for delineating source water areas is the calculated fixed radius. This method is applicable for wells producing from aquifers with either diffuse or porous flow conditions. Radii are calculated using aquifer porosity, well screen length, and pumping rate. Radii for both two and five year time of travels will be calculated. If insufficient information exists to calculate a fixed radius, average or estimated parameters will be used to estimate a calculated fixed radius.
- **Arbitrary Fixed Radius:** This method is the least accurate method and should only be used if a calculated fixed radius cannot be estimated. In a deviation from the Wellhead Protection Program Guidance Document, the arbitrary fixed radius method may only be used in the following situations. Wells must be completed in porous or diffuse flow confined aquifers that are greater than 100 feet below the ground surface and have an intact, regionally expansive, low permeability confining layer overlying the aquifer. In such situations, the area within a 500 foot radius from the wellhead would be considered the source water area. However, recharge areas of the confined aquifer within an approximate five year time of travel must also be delineated using hydrogeologic and aquifer vulnerability mapping techniques.

Preferred Groundwater Delineation Methods Based On Public Water System Type

- **Community and nontransient noncommunity public water systems**
Approximately one quarter of Wyoming's population is served by community or nontransient noncommunity groundwater public water systems. Community and nontransient noncommunity public water systems serve the same population daily.

Because individuals served by these public water systems usually consume the water over long periods of time, more protective delineations are needed. DEQ will accept any delineation method except arbitrary fixed radius for these public water systems.

- **Transient noncommunity public water systems**
Transient noncommunity public water systems typically do not serve the same individuals over a long period of time. They also rarely have jurisdiction over land use activities outside their property boundaries or extensive resources to develop and implement protection programs. The use of sophisticated delineation methods would be impractical in these circumstances. Source water assessment areas for transient noncommunity systems will be delineated using the calculated fixed radius method. The arbitrary fixed radius method may also be used if conditions exist as listed in the description of the arbitrary fixed radius method above.
- **Consecutive public water systems**
Consecutive public water systems obtain their water from other public water systems. All consecutive public water systems that obtain water from a public water system for which an assessment have been done will be provided with copies of the assessment results. If a consecutive public water system requests an assessment and the public water system from which they obtain their water has not been assessed, an assessment on the public water system which provides the water will be conducted provided the supplying public water system agrees. DEQ will attempt to resolve any conflicts arising between consecutive public water systems and their suppliers. The method used to delineate the public water system will be determined as outlined above.

Delineation of Inactive and Abandoned Wells

Wyoming will not conduct assessments on inactive or abandoned wells unless the public water system requests that they be assessed and indicates that these wells will be reactivated in the future. However, the location and status of abandoned wells may be important information for the public water system to consider during the contaminant inventory and susceptibility analysis steps.

Delineation of Aquifer Recharge Areas

Recharge areas for porous or diffuse flow confined aquifers that are within a five year time of travel of a well will be delineated. A licensed geologist will make this determination based on best professional judgement and information available during the delineation. A combination of hydrogeologic and aquifer vulnerability mapping methods as well as surface water delineation techniques will be used to delineate recharge areas. Included within the recharge area will be a 1000 foot wide buffer zone on both sides of all perennial streams for a distance of one mile upstream of the recharge area, or to the point where the stream becomes intermittent.

3.5 Surface Water Systems

Less than 10 % of all public water systems in Wyoming utilize surface water sources for drinking water. However, these 60 public water systems provide water to nearly two thirds of Wyoming's population. Several of Wyoming's large communities such as Casper, Cheyenne, and Laramie rely upon surface water to supplement drinking water supplies during certain times of the year.

Delineation of Surface Water Systems

In order to protect surface water supplies, community leaders and planners must have information regarding the area contributing water to the public water system. Potential sources of contamination located upstream from the drinking water intake could reach and possibly impact the water system. Water moving across the ground surface or through the upper layers of soil may move pollutants from the pollutant source to nearby bodies of water. Once in the water, pollutants can be transported downstream to the drinking water intake.

The source water assessment area will therefore be the entire watershed above the intake. Unlike most source water areas for groundwater systems, assessment areas for public water systems using surface water sources may encompass large areas of the land surface. Public water systems which use trans-basin diversions to supplement water supplies will require additional delineation. Trans-basin diversions are structures such as pipelines, ditches, or tunnels that move water from one watershed into another. The watershed upstream from each diversion point will be incorporated into the source water area of the public water system. If open conveyances are used to transport water, the source water area will include the topographic areas which could contribute water to the conveyance.

Preferred Surface Water Delineation Methods Based on Public Water System Type

- **Community and nontransient noncommunity public water systems**
Source water assessment areas will include the entire watershed upstream from the intake. Watersheds above any trans-basin diversions which contribute water to the intake will also be included in this area.
- **Transient noncommunity public water systems**
The entire watershed above the intake will be delineated as described above.
- **Consecutive public water systems**
Assessments for consecutive surface water systems will be conducted if the public water system requests an assessment and the public water system from which they obtain their water has not been assessed. The public water system from which they obtain their water must also agree to have a source water assessment completed for their system. DEQ will attempt to resolve any conflicts arising between consecutive public water systems and their suppliers in this matter. If the

public water system from which they obtain their water has already been assessed, the assessment results will be forwarded to the consecutive public water system.

3.6 Other Delineation Methods

Conjunctive Delineation

Conjunctive delineation combines both groundwater and surface water delineation techniques. This type of delineation protects a public water system when both surface and groundwater drinking water sources are used, or when groundwater sources are influenced by surface water. Wells that can be influenced by surface water typically occur in karst, fractured flow, or alluvial aquifers. Shallow wells less than 100' deep may also be affected by surface water. The Wyoming Aquifer Sensitivity map will be used to determine how likely shallow, unconfined wells are to be affected by surface water. Additionally, wells which have been determined to be under the direct influence of surface water using microscopic particulate analysis or other, similar techniques, will require conjunctive delineation.

In a conjunctive delineation, DEQ will delineate the source water area using both groundwater and surface water delineation methods. The methods which will be used and the situations in which each is appropriate have been described above.

Interstate Delineation

Watershed and aquifer boundaries may cross state lines and extend into South Dakota, Montana, Idaho, Utah, Colorado, and/or the Wind River Indian Reservation. DEQ is not required to assess the portions of watersheds or aquifers beyond its boundaries. Assessment areas will terminate at the Wyoming or reservation border. The adjacent state or tribe will, however, be asked to notify DEQ of any potential contaminant sources that may affect the quality of water in the assessment areas. DEQ will, in turn, provide other states and the Wind River Indian Reservation with any information that they may request.

Area-Wide Delineation

The delineation of a larger area serving as the source water area for multiple public water systems may be useful in some situations. For example, groundwater in karst aquifers may travel tortuous paths. The speed and direction of groundwater movement in karst aquifers can rarely be accurately determined, even with the aid of monitoring wells. In areas with large karst aquifers such as the Black Hills of Wyoming, the best way to protect all public water systems using this water is to protect the entire aquifer system. The result of a delineation for any participating public water system would be an area-wide or aquifer assessment area serving several public water systems. Another appropriate use of area-wide assessments is where several public water systems have closely spaced wells or intakes that share the same hydrogeologic setting. The delineation of multiple wells within close proximity, or wellfield delineation, is an example.

3.7 Delineation of Contaminant Inventory Zones

Three zones will be delineated within each source water area for the purpose of inventorying possible sources of contaminants that could affect drinking water quality. These zones will determine the nature of the contaminant inventory conducted. Zones are based on the proximity to the well or intake. Contaminant inventory zones can be made more inclusive based upon local funds and interest.

Zone 1 is the area immediately surrounding the well or intake. Contaminants released within this zone would have the greatest likelihood of reaching and affecting the quality of the water. Potential sources of contamination within Zone 1 are therefore of the greatest concern.

Zone 2 lies immediately beyond Zone 1. Contaminants released within this zone are within close proximity of the well or intake. Zone 2 for surface water systems includes an area upstream of the intake because contaminants could potentially reach the river system and be transported to the intake. Contaminants released within Zone 2 are of concern because the chances of them reaching the well or intake is still high.

Zone 3 is the area furthest from the well or intake. Contaminant sources within this zone are less likely to reach the well or intake in quantities which could affect water quality. Major sources of contamination within Zone 3 will still be noted. These potential sources of contamination should still be considered in source water protection planning efforts.

Groundwater

- Zone 1: Zone 1 is called the “Accident Prevention” or “Sanitary Protection Zone”. The Wellhead Protection Program Guidance Document defined this area to prevent the introduction of contaminants into the well. The Wellhead Protection Document suggests that potential sources of contamination within Zone 1 be strictly monitored, controlled, or excluded to prevent the introduction of contaminants into the aquifer. A thorough, comprehensive contaminant inventory will be conducted within this zone. Types of contaminant inventories are discussed in detail in Chapter 4 of this document.

Zone 1 will be delineated as outlined in the Wellhead Protection Program Guidance Document. The default radius for Zone 1 is 100 feet. This is a deviation from the Wyoming Wellhead Protection Program Guidance Document.

- Zone 2: Zone 2 is called the “Attenuation Zone”. The Wellhead Protection Program Guidance Document delineated this area to protect wells from sources of microbial contamination. Microbial contaminants such as *Giardia lamblia* and *Cryptosporidium parvum* will usually die, or become attenuated, within 2 years of release into the groundwater. Live organisms may reach the well if microbial contamination sources are located within Zone 2. Sources of microbial contamination within Zone 2 are therefore of great concern. Zone 2 may, however, provide some time for emergency response, active

cleanup, or the implementation of contingency plans if non-microbial contaminants are introduced into the aquifer. A comprehensive contaminant inventory will be conducted within this zone.

Zone 2 will be delineated as outlined in the Wellhead Protection Program Guidance Document by licensed geologists during the delineation. Zone 2 will extend from the outer edge of Zone 1 to the two year time of travel boundary for porous and diffuse flow aquifers. In conduit flow aquifers, Zone 2 will be determined by hydrogeologic and aquifer vulnerability mapping. Zone 2 in conduit flow aquifers will be defined as areas of vulnerability within the aquifer such as fault systems or recharge areas.

- Zone 3: Zone 3 is called the “Remedial Action Zone”. The Wellhead Protection Program Guidance Document defined this area to include a large part of the aquifer which contributes water to the well. This zone needs to be sufficiently large to allow time to detect and respond to contaminants. The length of time between contaminant detection and when it reaches the well must be sufficient for either cleanup, emergency response, well replacement, or the implementation of other contingency plan options. A limited contaminant inventory will be conducted within this zone.

Zone 3 will also be delineated as outlined in the Wellhead Protection Program Guidance Document. Zone 3 will extend from the outer edge of Zone 2 to the five year time of travel boundary for porous or diffuse flow aquifers. **Figure 3.1** illustrates Zones 1, 2, and 3 for a hypothetical well located in a porous or diffuse flow aquifer. If the aquifer is a conduit flow aquifer, Zone 3 will extend to the flow system boundaries or the lateral extent of the aquifer.

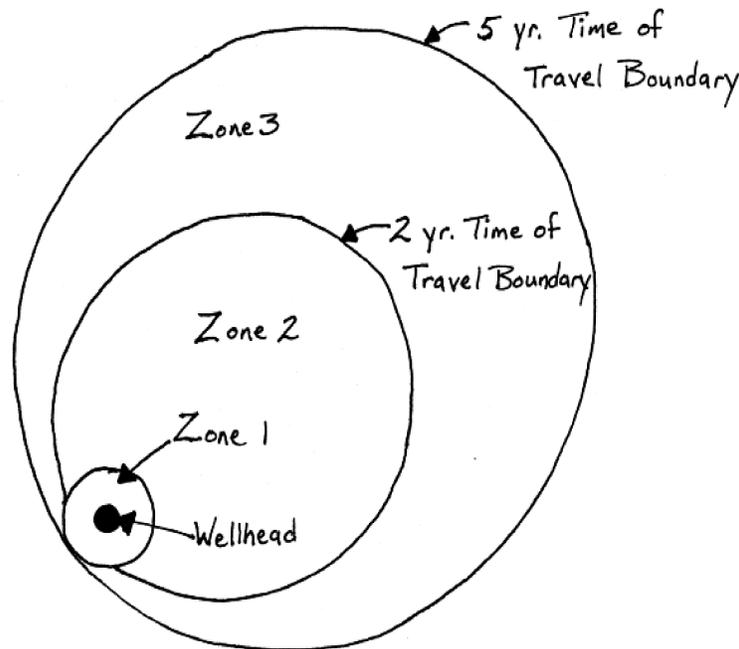
Recharge Areas: A limited contaminant inventory will be conducted in aquifer recharge areas within a five year time of travel from the wellhead for porous or diffuse flow aquifers. Because recharge areas for conduit flow aquifers will most likely occur in areas mapped as vulnerable, a comprehensive inventory will be conducted.

Contaminant Inventory Zones in Arbitrary Fixed Radius Delineations: The arbitrary fixed radius may only be used for transient public water systems. Where the arbitrary fixed radius method has been used, Zones 1 and 2 will extend 100 and 500 feet around the wellhead, respectively. A 500 foot radius is a reasonable estimate of a two year time of travel for porous flow confined aquifers in the state of Wyoming. A Zone 3 delineation will not be necessary because transient systems are primarily concerned with acute contaminants, specifically microbes. A comprehensive contaminant inventory will be done in Zones 1 and 2.

Figure 3.1 Zones 1, 2, and 3 for a hypothetical well drawing water from a porous or diffuse flow aquifer.

Surface Water

- Zone 1: Zone 1 for surface water systems is also called the “Accident Prevention” or “Sanitary Protection Zone”. As with groundwater systems, this area will be delineated to prevent the introduction of contaminants into the intake. The area within a 100 foot radius of the intake will be considered to be Zone 1. A comprehensive contaminant inventory will be conducted within this zone. Contaminants are discussed in detail in Chapter 4 of this document.
- Zone 2: This zone will extend upstream from the edge of Zone 1 for a distance of 15 valley miles on the mainstem and all tributaries. A distance equivalent to an eight hour travel at high flow, if known, may also be used. Zone 2 will terminate at the watershed boundary, state or reservation boundary,



or where the tributary streams become intermittent if these boundaries are less than 15 valley miles or an eight hour time of travel above the intake. If the distance between the intake and the next public water system upstream is less than 15 valley miles or an eight hour time of travel, Zone 2 will terminate at the upstream intake. If the upstream public water system has not conducted an assessment, Zone 2 will continue upstream past the intake as described above. Open conveyances may be vulnerable to contamination from water and contaminants entering the conveyance. Where open conveyances are used, the source water area delineation and Zones 1 and 2 will be modified to include the topographic areas which can contribute water to the conveyance.

Zone 2 will also extend laterally 1000 feet beyond each perennial streambank. The EPA requires contaminant inventory zones 1000 feet or more wide to identify possible sources of contamination that could affect water reaching the intake. Contaminants released within Zone 2 could reach the intake by being washed into the river or stream or by moving through the alluvial aquifer. A comprehensive contaminant inventory will be conducted within this zone.

- Zone 3: This zone will include the remaining delineated watershed. A limited contaminant inventory will be conducted within this zone. **Figure 3.2** illustrates Zones 1, 2, and 3 for a hypothetical surface water intake.

Intakes Below Lakes/Reservoirs: It is assumed that a lake or reservoir will retain water for longer than eight hours. Therefore, surface water sources which are located within an eight hour time of travel or 15 valley miles below a lake or reservoir will delineate Zones 1 and 3 as described above. Zone 2 will be delineated only up to the lake or reservoir. **Figure 3.3** illustrates Zones 1, 2, and 3 for an intake below a lake or reservoir.

Public water systems may also choose to extend Zone 2 around the lake or reservoir. Public water systems with intakes within a mile of the lake or reservoir outflow must include the perimeter of the lake or reservoir within Zone 2 to account for activities or potential sources of contamination in close proximity to the dam or outflow.

Intakes On Lakes/Reservoirs: It is assumed that a lake or reservoir will retain water for longer than eight hours. Therefore, surface water sources which are located on a lake or reservoir will delineate Zones 1 and 3 as described above. Zone 2 will consist of a 1000 foot boundary around the lake or reservoir high water line. **Figure 3.4** provides an illustration of a surface water intake on a lake or reservoir.

Figure 3.2 Zones 1, 2, and 3 for a hypothetical surface water intake.

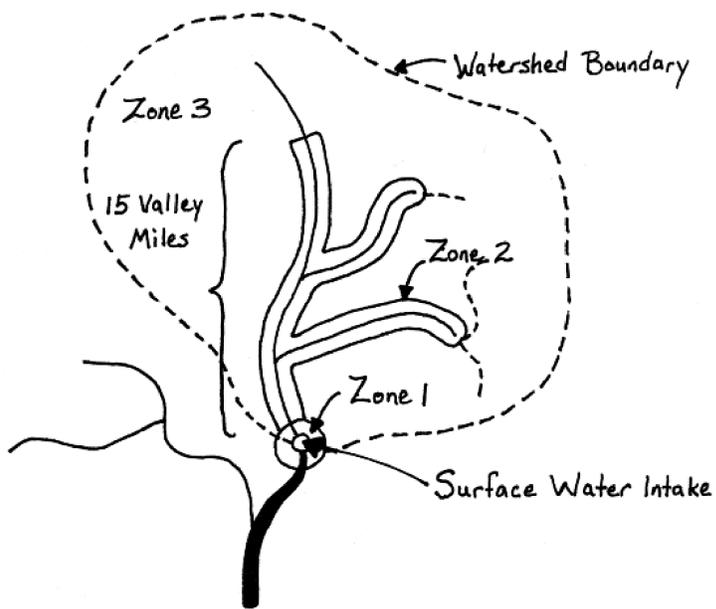


Figure 3.3
for a
water intake below a lake or reservoir.

Zones 1, 2, and 3
hypothetical surface

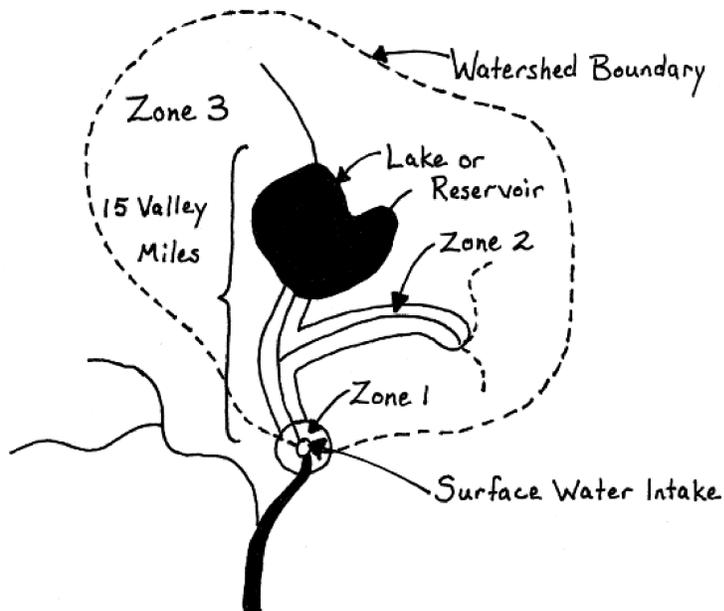
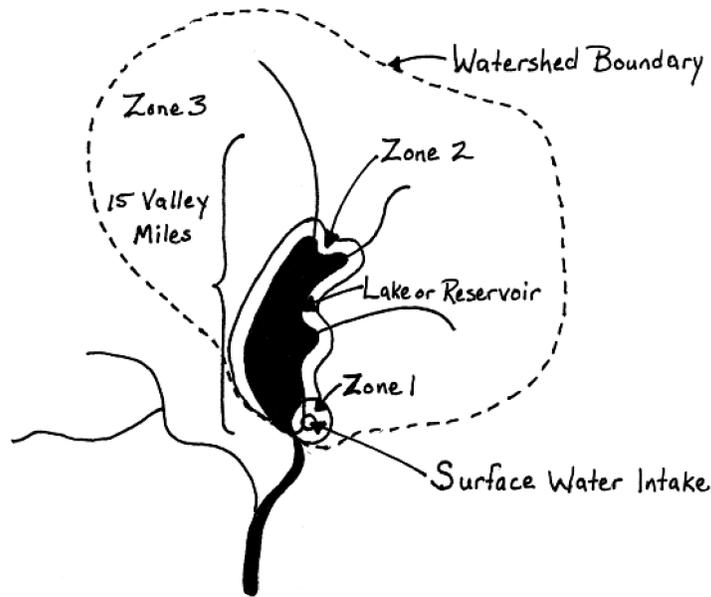


Figure 3.4 Zones 1, 2, and 3 for a hypothetical surface water intake on a lake or reservoir.



Intakes On Or Below Lakes/Reservoirs With Short Retention Times: Zone delineations for surface water intakes located on or below a lake or reservoir where water entering the lake or reservoir may not be retained for an eight hour period before reaching the intake will need to be completed on a case-by-case basis. DEQ contractors performing the delineations will consult the U.S. Geological Survey for known reservoir and lake retention times. Alternatively, the U.S. Geological Survey may have some means of calculating retention time using surface area or volume.

Chapter 4

Contaminant Inventory

4.1 Overview

An inventory of potential sources of contamination located within the source water assessment area is necessary for proper source water protection, management, and planning. With this information, a public water system can be aware of potential impacts to its water supply. Knowledge of potential contaminants may encourage communities to develop and manage a source water protection area. An understanding of what types of contamination issues may occur will also enable a public water system to plan for necessary improvements in treatment capabilities, develop emergency response plans, or allow time to remediate the source of contamination.

The most common type of contaminants in Wyoming will be associated with permitted sources of contamination. Permitted sources of contamination produce contaminants which are regulated by state or federal laws. Examples of regulated activities or facilities include wastewater treatment plants; confined animal feeding operations; underground injection wells; chemical or hazardous waste use, production, or storage sites; and landfills. While not all permitted contaminant sources will pose a threat to drinking water resources, they will be viewed as potential sources of contamination.

4.2 Available Data

State and federal regulatory agencies maintain databases containing information on the activities and facilities which are regulated under existing state and federal laws. A list of the state and federal agencies, contact information, and the information available from each is presented as **Appendix C**.

In some situations, it may be necessary to obtain more accurate locations for potential sources of contamination identified in the contaminant inventory. DEQ would then contract with other public agencies or private firms to locate potential sources of contamination using global positioning system equipment.

Local representatives of the public water system, such as water system operators, community leaders, or groups of local citizens, can also be a valuable source of information. These individuals will have knowledge of the local area and can identify the presence of potential sources of contamination not regulated by the state and federal agencies. The types of potential sources of contamination not readily available in state and federal databases are sites such as historical landfill or gas station locations or septic system locations. Local assistance will also

play a vital role in verifying land uses and the locations of regulated potential sources of contamination identified in the state and federal database search. A list of potential sources of contamination likely to be found in Wyoming can be found in **Appendix D**. **Appendix D** also contains a table listing the types of contaminants often associated with each potential source of contamination.

4.3 Types of Contaminant Inventories

The thoroughness of the contaminant inventory will be based on proximity to the drinking water well or intake. A more thorough inventory will be conducted in the source water assessment area zones which are closest to the well or intake. The type of public water system and delineation method used will influence how comprehensive an inventory is needed. Available resources including time, funding, and personnel may also affect the type of inventory which will be completed. High priority systems, as described in **Appendix B**, will follow, at a minimum, the inventory procedure outlined below. Public water systems may always elect to conduct more extensive inventories.

Comprehensive Inventory

A complete, or comprehensive, inventory will be conducted in Zones 1 and 2 for both surface water and groundwater sources. All readily available information identified in **Appendix C** will be used to develop a list of potential sources of contamination present in the source water assessment area. These potential sources of contamination will consist of state and federal regulated activities and land uses.

As part of the comprehensive inventory, the assistance of local representatives will be encouraged. The verification of regulated potential source of contamination locations and land use boundaries and the identification of local or historical potential sources of contamination will supplement the results obtained in the state and federal database search. The combination of local and DEQ efforts will produce a complete and useful contaminant inventory.

Limited Inventory

A limited contaminant inventory will be conducted in Zone 3 for both surface water and groundwater sources. A limited inventory will include major state and federal regulated activities. These will include, at a minimum, superfund sites, hazardous waste disposal sites, and federal facilities. No local contaminant inventory efforts will be necessary in Zone 3 areas. A public water system, however, may always elect to do a comprehensive inventory in Zone 3.

Transient Noncommunity Systems

Exposure to the water obtained from transient noncommunity systems such as campgrounds and rest stops is usually of a short-term nature. Consequently, DEQ may concentrate the inventory efforts on contaminants which can cause an immediate effect with short exposure times. These contaminants are microbial and nutrient contaminants such as *Giardia lamblia* and nitrates.

Confirmed releases to groundwater or surface water within the assessment area contained in DEQ's databases will also be identified.

This limited contaminant inventory is allowed by the EPA. The EPA State Source Water Assessment and Protection Program Guidance (Final Guidance, August 1997) specifies, "For transient noncommunity systems, a state may decide to conduct assessments that identify sources of microbial and nitrate contamination only within a specified distance from the drinking water well, leaving more detailed assessment efforts for all community water systems and the majority of nontransient noncommunity water systems" (p. 2-10).

4.4 Contaminants of Concern

The contaminants of concern include those contaminants regulated under the Safe Drinking Water Act plus additional microorganisms such as *Cryptosporidium*. Microorganisms not currently regulated under the Safe Drinking Water Act are included as contaminants of concern for Wyoming's Source Water Assessment Program in anticipation of upcoming federal rules. *Cryptosporidium* is included in the proposed Enhanced Surface Water Treatment Rule and pathogenic viruses and bacteria will be addressed under the proposed Groundwater Disinfection Rule. Contaminants of concern are listed in a table included in **Appendix D**. Contaminants are grouped by volatile or soluble organic carbons, inorganic compounds, and microorganisms. Radionuclides are also listed. Each contaminant listed in **Appendix D** has a Chemical Abstracts Service (CAS) registry number which can be used to search for details about that contaminant for planning or emergency response purposes.

Chapter 5

Susceptibility

5.1 Overview

The final step in a Source Water Assessment is to conduct a susceptibility analysis. This is an analysis of the susceptibility of a public water system to contamination from potential contaminant sources. Potential contaminants and contaminant sources that may affect the public water system were identified in the contaminant inventory step. Susceptibility must be determined for each water supply well or intake owned by the public water system.

The EPA defines the susceptibility of a public water system as the potential for the well or surface water intake to draw water contaminated at concentrations that would pose concern. The EPA suggests that contaminants may reach the intake or well by infiltration through geologic strata and overlying soil, direct discharge into groundwater, overland flow, or contamination of upgradient water. Contaminants may also enter the water source at the well, intake, or the conveyance. A conveyance is defined as the pipe, canal, or aqueduct between the well or intake and the first form of treatment, or where the water enters the distribution system if there is no treatment.

Susceptibility is related to three factors. The first is the physical integrity of the well, intake, and conveyances. These structures must be well designed, properly constructed, and adequately maintained to prevent contaminant entry into the system. The second factor is the sensitivity of the area over or through which the contaminants must move to reach the well or intake. Physical, geologic, and hydrologic characteristics of the aquifer and/or watershed are considered. The third factor in determining susceptibility is the nature of the contaminants. Diffuse sources of contamination associated with land uses and point sources of contamination associated with regulated activities will be examined. For point sources, the type of potential contaminants, the location of the contaminant source relative to the well or intake, and confirmation of a contaminant release describe the nature of contaminants involved. The percentage of land use categories within the source water area will determine the extent of the risk to the water supply provided by those land uses.

The susceptibility analysis was designed to use information that is readily available for all public water systems in the state. The delineated source water assessment areas, the contaminant inventories, land use maps, sanitary surveys, and both DEQ and State Engineer's Office well or intake permits will provide the information necessary to complete the analysis. This information objectively provides consistent estimates of susceptibility for all Wyoming public water systems.

The susceptibility analysis was also designed to be straightforward. A well or intake rating will be determined based on well or intake integrity and sensitivity. Next, an iterative process will be used to develop contaminant ratings for all potential contaminants from all contaminant sources identified in the contaminant inventory. The well or intake rating will then be combined with the contaminant ratings using a matrix. The resulting susceptibility ratings will be summarized to provide the public water system with useful information to protect the drinking water source.

5.2 The Integrity Score

The first step in the susceptibility analysis is to determine the well or intake integrity score. The age, design, and maintenance of the well or intake will be ascertained. This information should be obtained from sanitary surveys, permits, or completion records.

The first piece of information needed is the well or intake completion date. Points assigned for completion date are based on DEQ permitting regulations. Prior to 1983, the Ten States Standards were used for the permitting and construction of wells and intakes. In 1983, DEQ adopted regulations specifying well and intake construction standards and permitting requirements. In 1993, DEQ began requiring as-built construction drawings and Certificates of Completion to be submitted as part of the permitting process. The various points assigned to completion dates, as shown in **Table 5.1**, reflects DEQ's increasing confidence in the standards applied to the design, construction, and completion of wells and intakes.

Completion date also serves as an indication of well or intake age. Even the most well constructed and maintained wells and intakes will tend to lose structural integrity with age. Cracks, loose joints, and broken or incomplete seals may allow the entry of contaminants into the system.

Wells will then be evaluated for four factors. The first and most critical of these is the presence of a surface seal which is in good repair. DEQ feels that the surface seal is a good indicator of the overall well condition. A well without a surface seal or with a seal in poor condition is assumed to be poorly constructed and maintained. The second factor is the presence of an annular seal in good condition is also important. However, this information is less easily obtained, so an assumption about the annular seal will be made based on the surface seal. The third factor is the protection of the vicinity immediately around the wellhead from contaminant sources. This is usually accomplished by enclosing the wellhead in a well or pump house or a fenced off area. The fourth factor is the protection of the wellhead from flooding. For instance, the ground around the wellhead should be sloped away from well to encourage water and any contaminants it may carry to move away rather than towards the well.

Surface water systems will be evaluated for three factors. The first of these is the presence of a screen. A screen, or series of screens, will prevent debris from interfering with the water treatment process. Secondly, screens must be inspected and cleared of debris regularly, for

example weekly, to remain effective. Public water system may position screens in different locations. For example, screens may be located at the intake, at a diversion point, or where water is transferred from an open to a closed conveyance. Thirdly, similar to wells, access to the area immediately surrounding the screen location should be restricted.

The means of transporting water from the well or intake to the treatment facility must be also be evaluated. Conveyances will be scored based on three factors. These are the length, the risk of damage, and the degree to which the transported water is exposed to contaminants. Longer conveyances are more likely to develop problems than shorter, more easily maintained conveyances. DEQ will consider conveyances in excess of one mile in length to be long. Past history of breakage or breaches and location will determine the risk of damage. For example, a pipeline that has experienced breaks due to settling soils or that is located in avalanche or landslide prone areas would be at risk of damage. Lastly, whether the conveyance is open or closed will influence the ability of contaminants to enter the water. Groundwater sources are assumed to have closed conveyances, such as pipelines. Conveyances such as ditches, canals, or aqueducts are considered open. Source water assessment areas may need to be modified if open conveyances intercept surface or groundwater sources between the point of diversion and the water treatment plant.

After being evaluated for the factors listed above, each well or intake will be scored. Both groundwater and surface water sources will receive a score between 1 and 13. If sanitary surveys, permits, or completion records are not available, or do not contain the appropriate information, the maximum number of points will be added for each factor. For example, if the presence of a surface seal cannot be verified, five points will be added. The well and intake integrity scoring procedure is summarized in **Table 5.1**.

5.3 The Sensitivity Score

The second step in the susceptibility analysis is to determine the well or intake sensitivity score. The inherent sensitivity of the aquifer or watershed will be combined with indicators of current or past contamination. This information will primarily be available as a result of the delineation process and from a database called the Safe Drinking Water Information System. In situations where no information is available, a high sensitivity will be assumed.

For groundwater systems, it is first necessary to determine in what kind of aquifer the wells are completed. Some types of aquifers are much more vulnerable to contamination from surface contaminant sources than others. Porous flow confined aquifers are considered to be the least vulnerable type of aquifer. Conversely, aquifers which require conjunctive delineation (see **Section 3.6**) are highly vulnerable to contamination by surface contaminant sources. Aquifers that may require conjunctive delineation are sources of groundwater under the direct influence of surface water, shallow alluvial aquifers, karst, and fracture-flow aquifers.

Table 5.1 Determining surface water and groundwater source integrity.**Groundwater--Well Integrity**

Well Completion Date:	Before 1983	Between 1983 and 1993	After 1993	Total Points
Add points from column that applies.	3	2	1	1, 2, or 3
From Sanitary Surveys and/or Completion Records Answer The Following**:				
Surface seal present?	Yes (Add 0 pts.)	No (Add 5 pts.)		0 or 5
Wellhead protected? (enclosed in wellhouse or fenced off)	Yes (Add 0 pts.)	No (Add 1 pt.)		0 or 1
Well protected from flooding?	Yes (Add 0 pts.)	No (Add 1 pt.)		0 or 1
Annular seal present?	Yes (Add 0 pts.)	No/Unknown (Add 1 pt.)		0 or 1
Conveyance structure length (short is less than 1 mile long)	Short (Add 0 pts.)	Long (Add 1 pt.)		0 or 1
Risk of conveyance structure damage?	Low (Add 0 pts.)	High (Add 1 pt.)		0 or 1
				<u>1 through 13</u>

****If Sanitary Surveys and/or Completion Records are not available, add 10 points to Well Completion Date score.**

Surface Water--Intake Integrity

Intake Completion Date:	Before 1983	Between 1983 and 1993	After 1993	Total Points
Add points from column that applies.	3	2	1	1, 2, or 3
From Sanitary Surveys and/or Completion Records Answer The Following**:				
Intake screened?	Yes (Add 0 pts.)	No (Add 3 pts.)		0 or 3
Intake inspected regularly (weekly)?	Yes (Add 0 pts.)	No (Add 2 pts.)		0 or 2
Area around intake restricted?	Yes (Add 0 pts.)	No (Add 2 pts.)		0 or 2
Conveyance structure length (short is less than 1 mile long)	Short (Add 0 pts.)	Long (Add 1 pt.)		0 or 1
Risk of conveyance structure damage?	Low (Add 0 pts.)	High (Add 1 pt.)		0 or 1
Conveyance open or closed?	Closed (Add 0 pts.)	Open (Add 1 pt.)		0 or 1
				<u>1 through 13</u>

****If Sanitary Surveys and/or Completion Records are not available, add 10 points to Intake Completion Date score.**

A map of uppermost aquifer sensitivity has been developed for the state of Wyoming using a modified DRASTIC model. The DRASTIC model was developed by the EPA and the National Groundwater Association. This model takes into account depth to water, recharge and overlying soil characteristics, land slope, vadose zone characteristics, and other geohydrologic characteristics. DEQ will use these maps to assign a sensitivity score to all wells drawing from unconfined aquifers. These sensitivity scores will range from high to low. Aquifers too small to appear on the sensitivity map will be assigned a score based on equivalent aquifer types in the vicinity.

DEQ assumes that all surface water systems are highly sensitive to contamination. There are many factors that influence the ability of a contaminant to reach the intake. Examples include the slope of the land surface, the amount of vegetative cover, soil permeability, water volume, the degree of water mixing, and flooding frequency. Little information is available on a state-wide basis for these factors. While sophisticated fate and transport modeling analyses may be able to incorporate these variables for individual systems, such analyses are expensive and require much time. While DEQ feels that this level of detail is impractical for the initial source water assessments, public water systems may use this type of analysis in subsequent assessments.

Both groundwater and surface water sources will be evaluated for indicators of past or present source water contamination. Detection of any chemical contaminant in either raw or treated water indicates that contamination has already occurred. In order for a well or intake to have a chemical detection, a pathway must exist for contamination to reach the source water. Consequently, chemical detections within the last five years will strongly influence the sensitivity score. New wells or intakes may rely on monitoring results from nearby water sources. If this is not feasible, a high sensitivity rating will be assumed until monitoring results for that intake or well are available.

The Safe Drinking Water Information System database contains information about all public water systems. Monitoring and testing results are entered into this database. The Safe Drinking Water Information System database is one of two sources of information that will be used to indicate watershed sensitivity. Another source of information is the Total Maximum Daily Load program. The Total Maximum Daily Load program has developed a listing of stream segments that do not meet water quality standards based on their intended use. These stream segments may indicate existing factors in the watershed that could increase watershed sensitivity. Only stream segments that have been listed as a result of credible data and are located within Zones 1 and 2 will affect the sensitivity score.

After being evaluated for the factors listed above, each well or intake will be scored. Groundwater sources will receive a score between 1 and 10, and surface water intakes will receive a score of 5 or 10. A listing of sensitivity points assigned to wells and intakes can be found in **Table 5.2**.

Table 5.2 Determining groundwater and surface water source sensitivity.

Groundwater--Well Sensitivity

1) Well is located in a(n):	Total Points
Unconfined aquifer. Use Aquifer Sensitivity Maps.	1-5
Shallow wells in alluvial aquifers and ground water under the direct influence of surface water. Assume high sensitivity.	5
Karst, fracture flow, or conduit flow aquifers. Assume high sensitivity.	5
Confined aquifer, porous flow.	1
2) Confirmed chemical contaminant detection	
Confirmed detection of any chemical contaminant in raw or treated water within the last 5 years.	5
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/> 1 through 10

Surface Water--Intake Sensitivity

	Total Points
1) Assume high sensitivity for all surface water sources	5
2) Confirmed chemical contaminant detection	
Confirmed detection of any chemical contaminant in raw or treated water within the last 5 years &/or the presence of documented impaired stream segment(s) within a 15 mile distance upstream of the intake.	5
	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/> 5 or 10

5.4 Determining The Well Or Intake Rating

Once a score has been obtained for both integrity and sensitivity, the well or intake rating can be determined. The points for well or intake integrity and sensitivity will be combined. The combined scores will range between 2 and 23. This score will then be converted to a low, medium, or high rating. Wells or intakes with a score between 2 and 8 will be low, 9 and 15 medium, and 16 to 23 high. **Table 5.3** illustrates which scores will be rated as low, medium, and high. Converting the numeric well or intake ratings to low, medium, or high rating will make them easier to combine with the contaminant ratings.

This rating only needs to be determined once during the susceptibility analysis process. The well or intake rating will provide the public water system with an assessment of the inherent vulnerability of the drinking water source based on integrity and sensitivity. Public water systems which rate as medium or high may wish to address obvious deficiencies. For example, surface seals greatly reduce the integrity score and are easily installed or replaced. If the current drinking water source needs to be replaced, it may be possible to replace it with one less sensitive. Using groundwater instead of surface water or completing the well into a deeper aquifer are possible options to reduce sensitivity.

Table 5.3 Determining the well or intake rating.

	Low	Medium	High
Combined Integrity and Sensitivity Scores	2-8	9-15	16-23

5.5 The Contaminant Ratings

There are two basic types of contaminant sources, point sources and nonpoint sources. The distinction is based on how easily the sources of the contaminants can be identified. The contaminant inventory will consider both types as potential sources of contamination.

Point sources are usually associated with a single location, like a pipe or outfall. For many years, point sources have been regulated and required to have pollutant discharge permits. Because point sources should have permits, regulatory databases usually contain information on point sources. Information regarding their exact locations, the nature of contaminants present, quantities discharged, and facility compliance with their permit conditions is available.

Nonpoint source pollution, however, results from diffuse sources of pollution. Nonpoint sources of pollution are difficult to identify, locate, or quantify. Examples of nonpoint sources include road construction, logging, stormwater runoff, agricultural runoff, and urban areas. DEQ will use land use information to identify non-point sources.

Nonpoint Sources

Nonpoint source pollution is a more complex problem than point source pollution. Water moving over or through the ground will carry natural and human-made contaminants into rivers, lakes, wetlands, or groundwater. This makes it more difficult to determine the primary source or sources of the contaminants. For example, a common groundwater contaminant is nitrate. Nitrates may originate from confined animal feeding operations, landfills, agricultural land, urban stormwater runoff, or waste water treatment facilities. If more than one possible source of nitrates exists, much effort is required to determine which source or combination of sources is responsible.

DEQ realizes that nonpoint sources can be significant sources of contamination for drinking water supplies, and should be included in the contaminant inventory. However, there is little information available on individual nonpoint sources in Wyoming. Instead, DEQ will use land use activities as an indication of several common nonpoint sources.

Once the source water assessment areas and contaminant inventory zones described in **Section 3.7** are delineated, the percent land use in each zone can be determined. For groundwater systems using standard wellhead protection area or wellfield delineations, Zones 1, 2, and 3 will be evaluated. All other delineations, including surface water watersheds, groundwater under the influence of surface water, and area-wide aquifer delineations will examine only Zones 1 and 2. This distinction is due to the difference in assessment area size. Contaminant ratings will be based on the percentage of land uses in these zones. **Table 5.4** lists the percentages of each land use and the associated contaminant rating.

DEQ and the University of Wyoming developed a map of land uses for the Aquifer Vulnerability Mapping Project (see **Appendix C**). The University of Wyoming determined the locations of irrigated cropland, non-irrigated cropland, and urban areas by examining aerial photos. Although these land uses make up less than six percent of Wyoming's total land area, these land uses have significant potential to impact public drinking water supplies.

Urban land area was defined as the developed area in each town or city. This includes areas such as subdivisions, downtown areas, industrial parks, parks, and golf courses. About 0.2% of Wyoming's total land area is considered urban. Within an urban setting, common contaminants include petroleum products, solvents, heavy metals, pesticides, fertilizers, bacteria, salts, and sediments. Typical sources of these contaminants are golf courses and parks, residential areas, and runoff from roadways and parking lots. DEQ will also consider municipal sewer lines and septic systems as potential sources of contamination which are components of urban land use. Because of the wide variety and serious nature of potential contaminants that could reach a public drinking water supply, DEQ considers urban land use to be of the greatest concern. Consequently, a small percentage of urban land within the assessment area will yield a high contaminant rating.

Irrigated cropland makes up 3.8% of Wyoming's total land area. These lands are predominantly located in valley bottoms where surface water can be used for flood irrigation. The most common contaminants associated with irrigated cropland are pesticides, fertilizers, bacteria, and sediments. Pesticides and fertilizers are easily dissolved in water applied for irrigation, and can run off into nearby rivers or streams or reach shallow aquifers. However, the likelihood of this occurring depends on agricultural management techniques such as application rate, irrigation method, soil type, crop rotation, etc. DEQ considers irrigated cropland to be a land use that has a significant potential to impact Wyoming public drinking water supplies.

Non-irrigated cropland makes up 1.7% of Wyoming's total land area. The common contaminants associated with non-irrigated agriculture are pesticides, bacteria, and sediments. In

some cases, fertilizers may also be present. Non-irrigated cropland relies upon residual soil moisture and precipitation to provide enough water to grow the crop. Although contaminants may be present in similar quantities to irrigated cropland, the absence of water usually prevents the contaminants from moving into water supplies. DEQ considers non-irrigated cropland to have a lower potential to impact public drinking water systems.

Table 5.4 Contaminant ratings for non point sources of contamination based on the percentage of principal Wyoming land uses.

		Contaminant Rating		
		Low	Medium	High
% Land Use	Urban	<5	5-10	>10
	Irrigated Cropland	<20	20-40	>40
	Non-irrigated Cropland	<40	40-80	>80

Point Sources

The next step will be to determine the point source contaminant ratings for each well or intake. Contaminant ratings are based on three critical pieces of information: the contaminant category, the location of the potential source of contamination in relation to the well or intake, and contaminant release status. These factors will be described in more detail in the following pages. A matrix of these factors and the resulting contaminant ratings is included as **Table 5.5**.

The information required to rate contaminants will largely be gathered during the contaminant inventory process. **Appendix D** includes a table listing contaminants often associated with some common potential sources of contamination. This table can be used if exact lists of contaminants for each potential source of contamination are unavailable.

The first of the three factors used to rate contaminants is the contaminant category. The Safe Drinking Water Act grouped drinking water contaminants into two categories, acute or chronic, and developed standards for them. These standards are based on the levels of consumption which are considered safe for humans. Acute contaminants may cause symptoms to appear after a single exposure, usually within a matter of hours or days. Acute contaminants include microorganisms, nitrates, and nitrates. Chronic contaminants will cause symptoms if the individual is exposed to them over several to many years. Chronic contaminants are considered to be either carcinogenic or non-cancer causing. Carcinogenic contaminants are identified in the federal drinking water standards by having Maximum Contaminant Level Goals (MCLG=0) of

zero. Maximum Contaminant Level Goal refers to the level of contaminant in drinking water that treatment facilities attempt to maintain if the Maximum Contaminant Levels required by federal regulation are lower than detection limits or treatment capabilities.

For the purposes of the Wyoming susceptibility analysis, contaminants will be grouped into two categories: ‘Serious Contaminants’ and ‘Other Contaminants.’ Acute contaminants and carcinogens will be considered ‘Serious Contaminants.’ DEQ considers carcinogens ‘Serious Contaminants’ because even single or short term exposures to these contaminants may create a significant health hazard. The ‘Other Contaminants’ category includes the remainder of the chronic contaminants as listed in the federal drinking water standards. The Contaminants of Concern table in **Appendix D** indicates whether a contaminant is classified as acute, carcinogenic, or chronic.

Point sources identified in the contaminant inventory will have one or both categories of potential contaminants. Each contaminant category present will be assigned a contaminant rating. For example, landfills often contain solvents and animal wastes that are in the ‘Serious Contaminants’ category, as well as batteries and insecticide and herbicide residues that are included in the ‘Other Contaminants’ category. Consequently, two contaminant ratings are needed for the landfill, one for each contaminant category. This process will be completed for each point source identified in the contaminant source inventory.

The second factor needed to rate contaminants is the location of the potential source of contamination in relation to the well or intake. For example, potential sources of contamination located within Zone 1 will yield high contaminant ratings, regardless of contaminant type and detection status. Contaminant inventory zones were defined in **Section 3.7**.

The third factor in determining a contaminant rating is the contaminant release status. This factor is an indication of whether a potential source of contamination has released contaminants into the source water. Documented releases are typically found with potential sources of contamination like facilities with permitted discharges, groundwater pollution control sites, and leaking storage tanks. These sites will be identified in the databases queried during the contaminant inventory. In the matrix provided in **Table 5.5**, release status only affects the contaminant rating in Zone 2 for ‘Other Contaminants’ and in Zone 3. However, release status will also be important in the susceptibility analysis summary.

5.6 Determining The Susceptibility Ratings

After the well or intake rating and all the contaminant ratings have been determined, the final susceptibility ratings can be determined. The matrix table developed to combine these two variables appears as **Table 5.6**. Each of the susceptibility ratings will be analyzed further during the susceptibility analysis summary step.

DEQ believes it is important to combine the contaminant and well or intake ratings to contribute equally to the susceptibility rating. Both ratings are equally important in understanding the threat to the public water system. For example, a public water system with a high well or intake rating, based on well or intake integrity and sensitivity, should be concerned about all contaminant sources, even if contaminant ratings are low. Conversely, a public water system with a low well or intake rating will not need to be as concerned about contaminant sources with low contaminant ratings.

Table 5.5 Point source contaminant rating matrix for groundwater and surface water sources.

	Zone 1 ¹		Zone 2		Zone 3	
	Known Release	No Known Release	Known Release	No Known Release	Known Release	No Known Release
Serious Contaminants						
Acute (microorganisms and nutrients)	High	High	High	High	Medium	Low
Carcinogens (MCLG=0 ² contaminants)						
Other Contaminants						
Remaining primary and secondary drinking water contaminants	High	High	High	Medium	Medium	Low

¹Zones 1, 2, and 3 as determined in Section 3.7.

²Maximum Contaminant Level Goal (MCLG) refers to the level of contaminant in drinking water that treatment facilities attempt to maintain if the Maximum Contaminant Levels required by federal regulation are lower than detection limits or treatment capabilities.

Table 5.6 Well or intake and contaminant rating combination matrix to determine susceptibility ratings.

		Contaminant Rating		
		High	Medium	Low
Well or Intake Rating	High	High	High	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Low

5.7 Summarizing The Susceptibility Analysis

The goal of this final step in the susceptibility analysis is to provide the public water system with a summary of the susceptibility results. Public water systems must be able to use this information to manage and protect the drinking water source. To accomplish this, they need to know why their well or intake is susceptible to contamination and to which potential contaminants or contaminant sources it is susceptible. This will allow the public water system to manage the current situation as well as make appropriate plans for the future.

Summary Tables

The tables will summarize a large amount of data and provide information to the public drinking water supplier. Each well or intake will have a list of potential sources of contamination developed during the contaminant inventory phase of the assessment. One or two susceptibility ratings will have been determined for each of these potential sources of contamination.

Each susceptibility rating will be entered into two tables. One of these tables will group the susceptibility ratings based on the general contaminant source types found in the assessment area. The other will group susceptibility ratings by contaminant type.

Each well or intake will have a unique contaminant source type summary table. Examples of contaminant source types would be land uses, highways, interstates, waste water treatment facilities, commercial sources like dry cleaners and automobile repair shops, and industrial sources like pipelines, factories, and plants. **Table 5.7** represents an example summary table using some commonly occurring types of contaminant sources. The public water system will

then have a table listing all contaminant source types and the level of threat that each poses to each drinking water source.

Table 5.7 Example table of susceptibility ratings grouped by potential source of contamination category.

Contaminant Source Type	Susceptibility Rating		
	Low	Medium	High
Land Uses			
Irrigated cropland			
Urban			
Government Sources			
Interstate 25			
State Highway 66			
Waste water treatment, lagoons			
Commercial Sources			
Active and abandoned wells			
Auto repair shops			
Cemeteries			
Dry cleaners			
Gasoline service stations			
Landfill			
Storage tanks (above- and belowground)			
Industrial Sources			
Machine shop			
Pipelines			
Production and exploratory wells			
Railroad tracks and yards			
Storage tanks (above- and belowground)			

The second table will group the susceptibility ratings based on contaminant type. This summary table will indicate which types of contamination are of the greatest concern for each drinking water source. Public water systems may choose to further separate contaminant types into subcategories such as nitrates and nitrites, microorganisms, carcinogens, and primary or secondary chronic contaminants. The **Appendix D** table ‘Chemicals and Products Often Associated With Potential Sources of Contamination’ can be used as a guide in filling out this table. An example of a contaminant type table, including contaminant subcategories, is shown as **Table 5.8** below.

Table 5.8 Example table of susceptibility ratings grouped by contaminant type.

Contaminant Type	Susceptibility Rating		
	Low	Medium	High
Serious Contaminants			
Microorganisms			
Nitrates and nitrites			
Carcinogens (MCLG=0)			
Other Contaminants	Low	Medium	High
Primary drinking water contaminants			
Secondary drinking water contaminants			

Contaminant Release Table

Contaminant release status was determined for point sources in the Contaminant Rating step. Potential sources of contamination with known releases in each Zone will be listed in a table. The public water system can then gauge the immediacy or severity of the threat to the water supply based on the proximity of the release to the well or intake.

Narrative Summary

In addition to the summary tables above, a narrative summary of the susceptibility analysis will be written. A discussion of the summary tables will be included in the narrative portion. Additional information about the potential sources of contamination can also be discussed. For example, potential sources just outside of Zones 1 or 2 may be mentioned. Statements about trends in contaminant source types, cumulative impacts, or contaminant quantity issues may be made. Clean-up efforts, development, and implementation of pollution prevention or best management plans can also be discussed.

In addition, the narrative summaries will discuss the likelihood of the potential sources of contamination to affect the water supply. For example, all potential sources of contamination will be analyzed for a well completed into a deep, confined aquifer. However, most potential sources of contamination will not be likely to affect the water supply unless there are pathways for the contaminants to reach the aquifer. The public water system will need to be aware of potential pathways such as abandoned or improperly plugged wells or other breaches of the confining layer, and any potential sources of contamination in close proximity to these potential pathways.

The narrative summary is also an opportunity to describe the monitoring and compliance history, current treatment capabilities, and planned future improvements of the public water system. What is currently being done to address problems identified by the source water assessment are also important items to discuss. Limitations to future management options would also be appropriate topics for the narrative summary. For example, the size, ownership, and land use characteristics of a watershed or aquifer recharge area will have a large effect on the type of management options which may be pursued.

5.8 An Example Susceptibility Analysis

The fictional town of Gale, Wyoming has two water sources. One is a surface water intake on the Wind River, and the other is a well. This example will follow the basic steps for completing a susceptibility analysis. These steps are outlined in **Table 5.9**.

Table 5.9 Basic steps for completing a susceptibility analysis.

Step Number	Description of Step
1	Determine well or intake integrity score (1-13)
2	Determine well or intake sensitivity score (Wells 1-10, Intakes 5 or 10)
3	Determine well or intake rating (Low, Medium, or High)
4	Determine contaminant ratings (One or two per potential contaminant source, Low, Medium, or High)
5	Determine susceptibility rating (One or two per potential contaminant source, Low, Medium, or High)
6	Develop contaminant source type table for well or intake
7	Develop contaminant type table for well or intake
8	Develop contaminant release table for well or intake
9	Write narrative summary of susceptibility analysis

Intake: Steps 1, 2, and 3

The surface water intake was constructed before 1983 (3 points). Please refer to **Table 5.1** for intake integrity score point values. The intake at the water treatment plant is screened and the screen is routinely inspected (0 + 0 points). Access to the intake, however, is not restricted (2 points). The water is diverted from the Wind River at a point about 2 miles upstream of the water treatment plant (1 point). The conveyance is an open ditch (1 point). The ditch is in the path of mud slides, and has had to be repaired numerous times in the past (1 point). Given these conditions, the surface water intake receives an 8 in the integrity score. Intake sensitivity score from **Table 5.2** is 5, because it is a surface water source and there have been no chemical detects in water samples during the last five years. The combined integrity (8) and sensitivity(5) scores is 13, yielding an intake rating of medium.

Well: Steps 1, 2, and 3

The well was also drilled before 1983 (3 points). Please refer to **Table 5.1** for well integrity score point values. The surface and annular seals are both present and in good condition (0 + 0 points). The wellhead is properly protected from flooding (0 point), but access to the wellhead is not restricted (1 point). The well is located close to the water treatment plant, so the pipeline conveying the well water to the plant is less than a mile long and has a low probability of being damaged (0 + 0 points). The well integrity score is a 4. Please refer to **Table 5.2** for well sensitivity score point values. The well is completed into a shallow, unconfined aquifer, which was rated highly sensitive by the Wyoming Aquifer Sensitivity Mapping project (5 points). There have been no chemical detects in water samples during the last five years (0 points). The well sensitivity score is 5. The combined integrity (4) and sensitivity(5) scores is 9, yielding a well rating of medium (see **Table 5.3**).

Step 4, Land Uses For Well And Intake

Irrigated cropland makes up approximately 30% of Zones 1 and 2 for the surface water intake. This is the only land use reported within Zones 1 and 2. Based on the percentages in **Table 5.4**, this land use has a medium contaminant rating. Two land uses are present in Zones 1, 2, and 3 of the wellhead assessment area. The wellhead assessment area is 60% irrigated cropland and 5% urban. Irrigated cropland has a contaminant rating of high, and urban has a contaminant rating of medium.

Step 4, Intake Point Sources

The contaminant inventory revealed the following potential sources of contamination which may release ‘Serious Contaminants’ in Zones 1 and 2 for the intake. The junction of State Highway 105 and Interstate 25, two gas stations at the junction, railroad tracks, an abandoned landfill, and a pipeline carrying petroleum products. These potential sources of contamination also may release contaminants in the ‘Other Contaminants’ category. The landfill was discovered because a plume of mixed contaminants was detected in the alluvial aquifer. Last year a train carrying ammonium nitrate fertilizer tipped over and spilled 3 boxcars full of fertilizer. The junction of the state highway and the interstate is dangerous, especially in bad weather. There are usually one or two accidents a year, and automotive fluids frequently run off onto the shoulder of Interstate 25.

‘Serious Contaminants’ in Zones 1 and 2 will always receive a high contaminant rating, regardless of release status. ‘Other Contaminants’ receive a high contaminant rating if there has been a confirmed release, and medium if not. The landfill, one gas station, Interstate 25, and railroad all have had contaminant releases within Zone 2. These potential sources will receive a high contaminant rating. One of the gas stations had a leaking underground tank (confirmed release), so they it received a high contaminant rating in the ‘Other Contaminants’ category, and the other gas station received a medium. These contaminant ratings are listed in **Table 5.10**.

Table 5.10 Contaminant sources and contaminant ratings for the Wind River intake for the town of Gale, Wyoming.

Potential Sources of Contamination		Contaminant Ratings	
Land Uses			
Irrigated cropland	Medium		
Point Sources		For Serious Contaminants	For Other Contaminants
State Highway 105	High		Medium
Interstate 25	High, 1 Release		High, 1 Release
Gas Station #1	High, 1 Release		High, 1 Release
Gas Station #2	High		Medium
Abandoned Landfill	High, 1 Release		High, 1 Release
Pipeline	High		Medium
Railroad Tracks	High, 1 Release		High, 1 Release

Step 5-8, Intake Summary Tables

Susceptibility ratings were obtained by using the matrix in **Table 5.6** and were entered into the summary **Table 5.11**. **Table 5.11** will assist the Town of Gale, Wyoming in determining which type of sources may have the greatest impact on the intake. To determine which types of contaminants may affect the intake the most, the susceptibility ratings are entered into **Table 5.12**. The contaminant release table for the intake is shown below as **Table 5.13**.

Table 5.11 Contaminant source type table for the Wind River intake for the town of Gale, Wyoming.

Contaminant Source Type	Susceptibility Ratings		
	Low	Medium	High
Land Uses			
Irrigated cropland		30%	
Government Sources			
State Highway 105		1	1
Interstate 25			2
Commercial Sources			
Gas stations		1	3
Landfill			2
Industrial Sources			
Pipelines		1	1
Railroad tracks			2

Table 5.12 Table of susceptibility ratings grouped by contaminant type for the Wind River intake, town of Gale, Wyoming.

Contaminant Type	Susceptibility Rating		
	Low	Medium	High
Serious Contaminants			
Microorganisms			
Nitrates and nitrites		1	2
Carcinogens (MCLG=0)			8
Other Contaminants	Low	Medium	High
Primary drinking water contaminants		5	4
Secondary drinking water contaminants			

Table 5.13 Contaminant release table for the Wind River intake, town of Gale, Wyoming.

Contaminant Sources With Confirmed Releases	Zone 1	Zone 2	Zone 3
Interstate 25		U	
Gas Station #1		U	
Abandoned Landfill		U	
Railroad Tracks		U	

Step 4, Well Point Sources

The contaminant inventory revealed the following potential sources of contamination in Zones 1 and 2 for Well #1: State Highway 105, two gas stations, an auto repair shop, a dry cleaner, a cemetery, a machine shop, a pipeline carrying petroleum products, and two aboveground petroleum storage tanks. These potential sources of contamination will release contaminants in both the ‘Serious Contaminants’ and ‘Other Contaminants’ categories. One of the aboveground petroleum storage tanks has been found to be leaking into the soil under the tank.

Step 5-8, Well Summary Tables

As with the intake, the potential sources of contamination discovered during the contaminant inventory and their contaminant ratings are listed in **Table 5.14**. Susceptibility ratings were obtained by using the matrix in **Table 5.6** and were entered into the summary **Table 5.15**. The susceptibility ratings were then entered into **Table 5.16** to determine which types of contaminants may affect the well the most. The contaminant release table for the intake is shown below as **Table 5.17**.

Table 5.14 Contaminant sources and contaminant ratings for Well #1 for the town of Gale, Wyoming.

Potential Sources of Contamination		Contaminant Ratings	
Land Uses			
Urban	Medium		
Irrigated cropland	High		
Point Sources		For Serious Contaminants	For Other Contaminants
State Highway 105	High		Medium
Gas Station #1	High		Medium
Gas Station #2	High		Medium
Cemetery	High		Medium
Auto Repair Shop	High		Medium
Machine Shop	High		Medium
Dry Cleaner	High		Medium
Pipeline	High		Medium
Aboveground storage tanks	High, 1 Release		High, 1 Release

Table 5.15 Contaminant source type table for Well #1 for the town of Gale, Wyoming.

Contaminant Source Type	Susceptibility Rating		
	Low	Medium	High
Land Uses			
Urban		5%	
Irrigated cropland			60%
Government Sources			
State Highway 105		1	1
Commercial Sources			
Auto repair shop		1	1
Cemetery		1	1
Dry cleaner		1	1
Gas stations		2	2
Industrial Sources			
Pipeline		1	1
Machine shop		1	1
Aboveground storage tanks			2

Table 5.16 Table of susceptibility ratings grouped by contaminant type for Well #1 for the town of Gale, Wyoming.

Contaminant Type	Susceptibility Rating		
	Low	Medium	High
Serious Contaminants			
Microorganisms		1	
Nitrates and nitrites		1	2
Carcinogens (MCLG=0)		1	8
Other Contaminants	Low	Medium	High
Primary drinking water contaminants		9	2
Secondary drinking water contaminants		1	

Table 5.17 Contaminant release table for Well #1 for the town of Gale, Wyoming.

Contaminant Sources With Confirmed Releases	Zone 1	Zone 2	Zone 3
Above ground storage tanks		U	

Step 9, Narrative Summary For System

The Town of Gale, Wyoming has two water sources. One is a well located on the edge of town and the other is a surface water intake on the Wind River.

The surface water intake has a moderate rating. Restricting access to the intake screens and converting the conveyance from an open ditch to a closed pipeline is recommended. Irrigated cropland makes up 30% of Zones 1 and 2 and provides a moderate risk of contamination to the intake. The four potential sources of contamination with known releases have the highest potential to impact the water supply. All contaminant source types with High susceptibility ratings in **Table 5.11** occurred with about the same frequency. However, **Table 5.12** indicates that the intake is exposed to more sources containing carcinogens than any other contaminant type. The second most common type is primary drinking water contaminants.

Well #1 has a moderate rating. Restricting access to the wellhead would reduce the well rating to a low. This may also reduce the susceptibility ratings. Irrigated cropland and urban land uses make up 60 and 5%, respectively, of Zones 1, 2, and 3. Irrigated cropland provides a high risk of contamination to the well, and urban a medium. The leaking aboveground storage tanks may have the highest potential to impact the water supply. All contaminant source types with High susceptibility ratings in **Table 5.15** occurred with about the same frequency. However, **Table 5.16** indicates that the well could be exposed to more sources containing carcinogens and primary drinking water contaminants than any other contaminant types. Sources containing carcinogens have the highest number of sources that received high susceptibility ratings.

5.9 Inter-system Ranking

The EPA suggested that each state develop a method to rank public water systems against each other based on the susceptibility analysis findings. At the present time, DEQ does not see the need for ranking public water systems in this manner. DEQ may, however, develop an inter-system ranking process in the future should a need arise.

Chapter 6

Source Water Assessment Reports

6.1 Source Water Assessment Reports

The final step in the assessment process will be to develop a report of the assessment findings. Assessment reports will summarize information gained from each step in the assessment process. These assessment reports will be made available to the public.

Assessment reports will include the delineated source water area for each well or intake used by the public water system, a brief description of how the delineation was done, major potential sources of contamination within the source water area(s) identified during the inventory, and the susceptibility of the public water system to contamination from identified potential sources of contamination. Because public water systems will often have multiple wells or intakes, an assessment report may include information about more than one water source. Assessment reports will be presented using a combination of maps and brief narratives.

The size of the delineated source water assessment area and the complexity of the contaminant inventory will dictate the type of map that will be provided to the public water system. For example, in most cases, the source water area for a surface water system will be larger than that of a groundwater system and may require the use of a small scale map to reduce the number and size of maps needed for the report. Conversely, source water areas with a high density of potential sources of contamination will require the use of a larger scale map to show all the necessary detail.

Assessment maps will be created in electronic form using either small or large scale data, 1:100,000 or 1:24,000, respectively. The United States Geologic Survey has spatial data, such as section lines, roads, towns, political boundaries, and hydrography available in both of these common mapping scales. United States Geologic Survey 7.5 minute topographic quadrangle maps which have been scanned and converted to digital form are also available. These maps are known as digital raster graphic maps and contain all the information visible on the original topographic maps.

The general locations of the public water supply wells and intakes, the delineated source water assessment area, and Zones 1, 2, and 3 will be indicated on the assessment report map. The potential sources of contamination located within the source water assessment area that pose the greatest threat to the water supply will also be indicated. The number and type of potential sources of contamination listed will depend on the scale of the map. At a minimum, potential sources of contamination to which the water source was highly susceptible will be listed. Information regarding the potential source of contamination and contaminant types involved will

be listed in the narrative portion of the report. The susceptibility analysis summary will also be included in the narrative portion of the report. Assessment reports will be written in a manner understandable to the general public of Wyoming.

Assessment reports are, by nature, a summary of the entire assessment process. In addition containing general information, some information will be omitted. Precise intake and well locations will be omitted for security reasons. The entire list of potential sources of contamination identified within the source water assessment area may prove too large to include in its entirety. In such cases, only the potential sources of contamination that were rated high in the susceptibility analysis will be indicated on the assessment report map. Likewise, information such as the identity and ownership of these potential sources of contamination are not necessary to assess impacts on a public water system and will not be presented. Complete assessment information will be available upon written request to DEQ.

6.2 Public Water System Involvement

Public water systems will be encouraged to assist with the source water assessments. Their help will be especially beneficial during the contaminant inventory process. Public water systems can verify information compiled by DEQ and help complete the contaminant inventory by providing information about local or historic contaminant sources. Public water systems will be asked to contribute to the assessment report and will also have the opportunity to review the report before finalization. Because the Source Water Assessment Program is a state responsibility, the DEQ will make final determinations regarding information included in the assessment reports. All public water systems will receive a copy of the final assessment report. In addition, public water systems will be expected to publicize the availability of the assessment reports. Community public water systems must also include a brief summary of the assessment results in their annual consumer confidence reports.

6.3 Updating Assessments

Once the initial assessment has been done by DEQ, it will be the responsibility of the public water system to update the source water assessment. DEQ recommends that the public water system use the original assessment methodology as a template for subsequent assessments. Public water systems may always opt to conduct a more detailed assessment.

DEQ recommends that an assessment be updated every 2 years or whenever significant changes to the system occur. Updating the assessments will be necessary if: a water source is added or removed; significant development within the source water area occurs; land use changes within the source water area are made; or remediation of contaminant sources is completed. Additionally, future federal rules such as Alternative Monitoring Guidelines, Ground Water Rule, and Enhanced Surface Water Treatment Rule may affect source water assessments.

Assessments may need to be updated to reflect changes occurring as a result of these new rules. DEQ will assist with technical aspects of the assessment updates to the extent that funding and resources are available.

6.4 Making The Reports Available To The Public

Section 1453(a) of the 1996 Safe Drinking Water Act Amendments requires states to ensure that source water assessment results are made available to the public. DEQ encourages all public water systems requesting assessments to make the assessment report available to all their customers.

DEQ will provide guidance to the public water system on how to format the notices of availability. A number of different methods will be used to publicize the availability of assessment results. The method used in each case will depend on public water system type.

Community water systems should make and keep several copies at central and easily accessible locations throughout the community. For instance, copies of the report could be kept at the public water system office, county or municipal offices, or the library. Newspaper and radio public service announcements should be developed to make the public aware of the assessment reports and their availability. Similarly, an insert in the monthly bills or even a separate mailer could help advise the public of assessment report availability. Beginning in October, 1999, community public water systems are required to send out a Consumer Confidence Report. Consumer Confidence Reports contain information about both the raw and treated water delivered to public water system customers. As soon as Source Water Assessment results are available, the public water system must include this information about the raw water in the Consumer Confidence Report. The format used for reporting assessment results in the Consumer Confidence Report has been developed by the EPA.

Nontransient noncommunity systems should keep a copy of the report at the business office or work site and post notices of the report availability in locations easily noticed by employees or customers. Transient noncommunity systems should post a copy of the report or a notice of report availability in a conspicuous location.

A copy of all assessment reports will be kept at the main DEQ office and the appropriate district offices. Copies of the assessment report will be available upon written request from these offices. Assessment reports will also be available on the DEQ Internet site. DEQ will publish a list of available assessment reports and where to obtain a copy in its quarterly newsletter as they are completed and become available.

Chapter 7

Implementation Of The Source Water Assessment And Protection Program

7.1 Timetable For Implementing Source Water Assessment and Protection

The 1996 Safe Drinking Water Act Amendments specify that source water assessments must be completed within two years of EPA approval of the state Source Water Assessment and Protection Program Plan. However, Section 1453(b) of the Safe Drinking Water Act Amendments allows the EPA to grant an extension of up to 18 months beyond this two year period. Wyoming is requesting this 18-month extension primarily due to budgetary and personnel constraints. Wyoming's implementation schedule reflects a total of 3.5 years after EPA approval of Wyoming's program to complete the assessments. **Table 7.1** shows Wyoming's timetable for developing and implementing the Source Water Assessment and Protection Program.

Table 7.1 The Wyoming Source Water Assessment and Protection Program Schedule.

October 1997	First Technical/Citizen's Advisory Committee meeting
December 1998	Draft Source Water Assessment and Protection document available to the public for review and comment
	Public meeting before the Water and Waste Advisory Board for Board acceptance of the Source Water Assessment and Protection Program
February 1999	Submit Draft Source Water Assessment and Protection document to the EPA
January 2001	Approval of Source Water Assessment and Protection document by the EPA
April 2001	Begin delineation of surface water and groundwater source water assessment areas using prioritization scheme outlined in Appendix B
October 2001	Begin contaminant inventory for all public water systems
October 2002	Begin susceptibility analysis for all public water systems
April 2003	Begin development of assessment reports
October 2003	Begin publicizing assessment report availability
June 2004	Complete all source water assessment related tasks

Delineations and contaminant inventories for public water systems using groundwater may commence prior to EPA approval of the Source Water Assessment and Protection program. Procedures used for these tasks have been previously approved by the EPA in the Wyoming Wellhead Protection Program document.

7.2 Financial Resources Available To Complete Assessments

The Safe Drinking Water Act Amendments of 1996 authorized the creation of a Drinking Water State Revolving Fund to provide financial assistance for public water system infrastructure improvements. The objective was to help public water systems achieve or maintain compliance with Safe Drinking Water Act requirements and to protect human health. In addition to authorizing the infrastructure fund, the Safe Drinking Water Act Amendments established a new emphasis on preventing contamination problems through source water protection and enhanced water systems management.

The 1996 Safe Drinking Water Act Amendments allowed states to set aside up to ten percent of their 1997 Drinking Water State Revolving Fund allotment to develop and implement a Source Water Assessment and Protection program. This set-aside provided a one-time-only funding source for a total of \$1,255,880. The cost of developing Wyoming's Source Water Assessment and Protection program and completing the assessments may exceed this amount. However, DEQ will prioritize assessments as outlined in **Appendix B** to ensure that community systems or systems vulnerable to contamination are completed.

In addition to the Source Water Assessment and Protection set-aside, the 1996 Safe Drinking Water Act Amendments authorized a yearly Wellhead Protection set-aside. The Wellhead Protection set-aside may be a source of funding which could be used to complete source water assessments on groundwater systems. Wellhead Protection set-asides may also be used to assist communities in developing and implementing Source Water Protection Plans.

7.3 Primary Responsible Parties

DEQ has limited personnel available to dedicate to the Source Water Assessment and Protection Program. Therefore, DEQ personnel will focus their efforts on program promotion and administration, contract oversight, and public awareness and outreach duties. Contractors will conduct the majority of tasks needed to complete source water assessments. This includes locating public water system wells and intakes, delineating source water assessment areas, conducting contaminant inventories, determining susceptibility, and producing assessment reports. DEQ personnel will oversee the contracts to ensure that end products are consistent with procedures detailed in the final EPA-approved Source Water Assessment and Protection document. DEQ personnel will require regular reports from contractors to ensure that the

required quantity and quality standards and product deadlines are met. DEQ will also expect public water systems to make the public aware of assessment report availability.

7.4 Reporting Program Progress To The EPA

Wyoming will submit an annual Source Water Assessment Program report to the EPA to provide information regarding the progress of the source water assessment effort. An annual reporting schedule will facilitate the combination of the Wellhead Protection and Source Water Assessment and Protection Programs. To indicate progress on the Source Water Assessment and Protection program, the annual report will contain summaries of the following information:

- Set-aside fund expenditures.
- Public water system information including population served and whether they depend on groundwater, surface water, or both.
- The progress on assessments including the number of completed delineations, contaminant inventories, susceptibility analyses, assessment reports completed, etc.
- Outline the efforts made to ensure that assessment reports are made available to the public.

7.5 Encouraging Source Water Protection Plans

The development of source water protection plans is not a mandatory part of Source Water Assessment and Protection Program. However, preventing contamination is key to keeping Wyoming's drinking water supplies safe. Once a drinking water supply becomes contaminated, a community is faced with the difficult and costly task of upgrading treatment facilities or locating an alternative drinking water source.

Source water assessments are the necessary first step for developing source water protection plans. The assessments will provide a sound technical basis for future protection measures, but are not themselves an end product. DEQ considers the protection of drinking water resources and the development of source water protection plans to be the long-term goal of the program. To this end, DEQ will write a set of general guidelines patterned after those included in the Wellhead Protection Program. These guidelines will assist public water systems in developing and implementing source water protection plans. The guidelines will also describe the DEQ Source Water Protection Plan approval process.

DEQ may be able to support protection plan activities by providing financial assistance to public water systems. For instance, low-interest loans may be available through the State Revolving

Fund program. These monies may be used for the acquisition of land critical to source water protection, the remediation of contaminant sources, or other protection plan development or implementation activities.

DEQ is currently working with EPA to develop a waiver program for volatile and synthetic organic chemicals. The EPA will likely require the public water system to have a completed source water assessment in order to receive or retain this type of waiver. Development of a protection plan will not affect public water system eligibility for these waivers. However, a developed protection plan may aid the public water system by reducing costs associated with upcoming proposed regulations such as the Ground Water Rule.

DEQ already advocates long-term protection of drinking water resources through the Wellhead Protection Program. DEQ encourages the assembly of planning teams made up of local community members. These planning teams develop strategies to manage potential sources of contamination within the wellhead protection areas. The use of similar teams will be promoted with the Source Water Assessment and Protection program to develop source water protection plans.

The process of developing effective management strategies is the most important aspect of preventing drinking water contamination. It is also the most difficult and time consuming step in developing a source water protection plan. The responsibility of protecting the community from possible drinking water contamination must be balanced with the fundamental right of private property ownership. Management of the source water protection area involves knowledge of the local resources available for protection efforts. In addition, local planning teams must be familiar with the incentives and legal authorities available to the community to achieve the desired land use changes necessary to protect the drinking water source. The process of developing management strategies for regional aquifer watershed protection areas will require the collaboration of all municipalities, counties, and land management agencies affected by the protection area.

As indicated in earlier sections, DEQ recommends the regular review and update of the source water assessments. DEQ also encourages the regular review and update of the source water protection plans. Regular reviews help the local planning team constructively deal with new trends, issues, and activities within the community.

The development of contingency plans as part of protection plans is also encouraged. Contingency plans describe how a public water system would handle a contamination event or the loss of a water supply. Examples of components that local planning teams can include in a contingency plan are: options for replacing a water source; customer notification plans; emergency response plans; water storage plans; and measures to promote water conservation, if necessary.

Local planning teams may request assistance from DEQ while developing protection plans. DEQ will provide assistance to local planning committees to the extent possible given personnel and budgetary constraints.

7.6 Coordination With Other State Programs

Groundwater Pollution Control Program

The DEQ Groundwater Pollution Control Program has information which will be useful for source water assessments. Aquifer sensitivity has been mapped for the entire state. An ongoing survey determining levels of nitrate and pesticides in groundwater is being conducted for each county. Records of spills or releases; cleanups or corrective actions; and other known groundwater contamination sites are also available. Information gained from the source water assessments may assist the Groundwater Pollution Control Program in the development of state management plans for pesticides or other groundwater contaminants.

Nonpoint Source Pollution Program

The goal of the Wyoming Nonpoint Source Pollution program is to reduce or prevent water pollution from diffuse sources. The program is voluntary and encourages the development of pollution control strategies on the local level. The structure and goals of the Wyoming nonpoint source pollution program and the Source Water Assessment and Protection Program are similar.

The Clean Water Act Amendments of 1987 authorized Section 319. Section 319 encourages the development of nonpoint source pollution control strategies and provides funding to implement these strategies. Congress appropriated monies to fund Section 319 in 1990. A portion of the Section 319 grant monies may even be available to develop source water protection plans when significant nonpoint source pollution issues exist within the source water area.

Wellhead Protection Program

The Wellhead Protection Program is the predecessor to the Source Water Assessment and Protection Program. Wyoming's Wellhead Protection Program was approved by the EPA in 1997. Since the Wellhead Protection Program went into effect, three Wyoming public water systems have completed Wellhead Protection Plans. Approximately 30 public water systems are at various stages in the process. These public water systems will have a head start on the source water assessments.

Where a wellhead protection area has been delineated, DEQ will review the delineated area to ensure conformance with the methods described in Chapter 3 of this document and the Wyoming Wellhead Protection Program document. DEQ will also determine if the public water system uses surface water, or if the EPA has determined the groundwater source to be under the influence of surface water. If there is no surface water component to the water source, the wellhead protection area will become the source water area.

If the public water system uses a water source which can be affected by surface water, the assessment area will be expanded to include the surface water delineation. The combined groundwater and surface water delineated areas will then become the source water assessment area. If the DEQ determines that the method used to delineate the wellhead protection area does not meet the criteria presented in Chapter 3 or the Wyoming Wellhead Protection document, DEQ will work with the public water system to complete the source water area delineation. Previously delineated wellhead protection areas will be used for the source water areas whenever possible.

DEQ will review and update the contaminant inventory information for public water systems that have completed the contaminant inventory. Some contaminant inventories may need to be expanded where the original wellhead protection area was changed or increased. Susceptibility analyses will be completed for all groundwater public water systems requesting source water assessments. DEQ will encourage public water systems with approved Wellhead Protection Plans to conduct a susceptibility analysis and incorporate the results into their plans.

DEQ encourages the development of wellhead protection plans for public water systems with completed source water assessments. Wellhead protection plans involve the development of management and contingency plans by a committee of affected groups, entities, or individuals. DEQ will assist in this process as needed if asked to do so by public water system representatives.

It is the intent of DEQ to integrate the Source Water Assessment and Protection and the Wellhead Protection Programs. The goal of both programs is to protect drinking water resources. A protection plan developed for either program will have gone through the same process and completed the same steps. Therefore, Wellhead Protection Plans completed after the approval of the Source Water Assessment and Protection Program will serve as Source Water Protection Plans.

Other State Programs

DEQ manages several regulatory programs such as Underground Injection Control, National Pollutant Discharge Elimination System, Stormwater, and Animal Feeding Operation Programs. These programs issue permits for sources of potential pollutant discharges. Information such as the location of the potential discharge and the nature of the contaminant are collected. Consequently, these state programs will be able to provide valuable information to be used during the contaminant inventory process.

These programs will also use information gained in the source water assessment process. As protection plans are developed, DEQ will determine if new permits would conflict with any approved source water protection plan before they are issued. For example, wastewater construction permits may be reviewed and issued individually within Zone 2, rather than issuing a general construction permit. This will help insure that permits for activities which could

endanger the source water will be closely scrutinized. DEQ will not issue permits which are in conflict with state approved source water protection plans.

There are also other programs within DEQ which do not issue permits, but that would have important information about potential sources of contamination. Examples of these programs include Underground Storage Tank/Leaking Underground Storage Tank, and the 303(d) and Total Maximum Daily Load programs. The information which these programs maintain will help in the contaminant inventory process.

7.7 Coordination With Other State Agencies

DEQ will also pursue partnerships with other state agencies such as the Department of Transportation, Department of Agriculture, Oil and Gas Conservation Commission, and the State Geologic Survey to complete the source water assessments. These partnerships may include monetary or in-kind service matches or other types of collaboration on data exchange and collection.

7.8 Coordination With Federal Agencies

The Environmental Protection Agency

Coordination with the EPA will be ongoing for the Wyoming Source Water Assessment and Protection Program. The EPA will be able to provide technical support by providing data for the delineation, contaminant inventory, and susceptibility analysis steps of the assessments. The EPA maintains databases, such as the Safe Drinking Water Information System database, that will be important in the contaminant inventory step. The EPA also conducts regular inspections of public water systems. The results of these sanitary surveys will be central to the susceptibility analysis step.

The EPA will also play a role in developing and granting monitoring waivers for the state of Wyoming. Monitoring waivers provide a public water system with the opportunity to decrease the costs associated with sampling and testing for some contaminants. Section 1418(b) of the Safe Drinking Water Act Amendments specifies that states with approved Source Water Assessment and Protection programs may adopt “tailored alternative monitoring requirements.” Because Wyoming does not have primacy for its drinking water program, the alternative monitoring program must be developed in cooperation with the primacy agency, or the EPA. The EPA may allow reductions in monitoring frequency for some contaminants. Monitoring waivers can not be granted for microbial contaminants, disinfection by-products, or corrosion by-products.

The decision to grant monitoring waivers will be made on a case-by-case basis. The EPA may grant an interim waiver if the public water system is participating in the Source Water

Assessment and Protection program. The renewal of the waiver will likely be dependent upon the assessment results.

The EPA is also involved in the development of the Consumer Confidence Report. Source water assessment results must be published in Consumer Confidence Reports beginning October, 1999. Because Wyoming does not have primacy in the drinking water program, the EPA will be developing the reporting format and ensuring that public water systems report assessment information where it is available.

Other Federal Agencies

In 1998, a Federal Multi-Agency Source Water Agreement was signed by ten federal agencies. The purpose of the agreement was to integrate the source water assessment and protection activities of federal, state, tribal, and local entities. The signatory federal agencies agreed to assist with the source water assessment and protection efforts by providing data, and work with state and local representatives to develop appropriate natural resource or water resource management plans. For example, the Natural Resource Conservation Service will be sent a list of delineated source water areas in order to encourage participation in the Conservation Reserve Program. Public water systems that enter their wellhead protection areas in the Conservation Reserve Program can be eligible for federal funds.

7.9 Coordination With Native American Tribes

DEQ maintains working relationships with the Native American Tribes within the state. DEQ offered assistance to the Native American Tribes with developing a drinking water protection program similar to the Source Water Assessment and Protection program. DEQ is also willing to exchange information regarding source water areas and potential sources of contamination for source water areas which are close to or cross over Tribal/Non-Tribal property boundaries.

7.10 Coordination With Neighboring States

DEQ maintains excellent working relationships with its neighboring states. During the program development process, DEQ participated in several conference calls involving Montana, North Dakota, South Dakota, Colorado, and Utah. Each state provided updates on the progress of their Source Water Assessment and Protection Program and discussed the approaches used for each step in the assessment process. Idaho will be contacted individually to discuss and compare source water assessment area delineation and contaminant inventory procedures. DEQ also participated in an interstate coordination meeting for the North and South Platte River Watershed which was organized and hosted by Colorado. DEQ will continue to work with neighboring states to exchange information about source water areas which cross over or are located near the Wyoming border.

Glossary

alluvium: a general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.

annular seal: a structure used to plug the annular space, or the space between the well casing and the borehole or outer casing. Annular seals are usually located on either side of each water bearing geologic layer that the well penetrates. Annular seals prevent contaminants from moving into water bearing geologic layers.

aquifer: a formation, group of formations, or part of a formation that contains enough saturated permeable material to yield sufficient, economical quantities of water to wells and springs.

bedrock: a general term for the consolidated rock that underlies soils or other unconsolidated surficial materials.

community public water supply system: water systems that serve a permanent residential population and include municipalities, rural water systems, mobile home courts, and housing developments.

conduit flow: groundwater movement down-gradient along fractures, faults, joints, bedding planes, and solution openings resulting in “flashiness”. Flashiness is indicated by rapid aquifer recharge; turbulent flow; and highly variable chemistry, temperature, and flow rates. Darcy’s Law does not apply in conduit flow conditions.

confined aquifer: an aquifer bounded above and below by confining units of distinctly lower permeability than the aquifer media or an aquifer containing confined groundwater. An aquifer in which groundwater is under pressure significantly greater than atmospheric and its upper limit is the bottom of a bed of distinctly lower hydraulic conductivity than that of the aquifer itself.

consecutive public water supply system: a water system that is served by another public water supply system.

contaminant: an undesirable substance not normally present, or an unusually high concentration of a naturally occurring substance in water, soil, or other environmental medium.

contamination: the degradation of natural water quality as a result of man’s activities. There is no implication of any specific limits, since the degree of permissible contamination depends on the intended end use or uses of the water.

contaminant source inventory: the process of identifying and inventorying potential sources of contamination within delineated source water assessment areas through recording existing data, describing contaminant sources within the source water assessment area, targeting likely contaminant sources for further investigation, and verifying accuracy and reliability of the information gathered.

diffuse flow: groundwater movement down-gradient along fractures, faults, joints, and bedding planes resulting in less turbulent flow, slower aquifer recharge, and more uniform chemistry, temperature, and flow rates than observed in conduit flow. Groundwater movement is similar to that in porous flow environments and may be described using Darcy's Law. Groundwater movement through a fractured-rock aquifer may be considered to be diffuse flow if: 1) the fractures are closely spaced, 2) the fractures are evenly sized, evenly distributed, and randomly oriented, and 3) the area of consideration is large relative to the spacing of the fractures. Criteria such as pumping test responses, configuration of the water table, water chemistry variations, distribution of hydraulic conductivity, and the ratio of the fracture scale to the problem scale may be used to determine which type of flow regime exists.

DRASTIC model: an analytical model used to assess groundwater pollution potential. The seven parameters that are used in the model also form its name. These factors are: Depth to groundwater, Recharge, Aquifer media, Soil media, Topography or land slope, Impact of the vadose zone, and the saturated hydraulic Conductivity of the aquifer.

drawdown: the vertical distance groundwater elevation is lowered, or the amount pressure head is reduced, due to the removal of groundwater. Also the decline in potentiometric surface caused by the withdrawal of water from a hydrogeologic unit.

Drinking Water State Revolving Fund (DWSRF): under section 1452 of the Safe Drinking Water Act, the EPA awards capitalization grants to states to develop drinking water revolving loan funds to help finance drinking water system infrastructure improvements, source water protection, to enhance operations and management of drinking water systems, and other activities to encourage public water system compliance and protection of public health.

groundwater: the water contained in interconnected pores located below the water table in an unconfined aquifer or located in a confined aquifer.

hydraulic conductivity (k): proportionality constant relating hydraulic gradient to specific discharge, which for an isotropic medium and homogeneous fluid, equals the volume of water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

hydraulic gradient (I): slope of the water table or potentiometric surface.

igneous rock: a rock that solidified from molten or partly molten material.

karst: a landscape or region characterized by rock dissolution.

metamorphic rock: a rock formed when preexisting rocks undergo mineralogical, chemical, and structural changes caused by high temperature, pressure, and other factors.

nontransient noncommunity public water supply system: nonresidential water systems that serve the same population for at least six months per year and includes factories and schools.

permeability: ability of a porous medium to transmit fluids under hydraulic gradient.

porosity: ratio of the total volume of voids available for fluid transmission to the total volume of a porous medium. Also the ratio of the volume of the voids of a soil or rock mass that can be drained by gravity to the total volume of the mass.

porous flow: groundwater movement down-gradient through the pore space of aquifer host rocks, such as uncemented or poorly-cemented sandstones. Darcy's Law is operative in porous flow environments. Groundwater flow through a fractured-rock aquifer may be considered to resemble porous flow if 1) the fractures are closely spaced, 2) the fractures are evenly sized, distributed, and spatially oriented, and 3) the area of consideration is large relative to the spacing of the fractures.

potentiometric surface: an imaginary surface representing the level to which water will rise in a well.

public water supply system (PWS): system for provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves at least 25 individuals daily or at least 60 days out of the year.

pumping rate: the rate at which water is withdrawn from the well.

radius of influence: the radial distance from the center of a well bore to the point where there is no lowering of the water table or potentiometric surface.

recharge area: area in which water reaches the zone of saturation by surface infiltration. An area in which there are downward components of hydraulic head in the aquifer. Infiltration moves downward into the deeper parts of an aquifer in a recharge area.

semi-confined aquifer: an aquifer that has a "leaky" confining unit and displays characteristics of both confined and unconfined aquifers.

sensitivity: the potential for a water source to become contaminated based on the intrinsic hydrogeologic characteristics of the watershed or aquifer.

source water assessment area: the area delineated by the state for a public water supply, whether the water source is groundwater or surface water or both, as part of the state Source Water Assessment and Protection program approved by EPA under section 1452 of the Safe Drinking Water Act.

source water assessment: three step process which includes delineating the part of the watershed or groundwater area that contributes water to the water supply system; identifying the potential sources of pollution in the delineated area; and conducting a susceptibility analysis of the water supply to potential contaminant sources.

surface seal: a structure used to plug the annular space, or the space between the well casing and the borehole or outer casing, at the ground surface. Surface seals are usually made with concrete and extend into the well deep enough to be below the frost line. Surface seals prevent contaminants from entering the annular space.

susceptibility: the potential for a public water supply system to draw water contaminated at concentrations that would pose concern, through geologic strata and overlying soil, direct discharge, overland flow, or cracks/fissures in the physical well or surface-water intake.

transient, noncommunity public water supply system: water systems that serve a transient or nonresidential population and includes campgrounds, rest stops, and resorts.

time of travel: the time required for a contaminant to move in the saturated zone from a specific point to a well.

unconfined aquifer: conditions in which the upper surface of the zone of saturation forms a water table under atmospheric pressure.

vulnerability: the potential for a water source to become contaminated based on both the watershed or aquifer sensitivity and the likelihood that contaminants will be released where they could reach and contaminate the water source. Vulnerability combines intrinsic hydrogeologic characteristics with anthropomorphic factors.

watershed area: a topographic area that is within a line drawn connecting the highest points uphill of a drinking water intake, from which overland flow drains to the intake.

wellhead protection area: a designated area around a public water supply well(s) that is to be protected from contaminants that may adversely affect human health.

Wellhead Protection Program: a program to protect wellhead protection areas within a states jurisdiction from contaminants that may have any adverse effects on the health of persons (Safe Drinking Water Act, subsection 1428(a)).

List of Acronyms

DEQ	Wyoming Department of Environmental Quality
EPA	United States Environmental Protection Agency
GIS	Geographic Information Systems
GPS	Global Positioning System
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MPA	Microscopic Particulate Analysis
PWS	Public Water System
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SRF	State Revolving Fund
SWAP	Source Water Assessment and Protection
TMDL	Total Maximum Daily Load
USGS	United States Geologic Survey
WGS	Wyoming Geologic Survey

APPENDIX A

Public Participation

List of Organizations and Individuals Invited To Participate On The Advisory Committee

WYOMING SOURCE WATER ASSESSMENT PLAN INVITED ADVISORY COMMITTEE MEMBERS

John Barnes
State Engineer's Office
Herschler Bldg. - 4E
Cheyenne, WY 82002

Myron Brooks, District Chief
U.S. Geological Survey
2617 E. Lincolnway
Cheyenne, Wyoming 82001

Jim Cochran
Wyoming Association of Conservation Districts
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Maggie Davison
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Floyd Field
Wyoming Association of Rural Water Systems
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Cindy Garretson-Weibel, Exec. Director
Wyoming Stock Growers Association
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Curtis Grandstaff
Mayor, Town of LaGrange
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LaGrange, WY 82221

Dan Heilig, Exec. Director
Wyoming Outdoor Council
201 Main Street
Lander, WY 82520

Linda Kirkbride, President
Wyoming League of Women Voters
3205 Road 139
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Gus Lopez
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Jim Bigelow
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Tom Clayson, Associate Director
Petroleum Association of Wyoming
951 Werner Ct.
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Joe Evans, Exec. Director
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Cheyenne, WY 82003

Kevin Frederick
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Wyoming Farm Bureau Federation
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Marcella Hutchinson
U.S. Environmental Protection Agency
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Denver, CO 80202

Marion Loomis, Exec. Director
Wyoming Mining Association
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Jeff Lundberg
Wyoming Agriculture Business Association
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Larry Martin
National Park Service
Water Resources Division
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Ft. Collins, CO 80525

Wes Nash
FMC WY Corporation
P O Box 872
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George Parks, Director
Wyoming Association of Municipalities
P.O. Box 3110
Cheyenne, WY 82003

David Schmidt
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999 18th St.
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Bud Spillman
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Jim VanDorn
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Michael Wireman
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Larry Meuli
City/County Health Department
Wyoming State Legislator
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Janie Nelson
Wyoming Oil & Gas Conservation Commission
P O Box 2640
Casper, WY 82602

Mark Opitz
Natural Resources Conservation Service
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Casper, WY 82601

Bryce Reece, Exec. Director
Wyoming Wool Growers Association
811 North Glenn Rd.
P O Box 115
Casper, WY 82602

Rick Schuler
U.S. Bureau of Land Management
5353 Yellowstone Rd.
Cheyenne, WY 82009

Jack States
Non-Point Source Task Force
2 Canyon Shadows Road
Lander, WY 82520

Rod Weyrich
Town of Yoder
P O Box 485
Yoder, WY 82244

David Zelenka
Wyoming Water Development Commission
Herschler Building, 4th Floor West
Cheyenne, Wyoming 82002

Source Water Assessment and Protection Advisory Committee Meeting Minutes

Minutes
Source Water Assessment Plan Advisory Committee Meeting
October 2, 1997

The meeting was convened at 10:00 am to introduce members to the objectives and framework of the source water assessment program, the resulting assessments and protection plans and to identify issues associated with the SDWA SRF set-aside funds which are available through fiscal year 1998 to be used for conducting source-water assessments. Attendees and their affiliations are listed below.

Phil Stump	Dept. of Environmental Quality/Water Quality Division
Joe Evans	Wyoming County Commissioners Association
John Barnes	Wyoming State Engineer's Office
Chad Root	US Environmental Protection Agency, Region VIII
David Zelenka	Wyoming Water Development Commission
Mike Hackett	Wyoming Water Development Commission
John Geidt	US Environmental Protection Agency, Region VIII
Michael Stull	Wyoming Association of Municipalities
Tom Clayson	Petroleum Association of Wyoming
Maggie Davison	Dept. of Environmental Quality/Water Quality Division
Jake Strohmman	Dept. of Environmental Quality/Water Quality Division
Phil Ogle	Dept. of Environmental Quality/Water Quality Division
Chuck Harnish	US Forest Service
Mark Opitz	Natural Resources Conservation Service
Rick Schuler	US Bureau of Land Management
Ken Hamilton	Wyoming Farm Bureau
Jim Bigelow	Wyoming Dept. of Agriculture
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division

Schedule of Future Meetings and Submittals

The purpose of the next meeting will be to provide a forum for the exchange of information and discussions on concerns related to developing and implementing a source water assessment and protection program in Wyoming. The areas to be addressed are those that are identified as a priority in the responses provided by completion of the questionnaire being distributed with these minutes as Attachment 1.

Presentation of Source Water Assessment and Protection Program - EPA perspective

Mr. John Geidt of the U.S. Environmental Protection Agency, Region 8 office presented a Source Water Assessment and Protection Program overview. The major components of John's presentation are found in the enclosed copy of his overheads (Attachment 2). The intent of the SWAP is to encourage the implementation, by public water suppliers, of management strategies for local source water protection. Additional discussions focused on how the SWAP program, which is mandatory in states where the state has primacy for the Drinking Water program, would be implemented here since Wyoming does not have primacy for the Drinking Water program. Wyoming, being a non-primacy state, is not required to conduct source water assessments. However, EPA did not receive funding to support source water assessments in Wyoming; therefore, if public water suppliers are to receive the benefits such as monitoring waivers provided for in the amendments to the Safe Drinking Water Act, the state and/or the water supplier must participate in the assessment and protection plan process.

The DWSRF set-aside for Wyoming is \$1.25 million. There is a 20% state match requirement. aside funds are available to states during FY 1997 and 1998. After that time, there will be no monetary support available for conducting source water assessments.

Source Water Assessment in Wyoming: Exiting Conditions and Future Potential

Kevin Frederick of the Wyoming Department of Environmental Quality made a presentation on has been achieved in Wyoming, to date, towards accomplishing the tasks set forth in the Source Water Assessment & Protection Guidance. He discussed the Wellhead Protection Plan and how it was incorporated into the SWAP process. Demographics of the various types of drinking water systems in Wyoming (source types, populations served, community/non-community, transient/non-transient) were described. Benefits of conducting source water assessments and implementing source water protection plans were also discussed. For greater detail on Kevin's presentation, see Attachment 4.

Source Water Assessment Plans: Guidance and Requirements

Maggie Davison of the Wyoming Department of Environmental Quality presented an explanation of the Source Water Assessment & Protection Program development process and the submittal to EPA. She discussed the program description, as conveyed in the EPA SWAP Guidance. Specific areas where the Advisory Committee plays a role were identified. These areas include: determining the approaches to be used to facilitate public participation; determining advisory committee makeup; determining the approaches to be taken to delineate source water protection areas; specifying the level of accuracy necessary for conducting inventories of potential sources and the method(s) to be used in conducting inventories of potential sources; determining the approach to assessing the susceptibility of a source water protection area; and deciding how assessments will be made available to the public, once completed. An outline of this presentation is represented in Attachment 5.

Geographic Information Systems (GIS) in the Source Water Assessment & Protection Process

Chad Root with the US Environmental Protection Agency described training opportunities that are being sponsored regarding the use of GIS in conducting source water assessment and developing source water protection strategies. There will be a workshop on using the ArcView software package for source water and well head protection in Denver on February 1, 1998. Also, a GIS users group is being formed of GIS specialists from various states for the purpose of exchanging information. A meeting of this group will also be held on February 1, 1998.

Discussions:

Areas of discussion included the following:

Jake Strohman of the WDEQ described the state's plan, if the SRF set-aside becomes available, to conduct assessments for community water supplies and publicly-owned non-transient non-community water supply systems where the water supplier has requested to have an assessment done. He planned that the performance of assessments would be accomplished through contracts. The fact that source water assessments are optional in Wyoming because of its non-primacy status was discussed.

The status of the draft legislation that would allow Wyoming access to the Safe Drinking Water Act (SDWA) SRF was discussed. The legislation is being reviewed by the Public Lands and Agriculture Committee. The committee is meeting on October 14th in Saratoga.

The consequence of the state not accessing the set-aside funds for conducting assessments is a financial burden for a public water supply. Conducting an assessment will fall on the shoulders of the water supply. Monitoring relief will not be available to water supplies unless assessments are completed. The question of how much money is needed to accomplish the assessments was asked.

The need for the coordination of meetings with agriculture groups such that information on source water assessments and their impact on agricultural interests could be provided and discussed was identified.

Concerns that findings obtained during the assessment process may result in action being taken against an entity identified as a potential pollutant source were raised. It was clarified that there can be no basis for action except when the entity was determined to be violating state or federal law.

Discussions on how local authorities may choose to implement management practices as source water protection measures occurred. The need to delineate the boundaries of the authorities held by various entities was identified.

Discussions of how a SWAP relates to other water quality programs occurred. Also the potential duplication of authority was raised as a concern. The specific issue voiced in this area was regarding managing the use of chemicals such as pesticides and herbicides.

Some concerns related to liability were expressed with regard to the inventory of potential sources. The need for accuracy in accomplishing the inventory was raised.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
January 29, 1998

The meeting was convened at 10:00 am. Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
Jack Theis	US Environmental Protection Agency, Region VIII
David Zelenka	Wyoming Water Development Commission
Mike Wireman	US Environmental Protection Agency, Region VIII
Michael Stull	Wyoming Association of Municipalities
Tom Clayson	Petroleum Association of Wyoming
Maggie Davison	Dept. of Environmental Quality/Water Quality Division
Phil Ogle	Dept. of Environmental Quality/Water Quality Division
Mark Opitz	Natural Resources Conservation Service
Rick Schuler	US Bureau of Land Management
Ken Hamilton	Wyoming Farm Bureau
Jim Bigelow	Wyoming Dept. of Agriculture
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Ted Bartke	US Geological Survey
Gary Beach	Dept. of Environmental Quality/Water Quality Division
Jack States	Non-Point Source Task Force
Karen Larsen	League of Women Voters
Jim Case	Wyoming State Geological Survey
Jeff Lundberg	Wyoming Agri-Business
Floyd Field	Wyoming Association of Rural Water Systems

Following opening remarks, a brief presentation was made as to the objectives of, and process associated with conducting source water assessments. It was pointed out that source water assessments are conducted to provide information to water suppliers that can be used in the development of source water protection plans. It was clarified that the implementation of source water protection plans by public water supplies is voluntary and that the objectives of implementing source water protection management tools are to provide a pro-active pollution prevention approach to providing water to consumers. Some of the benefits of adopting pollution prevention plans were discussed. The elements of a source water assessment plan were discussed, those being: public participation in developing a plan to perform source water assessments; a strategy for delineation of source water protection areas; a process for identification of potential contaminant sources within the protection areas; an approach for the determination of susceptibility of source waters to contaminants and a process of making assessments available to the public. It was explained that the task of the advisory committee was to make decisions on these approaches and strategies such that source water assessments could be accomplished in Wyoming.

Gary Beach provided clarification on the differences between the Total Maximum Daily Load (TMDL) program and source water assessments. He explained that the TMDL program provides management options for control of waste loadings to surface waters, while the SWAP program is designed as a preventive program which is voluntary, rather than regulatory, in nature. There may be some overlap of information between the programs, such as in the area of contaminant source identification where the similarity stops.

Kevin Frederick discussed the responses to the questionnaires that were sent out to members following the first SWAP meeting in October. The most commonly voiced concern was that the objectives of conducting source water assessments were not clearly understood and that more information was needed regarding not only the specific tasks for the committee to undertake but the overall goals of the Source Water Assessment Program.

Mike Wireman provided some insights into how source water assessment and protection were undertaken in some of the communities in Colorado that he has been working with and described some of the benefits he has seen for these communities as a result of their participation in the program. Mike then presented an overview of alternative approaches to delineation of source water protection areas supplied by surface water and included a brief description of conditions where the surface water/groundwater connection must be considered to effectively delineate a source water protection area.

The committee held discussions on determining whether or not to continue in this effort. It was decided that this would be explored further following the legislative session when more would be known about the fate of the State Revolving Fund (SRF) set-aside moneys and whether the funds would be available to conduct assessments in Wyoming. Future meeting dates were proposed and the meeting was adjourned.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
April 9, 1998

The meeting was convened at 10:00 am. Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
David Zelenka	Wyoming Water Development Commission
Mike Wireman	US Environmental Protection Agency, Region VIII
Maggie Davison	Dept. of Environmental Quality/Water Quality Division
Phil Ogle	Dept. of Environmental Quality/Water Quality Division
Mark Opitz	Natural Resources Conservation Service
Rick Schuler	US Bureau of Land Management
Jim Bigelow	Wyoming Dept. of Agriculture
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Ted Bartke	US Geological Survey
Chris Jessen	Wyoming State Geological Survey
Jeff Lundberg	Wyoming Agri-Business
Floyd Field	Wyoming Association of Rural Water Systems
David Schmidt	US Environmental Protection Agency, Region VIII
Jim VanDorn	Cheyenne Board of Public Utilities
Bud Spillman	Cheyenne Board of Public Utilities
Phil Stump	Dept. of Environmental Quality/Water Quality Division
Rod Weyrich	Town of Yoder
Gus Lopez	Laramie County Environmental Health
Larry Meuli	City/County Health Department
Wes Nash	Wyoming Mining Association/FMC Corporation
Larry Martin	National Park Service
Joe Evans	Wyoming County Commissioners Association
Tom Clayton	Petroleum Association of Wyoming

After opening remarks, David Schmidt, representing the US Environmental Protection Agency, presentation on the monitoring requirements in the Safe Drinking Water Act and described how monitoring waivers are implemented. The relationship between source water assessments and types of monitoring waivers was described.

Mike Wireman described the Intended Use Plan (IUP) that must be written in order for a state to set-aside the SRF. Mike referenced the work plan that must be included in the IUP and identified specific issues that must be addressed in the work plan.

The schedule which had been prepared to describe tasks to be accomplished by the committee and associated deadlines was reviewed and discussed.

A plan for prioritizing how source water assessments would be accomplished was discussed. The Advisory Committee identified the following considerations to be made in determining the order in which assessments would be conducted:

- I. Vulnerability to Contamination
 - C Numbers of wells and/or surface water intakes
 - C Location(s) of intake(s) within the watershed (i.e., upper or lower watershed)
 - C History of MCL exceedances
 - C Threats to the system
 - C Aquifer sensitivity
 - C History of detected contaminants
 - C Existing treatment

- II. Population/Greatest Benefit Considerations
 - C Population served by water supply system
 - C Systems with surface water intakes within the same watershed
 - C Systems with wells within the same recharge area

- III. Intent/Interest in Protecting Drinking Water Supply
 - C Commitment to contribute to assessment (in funding and/or service) and to implementing protection plan
 - C Willing but unable to commit resources (i.e., "hardship")

It was discussed that this input from the committee would be formulated into a prioritization report and provided to the committee for discussion at the next meeting.

The meeting was adjourned.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
June 16, 1998

The meeting was convened at 10:00 am. Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
Maggie Davison	Dept. of Environmental Quality/Water Quality Division
Jim Cochran	Wyoming Association of Conservation Districts
Rick Schuler	US Bureau of Land Management
Jim Bigelow	Wyoming Dept. of Agriculture
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Ted Bartke	US Geological Survey
Jim Case	Wyoming State Geological Survey
Jeff Lundberg	Wyoming Agri-Business
Floyd Field	Wyoming Association of Rural Water Systems
David Schmidt	US Environmental Protection Agency, Region VIII
Bud Spillman	Cheyenne Board of Public Utilities
Phil Stump	Dept. of Environmental Quality/Water Quality Division
Rod Weyrich	Town of Yoder
Larry Meuli	City/County Health Department
Larry Martin	National Park Service
Jack States	Non-Point Source Task Force
Curtis Grandstaff	Town of LaGrange
Charles Harn	Dept. of Environmental Quality/Water Quality Division

Following opening remarks, discussions were held on the proposed ranking system for determining what order source water assessments would be accomplished. The committee suggested the system be applied to several public water supplies to see how they would rank relative to one another. The committee also proposed that following the "field test" of the ranking system and one month of discussions at the next meeting, public comment on the system should be solicited.

The application of the ranking to how source water assessments are conducted was discussed in detail, by the committee. Three major issues were identified and voted on by the committee. They were: 1) conducting source water assessments for all public water systems; 2) including prior credit for PWSs who have already begun source water assessments using their own resources; 3) disqualifying PWSs from having assessments done with set-aside monies if they do not express interest in the assessment program. The committee voted in favor of providing assessments for PWSs (8 for, 2 against). The committee determined that PWSs would not be given additional credit for the ranking system for beginning assessments on their own (4 for, 5 against). The committee disagreed that PWSs should be disqualified from having assessments done with set-aside monies for failing to indicate their interest in participating (2 for, 7 against).

It was decided that the SWAP work plan should be included on the agenda once again prior to being submitted to EPA. It was to be determined whether or not public participation was required by the work plan prior to being finalized.

Jim Case from the Wyoming Geological Survey made a presentation on the well-head protection delineation project that has been underway at the WGS.

A site-visit of the City of Cheyenne source water areas was proposed for the meeting in August. The next meeting was scheduled for Monday, July 27, 1998. The meeting was adjourned.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
July 27, 1998

The meeting was convened at 10:00 am. Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
Jim Bigelow	Wyoming Dept. of Agriculture
Myron Brooks	US Geological Survey
Jim Case	Wyoming State Geological Survey
Tom Clayson	Petroleum Association of Wyoming
Jim Cochran	Wyoming Association of Conservation Districts
Maggie Davison	Dept. of Environmental Quality/Water Quality Division
Floyd Field	Wyoming Association of Rural Water Systems
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Ken Hamilton	Wyoming Farm Bureau
Chris Jessen	Wyoming State Geological Survey
Karen Larsen	League of Women Voters
Gus Lopez	City/County Health Department
Jeff Lundberg	Wyoming Agri-Business
Larry Martin	National Park Service
Phil Ogle	Dept. of Environmental Quality/Water Quality Division
George Parks	Wyoming Association of Municipalities
David Schmidt	US Environmental Protection Agency, Region VIII
Rick Schuler	US Bureau of Land Management
Bud Spillman	Cheyenne Board of Public Utilities
Mike Wireman	US Environmental Protection Agency, Region VIII

Following opening remarks, the outcome of the "field test" of the ranking system for conducting source water assessments was discussed. Problem areas were identified with the proposed ranking system in terms of inordinately weighted categories or areas where information was not readily available. One source of information identified was EPA's database containing the results of PWS monitoring. It was stated that the database could be made available to the state to use in ranking water systems. It was also stated that information regarding whether or not a water system is equipped with disinfection is also contained in the database.

Discussions followed regarding the use of monitored water quality as an indication of the quality or potential vulnerability of the source water. It was suggested that microbiological contamination may be more of an indicator of the integrity of the distribution system than the vulnerability of the source water. A discussion of the number of systems without disinfection capabilities ensued. The potential use of chemical parameters was discussed with the need to focus on synthetic organic contaminants. The possibility of basing the vulnerability history on a ten year time frame rather than five years was considered. It was suggested that a five year consideration of synthetic organic contaminants detected at any levels may constitute an adequate assessment of vulnerability for the purpose of prioritizing how source water assessments are accomplished.

The difficulties of addressing the "economies of scale" factor was described; particularly how surface water intakes within the same basin are weighted and how there is not an appropriate counterpart for groundwater systems. Jim Case of the Wyoming Geological Survey, Mike Wireman of US EPA and Kevin

Frederick of Wyoming DEQ agreed to meet to discuss potential approaches to applying this factor to groundwater systems.

The proposal was made to simplify the ranking system such that fewer factors are addressed. What was proposed still considered the major areas identified by the committee in earlier meetings. The proposal was:

- I. Vulnerability determined based on:
 - Surface water source;
 - Surficial aquifer;
 - Deep aquifer
- II. Population served
- III. Ratio of annual mean household income to state annual mean household income
- IV. Detections of SDWA Contaminants during the past 5 or 10 years

The committee was in favor of simplifying the ranking system as proposed and suggested that the modified system be tested.

Mike Wireman from EPA made a presentation on surface water protection area delineations, drawing the relationship of how options for inventorying potential pollutant sources can be customized to the delineated area. Mike described how the level of effort in identifying sources within the delineated watershed upstream of an intake can vary based on a described buffer zone or distance upstream of the intake relative to a PWS's ability to respond to a release (time of travel). Mike stated that buffer zones were being defined as 50 to 100 foot strips and that the level of effort in identifying potential contaminant sources within these areas should be thorough and complete and that buffer zone widths may vary with distance from intakes. He also stated that the USDA was providing funding to support buffer zone easements. A list of PWSs for which conjunctive delineations would be appropriate needs to be compiled.

The following comments were provided by the committee members:

Ken Hamilton raised the issue of the potential for conflicts arising between the agricultural community and municipalities if "buffer zones" are drawn on maps. He also questioned how zones delineated as "buffer zones" would be managed on federal lands. The fact that management strategies that are developed based on information obtained through assessments are implemented through cooperative efforts on the parts of the PWS, affected landowners, and sometimes land management agencies was discussed.

Jim Bigelow asked if buffer zones couldn't be identified as a last step. He also questioned the process for determining whether or not a potential contaminant source will, in fact, constitute a problem at the water intake.

Jim Case suggested that time-of-travel delineations should be different for soluble chemical contaminants relative to biological contaminants.

George Parks stated that most municipalities would be interested in the source inventory information. He described the fact that there currently exists a predominant spirit of cooperation between municipalities and agricultural interests.

Rick Schuler stated that the purpose of conducting source water assessments is to provide useful information to PWSs and questioned the value of a delineation and source inventory of a water body. ******Please see Rick Schuler's comment regarding this statement in his letter on page A-88******

Jim Bigelow proposed the use of the term "inventory zone" as opposed to "buffer zone"; suggesting that this terminology would more clearly communicate the intent.

Bud Spillman suggested that lines on a map delineating an "inventory zone" did not necessarily imply the presence or need for fences.

Floyd Field stated his support for the use of the term "inventory zone".

Larry Martin proposed that the inventory zone for source identified as groundwater under the influence of surface water should consist of the lateral extent of the alluvial aquifer.

Myron Brooks said he would provide information on surface water velocities so that lengths of various time-of-travel zones could be approximated.

The next meeting of the advisory committee, which will consist of a tour of part of the Cheyenne well field and surface water source areas, was scheduled for September 1, 1998. The meeting was then adjourned.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
September 1, 1998

Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
Floyd Field	Wyoming Association of Rural Water Systems
Larry Meuli	City/County Health Department
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Gus Lopez	City/County Health Department
John Geidt	US Environmental Protection Agency, Region VIII
Myron Brooks	US Geological Survey
Rick Schuler	US Bureau of Land Management
Jim VanDorn	Cheyenne Board of Public Utilities
Bud Spillman	Cheyenne Board of Public Utilities
Rod Weyrick	Town of Yoder
Curtis Grandstaff	Mayor, Town of LaGrange
Jim Bigelow	Wyoming Department of Agriculture
Joe Evans	Wyoming County Commissioners Assoc.
Larry Martin	National Park Service
Karen Larsen	League of Women Voters
David Schmidt	US EPA
Jim Case	Geological Survey of Wyoming
Phil Ogle	Dept. of Environmental Quality/Water Quality Division
Mike Wireman	US EPA
Marcella Hutchinson	US EPA
Phil Stump	Dept. of Environmental Quality/Water Quality Division

Today's meeting involved a tour of Cheyenne's municipal wellfield and reservoir used to supply drinking water to the city.

Minutes
Source Water Assessment Plan Advisory Committee Meeting
November 4, 1998

Attendees and their affiliations are listed below:

John Barnes	Wyoming State Engineer's Office
Floyd Field	Wyoming Association of Rural Water Systems
Larry Meuli	City/County Health Department
Kevin Frederick	Dept. of Environmental Quality/Water Quality Division
Gus Lopez	City/County Health Department
John Geidt	US Environmental Protection Agency, Region VIII
Myron Brooks	US Geological Survey
Rick Schuler	US Bureau of Land Management
Jim VanDorn	Cheyenne Board of Public Utilities
Brian Mark	Dept. of Environmental Quality/Water Quality Division
Larry Robinson	Dept. of Environmental Quality/Water Quality Division
Mike Hackett	Wyoming Water Development Commission
Carol Stearns	Wyoming Association of Municipalities
Jeff Lundberg	Wyoming Ag-Business

Following the opening comments, the deadline for the Wyoming SWAP review and approval process was discussed. Since Wyoming's Source Water Assessment Plan (SWAP) must be submitted to EPA Region VIII by February 6, 1999, the draft needs to be completed by the first week in December. A 45-day public review and comment period is required prior to presenting the SWAP to the Water and Waste Advisory Board on January 18, 1999. The Guidance must be signed by the Water Quality Division Administrator prior to be submitted to the EPA.

Kevin then provided the location of the Nebraska SWAP that is available over the Internet: www.deq.state.ne.us Kevin noted that because of similarities between the Nebraska and Wyoming, rural areas, that Wyoming's SWAP may be similar in some ways to Nebraska's SWAP.

The **first topic** discussed was the **final review of the prioritization sheet** for ranking public water systems (PWSs) for Source Water Assessments.

Floyd Field noted that the definition of 'undeveloped' and 'urban and industrialized' should be defined to determine the difference when performing the ranking in Section II.

Rick Schuler said that grazing and timber cutting would be an example of uses on undevelope

Kevin noted that Forest Service and National Parks would not likely change in land use in the f
It was concluded that examples of land uses would be included under II. to help define these '

Such as the following:

- 1)'undeveloped Forest Service and National Park lands' would probably fall under undeveloped headwaters with no evidence of future development
- 2) 'Privately owned lands' are probably more prone to future development.

Next, the '**Ability to Pay**' in **Section III** was discussed. Brian Mark noted that the SRF Funding intended use plan (IUP) ranks the public water systems receiving State Revolving Funds based upon public

health and compliance considerations. Most of the municipalities have annual median household incomes (AMHI) above 70%, therefore, it was suggested that the graduations or ranges in the 'Ability to Pay' category are adjusted. It had been proposed that the privately-owned systems will be awarded 3 points.

Mike Hackett said that of the approximately 100 projects that are being funded most have an AMHI between 70 -90% of the state AMHI. Mike also said that most of the privately owned systems may likely be in the less than 50% category, such as, trailer parks, etc..

Myron Brooks asked whether the **vulnerability ranking in 1.A.** would tend to heavily favor this category.

Floyd Field said that since the public water systems are sampling water at intake to distribution system every 3 to 5 year; therefore, the 5 year interval for chemical contaminants is reasonable.

Larry Robinson described the **Drinking Water State Revolving Fund (SRF) Programs.**

The Community Support Branch of DEQ will be under the direction of Brian Mark. Approximately \$80 million with the State Fund Match is available for low interest loans to help fund the capital improvements for public drinking water systems. Capacity development requires the demonstration of financial, technical, and managerial capabilities. Source water assessments are an important part of demonstrating technical capabilities. The deadline for completing the draft capacity development regulations for the Water and Waste Advisory Board on January 18, 1999. The deadline for the final regulations is Oct. 1, 1999 and a potential sanction or penalty may be incurred if the deadline is not met.

The results of the source water assessments will be important in determining the needed improvements or to the implementation of preventive measures to insure the quality and adequacy of the water from public water systems. 4 % or about \$.5 million of the annual Drinking Water SRF money is available for administering the program.

John Giedt also recommended that Wyoming may consider that loan funding in the SRF Program should only be available to public water systems that are wanting to have source water assessments completed.

Brian Mark said the PWS's ability to meet capacity development requirements must be acceptable to be eligible for SRF funding. The PWS's compliance with Consumer Confidence Reporting may also be a consideration for determining the eligibility for funding.

John Giedt talked about performing **susceptibility assessments.** The EPA susceptibility assessment document (SAD) has finally been completed. He discussed how the susceptibility needs to address both (inter issues - 'how states will perform statewide ranking of public water systems') and (intra-'how each PWS ranks particular contaminant sources'.)

The document discusses some simple ways of how states can breakout susceptibility rankings for particular water systems:

High Susceptibility

By Type of Water Supply:

Surface Water Systems

Groundwater-unconfined aquifers

Low Susceptibility

Groundwater Systems

Groundwater-confined aquifers

By Type of Contaminants Sources and

Type of System:

Transient Public Water Systems-

Contaminants with acute health

effects - pathogenic

Transient Public Water Systems-

Toxic contaminants - SOCs, etc.

Since sanitary surveys are being completed every 3 to 5 years for public water systems, it was discussed whether a limited susceptibility assessment could be conducted during the sanitary survey. The present survey provides recommendations for improving the public health and safety of the public water system.

Jim VanDorn said that the sanitary surveys were recently completed on Cheyenne's well fields and could be made available.

Floyd Fields echoed Bob Blanco's recommendation that the method for evaluating susceptibility needs to be as simple as possible.

Kevin then discussed the method for **delineating surface water protection areas** that was presented during a recent EPA Region VIII meeting in Casper, WY.

John Giedt commented about the 200 ft. distance from the surface water body (i.e., river, streams) that was suggested by Kevin for the "Inventory Zone". John said that South Dakota has suggested a distance of ½ mile. Kevin said that because Wyoming's drainage basin areas are higher up in the watershed (i.e., closer to the headwaters), the gradients are much steeper and a shorter distance is needed. South Dakota has much wider and less steep drainage basins, therefore greater distances are needed for the inventory zone.

Rick Schuler asked whether the source water assessment information is important to operators

Kevin Frederick discussed a story regarding a herbicide application in Teton County that caused xylene impacts to a nearby public water supply well.

Floyd Field said that many operators of the small public water systems are only doing the work on a very limited part-time basis with salaries being paid about as low as \$200 per month. Some operators are completely volunteer, and in general, the amount of their time that can be committed to operating the systems and adhering to the new Safe Drinking Water Act Amendment requirements (i.e., capacity development, consumer confidence reports, etc.) will be very limited.

John Giedt recommended having a sanitary control zone immediately around the area of the surface water intake to provide for a high level of protection in this area.

Kevin Frederick said that he would plan to have the **Draft SWAP** sent out to the Source Water Assessment Advisory Committee before Thanksgiving. Kevin said that the SWAP reviewers' comments about the SWAP need to be submitted during the 45-day public review period prior to the January 18, 1999 Water and Waste Advisory Board Meeting.

Public Responsiveness Summary of Advisory Committee Meetings

The major issues brought up in the committee meeting are summarized below:

October 2, 1997- Source Water Assessment Plan Advisory Committee Meeting.

- I **Comment:** WDEQ Staff asked how a Source Water Assessment Program is addressed in Wyoming because of its non-primacy status for implementation of the Safe Drinking Water Program---**Response:** Mr. John Giedt said that because of Wyoming's non-primacy status, Wyoming public water systems are not required to conduct source water assessments. SWAP is a voluntary program in Wyoming.
- II **Comment:** Committee Member asked what action is needed to acquire the source water assessment 10% set-aside from the Drinking Water State Revolving Funds Program.---**Response:** Draft legislation has been written to obtain the set-aside. The legislation will be presented to the Public Lands and Agriculture Committee on Oct. 14, 1997 in Saratoga. If the committee approves of the legislation will be presented to the 1998 Wyoming State Legislature.
- III **Comment:** Committee Member asked how the information of the source water assessment may impact agricultural interests in Wyoming.--- **Response:** Source water assessments are voluntary in Wyoming. The implementation of source water protection plans; i.e., pro-active pollution prevention plans, etc., are voluntary in all states. The potential contaminant sources will be identified through the SWAP process. Actions by WDEQ would be taken only if a potential contaminant source was determined to be violating state or federal law.

January 29, 1998- Source Water Assessment Plan Advisory Committee Meeting.

- IV **Comment:** Committee Members asked what is the purpose for conducting the Advisory Committee meetings.--- **Response:** The meetings are being conducted to make decisions on the approaches and strategies for performing source water assessments in Wyoming. The DW-SRF set-aside legislation did pass committee vote but the fate of the set-aside lies with the 1998 Wyoming State Legislature.
- V **Comment:** Committee Member asked how the Total Maximum Daily Load (TMDL) process relates to performing source water assessment in Wyoming.--- **Response:** Mr. Gary Beach described how the TMDL program provides management options for controlling waste loading to surface waters, which the SWAP program is a preventive program which is voluntary, rather than regulatory, in nature.

April 9, 1998- Source Water Assessment Plan Advisory Committee Meeting.

- VI **Comment:** WDEQ Staff asked committee members how the source water assessment work should be prioritized or ranked.---**Response:** The committee members brainstormed for about two hours identifying various ranking criteria. The three major criteria for ranking were: I. Vulnerability of Contamination, II. Population/Greatest Benefit Considerations, and III. Intent/Interest in Protecting Drinking Water Supply.

June 16, 1998- Source Water Assessment Plan Advisory Committee Meeting.

- VII **Comment:** Committee members asked if the source water assessment ranking criteria can be applied effectively.---**Response:** It was discussed that the ranking scheme needs to be tested on several public water systems to check how they rank relative to each other.

July 27, 1998- Source Water Assessment Plan Advisory Committee Meeting.

- VIII **Comment:** Committee member raised the issue of the potential for conflicts arising between the agricultural community and municipalities if “buffer zones” are drawn on maps. The member also questioned how well the “buffer zones” could be managed on federal lands.---**Response:** Any management strategies will have to be implemented through cooperative efforts between the PWS suppliers, affected landowners, and land management agencies. A Wyoming Association of Municipalities (WAM) representative stated that a spirit of cooperation exists between municipalities and agricultural interests. It was strongly suggested that the terminology of “contaminant inventory zone” be used instead of “buffer zone”. It was stated the ‘inventory zone’ should extend the lateral extent of the alluvial aquifer if this information is available.

September 1, 1998- Source Water Assessment Plan Advisory Committee Meeting.

This meeting involved a tour of Cheyenne’s municipal well field and reservoir used to supply drinking water to the City. Many issues were discussed with regard to Cheyenne’s ongoing source water protection efforts.

November 4, 1998- Source Water Assessment Plan Advisory Committee Meeting.

- IX **Comment:** Committee member stated that the ‘undeveloped’ and ‘urban and industrialized’ terms on the prioritization ranking criteria needs to be formally defined to clarify how the ranking will be performed.---**Response:** Forest Service and National Parks lands were give as an example of an ‘undeveloped’ watershed because it is unlikely that the land use will change in the future. Privately-owned lands could potentially contain potential sources and are more prone to future development.

X **Comment:** Mr. John Giedt asked whether the suggested 200 ft. distance from the surface water body was adequate. John stated that South Dakota has suggested a distance of ½ mile.---**Response:** Most of Wyoming's drainage are higher up in the watershed and in the headwaters so the gradients are much steeper. Because of the above reasons, the 200 ft. distance should include the alluvial areas and the highly permeable sediments along the stream and river banks. Because South Dakota has less steep watersheds & is further down the watershed, a larger inventory distance may likely be appropriate.

**Water and Waste Advisory Board
Paid Advertisement and Meeting Minutes**

Department of Environmental Quality

GOVERNOR
TIM GEVINCHER

THE STATE



OF WYOMING



MEMORANDUM

TO: Casper Star Tribune
Fax 266-0501

FROM: Patti Burns, IPS Supervisor

DATE: December 16, 1998

RE: Display Ad

Please print the attached notice as a paid display ad as soon as possible and again the week of January 25, 1999. Reduction may be necessary. Please send one affidavit of publication and one copy of the printed notice along with your invoice to:

DEQ/Water Quality Division
122 West 25th Street
Herschler Building, 4W
Cheyenne, WY 82002

Attn: Patti Burns

If you have any questions, please contact me immediately at 777-7080.

Thank you.

WATER AND WASTE ADVISORY BOARD MEETS TO CONSIDER

NEW RULES AND PROGRAMS FOR PUBLIC WATER SUPPLY SYSTEMS AND GENERAL PERMITTING REQUIREMENTS

The Water and Waste Advisory Board of the Department of Environmental Quality will hold a regular meeting on February 8, 1999, beginning at 10:00 a.m. in the Herschler Building Room 1699, 122 West 25th Street, Cheyenne, Wyoming 82002. The board will accept public comments and make recommendations on proposals developed by the Water Quality Division, in the following order:

State's Source Water Protection Plan which provides guidance on development of source water assessment plans and how the state can assist water supply systems with source water protection. Revisions to Chapter 3 rules creating authority for general permits for certain facilities and activities.

New Chapter 22 rules implementing capacity development requirements for water supply systems.

Copies of these documents shall be available on the department's web site at <http://deq.state.wy.us> (after January 1, 1999) or may be obtained by contacting Mary Fowles at 307-777-7781.

Persons who wish to comment on these documents and can attend the board meeting will be encouraged to submit written copies of their statement. Persons who cannot attend the board meeting may submit written comments on or before January 29, 1999 to Water and Waste Advisory Board, % Administrator, DEQ/Water Quality Division, 122 West 25th Street, Herschler Bldg - 4W, Cheyenne, WY 82002.

In accordance with the Americans with Disabilities Act, special assistance or alternate formats will be made available upon request for individuals with disabilities.

Water and Waste Advisory Board Meeting Minutes
February 8, 1999
Herschler Building, Room 1699
10:00 a.m.

Ron Vore convened the meeting at 10 a.m. Ron was asked to chair the beginning of the meeting as senior board member. Ron welcomed the new board members and asked everyone to introduce themselves. Present were Ron Vore, representing agriculture from Beulah; Quentin Skinner representing the public at large from Laramie; Gene George representing industry from Casper; Lisa Jarvis representing the public at large from Laramie; and Harry LaBonde representing political subdivisions, also from Laramie.

The first order of business was to elect a chair and vice chairperson. Nominations were opened for chairman. Quentin S. nominated Ron V. with a second by Harry L. Gene G. made a motion to cease nominations. Lisa J. seconded the motion. A unanimous vote was cast for Ron V. as chair. Nominations for vice chairman was opened. Harry L. made a motion to nominate Quentin S. as vice chairman with a second from Gene G. Gene G. made a motion to cease nominations with a second from Lisa J. A unanimous vote was cast for Quentin S. as vice chairman.

The next order of business was the minutes of the past meeting. Quentin S. made a motion that the minutes be accepted. Gene G. seconded the motion. The vote was unanimous.

Source Water Protection Program

Kevin Frederick gave a presentation on the program. The Source Water Protection program is a voluntary plan. A committee was formed of many local, state and federal agencies to develop the plan. The assessment is a procedure to gather information which defines a well area for drinking water supplies and lists potential and existing contaminants.

When the plan is approved by the Advisory Board, WQD will send the plan to EPA. EPA will have nine months to review and approve the plan. In Wyoming, the plan is voluntary so there is no requirement that the towns and cities adopt the plan. It is hoped that communities will take this information to help protect their drinking water. With the state developing a Source Water Protection Plan, funding to do assessments is available under the State Revolving Fund (SRF) of \$1.2 million. The state has four years to develop the source water assessments. The division asked the board to adopt the plan by resolution. Because the state does not have primacy under the Safe Drinking Water Act for the Drinking Water Program, this is not a mandatory requirement.

Public comment was opened. Herman Noe of the Cheyenne Board of Public Utilities and Floyd Field of Wyoming Association of Rural Water both supported the plan and asked the board to

pass the resolution. A board member asked what perception communities have of the plan. Most small communities have no idea what the assessment is for so education will be a key issue.

There was a discussion on the \$1.2 million available. DEQ proposes to contract the work out for the assessments because the money cannot be loaned out to the communities. At this time, DEQ does not know how much each assessment will cost. The \$1.2 million is available now. If more money is needed in the future, the department may look for additional funds from other sources.

The department intends to launch an aggressive outreach campaign with newsletters, public notices, etc. There was a question on the coordination between DEQ and the Water Development Commission. DEQ is working with WDC on the prioritization and monies allocated. Another concern was regarding how the information in the assessment would be disseminated. The information would be of interest to the local landowners in the areas surrounding the towns. There was a suggestion that public notice of the completed assessment be added to the plan.

A resolution was prepared by the division. Gene G. made a motion to adopt the resolution. The second was made by Lisa J. The vote was unanimous.

Proposed Changes to Chapter 3

Kevin Frederick gave a briefing on the rule. The intent of the changes is to make permitting more efficient. There is a trend to capture activities of little environmental impact into a general permit. The permit by rule is for some activities of low risk to proceed without a permit approval mechanism.

Public comment was opened.

Mel Oberholtzer, Midwest Assistance Program of Laramie asked that the definitions include administrator and director.

Kevin then presented the Belle Fourche Pipeline Co. written comments and walked the board through them. See attached copy of the comments and the department's suggested changes.

A change requested by the board was to page 3- 7 line 26 to add “/or”.

All plans, specifications and reports submitted under this chapter shall be sealed, signed and dated by a licensed professional engineer under W.S. Title 33, Chapter 29 and/or by a licensed professional geologist under W.S. Title 33, Chapter 41, as applicable.

The other request from the board was to tie the public interest to the denial of permit.

The board was comfortable with the approach of the proposed rule but would like to revisit the revisions that were discussed today. Gene G. made a motion to revise the chapter and allow public comment at the next meeting. The second was made by Quentin S. A unanimous vote was taken.

Next Board Meeting

Gary B. reported that a change was needed regarding the agenda for the board meeting set for April 8, 1999 in Casper. Solid and Hazardous Waste Division will not be able to bring their rules before the board as originally planned. Chapter 1 from WQD will also not be ready. There is legislation going through the legislature that will directly affect Chapter 1 and WQD must wait to see if it will pass and in what form. The agenda for the April meeting can be changed to educate the new board members on Chapter 1 and to revisit Chapter 3. This change was agreed to by the board. SHWD requested a meeting in June for their rules. The date of June 21 or 22 was targeted.

Chapter 22, Capacity Development

Gary B. explained that this new rule is a mandatory program for operators of public water supplies. The state must have this program to access the full share of the state revolving funds. EPA would withhold funds which would place a burden to the public water systems of the state. The rule needs to be promulgated by October 1 so funds are not lost.

Larry Robinson, WQD presented the following information. Amendments were made to the Safe Drinking Water Act to provide funding for a loan program to assist communities in capacity development. Capacity development means "capability to demonstrate" technical, managerial and financial means. A committee was established with representation from local, state and federal government entities. The state statute stipulates capacity development must be met before a construction permit can be issued in direct response to the federal requirement. Brian Mark, WQD discussed the comments from the committee. See the memo to the board of February 8, 1999.

Public comment on Chapter 22 was opened.

Floyd Field, Wyoming Rural Water; Dorothy Vollmer, Town of Lingle; Karen Guidice, Town of Chugwater all spoke to encourage approval of the proposed rules.

Paul Felz of EPA spoke to his comments in writing. See EPA comments. There was discussion regarding EPA's intent that public water systems be able to demonstrate capacity development today or for the future? EPA is concerned with both. It was not expected that all systems must have a five year capitol improvement plan but it is recommended.

Ben Bracken - Green River/Rock Springs Joint Power Board spoke in favor of the proposed chapter.

There was additional discussion regarding Section 5. Demonstrating Capacity Development. One board member asked the question of whether the rules require a capital improvement plan, or just a plan to assure the operation and maintenance of the authorized/existing systems. It was suggested that the rule be revised to require a plan to assure sufficient financial resources to cover system operation and maintenance costs including debt service.

The next question was in regards to Section 7 (c). What happened to the compliance schedule and where does this fit into the approval or disapproval. WQD agreed to add (iii) reference back to the compliance schedule and recommendations.

Harry L. made a motion to accept approval the proposed rules of chapter 22 dated Feb. 8, subject to the discussed changes in Section 5 (d) Providing a plan to assure sufficient financial resources to cover system operation and maintenance costs including debt service and adding (iii) to Section 7 Approval of the system assessment subject to a corrective action plan and implementation schedule. Quentin S. seconded the motion. The vote was unanimous.

The question was asked if there will be an opportunity to address concerns on the worksheet. Comments received in the next couple of weeks will be incorporated immediately.

The meeting was adjourned at 3:40 p.m.

These minutes were approved on _____, 1999.

Chairperson

/pjb
90399.ltr

**Wyoming Association of Rural Water Systems Memo
Indicating Attendance At Source Water Assessment
And Protection Trainings**



Wyoming Rural Water Association

PO Box 1750 ~ 715 W Birch Street ~ Glenrock, WY 82637
(307) 436-8636 Fax: (307) 436-8441 e-mail: warws@coffey.com



RECEIVED

September 24, 1998

SEP 25 1998

WATER QUALITY DIVISION
WYOMING

Kevin Frederick
DEQ Water Quality
122 W 25th Street # 4W
Cheyenne WY 82002

Dear Kevin:

The Wellhead Protection training sessions are completed for the series on "State WHP Guidance Document". These classes were held in all parts of Wyoming and the total attendance was 135 for an average of 15 per training session.

As a result of this training, I believe WHP is rapidly moving forward across Wyoming. Local systems have and are utilizing this training and are moving forward with their individual WHP programs. This is good for Wyoming and it's people.

I want to thank you and your staff for the excellent assistance given to these training sessions. They did an excellent job of communicating to the systems and operators, the ideas and concepts of our Wellhead Protection Guidance document. It would not have been possible without them.

Looking forward to our next challenge with anticipation.

Sincerely,

Floyd Field
Groundwater Technician

/du

Nice work GPC!

Stump
Fischer
Davison
Thiessen
Stedman
Beach

**Memorandum Inviting Advisory Committee Members
To Comment On Draft Document**



The State of Wyoming



Department of Environmental Quality

Jim Geringer, Governor

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH WASTE	ABANDONED MINES WATER QUALITY	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ.
307-777-7758	307-777-6145	307-777-7391	307-777-7369	307-777-7756	307-777-7752
307-777-7781					
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973

MEMORANDUM

To: Source Water Assessment Advisory Committee Invited Members

From: Kevin Frederick, Water Quality Division

Date: October 9, 2000

Subject: Wyoming's Draft Source Water Assessment Program

Dear Advisory Committee Members:

I am pleased to send you a copy of Wyoming's draft Source Water Assessment Program for your review and comment. With your invaluable input and assistance over the past several months, the plan describes how source water assessments will be completed for those Wyoming Public Water Supply Systems (PWSS) that wish to have assessment information compiled for them, and includes proposed methods for delineating source water areas, developing an inventory of potential contaminant sources within the source water area, determining the susceptibility of the public water supply to contamination, and making assessment information available to the public. I encourage and hope you will find time over the next few weeks to review the draft plan, and will be interested in hearing your thoughts, ideas and suggestions. In particular, please make note of the following:

- XI Chapter III:
 - I Delineation methods for Transient, Non-Community PWSS and PWSS drawing from confined aquifers differ from those described in *Wyoming's Wellhead Protection Guidance Document*, as initially proposed by WQD. Reasoning is provided in the draft.
 - II Delineation methods for surface water supplies are explained.

XII Chapter IV:

- I Potential Contaminant Sources (Appendix E) differ from those described in *Wyoming's Wellhead Protection Guidance Document*, as initially proposed by WQD. The proposed list is sufficiently comprehensive and easier to read and follow.
- II Comprehensive v. Limited Potential Contaminant Source Inventory: A differential approach is proposed for the different source water areas that are delineated; inventories are limited for Transient, Non-Community PWSS.
- III Contaminants of Concern (Appendix F) include those currently regulated by EPA, and the micro organism *Cryptosporidium*; all are required according to EPA's SWAP guidance.

XIII Chapter V:

- I The approach to determining susceptibility is explained.

XIV Appendix A:

- I Part III of the score sheet for ranking and prioritizing PWSS for completion of source water assessments has been modified; the annual median household income (AMHI) factor has been replaced by one which considers the type of public water supply system. Our analysis revealed that the AMHI factor was difficult to obtain and subject to error.

If you have any questions on the proposed plan, please do not hesitate to call me at (307)-777-5985 and I will do my best to get you any answers or information you need.

Notices have also been published in statewide newspapers announcing the availability of the draft document for review and comment. The public is encouraged to review the proposed plan and provide public comment before the Advisory Board, or written comment to the Water Quality Division (WQD) before February 8, 1999.

The proposed plan will be presented to the department's Water and Waste Advisory Board for adoption at its next scheduled public meeting on February 8, 1999 at 10:00 AM in Room 1699 of the Herschler Building in Cheyenne. If you have any comments on the proposed plan that you would like me to present before the Board at this meeting I would be more than happy to do so. Once adopted, the plan will be submitted to EPA for their review and approval.

Additional copies of the draft plan may be obtained by contacting me personally, or the Water Quality Division's Cheyenne office at (307)-777-7781; the document is also available from the division's Web page at <http://deq.state.wy.us/wqd/ground/source.html>.

Monitoring Waivers

In December, three of us at WQD participated in a conference call with EPA staff to begin discussing development of a monitoring waiver program for Wyoming's Public Water Supply Systems (PWSS). As you may recall, EPA, as the agency responsible for administering federal drinking water regulations in Wyoming, may waive certain monitoring requirements (e.g. the number of regulated contaminants analyzed, frequency of sampling) under certain conditions. Through waivers, costs to systems and communities may be significantly reduced.

In order to obtain a monitoring waiver, the Safe Drinking Water Act (SDWA) amendments of 1996 require, at a minimum, that states have an EPA-approved Source Water Assessment Program and that a Source Water Assessment has been completed for each PWSS that seeks monitoring relief through waivers. As we continue to coordinate and work with EPA in developing Wyoming's waiver program it will be important to consider input from Source Water Assessment Advisory Committee members and we will be soliciting input from many of you in the near future.

Wyoming's Groundwater Protection Strategy

As mentioned at our last Advisory Committee meeting, WQD's Groundwater Section is in the early stages of developing the tools needed to begin drafting a strategy that clearly defines our priorities for groundwater protection in the state. As a broad-based group representing major groundwater interest groups, organizations and resource agencies within Wyoming, the Source Water Assessment Advisory Committee is our logical selection for assisting and advising us as we continue to develop this strategy. We ask for and look forward to your support, and hope that you will be able to attend future meetings to help us with this important undertaking.

In closing, please accept WQD's deep appreciation for your work in developing Wyoming's Source Water Assessment Program. We sincerely look forward to working with you in the coming months on equally important issues.

attachments *Draft: Wyoming's Source Water Assessment Program*

Meeting Minutes: Source Water Assessment Advisory Committee; November 4, 1998.

swap/draft/advcommem/1.5.98

Surveys and Survey Response Summaries

Fact Sheet and Survey Questionnaire



Source Water Protection (SWP) Opportunities Under the 1996 Amendments to the Safe Drinking Water Act (SDWA)

(One-Time Funding to Assist Public Water Systems)

Under the provisions of the federal Safe Drinking Water Act (SDWA) Amendments of 1996, Public Water Systems in Wyoming would be eligible to receive assistance to finance the costs of infrastructure improvements needed to achieve or maintain compliance with the SDWA requirements and to protect public health. With Wyoming's implementation of the Drinking Water State Revolving Fund (DWSRF), the state would be annually allocated funds of between \$7 to \$12 million which is estimated to total \$66.1 million in federal capitalization grants through the year 2003. In addition to the federal funds the state would be required to provide a 20% state match which provides initial funding revenues for the program in the range of \$79 million. These funds in turn would provide low cost loans and other types of assistance to eligible¹ Public Water Systems. Repayment of the financial assistance by the water utilities would be to the revolving fund account which would then become available for additional assistance for other improvement projects.

Eligible projects could include those to: comply with primary drinking water monitoring requirements, meet SDWA health standards and violations, consolidate with other public water systems, install or upgrade treatment facilities, develop or rehabilitate water sources, finished water storage and the installation/replacement of transmission and distribution piping. Eligible project activity costs could include those associated with planning, design and construction of the treatment system improvements.

Another provision, under the 1996 Amendments to the Safe Drinking Water Act, allows that..."states may use a portion of the Drinking Water State Revolving Fund (SRF) to protect both surface and underground sources of drinking water (i.e. source water protection)".

Source Water Protection (SWP) begins in local communities with the identification of sources of public drinking water supplies and the assessment of potential contamination threats to these supplies. Some of the SRF funds can be used to fund these source water assessments. The information gathered in these efforts

¹ An eligible Public Water Systems is a water system which is owned, operated, managed and maintained by an entity of the state, county, city, township, town, school district, water district, improvement district, joint powers association or any other entity constituting a political subdivision under Wyoming law; providing water for use and consumption of the general public through pipes and other constructed conveyances, which is not owned, operated, managed or maintained by a private individual, association or corporation.

can then empower local governments, water suppliers and the public to work toward the development and implementation of Source Water Protection plans, including Wellhead Protection plans.

Preventing contamination of water supplies makes good sense in terms of both public health and economics -- and, it protects our drinking water resources for future generations. Cleaning up contaminated drinking water sources can cost millions, and the costs of providing safe drinking water through treatment also are increasing as regulations addressing public health concerns expand. Source Water Protection can prevent contamination at a fraction of these costs. Equally important, Public Water Systems that have a complete source water assessment may be able to qualify for reduced sampling and monitoring requirements and realize substantial cost savings; systems that do not have a complete source water assessment will not be eligible for monitoring relief.

Up to 10 percent (or approximately \$1.2 million) of Wyoming's SRF money may be set aside **one time** for source water assessments, and can be used to: 1) *delineate* source water areas; 2) *perform inventories* of potential contamination sources within the source water areas, and; 3) *assess the susceptibility* of public drinking water supplies (within the source water areas) to contamination. This may likely be the only funding opportunity that will become available to complete source water delineations, inventories and susceptibility assessments for Public Water Systems.

In August, the legislature's *Select Water Committee* will be acting upon a recommendation (from the WY State Loans and Investment Office, WDEQ, and the WY Water Development Commission) that Wyoming set aside and use a portion of its SRF funds to perform source water assessments. Although not yet determined, WDEQ anticipates that the actual assessment work described in the preceding paragraph will be performed and completed by outside contractors under the direction and supervision of WDEQ. These assessments will be completed at no cost to the community (or non-profit system owner) and all final work products will be made available to the community (or non-profit system owner) to assist in developing *Source Water Protection Plans, should they wish to develop such plans.*

At this time, WDEQ is beginning to develop information on local needs and interest in this potential program. The enclosed Survey Questionnaire is designed to obtain this information in order to develop an inventory of Public Water Systems that have expressed a desire to have source water assessments performed for them, and an estimate of the set-aside funding that will be needed to complete assessments for those PWSs on the inventory list.

Since the set-aside for source water assessments is a one-time funding, this may be your only opportunity to express your interests and needs.

For further information, contact Kevin Frederick, WDEQ Program Supervisor, Cheyenne, (307)-777-5985.



Survey Questionnaire One-Time Funding to Assist Public Water Systems (PWS)

1. Name of City, County, Water District or other PWS Owner/Operator: _____
2. Total number of PWS you own and operate: _____
3. Are your PWS: groundwater only _____ surface water only _____ or combination ____ ?
4. Total number of wells used: _____ (for all PWS)
5. Total number of surface water intakes used: _____ (for all PWS)
Are all intakes using the same surface water body? Yes _____ No _____
If not, how many different surface water bodies are used? _____
6. Do you want to have *Source Water Assessments* completed for your PWS (at no expense to you) with the use of Safe Drinking Water Act funds set aside for these assessments?
Yes _____ No _____
7. Please indicate your position/title:
Mayor _____ City Manager _____ City Engineer _____ Director of Public Works _____
PWS Operator: _____ Other: _____

NOTE: This survey questionnaire is being mailed to Mayors, City Managers, City Engineers, Directors of Public Works and owner/operators of 'Non-Community' PWS. Please return only one survey for each PWS owner/operator (e.g. City, Town, Water and Sewer District, etc.).

Comments: _____

For convenience, please use the enclosed self-addressed stamped envelope to return this completed survey questionnaire by Friday, October 3, 1997 to:

WDEQ/WQD
ATTN: PWS Survey
Herschler Bldg. - 4W
Cheyenne, WY 82002

For further information, contact Kevin Frederick, WDEQ Program Supervisor, Cheyenne, (307)-777-5985. Thank you for your cooperation and assistance.

Your Response is Important!

**Summary of Responses To Source Water Protection Questionnaire
Distributed To Wyoming's Public Water Systems (PWSs)**

Class of System ³	Source Water Assessment (YES)	Public Water Systems Wanting Source Water Assessment Completed with Set Aside Funding (Received 12/2/97)				
		PWS Source ¹	# of Wells	# of systems owned or operated	# of Surface water Intakes	Same Surface Water Body
Community Incorporated cities & towns, water districts, subdivisions.	56	G: 35 S: 13 C: 8	147 Wells Total 1 well : 16 PWSs 2 wells : 9 PWSs 3 wells : 11 PWSs 4-10 wells : 8 PWSs 45 wells: 1 PWS (Cheyenne) ²	49 PWSs : 1 system 1 PWS : 2 systems 1 PWS: 6 systems	31 Intakes Total 1 Intake : 16 PWSs 2 Intakes : 3 PWSs 3 Intakes : 1 PWS 6 Intakes : 1 PWS (Cheyenne)	19 PWSs with same surface water body Of 2 PWS with different water bodies 1 PWS has 2 water bodies & 1 PWS (Cheyenne) has 6 water bodies
Non-Transient Non-Community Non-Profit, Non-Federal	9	G: 9	9 Wells Total 1 well : 9 PWSs	9 PWSs : 1 system	0	0
Transient Non-Community Non-Profit, Non-Federal	19	G: 15 S: 1 C: 3	22 Wells Total 1 well : 15 PWSs 2 wells : 2 PWSs 3 wells : 1 PWS	13 PWSs : 1 system 1 PWS : 2 1 PWS : 5	11 Intakes Total 1 Intake : 0 PWS 2 Intakes : 4 PWSs 3 Intakes : 1 PWS	5 PWSs with same surface water body
TOTAL	84	G: 59 S: 14 C 11	178 Wells		42 Intakes	24 PWSs with same surface water body

1) PWS Sources: G - Groundwater, S - Surface Water, C - Combination

2) Since the Cheyenne BOPU is presently completing the wellhead protection plan (WHP) steps of delineation and identifying potential sources, the source assessment set-aside funds may not be needed for Cheyenne's 45 wells.

3) As classified by EPA , a '**community**' water system serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. A '**non-community**' water system may be classified as either (1) '**transient non-community**' (regularly serving fewer than 25 of the same persons over six months per year), such as a park, campground, gas station, or restaurant; or (2) '**non-transient non-community**' (regularly serving at least 25 of the same persons over six months per year), such as a rural schools, business offices, mines, or power plants, with their own water supply system.

Source Water Assessment and Protection Program Advisory Committee Questionnaire

Name: _____

Please mark any of the following that represent your areas of concern and/or need for additional information:

- ~ Source water protection and relationships with other water quality programs.
 - ~ Specifically non-point source programs
 - ~ Specifically point source programs
 - ~ Both point source and non-point source programs

Please specify the information needed and/or describe specific concern(s):

- ~ Delineation of source water protection areas.

Please specify the information needed and/or describe specific concern(s):

- ~ Identification of potential contaminant sources within source water protection areas.

Please specify the information needed and/or describe specific concern(s):

- ~ Susceptibility determinations for source water protection areas.

Please specify the information needed and/or describe specific concern(s):

Compiled Responses For Advisory Committee Questionnaire

Question 1: Source Water Protection & Relationship With Other Water Quality Programs

RESPONDENT	COMMENTS	WDEQ RESPONSE
Michael Stull, WAM	New Developments and DEQ's future plans for these topics.	Addressed by Gary Beach, Administrator, WDEQ/WQD
Jack States, Member Non-Point Source Task Force, Public Sector Representative	Identification of Wyoming municipalities that appropriate drinking water, all or a portion thereof, directly from surface water sources (and therefore may be overlooked in assessing and protecting Well Head sources).	(See Handout)
Mark Opitz, NRCS Casper, WY	The NRCS may be a good source for non-point source programs on agricultural land. There may also be good information that may be used for SWAP, such as land use, and the Technical Guide may contain practices to address for SWAP.	Existing information that can be used to complete a Source Water Assessment (i.e. Delineate, Inventory, and Determine Susceptibility) should be used whenever possible, rather than developing new sources of information.
Ted Bartke, USGS	How Does SWAP program relate to TMDL program?	Addressed by Gary Beach, Administrator, WDEQ/WQD
Karen M. Larsen, League of Women Voters	Avoid Duplication Avoid Neg Impacts on Programs working well now.	Completing Source Water Assessments (i.e. Delineation, Inventory, Susceptibility Determination) should be coordinated with local governments to eliminate duplication of efforts or work that they have completed themselves.

Question 1: Source Water Protection & Relationship With Other Water Quality Programs

RESPONDENT	COMMENTS	WDEQ RESPONSE
Martha S. Horn (for Janie Nelson), Oil & Gas Conservation Commission	For our information in keeping with our responsibility to eliminate the possibility of oil & gas operations impacting source water protection areas.	According to the SDWA legislation, the information obtained during Source Water Assessments (i.e. Delineation, Inventory, Susceptibility Determination) must be made available to the public. The Advisory Committee is tasked with helping to develop an approach that meets this objective. <u>(Refer to p. 2-22 of the SWAP Guidance document)</u>
James C. Case, WY GS	My concern or interest is the relationship between source water protection and wellhead/aquifer protection.	Source Water Protection occurs when a community (or other owner/operator of a Public Water System) uses the information obtained through a Source Water Assessment (i.e. Delineation, Inventory, Susceptibility Determination) to develop a local plan to protect the drinking water supply, from contamination; the drinking water supply may be supplied by a well (i.e. groundwater) or surface water. Wellhead/Aquifer Protection involves using the same types of information, but for the protection of groundwater supplies only - not surface water supplies.
David Zelenka, WWDC	N/A	
Floyd Field, WARWS	N/A	

Question 1: Source Water Protection & Relationship With Other Water Quality Programs

RESPONDENT	COMMENTS	WDEQ RESPONSE
John Barnes, State Engineer's Office	How will the source water program work into water quantity and the water rights system.	John Barnes, State Engineers Office
Rick Schuler, BLM	I think that a lot of folks understand portions of each program but fail to understand how they all relate and the interrelated nature of their administration - a comprehensive understanding is needed.	Addressed by Gary Beach, Administrator, WDEQ/WQD
Ken Hamilton & Jeff Lundberg	How does 401 permit on Fed. Grazing affect or interact w/source water protection. What authority does the municipality have to regulate outside of municipal boundary under WY statutes.	(See Handout)

Question 2: Who Benefits from Implementing Source Water Assessment and Protection and How

RESPONDENT	COMMENTS	WDEQ RESPONSE
Michael Stull, WAM	N/A	
Jack States, Member Non-Point Source Task Force, Public Sector Representative	Direct beneficiaries are the municipalities that have multiple source water supplies that are potentially threatened by non-point source pollution. Many are cities that cannot afford either assessment or mitigation costs but are faced with present and future drinking water problems.	Municipalities that have implemented SWP Plans may also benefit from reduced sampling costs. EPA has estimated Wyoming's Public Water Systems <u>may save more than \$1 million every three years</u> by having some sampling requirements waived.
Mark Opitz, NRCS Casper, WY	I am not familiar with the required monitoring program in place now that could possibly be replaced by SWAP.	Public Water Systems (PWS) are now required to monitor for both chemical and bacteriological contaminants. Some of these monitoring requirements can be waived for those systems that have implemented SWP plans. (See Above)
Ted Bartke, USGS	N/A	
Karen M. Larsen, League of Women Voters	Addressing Cost/Benefit Concerns.	Cost/benefit estimates have been developed for public water systems that rely upon groundwater wells; WDEQ has developed two <u>Fact Sheets</u> describing the potential savings and the potential costs that might be avoided when PWSs implement SWP plans. EPA has also developed cost/benefit reports. (<u>See Handouts</u>)

Question 2: Who Benefits from Implementing Source Water Assessment and Protection and How

RESPONDENT	COMMENTS	WDEQ RESPONSE
Martha S. Horn (for Janie Nelson), Oil & Gas Conservation Commission	N/A	
James C. Case, WYGS	It is important to document how benefits are achieved.	Noted.
David Zelenka, WWDC	N/A	
Floyd Field, WARWS	Would like local examples of process and benefits list with potential cost saving with SWP and without?	Cost/benefit estimates have been developed for public water systems that rely upon groundwater wells; WDEQ has developed two <u>Fact Sheets</u> describing the potential savings and the potential costs that might be avoided when PWSs implement SWP plans. EPA has also developed cost/benefit reports. <u>(See Handouts)</u>
John Barnes, State Engineer's Office	Same	

Question 2: Who Benefits from Implementing Source Water Assessment and Protection and How

RESPONDENT	COMMENTS	WDEQ RESPONSE
Rick Schuler, BLM	Not only who benefits but who (what entities) have to invest additional effort in project evaluations (during EISs & RMP) or project management.	It's not possible to predict how entities will be affected if a PWS or community decides to implement a SWP plan at the local level. The effect upon the entity will likely be determined by the requests or requirements of the local governing body.
Ken Hamilton & Jeff Lundberg	N/A	

Question 3: Other Concerns and/or Information Needs

RESPONDENT	COMMENTS	WDEQ RESPONSE
Michael Stull, WAM	I am concerned that funding the source water program using earmarked funds in the state revolving fund legislation will kill that bill. Opposition was very vocal on this issue.	WDEQ believes the earmarked funds can be used to assist small communities in developing local plans to protect their drinking water supplies. Without such funding many of these smaller systems would not be able to afford to develop such plans.
Jack States, Member Non-Point Source Task Force, Public Sector Representative	N/A	
Mark Opitz, NRCS Casper, WY	N/A	
Ted Bartke, USGS	Voluntary program versus regulatory program. Relationship between voluntary state program with regulatory EPA program. Responsibility for source identification and responsibilities of all parties if source outside source-water protection area. How to keep SWAP plans simple and straightforward to non-technical local administrators.	The SDWA Act requirement that states develop a Source Water Assessment Plan does not apply to Wyoming since it does not have primacy for the drinking water program. There are no requirements for implementation of SWAPs at the local level. The potential contaminant source identification portion of a SWAP applies only to those potential sources that lie within the delineated source water area.

Question 3: Other Concerns and/or Information Needs

RESPONDENT	COMMENTS	WDEQ RESPONSE
Karen M. Larsen, League of Women Voters	I have just begun to digest the information as I was not, unfortunately, at the first meeting. My basic concerns are to look at ways to protect water sources that involve the public and users in decisions. Collaborative solutions are better long term solutions, when possible. I am also concerned how this ties in with other programs and the chance to combine resources. There will, no doubt, be more questions as I become more involved. Thank you for the opportunity to be involved in this issue.	The Advisory Committee is encouraged to look for efficiencies in all aspects of developing the SWAP.
Martha S. Horn (for Janie Nelson), Oil & Gas Conservation Commission	This agency needs whatever information becomes available through the SWAP. We use the information to inform oil & gas operators when they have to take steps to avoid having impact on fresh waters. We also use the information to determine who might be responsible for impacting fresh water and impose mitigation requirements on guilty parties. This information is also helpful in settling disputes.	Local Source Water Assessments (i.e. Delineation, Inventory and Susceptibility Determination must be made available to the public.
James C. Case, WY GS		

Question 3: Other Concerns and/or Information Needs

RESPONDENT	COMMENTS	WDEQ RESPONSE
David Zelenka, WWDC	The WWDC is a participating agency with WDEQ and WSLIB in securing federal money for the State Drinking Water Revolving Loan. The Source Water Assessment Program is a function eligible for funding under the revolving fund program. To the extent that your program is compatible with and comprehensive enough to meet the SDWRF criteria, it will be sufficient enough for our needs.	
Floyd Field, WARWS	Concerns: Cost, time table, regulatory, effectiveness, cooperation - individual, local, county, state.	Most, if not all of these will be dependent upon the approaches that this Advisory Committee determines appropriate for Wyoming's Source Water Assessment Plan.
John Barnes, State Engineer's Office	N/A	

Question 3: Other Concerns and/or Information Needs

RESPONDENT	COMMENTS	WDEQ RESPONSE
Rick Schuler, BLM	Time consuming program requirements, if these exist, will likely pose a concern for industry and land management agencies that are required to “timely” process (analyze & approve) proposed projects. Please discuss the nature and scope of probable controls and their likely effects.	<p>A discussion of the types of management approaches, both voluntary and regulatory, that local governments may wish to adopt for protection of their drinking water supplies can be found in Section IV and Appendix L of <i>Wyoming’s Wellhead Protection Guidance Document</i>.</p> <p>The Source Water Assessment Plan (SWAP) to be developed with the input and assistance of the Advisory Committee should describe the procedures used to complete the assessment (i.e. Delineation, Inventory, Susceptibility Determination), not how the assessment will be used by local governments - that decision remains with the local governing body.</p>
Ken Hamilton & Jeff Lundberg		

Question 4: Delineation of Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Michael Stull, WAM	An explanation of the process.	Presentations on the process of delineating groundwater supplies and drinking water supplies will be given. For further information, refer to Section II and Appendix D of <i>Wyoming's Wellhead Protection Guidance Document</i> .
Jack States, Member Non-Point Source Task Force, Public Sector Representative	It is likely that Wyoming municipalities in the categories above may be unaware of kinds and (potential) sources of contamination of their surface and/or well drinking water for which their purification systems are inadequate. The areas involved may be extensive and the hazards may be periodical or seasonal, never-the-less exceeding water quality standards.	The decision to use, or not use the information provided in a Source Water Assessment (i.e. Delineation, Inventory, Susceptibility Determination) is left up to the municipality.
Mark Opitz, NRCS Casper, WY	I need to know which PWS are surface water and which are groundwater. Of the PWS that are surface water, is that a direct diversion from a stream (name of stream & diversion point), or a reservoir (name of reservoir and location).	(See Handout)

Question 4: Delineation of Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Ted Bartke, USGS	Is SWAP going to start with aquifer protection and expand to groundwater and surface water protection or start with groundwater and surface water protection? If the latter, how will surface water delineation be addressed?	The SWAP simply describes how Source Water Assessments (i.e. Delineation, Inventory, Susceptibility Determination) will be performed for wells and surface waters that supply Public Water Systems (PWS). There are a variety of options (presented today) for the delineation of surface water supplied systems - the Advisory Committee should help in deciding which option Wyoming prefers to implement.
Karen M. Larsen, League of Women Voters	What areas are presently defined? What scale are areas- stream, watershed, etc.	We know that many communities are interested in developing plans to protect their drinking water supplies, however we don not know how many have delineated their source water areas.
Martha S. Horn (for Janie Nelson), Oil & Gas Commission	We need to be kept informed of all source water protection areas, all wellhead protection areas and all sole source aquifer areas.	The Advisory Committee should consider OGCC's need for information when formulating an approach on how the Source Water Assessment information will be made available to the public.
James C. Case, WY GS	Again, I am interested in delineation of source water protection areas vs. delineation of wellhead/aquifer protection areas.	Presentations on delineation approaches will be given.
David Zelenka, WWDC	N/A	

Question 4: Delineation of Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Floyd Field, WARWS	Procedures to determine area.	Presentations on delineation approaches will be given.
John Barnes, State Engineer's Office	Same	
Rick Schuler, BLM	Please explain the process and the manner in which these may be protected by mandatory review and control; any voluntary controls?	<p>A discussion of the types of management approaches, both voluntary and regulatory, that local governments may wish to adopt for protection of their drinking water supplies can be found in Section IV and Appendix L of <i>Wyoming's Wellhead Protection Guidance Document</i>.</p> <p>The Source Water Assessment Plan (SWAP) to be developed with the input and assistance of the Advisory Committee should describe the procedures used to complete the assessment (i.e. Delineation, Inventory, Susceptibility Determination), not how the assessment will be used by local governments - that decision remains with the local governing body. The selection and adoption of 'management approaches' is a local government decision.</p>
Ken Hamilton & Jeff Lundberg	How far up the creek/river can or should a source water protection area extend?	It can vary: presentations on delineation approaches will be given.

Question 5: Identification of Potential Contaminant Sources Within Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Michael Stull, WAM	The process used to ID these sources and what interested parties are involved during the identification process.	Various alternatives for ID'ing potential sources of contaminants exist, as well as the degree to which interested parties are involved. The Advisory Committee has a great deal of flexibility in determining which approach Wyoming should use. (See p. 2-15 and Appendix E of SWP Guidance Document)
Jack States, Member Non-Point Source Task Force, Public Sector Representative	Variable runoff and erosion of watercourses upstream of the appropriation site may deliver agricultural fertilizer, organic wastes, pesticides and herbicides. Agricultural, mining and industrial waste dumps may be cut through delivering unanticipated pollutant loads. Petroleum products incorporated in snow and rain and flushed through cities into watercourses are increasingly a significant but not fully assessed source of contamination (i.e. city of Jackson).	Noted.
Mark Opitz, NRCS Casper, WY	What potential sources of contamination to PWS have already been identified? I believe that spills, i.e. pipelines, railroad, highways industrial, and agricultural should be identified as potential sources to both groundwater and surface water PWS sources.	See Appendix E of SWP Guidance Document and Table III-1 of <i>Wyoming's Wellhead Protection Guidance Document</i> .
Ted Bartke, USGS	How will surface water delineation be addressed? Entire basin?	Presentation to be given.

Question 5: Identification of Potential Contaminant Sources Within Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Karen M. Larsen, League of Women Voters	What programs/processes are being used/considered to proactively address contamination potential.	
Martha S. Horn (for Janie Nelson), Oil & Gas Commission	We need the information for use in evaluating areas and administering our own programs.	The Advisory Committee should consider OGCC's need for information when formulating an approach on how the Source Water Assessment information will be made available to the public.
James C. Case, WY GS	My concern or interest is the relationship between source water protection and wellhead/aquifer protection.	Source Water Protection occurs when a community (or other owner/operator of a Public Water System) uses the information obtained through a Source Water Assessment (i.e. Delineation, Inventory, Susceptibility Determination) to develop a local plan to protect the drinking water supply, from contamination; the drinking water supply may be supplied by a well (i.e. groundwater) or surface water. Wellhead/Aquifer Protection involves using the same types of information, but for the protection of groundwater supplies only - not surface water supplies.
David Zelenka, WWDC	N/A	

Question 5: Identification of Potential Contaminant Sources Within Source Water Protection Areas

RESPONDENT	COMMENT	WDEQ RESPONSE
Floyd Field, WARWS	N/A	
John Barnes, State Engineer's Office	Same	
Rick Schuler, BLM	Compare and relate this to existing programs i.e. aquifer vulnerability studies?	Aquifer vulnerability maps may be one tool that can be used to help determine the susceptibility of the drinking water supply to potential sources of contaminants within the source water area.
Ken Hamilton & Jeff Lundberg	What criteria will be used for contaminant identification?	See p. 2-15 of SWP Guidance Document. One criteria that can be used is a determination as to whether a potential source of contamination is considered to be 'significant'.

Question 6: Susceptibility Determinations for Source Water Protection Areas

RESPONDENT	COMMENTS	WDEQ RESPONSE
Michael Stull, WAM	N/A	
Jack States, Member Non-Point Source Task Force, Public Sector Representative	The sources described above, and others, need to be identified and evaluated. Information can be obtained through cooperative assessments with other programs, e.g. TMDL's impaired streams etc..	
Mark Opitz, NRCS Casper, WY	I am not familiar with any of the methods that are used to determine susceptibility of PWS to contamination. What methods are used in Wyoming for both surface water and groundwater?	Presentation to be given.
Ted Bartke, USGS	Relate WHP programs to SWAP, especially how to include surface water susceptibility.	Presentation to be given.
Karen M. Larsen, League of Women Voters	See above.	
Martha S. Horn (for Janie Nelson), Oil & Gas Conservation Commission	We need the information for use in evaluating areas, and administering our own programs.	The Advisory Committee should consider OGCC's need for information when formulating an approach on how the Source Water Assessment information will be made available to the public.

Question 6: Susceptibility Determinations for Source Water Protection Areas

RESPONDENT	COMMENTS	WDEQ RESPONSE
James C. Case, WYGS	N/A	
David Zelenka, WWDC	N/A	
Floyd Field, WARWS	How will “susceptibility” be determined? What will be the basis? Will it be local in scope or broad based? Will we include all programs active in this area?	See p. 2-18 and Appendix F of SWP Guidance Document; the determination of susceptibility will be left up to the Advisory Committee and the criteria established in the guidance document.
John Barnes, State Engineer’s Office	Same	
Rick Schuler, BLM	Characterize this process and the roles of various entities.	See p. 2-18 and Appendix F of SWP Guidance Document; the determination of susceptibility will be left up to the Advisory Committee and the criteria established in the guidance document.
Ken Hamilton & Jeff Lundberg		

Newsletter Articles

Source Water Assessment and Protection Articles Published in the Wyoming DEQ Quarterly Newsletter

October 1997

OTHER GROUNDWATER PREVENTION PROJECTS

- # Beginning on July 1, 1997, the groundwater protection program began reviewing subdivision applications in coordination with county organizations to insure that proposed water supply and sewage systems are adequate, safe, and compatible to protect the groundwater resource.
- # A Pesticide Management Plan has been developed jointly with the Department of Agriculture and interested public stakeholders. The plan provides for monitoring, outreach, and enforcement for pesticide use to protect groundwater. In conjunction with this plan, the division is prioritizing wells in the areas most sensitive to groundwater pollution in order to assess statewide pesticide contamination. Nitrates contamination is also being assessed. The draft has been submitted to the federal government for comment/approval.
- # Beginning in October, a source water protection program (includes wellhead protection) for Wyoming public water systems will be developed utilizing an advisory committee made up of interested stakeholders.
- # The Groundwater Sensitivity/Aquifer Vulnerability maps and final report for 14 counties are scheduled for completion in December, 1997.

January 1998

SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

What's It All About?

The Safe Drinking Water Act (Act) was reauthorized by Congress on August 6, 1996. Prior to 1996, the Act primarily regulated the treatment and distribution of drinking water from public water systems. The 1996 reauthorization now requires States having primary responsibility for regulating public water systems to develop a Source Water Assessment Program (SWAP) and conduct source water assessments. The SWAP would provide for an initial assessment, or 'snapshot', of public water systems by accomplishing: 1) a delineation of the land area surrounding a surface or groundwater source of drinking water through which contaminants could move and reach the well or intake; 2) an inventory of 'significant' existing and potential contamination sources within the source water area, and; 3) an analysis of the susceptibility, or likelihood, that a contaminant will reach the well or intake in an amount that will impact the public water system's ability to deliver safe drinking water.

Benefits that public water systems might realize from using source water assessments to develop local source water protection plans include: potentially reducing monitoring requirements and associated expenses; avoiding costs of treatment for contaminated drinking water supplies; and avoiding costs of replacing drinking water supply wells or other sources.

Although Wyoming does not have this EPA-delegated responsibility (and is not required to develop a SWAP or conduct assessments) the Act includes a unique 'one-time-only' opportunity for Wyoming to use special federal 'set-aside' funding for conducting source water assessments. The ability to use these set-aside funds (approximately \$1.2 million) is dependent upon the passage of legislation during the forth coming legislative session. Such funding would be especially useful to the many small community public water systems who often have difficulty in financing the 'delineation' and 'inventory' portions of wellhead and

source water protection plans. If the establishment of set-aside funding is not authorized, public water systems that are in the process of developing, or wish to develop local drinking water protection plans will have to rely upon their own sources of funding.

For further information, or to obtain a copy of EPA's 'State Source Water Assessment and Protection Programs Final Guidance' or 'Wyoming's Wellhead Protection Guidance Document', contact Kevin Frederick in Cheyenne at 307-777-5985.

June 1998

SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

Wyoming's Source Water Assessment Advisory Committee held its third meeting on April 9, 1998, in Cheyenne to continue its work in assisting WQD with development of a Source Water Assessment program. The committee heard presentations from the U. S. Environmental Protection Agency (EPA) describing the types of Public Water System (PWS) monitoring waivers that are recognized by EPA and may be used by PWS's with Local Source Water Assessment (including Wellhead Protection) plans to reduce monitoring requirements and costs. In development of its monitoring waiver program for Wyoming PWSs, EPA has offered to include the advisory committee in the design of a waiver program that recognizes the benefits of local source water assessment and wellhead protection plans.

The committee also began to identify criteria that could be used to prioritize the order in which Source Water Assessments could be accomplished for PWSs using federal funds (\$1.25M) approved during the 1998 legislative session. The committee will reconvene in June to re-evaluate the prioritization scheme and provide recommendations on WQD's draft plan describing an approach to performing source water assessments.

WQD is pleased to announce that *Wyoming's Wellhead Protection Guidance Document* is now available for viewing and download on the Internet at:

www.wrds.uwyo.edu/wrds/deq/deq.html

For further information about Source Water Assessment and Wellhead Protection, contact Kevin Frederick at 307-777-5985.

September 1998

SOURCE WATER ASSESSMENT AND PROTECTION PROGRAM

The Source Water Assessment Advisory Committee met on June 16 and July 27 to continue discussions for development of Wyoming's Source Water Assessment Program. Progress continues to be made in determining approaches for delineating Source Water Protection Areas (SWPA's) and completing inventories of potential contaminant sources within those areas. The Committee has recommended adoption of the delineation methods and criteria defined in *Wyoming's Wellhead Protection Program Guidance Document* as the approach to be taken for delineating SWPA's supplied by wells. The committee is currently evaluating methods and criteria to delineate SWPA's supplied by surface water.

The advisory committee and WDEQ are in the process of finalizing a ranking, or prioritization, system to establish the order in which Source Water Assessments conducted by the state will be completed. The ranking will likely be dependent upon system size, vulnerability, and median household income of the area. Source Water Assessments will be completed for those Public Water Systems that score the highest, followed by the next highest, etc. This fall, WDEQ will be contacting Public Water Systems and local governments to identify those systems that are interested in having Source Water Assessments completed for them at no charge. These systems will then be ranked and prioritized as described above. Source Water Assessments will be completed for as many systems on the list as funding allows. Only those system owners that express an interest will be placed on the priority list. Missing this opportunity, owners/operators will have to find their own source of funding if they want to develop a source water assessment. System owners and operators should begin now to think about how they will respond when they are asked about their interest in source water assessments. For further information contact Kevin Frederick at 307-777-7781.

January 1999

SOURCE WATER

ASSESSMENT AND PROTECTION PROGRAM

A draft of *Wyoming's Source Water Assessment Program (SWAP)* has been developed by the Water Quality Division with input and assistance from a citizen/technical advisory committee. Source water assessments are intended to provide useful information to local governments and private owner/operators to assist them in protecting their sources of drinking water. The plan describes how source water assessments will be completed for those Wyoming public water supply systems that wish to have assessment information compiled for them. The plan also includes proposed methods for: delineating source water areas, developing an inventory of potential contaminant sources within the source water area, determining the susceptibility of the public water supply to contamination, and making assessment information available to the public. The proposed plan will be presented to the Water and Waste Advisory Board for adoption at its next scheduled meeting on February 8, 1999 at 10:00 AM in Room 1699 of the Herschler Building in Cheyenne. The public is encouraged to review the proposed plan and provide public comment before the Advisory Board, or provide written comment to the Water Quality Division before February 8, 1999. Copies of the draft plan may be obtained by contacting the Water Quality Division's Cheyenne office at (307)-777-7781. The document will also be available for viewing and downloading from the Division's Web page at:

<http://deq.state.wy.us/wqd.htm>

**Correspondence Received
Commenting On The Source Water Assessment And
Protection Draft Document**



United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

RECEIVED

JAN 19 1999

**WATER QUALITY DIVISION
WYOMING**

In Reply Refer To:

7240 (930)

Mr. Kevin Frederick
Water Quality Division,
Wyoming Department of Environmental Quality
Herschler Building, 122 West 25th Street
Cheyenne, Wyoming 82002

JAN 15 1999

Dear Mr. Frederick:

We reviewed your draft Source Water Assessment Program and found it to be very comprehensive and well written. Based upon our understanding of the program, we would like to offer the following thoughts for your consideration as you prepare your final version of this plan. We also encouraged our Field Offices to review this document from your Internet site and submit comments directly to your office.

<u>PAGE</u>	<u>PARA.</u>	<u>LINE</u>	<u>COMMENTS</u>
1	2	8	Change: "...develop and plans...." to "...develop plans...."
2	3	2	Change: "...water assessments; assessments..." to "...water assessments. Assessments..."
9	5	3	Figure 3.1 is referred to but it does not appear in the text.
11	1	xx	The thought may track better if the first paragraph on page 11 is moved so it follows the "Calculated Fixed Radius" paragraph.
12	1	xx	We suggest that recharge areas outside that 500' radius but having conduit flow, e.g., scoria outcrops, should have a Zone A contaminant source inventory due to the potential for high conductivity. Certainly other portions of the watershed not having as direct a connection with the aquifer could have a Zone B type inventory.
13	5	xx	Perhaps the 8 hrs. TOT should be subject to exceptions (i.e., increased to 16 or 20 hrs. TOT) especially in a situation where the intake is in a more remote area (e.g., having limited highway access) where spill observation and response is more restricted. Also, perhaps a combination of TOT and a mileage standard should be applied for the tributaries, e.g., if a tributary is within <8 hr. TOT then apply a 200' wide assessment area for a distance of 1½ miles upstream from the mainstem and if it is outside an 8 hr. TOT then apply a 1 mile distance upstream.

16	2	xx	Will Confined Feeding Operations be included in this limited potential contaminant source inventory?
19	1	3 to end	We suggest that the 2 nd part of this paragraph, "The WDEQ is not proposing...and, 3) vulnerability assessment results"...be moved to page 17 and inserted following the last paragraph on that page.
20 and 24	2	xx	Should any of BLM's campground drinking water systems qualify as transient non-community systems, will the state consider including BLM systems in an Area-Wide assessment at no cost, or with matching funding, or in-kind service?
21	3	5	Consider including "railroads" in the transportation theme.
22	2	4	We encourage that the locations of intakes, etc., be available from the state by some means so that BLM may consider such information (without disclosure) in assessment of land use impacts.
31	11	last	Change "...water systems, an other..." to read "...water systems, and other..."
33			We suggest that "vulnerability" be defined as well.
Appx A			This is a fairly significant departure from the original outline but it is still reasonable. It will be interesting to see what the results of its use will be.
Appx B			Rick Schuler referenced his own notes on the SWAP meeting of July 27, 1998. He felt that the record on the 2 nd page of the minutes of July 27, 1998, would more accurately reflect his statement if it read, "Rick Schuler stated that the purpose of the conducting source water assessments is to provide useful information to PWSs and asked the PWS operators present whether the delineation and source inventory of a watershed as described will give them the information they need for best system management." Although he noticed the inconsistency when these minutes were first distributed within the Advisory Group he felt it was a minor oversight, not knowing that the minutes were to be included in the final SWAP document.
Appx B			Also, the record on the 3 rd page of the minutes of the November 4, 1998, meeting would more accurately reflect Rick's statement if it read, "Rick Schuler asked the PWS operators present whether the source water assessment information is important to their system operation."

Appx C

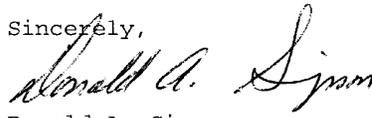
There are several typos in the table of Potential Sources of Contaminants; under Industrial, correct the spelling of "septage" lagoons; under Residential, delete the (//) after strippers, change "lawns (chemical" to "lawn chemicals", and delete the (,) after cesspools; under Waste Management, add a parentheses after treatment tanks.

Appx E

Under "OTHER STATE AGENCIES", it should read the University of Wyoming Spatial Data and Visualization Center.

We appreciate the opportunity to provide this input and look forward to continuing our work with you on the Source Water program. Please contact Rick Schuler at 775-6092 if you have any questions regarding our comments.

Sincerely,



Donald A. Simpson
Deputy State Director,
Resources Policy & Management

February 8, 1999

Administrator
WDEQ - WQD
122 W 25th St., 4W
Cheyenne, WY 82002

RE: Wyoming's Source Water Assessment Program

Dear Ladies and Gentlemen of the Water and Waste Advisory Board:

I am writing this letter to respond to an invitation to make comments on the Wyoming Source Water Assessment (SWAP) Plan Draft Guidance Document. I believe the program will benefit the people of Wyoming that are users of water from public water systems. However, I do have a few comments to make regarding the plan.

In the second paragraph of the Executive Summary (pg. 1), what do the last two words "technical capacity" mean? Please define what is meant by this term or give it some context. Also in that same sentence should it read, "Information derived from the source water assessments can be used to develop plans", leaving out the "and"? In the subheading Exceptions to the Ranking Process, first paragraph (pg. 2) who is the Water Development Office, is this the Wyoming Water Development Commission? In the second paragraph, first sentence should the sentence read, in part, "designed to assist local public water systems", not "local water supplies"?

In Chapter III, Public Water Supply System Types subsection, where is Figure 3.1? Under the Surface Water Assessment Approach for Rivers and Streams, how does the SWAP program plan to delineate protection areas where canals are used to convey surface water to the treatment plant? Several Wyoming surface water systems convey water from a surface water body to their treatment plants via open canals. Additionally, I would recommend that the SWAP Guidance Document stipulate that when calculating the 8-hour time of travel (TOT) Zone B protection areas for surface water systems, stream flows be high stage, ie. spring runoff flows. Using the high stream flows in the TOT calculations will result in the most conservative protection area and will provide the most protection for a surface water system should they decide to continue with Source Water Protection.

In Chapters IV and V the SWAP Draft Guidance Document states that nitrates are contaminants of concern for Transient, Non-Community PWSs. Because any individual, including the very young and the aged, is unlikely to consume large quantities of water from one Transient, Non-Community PWS, why are nitrates listed as a contaminant of concern. It is highly unlikely that occasional consumption of water with elevated nitrate levels will cause harm to an individual. Is nitrate concentration in the water being used as an indicator for other contaminants?

Thank you for the opportunity to make comments on the Wyoming Source Water Assessment Program Draft Guidance Document and thank you for your consideration of these items of concern to me

Sincerely,

A handwritten signature in black ink, appearing to read 'BJJ', with a long horizontal line extending to the right.

Ben J. Jordan
Weston Engineering, Inc.

From: Larry Martin <Larry_Martin@nps.gov>
To: DEQ.CHEYENNE(KFREDE)
Date: 1/22/99 11:35am
Subject: draft SWAP comments

The only comment I have is that I don't think you should terminate assessment areas at the State border. I know there are political boundaries, but that shouldn't prevent the PWS operator from identifying the contributing area or potential contaminant sources in the adjacent state.

I certainly like this document more than Utah's. I've done a couple of WHPA's for small parks in Utah this year and have found that Utah micro-manages the process to where anyone who can read and follow their guidelines could do the WHPA report. No hydro background necessary.

Larry

From: Mike Hackett
To: Frederick, Kevin
Date: 2/5/99 2:08pm
Subject: Draft SWAP

A couple of comments on the draft.

- 1). Page 1, 2nd para., 8th line - develop and plans
- 2). Page 9, "Public Water Supply System Types:" - There is a reference to Figure 3.1 which was not found in my draft copy.
- 3). Page 11, Hydrogeologic and Aquifer Vulnerability Mapping: - Using this delineates the outer boundary of the source water assessment area - but it was unclear to me how this relates to Zones 1, 2, or 3 and whether a comprehensive or limited potential contaminated source inventory is to be conducted.
- 4). Page 11 - Confined Aquifers - How are confined aquifers less than 100 ft. deep going to be treated? I assume that a comprehensive inventory is required but for what distance from the well?
- 5). Page 13 - Surface Water Assessment Approach for Rivers and Streams - Zone B Cutting off the Zone B at another intake would need to assume that the other community water system has or will in the near future conduct a source water assessment otherwise the Zone B should continue on to the 8 hour time of travel.

Mike Hackett

APPENDIX B

Public Water System Ranking Score Sheet

Score Sheet for Ranking Wyoming Public Water Supply Systems (PWSS) for Completion of Source Water Assessments

I. VULNERABILITY:

Points will be awarded for the apparent vulnerability of the PWSS to contamination.

	<u>Points Possible</u>	<u>Points Received</u>
A. Detections during the last five years of SDWA-regulated chemical contaminants at concentrations below MCLs (excluding lead and copper)	<u>number of detections x 2</u>	_____
B. Type of water supply		
1. Surface water	_____ 4 _____	_____
2. Unconfined Aquifer	_____ 3 _____	_____
3. Confined Aquifer	_____ 2 _____	_____
C. Location of surface water intakes within a watershed		
1. Undeveloped headwaters with no evidence of future development	_____ 1 _____	_____
2. Undeveloped headwaters with evidence of future development	_____ 3 _____	_____
3. Urban or Industrialized mainstem	_____ 5 _____	_____
Vulnerability Issues Points		_____

II. POPULATION CONSIDERATIONS:

Points will be awarded for cost-effectiveness of completing source water assessments.

A. Population served		
1. Greater than or equal to 5000	_____ 5 _____	_____
2. Less than 5000 but more than or equal to 2000	_____ 4 _____	_____
3. Less than 2000 but more than or equal to 1000	_____ 3 _____	_____
4. Less than 1000 but more than or equal to 500	_____ 2 _____	_____
5. Less than 500	_____ 1 _____	_____
Population Points		_____

III. GREATEST BENEFIT CONSIDERATIONS:

For publicly owned systems, points will be awarded based upon the type of system.

A. Type of PWSS:

1. Community	<u>10</u>	_____
2. Non-transient, Non-Community	<u>5</u>	_____
3. Transient, Non-Community	<u>3</u>	_____

Greatest Benefits Points _____

NOTE: Privately owned systems will be awarded 1 point.

POINTS AWARDED

Vulnerability Issues Points _____
Population Points _____
Greatest Benefits Points _____

Total Points _____

APPENDIX C

Information Sources

STATE DATA AVAILABLE

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) 122 W 25TH STREET, 4W; CHEYENNE, WY 82002	
AGENCY	INFORMATION AVAILABLE
Water Quality Division (WQD) District Offices Cheyenne: 307-777-7781 Lander: 307-332-3144 Sheridan: 307-672-6457	<ul style="list-style-type: none"> * NPL/CERCLA/FUD Sites (DSMOA Program) * Leaking Underground and Above Ground Storage Tanks * Surface Water Discharge Permits (NPDES) * Storm Water Pollution Prevention Plans & Permits * Sewage Treatment Plants & Wastewater Permits * Industrial Wastewater Treatment Plants * Animal Waste Management Facilities (over 1000 animal units) * Injection Wells (Classes I, III, IV & V) * Groundwater Monitoring Systems and Water Quality Information * Private Septic System Rules and Permits for the 8 Undelegated Counties * Wellhead Protection Planning * Groundwater Pollution Control Sites/Known Contamination Sites * Groundwater Pollution Investigations * Groundwater Sensitivity and Aquifer Vulnerability Maps * Land use maps * Well characteristic database * Public Water System (PWS) Construction Permits * Non-Point Source Pollution Control Program * Subdivision Permit Reviews
Solid and Hazardous Waste Division (SHWD) District Offices Cheyenne: 307-777-7752 Lander: 307-332-6924 Casper: 307-473-3750	<ul style="list-style-type: none"> * Hazardous Material Treatment, Storage and Disposal Facilities * RCRA Permits/Hazardous Waste Facility Cleanup * Solid Waste Management Storage, Treatment and Disposal Facilities (land farms, landfills, etc.) * Incinerators, Transfer Stations, Recycling Centers * Pollution Prevention (Assistance to Industry Regarding Source Reduction, Recycling or Treatment to Reduce Toxicity or Volume) * Spills, Leaks, Complaint Investigations
Land Quality Division (LQD) District Offices Cheyenne: 307-777-7756 Lander: 307-332-3047 Sheridan: 307-672-6488	<ul style="list-style-type: none"> * Mine Permits * Underground Mines * Above Ground Mines
Abandoned Mine Lands (AML) District Offices Cheyenne: 307-777-6145 Lander: 307-332-5085 Casper: 307-473-3460	<ul style="list-style-type: none"> * Abandoned Mine Areas * Acid Mine Drainage

AGENCY	INFORMATION AVAILABLE
OTHER STATE AGENCIES	
Wyoming Oil and Gas Conservation Commission (OGCC) Casper: 307-234-7147	<ul style="list-style-type: none"> * Oil & Gas Wells * Oil and Gas Production, Refining, Transport (Pipelines) & Storage Facilities * Class II Injection Wells
Wyoming State Geologic Survey (WY GS) Laramie: 307-766-2286	<ul style="list-style-type: none"> * General Geologic information * Geologic and Topographic Maps * Mineral Production and Reserves
Wyoming State Engineer's Office (SEO) Groundwater Division Cheyenne: 307-777-6163	<ul style="list-style-type: none"> * Well Completion Reports; Permits for water supply wells and monitoring wells * Ground Water Resource Information
Wyoming Department of Agriculture Technical Services Cheyenne: 307-777-6590	<ul style="list-style-type: none"> * Certification of Pesticide Applicators * Pesticide and Fertilizer Best Management Practices (BMPs)
Wyoming Department of Transportation (DOT) Maintenance Dept. Cheyenne: 307-777-6590	<ul style="list-style-type: none"> * Identification of DOT Storage Sites of regulated and non-regulated substances (e.g., salt) * Hazardous Cargo Shipments and Routes * Chemical Usage Locations * Aerial Photography Services
University of Wyoming Spatial Data and Visualization Center Laramie: 307-766-2532	<ul style="list-style-type: none"> * Groundwater Sensitivity Maps and Aquifer Vulnerability Maps
University of Wyoming Water Resources Data System Laramie: 307-766-6651	<ul style="list-style-type: none"> * Water Quality Databases * Wyoming Water Bibliography * Public Water System Databases

FEDERAL DATA AVAILABLE

CERCLA INFORMATION SYSTEM (CERCLIS)

Description: An inventory of potential hazardous waste sites in the United States. CERCLIS covers incidents of hazardous chemical spills as well as hazardous waste sites nominated or selected for cleanup under the provision of the Superfund Amendments and Reauthorization Action 1986 (SARA).

Developed by:

US EPA
Office of Emergency & Remedial Response
Office of Solid Waste & Emergency Response

Contacts:

FOI Office (A-101)
US EPA
401 M. Street, SW
Washington, DC 20460
(202)260-4048

US EPA
401 M. Street, SW
Washington, DC 20460
(202)260-9833

CERCLIS Hotline
(202)260-0056

US EPA Region VIII
(800)227-8917

Information Available:

- C **Site identification:** EPA identification number, name, alternate name (if applicable), geographic location (e.g., street address, city, county, State, and ZIP code, EPA Region
- C **Action taken at the site:** pre-cleanup investigations, cleanup activity status, and for some sites, descriptions of environmental problems encountered. During the Preliminary Site Investigation, if the site is found to pose no environmental threat and require No Further Action, a NFA flag appears in this column
- C **Project dates:** actual start and completion dates
- C Lead agencies
- C **Off-site waste transfer information:** names and addresses of wastes transferred, estimated amounts transferred, and basis for these estimates

RCRA INFORMATION SYSTEM (RCRIS) (replacing HWDMS)

Description: This database contains permitting and compliance monitoring activities for all generators, transporters, and Treatment, Storage and Disposal facilities.

Developed by:

US EPA
Office of Planning, Policy & Information and
Office of Solid Waste

Contacts:

US EPA
401 M. Street, SW
Washington, DC 20460
(202)260-2670

US EPA Region VIII
(800)227-8917

Information Available:

- C Information on waste types
- C Estimated annual quantities
- C Management processes
- C Data derived from Part A permit application

APPENDIX D

Contaminant Inventory Tables

Examples of Potential Sources of Contamination

Commercial	Industrial	Residential
Airports	Asphalt plants	Fuel storage systems
Automobile repair shops	Automobile service station disposal wells	Furniture and wood strippers, paints
Boat yards, marinas	Chemical manufacturing, warehousing, and distribution sites	Household hazardous chemicals, cleaning supplies
Construction areas	Construction excavations	Household lawns (fertilizers, lawn chemicals)
Car washes	Detonation sites	Septic systems, cesspools
Cemeteries (fertilizers, lawn chemicals)	Electrical/electronic products manufacturing	Sewer lines
Dry cleaning establishments	Electroplating and metal fabrication	Swimming pools (chlorine)
Educational institutions (labs, lawns, and chemical storage areas)	Foundries	
Gas stations	Industrial process water disposal wells	Waste Management
Golf courses (fertilizers, lawn chemicals)	Machine and metalworking shops	Fire training facilities
Jewelry and metal plating businesses	Manufacturing and distribution sites for cleaning supplies	Hazardous waste management sites (landfills, land treatment areas, waste piles, incinerators, and treatment tanks)
Laundromats	Mineral extraction disposal wells	Municipal incinerators
Material transport routes, yards, and maintenance facilities (trucks and railroads)	Mining (surface and underground) and mine drainage and waste piles	Municipal landfills
Medical facilities	Oil and gas disposal wells	Municipal wastewater treatment facilities
Paint shops	Petroleum product production, storage, and distribution centers	Open burning sites
Photography and printing establishments	Pipelines (oil, gas, slurry)	Recycling and reduction
Research laboratories	Radioactive disposal sites	
Stormwater drains, retention basins	Septage lagoons and sludge	Agricultural
Road maintenance operations (de-icing, road salt, pesticides)	Storage tanks and pipes (aboveground and underground)	Animal burial areas
Road maintenance depots (chemical storage)	Toxic and hazardous spills	Agricultural drainage
Scrap and junkyards	Wastewater disposal wells	Animal feedlots (operating and abandoned)
Storage tanks and pipes (aboveground and underground)	Class I, II, III, IV, and V wells	Chemical application and storage areas (for pesticides and fertilizers)
	Wood preserving facilities	Irrigated croplands

Chemicals and Products Often Associated With Potential Sources of Contamination

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT ^{1,2,3}
NATURALLY OCCURRING SOURCES	
Rocks and soils (0001)	<u>Aesthetic Contaminants:</u> Iron and iron bacteria; manganese; calcium and magnesium (hardness) <u>Health and Environmental Contaminants:</u> Arsenic; asbestos; metals; chlorides (fluorides, sulfates); sulfate-reducing bacteria; other microorganisms
Water (0002)	Excessive sodium; bacteria; viruses; low pH (acid) water
Decaying organic matter, Bacteria (0003)	
Geological radioactive gas (0004)	Radionuclides (radon, etc.)
Natural hydrogeological events and formations (0005)	Salt-water/brackish water intrusion (or intrusion of other poor quality water); contamination by a variety of substances through sink-hole infiltration in limestone terrains
AGRICULTURAL SOURCES (K)⁵	
Animal feedlots (0006) and burial areas (0007)	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform ⁶ and non-coliform bacteria; viruses
Manure spreading areas (0008) and storage pits (0009)	Livestock sewage wastes; nitrates
Livestock waste disposal areas (0010)	Livestock sewage wastes; nitrates
Crop areas and irrigation sites (0011)	Pesticides; ⁷ fertilizers; ⁸ gasoline and motor oils from chemical applicators
Chemical storage areas and containers (0012)	Pesticide ⁷ and fertilizer ⁸ residues
Farm machinery areas (0013)	Automotive wastes; ⁹ welding wastes
Agricultural drainage wells (0014) and canals (0015)	Pesticides; ⁷ fertilizers; ⁸ bacteria; salt water (in areas where the fresh-saltwater interface lies at shallow depths and where the water table is lowered by channelization, pumping, or other causes)

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT ^{1,2,3}
RESIDENTIAL SOURCES (D)	
Common household maintenance and hobbies (0016)	<p><u>Common Household Products:</u>¹⁰ Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides;¹¹; photochemicals; printing ink; other common products;</p> <p><u>Wall and Furniture Treatments:</u> Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers;</p> <p><u>Mechanical Repair and Other Maintenance Products:</u> Automotive wastes;⁹ waste oil; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rust-proofers; car wash detergents; car waxes and polishes; rock salt; refrigerants</p>
Lawns and gardens (0017)	Fertilizers; ⁷ herbicides and other pesticides used for lawn and garden maintenance ¹²
Swimming pools (0018)	Swimming pool maintenance chemicals ¹³
Septic systems (0019), cesspools (0020), and sewer lines (0021)	Septage; coliform and non-coliform bacteria; ⁶ viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides; ^{11, 12} paints; paint thinner; photographic chemicals; swimming pool chemicals; ¹¹ septic tank/cesspool cleaner chemicals; ¹⁴ elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Underground storage tanks (0022)	Home heating oil
Apartments and condominiums (0023)	Swimming pool maintenance chemicals; ¹³ pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control; ^{11,12} wastes from on-site sewage treatment plants; household hazardous wastes ¹⁰
GOVERNMENT SOURCES (E)	
Schools (0024) and government offices and grounds (0025)	Solvents; pesticides; ^{11,12} acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and heating oil from storage tanks; general building wastes ¹⁵
Park lands (0026)	Fertilizers; ⁸ herbicides; ¹² insecticides ¹¹
Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests (0027)	Pesticides ^{7,11}

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT ^{1,2,3}
Highways, road maintenance depots, and deicing operations (0028)	Herbicides in highway rights-of-way; ^{7,12} road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes ⁹
Municipal sewage treatment plants and sewer lines (0029)	Municipal wastewater; sludge; ¹⁶ treatment chemicals ¹⁷
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0030)	Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Land areas applied with wastewater or wastewater byproducts (0031)	Organic matter; nitrate; inorganic salts; heavy metals; coliform and non-coliform bacteria; ⁶ viruses; nitrates; sludge; ¹⁶ nonhazardous wastes ¹⁸
Storm water drains and basins (0032)	Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants
Combined sewer overflows (municipal sewers and stormwater drains) (0033)	Municipal wastewater; sludge; 16 treatment chemicals; ¹⁷ urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants
Recycling/reduction facilities (0034)	Residential and commercial solid waste residues
Municipal waste landfills (0035)	Leachate; organic and inorganic chemical contaminants; wastes from households ¹⁰ and businesses; ¹⁵ nitrates; oils; metals
Open dumping and burning sites (0036), closed dumps (0037)	Organic and inorganic chemicals; metals; oils; wastes from households ¹⁰ and businesses ¹⁵
Municipal incinerators (0038)	Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds
Water supply wells, monitoring wells, older wells, domestic and livestock wells (0039), unsealed and abandoned wells (0040), and test hole/wells (0041)	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Sumps and dry wells (0042)	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides; ⁷ and a wide variety of other substances
Drainage wells (0043)	Pesticides; ^{11,12} bacteria

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3}
Well pumping that causes inter-aquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc. (0044)	Saltwater; excessively mineralized water
Artificial ground-water recharge (0045)	Storm water runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses
COMMERCIAL SOURCES ©	
Airports (0046), abandoned airfields (0047)	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes; ⁹ heating oil; building wastes ¹⁵
Auto repair shops (0048)	Waste oils; solvents; acids; paints; automotive wastes; ⁹ miscellaneous cutting oils
Barber and beauty shops (0049)	Perm solutions; dyes; miscellaneous chemicals contained in hair rinses
Boat yards and marinas (0050)	Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes ⁹
Bowling alleys (0051)	Epoxy; urethane-based floor finish
Car dealerships (especially those with service depts.) (0052)	Automotive wastes; ⁹ waste oils; solvents; miscellaneous wastes
Car washes (0053)	Soaps; detergents; waxes; miscellaneous chemicals
Camp grounds (0054)	Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests; ^{7,11} household hazardous wastes from recreational vehicles (RVs) ¹⁰
Carpet stores (0055)	Glues and other adhesives; fuel from storage tanks if forklifts are used
Cemeteries (0056)	Leachate; lawn and garden maintenance chemicals ¹²
Construction trade areas and materials (plumbing, heating and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, roofing and sheet metal, wrecking and demolition, etc.) (0057)	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Country clubs (0058)	Fertilizers; ⁸ herbicides; ^{7,12} pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests; ¹¹ swimming pools chemicals; ¹³ automotive wastes

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3}
Dry cleaners (0059)	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)
Funeral services and crematories (0060)	Formaldehyde; wetting agents; fumigants; solvents
Furniture repair and finishing shops (0061)	Paints; solvents; degreasing and solvent recovery sludges
Gasoline services stations (0062)	Oils; solvents; miscellaneous wastes
Golf courses (0058)	Fertilizers; ⁸ herbicides; ^{7,12} pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests
Hardware/lumber/parts stores (0063)	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote
Heating oil companies, underground/above ground storage tanks (0064)	Heating oil; wastes from truck maintenance areas ⁹
Horticultural practices, garden nurseries, florists (0065)	Herbicides, insecticides, fungicides, and other pesticides ¹²
Jewelry/metal plating shops (0066)	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid
Laundromats (0067)	Detergents; bleaches; fabric dyes
Medical institutions (0068)	X-ray developers and fixers; ¹⁹ infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Office buildings and office complexes (0069)	Building wastes; ¹⁵ lawn and garden maintenance chemicals; ¹² gasoline; motor oil
Paint stores (0070)	Paints; paint thinners; lacquers; varnishes; other wood treatments
Pharmacies (0071)	Spilled and returned products
Photography shops, photo processing laboratories (0072)	Bio-sludges; silver sludges; cyanides; miscellaneous sludge
Print shops (0073)	Solvents; inks; dyes; oils; photographic chemicals
Railroad tracks and yards (0074)	Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties
Research laboratories (0075)	X-ray developers and fixers; ¹⁹ infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade; bleach); miscellaneous chemicals
Scrap and junk yards (0076)	Any wastes from businesses ¹⁵ and households; ¹⁰ oils

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3}
Sports and hobby shops (0077)	Gunpowder and ammunition; rocket engine fuel; model airplane glue
Aboveground and underground storage tanks (0078)	Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals
Transportation services for passenger transit (local and inter-urban) (0079)	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes ⁹
Veterinary services (0080)	Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); x-ray developers and fixers ¹⁹
INDUSTRIAL SOURCES (B)	
Material stockpiles (coal, metallic ores, phosphates, gypsum) (0081)	Acid drainage; other hazardous and nonhazardous wastes ¹⁸
Waste tailing ponds (commonly for the disposal of mining wastes) (0082)	Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes ¹⁷
Transport and transfer stations (trucking terminals and rail yards) (0083)	Fuel tanks; repair shop wastes; ⁹ other hazardous and nonhazardous wastes ¹⁷
Aboveground and underground storage tanks and containers (0084)	Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes ¹⁸
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments (0085)	Hazardous and nonhazardous liquid wastes; ¹⁸ septage; sludge ¹⁶
Chemical landfills (0086)	Leachate; hazardous and nonhazardous wastes; ¹⁸ nitrates
Radioactive waste disposal sites (0087)	Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)
Unattended wet and dry excavation sites (unregulated dumps) (0088)	A wide range of substances; solid and liquid wastes; oil-field brines; spent acids from steel mill operations; snow removal piles containing large amounts of salt
Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells (0089)	Metals; acids; minerals; sulfides; other sulfides; other hazardous and nonhazardous chemicals ¹⁸
Dry wells (0090)	Saline water from wells pumped to keep them dry

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT^{1,2,3}
Injection wells (0091)	Highly toxic wastes; hazardous and nonhazardous industrial wastes; ¹⁸ oil-field brines
Well drilling operations (0092)	Brines associated with oil and gas operations
INDUSTRIAL PROCESSES (B) (PRESENTLY OPERATED OR TORN-DOWN FACILITIES)²⁰	
Asphalt plants (0093)	Petroleum derivatives
Communications equipment manufacturers (0094)	Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution
Electric and electronic equipment manufacturers and storage facilities (0095)	Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Electroplaters (0096)	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Foundries and metal fabricators (0097)	Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes
Furniture and fixtures manufacturers (0098)	Paints; solvents; degreasing sludges; solvent recovery sludges
Machine and metalworking shops (0100)	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (TCE); metal marking fluids; mold-release agents
Mining operations (surface and underground) (0101)	Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides
Unsealed abandoned mines used as waste pits (0102)	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals ¹⁸
Paper mills (0103)	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals; ¹⁸ organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide
Petroleum production and storage companies, secondary recovery of petroleum (0104)	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Industrial pipeline (0105)	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes ¹⁸
Photo processing laboratories (0106)	Cyanides; bio-sludges; silver sludges; miscellaneous sludges

SOURCE	HEALTH, ENVIRONMENTAL, OR AESTHETIC CONTAMINANT ^{1,2,3}
Plastics materials and synthetics producers (0107)	Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.
Primary metal industries (blast furnaces, steel works, and rolling mills) (0108)	Heavy metal wastewater treatment sludge; picking liquor; waste oil; ammonia scrubber liquor; acid tar sludge; alkaline cleaners; degreasing solvents; slat; metal dust
Publishers, printers, and allied industries (0109)	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Public utilities (phone, electric power, gas) (0110)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Sawmills and planers (0111) and gluing wastes	Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating
Stone, clay, and glass manufacturers (0112)	Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal-finishing sludge
Welders (0113)	Oxygen, acetylene
Wood preserving facilities (0114)	Wood preservatives; creosote

¹In general, ground-water contamination stems from the **misuse and improper disposal** of liquid and solid wastes; the **illegal dumping or abandonment** of household, commercial, or industrial chemicals; the **accidental spilling** of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the **improper siting, design, construction, operation, or maintenance** of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from **atmospheric pollutants**, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed on this table are used and managed properly, ground-water contamination is not likely to occur.

²Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

³This table lists most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.

⁴Contaminant *Source* Code Number for Form III-1 (*Source Identification Form*).

⁵Facility *Type* Code Number for Form III-1 (*Source Identification Form*).

⁶Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

⁷Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides; many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine (EPA, 1990b), which EPA classifies as **moderately toxic** (class 3) and **slightly toxic** (class 4) materials, respectively (Meister Publishing Company, 1991).

⁸The EPA National Pesticides Survey (EPA, 1991) found that the use of fertilizers correlates to nitrate contamination of ground-water supplies.

⁹Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

¹⁰Toxic or hazardous components of common household products are noted on the attached table (EPA 1990c).

¹¹Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

¹²Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

¹³Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algaecides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

¹⁴Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

¹⁵Common wastes from public and commercial buildings include automotive wastes (see above definition); rock salt; and residues from cleaning products that may contain chemicals such as xlenols, glycol esters, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenols, and cresols.

¹⁶Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and non-coliform bacteria (see above definition); and viruses.

¹⁷Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

¹⁸The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) discharged from businesses.

¹⁹X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

²⁰This table lists potential ground-water contaminants from many common industries, but it does not address all industries.

CONTAMINANTS OF CONCERN

Organic Contaminants Regulated by the Safe Drinking Water Act:

CAS Number	Regulated Organics: VOCs	MCL : g/L	Contam. Type	Trade Name, Synonym, etc.	Use
75-35-4	1,1-Dichloroethylene	7	Carcinogen	Vinylidene chloride (VC)	making of "saran", adhesives, synthetic fibers
71-55-6	1,1,1-Trichloroethane	200	Chronic	Methyl chloroform	metal degreasing, pesticides
79-00-5	1,1,2-Trichloroethane	5	Chronic	Vinyl trichloride	solvent for fats, waxes, alkaloids, resins
107-06-2	1,2-Dichloroethane	5	Carcinogen	Ethylene dichloride, EDC	solvent, fumigant, Pb antiknock in gas
78-87-5	1,2-Dichloropropane	5	Carcinogen	Propylene dichloride	solvent, Pb antiknock, metal degreasing
120-82-1	1,2,4-Trichlorobenzene	9	Chronic	Trichlorobenzene	termite control
71-43-2	Benzene	5	Carcinogen	Benzol	component of gas, degreaser, solvent
56-23-5	Carbon tetrachloride	5	Carcinogen	Tetrachloromethane	refrigerant, fumigant, solvent, extinguishers
156-59-2	cis-1,2-Dichloroethylene	70	Chronic	Acetylene dichloride, Dioform	solvent, retarding fermentation
75-09-2	Dichloromethane	5	Carcinogen	Methylene chloride	paint remover, solvent/degreasing, aerosol
100-41-4	Ethylbenzene	700	Chronic	phenylethane	resin solvent, intermediate in mfg. of styrene
108-90-7	Monochlorobenzene	100	Chronic	Chlorobenzene, phenyl chloride	solvent, heat transfer, phenol
95-50-1	o-Dichlorobenzene	600	Chronic	1,2-dichlorobenzene	solvent, pesticide
106-46-7	para-Dichlorobenzene	75	Chronic	Paracide, PDB	insecticidal fumigant, moth repellent

CAS Number	Regulated Organics: VOCs	MCL : g/L	Contam. Type	Trade Name, Synonym, etc.	Use
100-42-5	Styrene	100	Chronic	Polysytrene	packaging, insulator (foam)
127-18-4	Tetrachloroethylene	5	Carcinogen	PCE, tetrachloroethene	dry cleaning, solvent, heat transfer
108-88-3	Toluene	1000	Chronic	methyl benzene, phenyl methane	gas additive, solvent, mfg. chemicals/explosives
156-60-5	trans-1,2-Dichloroethylene	100	Chronic	Acetylene dichloride, Dioform	solvent, retarding fermentation
79-01-6	Trichloroethylene	5	Carcinogen	TCE, trilene, trichloroethene	degreasing, solvent, dry cleaning, fumigant
75-01-4	Vinyl chloride	2	Carcinogen	Chloroethylene	plastics industry, refrigerant
1330-20-7	Xylenes (total)	10000	Chronic	Dimethylbenzene	used in gas, solvents, pesticides

CAS Number	Regulated Organics: SOCs	MCL : g/L	Contam. Type	Trade Name, Synonym, etc.	Use
1746-01-6	2,3,7,8-TCDD	0.00003	Carcinogen	Dioxin	defoliant
94-75-7	2,4-D	70	Chronic	Hedonal, Trinoxol	herbicide
93-72-1	2,4,5-TP	50	Chronic	2,4,5-Trichlorophenoxy	acetic acid herbicide, defoliant, plant hormone
15972-60-8	Alachlor	2	Carcinogen	Lasso, Alanex, metachlor	herbicide for corn, beans, soybeans, peanuts
1912-24-9	Atrazine	3	Chronic	AAtrex, Primatol A, Bicep	herbicide for corn, sorghum, other crops
50-32-8	Benzo(a)pyrene	0.2	Carcinogen	Polynuclear aromatic hydrocarbon	product of incomplete combustion

CAS Number	Regulated Organics: SOCs	MCL : g/L	Contam. Type	Trade Name, Synonym, etc.	Use
1563-66-2	Carbofuran	40	Chronic	Furadan	insecticide, nematocide, miticide for crops
57-74-9	Chlordane	2	Carcinogen	Velsicol 1068, Belt, Chlor Kill	insecticide, fumigant (termites)
75-99-0	Dalapon	200	Chronic	Dowpon, Radapon, Basafapon	herbicide for grasses, cattails, rushes
96-12-8	Dibromochloropropane	0.2	Carcinogen	DBCP, 1,2-Dibromo-3-chloropropane	nematocide, soil fumigant, pesticide
88-85-7	Dinoseb	7	Chronic	DNBP, Basanite, Caldon	herbicide, insecticide, miticide, fungicide
85-00-7	Diquat	20	Chronic	Dextrone, Actor, Reglone	herbicide/potato vines, seed crops, sugar cane
103-23-1	Di(ethylhexyl)adipate	500	Chronic	DEHA, Adipates	plasticizer - syn. rubber, food pkg, cosmetics
117-81-7	Di(ethylhexyl)phthalate	4	Carcinogen	DEHP, Phthalates	plasticizer for PVC resins
145-73-3	Endothall	100	Chronic	Aquathol, Hydout	herbicide/sugar beets, turf, hops, alfalfa, clover
72-20-8	Endrin	2	Chronic	Hexadrin	insecticide
106-93-4	Ethylene dibromide	0.05	Carcinogen	EDB	fumigant, insecticide, solvent, antiknock for gas
1071-53-6	Glyphosate	70	Chronic	Roundup, Rodeo, Kleenup, Shackle	non-selective broad-spectrum herbicide
76-44-8	Heptachlor	0.4	Carcinogen	Velsicol-104, Drinox	termite control
1024-57-3	Heptachlor epoxide	0.2	Carcinogen	(unknown)	degradation/oxidation product of heptachlor
118-74-1	Hexachlorobenzene	1	Carcinogen	Perchlorobenzene	waste - CL2 reactions, wood preservative, fungicide

CAS Number	Regulated Organics: SOCs	MCL : g/L	Contam. Type	Trade Name, Synonym, etc.	Use
77-47-4	Hexachlorocyclopentadiene	50	Chronic	HEX, Perchlorocyclopentadiene	pesticides, flame retardant, fungicide
58-89-9	Lindane	0.2	Chronic	gamma hexachlor, Lindafor	insecticide for tobacco, fruit/nut trees, vegetables
72-43-5	Methoxychlor	40	Chronic	Methoxy-DDT, Marlate	insecticide for trees, gardens, cattle, farm buildings
23135-22-0	Oxamyl	200	Chronic	Vydate, Thioxamyl	insecticide/nematocide for crops, fruits, vegetables
87-86-5	Pentachlorophenol	200	Carcinogen	PCP, Penta	wood preservative for fungus/termite/beetle, molluscicide
1918-02-1	Picloram	500	Chronic	Tordon, Pinene	herbicide for weeds/woody plants, brush control
1336-36-3	Polychlorinated biphenyl's	0.5	Carcinogen	PCB's, Aroclor	in electrical transformers & capacitors
122-34-9	Simazine	1	Chronic	Primatol S, Princep, Simanex	herbicide for grasses/weeds in many crops
8001-35-2	Toxaphene	3	Carcinogen	Chlorinated camphene	insecticide

Organics Regulated By Treatment Technique–No MCL:

CAS Number	SOCs	: g/L	Contam. Type	Trade Name, Synonym, etc.	Use
79-06-1	Acrylamide		Chronic	Propenamide	flocculent for water treatment plants
106-89-8	Epichlorohydrin		Chronic	Chloromethyloxirane	flocculent for water treatment plants, epoxy & phenoxy resins

Inorganic Contaminants Regulated by the Safe Drinking Water Act:

Regulated INORGANICS	MCL (: g/L)	Contaminant Type
Antimony	6	Chronic
Arsenic	50	Chronic
Barium	2000	Chronic
Beryllium	4 Fluoride 4	Chronic
Cadmium	5	Chronic
Chromium	100	Chronic
Cyanide	200	Chronic
Mercury	2	Chronic
Nickel	100	Chronic
Selenium	50	Chronic
Thallium	2	Chronic
Asbestos	7 million fibers per liter	Chronic
Nitrate	10,000	Acute
Nitrite	1,000	Acute
Nitrate+Nitrite	10,000	Acute
Fluoride	4,000	Chronic
Sulfate	Not Regulated	Chronic

Other Contaminants of Concern:

OTHER PARAMETERS	Contaminant Type	MCL or Action Level
Gross Alpha Activity	Chronic	15 pCi/l
Radium 226 + Radium 228	Chronic	5 pCi/l
Trihalomethanes	Chronic	100 : g/l
Turbidity	Chronic	95% of all turbidity measurements <= 0.5 NTU w/ no levels > 5 NTU
Lead	Chronic	90% of tap samples to have 15 : g/l or less of lead
Copper	Chronic	90% of tap samples to have 1.3 mg/l or less of copper
Total Coliform	Acute	Systems w/ 39 or fewer samples per month-If more than one sample is positive, the system is out of compliance. Systems w/ 40 or more samples per month-If more than 5% of the samples are positive, the system is out of compliance.
Fecal Coliform	Acute	Any repeat sample positive for fecal coliform OR any routine sample positive for fecal coliform that is followed by a positive repeat sample.
<i>Giardia lamblia</i>	Acute	Regulated by treatment technique by Surface Water Treatment Rule
Viruses	Acute	Regulated by treatment technique by Surface Water Treatment Rule
<i>Legionella</i> sp.	Acute	Regulated by treatment technique by Surface Water Treatment Rule
Heterotrophic Bacteria	Acute	Regulated by treatment technique by Surface Water Treatment Rule
<i>Cryptosporidium parvum</i>	Acute	Proposed Enhanced Surface Water Treatment Rule