Triview MD Source Water Protection Plan

El Paso County, Colorado December 2014





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Cover photo: Aerial view of Triview Metropolitan District

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ACRONYMS

BMP	Best Management Practice
CCR	Consumer Confidence Report
CDPHE	Colorado Department of Public Health and Environment
CRWA	Colorado Rural Water Association
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPM	Gallons per Minute
MCL	Maximum Contaminant Level
MRDL	Maximum Residual Level
OWTS	Onsite Wastewater Treatment System
PSOC	Potential Source of Contamination
SDWA	Safe Drinking Water Act
SWAA	Source Water Assessment Area
SWAP	Source Water Assessment and Protection
SWPA	Source Water Protection Area
SWPP	Source Water Protection Plan
тот	Time of Travel

EXECUTIVE SUMMARY

There is a growing effort in Colorado to protect community drinking water sources from potential contamination. Many communities are taking a proactive approach to preventing the pollution of their drinking water sources by developing a source water protection plan. A source water protection plan identifies a source water protection area, lists potential contaminant sources and outlines best management practices to implement to decrease risks to the water source. Implementation of a source water protection plan provides an additional layer of protection at the local level beyond drinking water regulations.

The Triview Metropolitan District (Triview MD) values a clean, high quality drinking water supply and decided to work collaboratively with area stakeholders to develop a Source Water Protection Plan. The source water protection planning effort consisted of public planning meetings and individual meetings with water operators, government, and agency representatives during the months of June 2014 to December at the Triview MD office located in Monument, CO. During the development of this Plan, a Steering Committee was formed to develop and implement this Source Water Protection Plan. Colorado Rural Water Association was instrumental in this effort by providing technical assistance in the development of this Source Water Protection Plan.

The Triview MD obtains its drinking water from seven groundwater wells in the Denver Basin Aquifers. The Source Water Protection Areas for these water sources lie east of Interstate 25 and are mostly within Triview MD's service boundaries. These Source Water Protection Areas are the areas that the Triview MD has chosen to focus its source water protection measures to reduce source water susceptibility to contamination.

The Steering Committee conducted an inventory of potential contaminant sources and identified other issues of concern within the Source Water Protection Area. Through this process, it was determined that the highest priority potential contaminant sources and/or issues of concern are: Vandalism and Residential Practices. Other noted water quality threats include: Cattle Grazing, Accidents and Maintenance along Roadways, Septic Systems, Private Wells, and Electrical Substations.

The Steering Committee developed several best management practices that may help reduce the risks from the potential contaminant sources and other issues of concern. The best management practices are centered on the themes of building partnerships with community members, businesses, and local decision makers; raising awareness of the value of protecting community drinking water supplies; and empowering local communities to become stewards of their drinking water supplies by taking actions to protect their water sources.

The following list highlights best management practices which pertain to the highest priority potential contaminant sources and other issues of concern:

• Display signage that states "tampering with this facility is a federal offense" at roadways leading to the SWPA, intakes and diversions, and on water storage tanks.

- Develop outreach material that explains the importance of Triview MD's source water protection.
- Post a copy of this SWPP on Triview MD's website.

The Steering Committee recognizes that the usefulness of this Source Water Protection Plan lies in its implementation and will begin to execute these best management practices upon completion of this Plan.

This Plan is a living document that is meant to be updated to address any changes that will inevitably come. The Steering Committee will review this Plan at a frequency of once every three to five years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

INTRODUCTION

The Triview MD operates a community water supply system that supplies drinking water to 3,150 residents located within El Paso County, Colorado. The Triview MD obtains their drinking water from seven wells in the Denver Basin Aquifers. The Triview MD recognizes the potential for contamination of the source of their drinking water, and realizes that it is necessary to develop a protection plan to prevent the contamination of this valuable resource. Proactive planning and implementing contamination prevention strategies are essential to protect the long-term integrity of their water supply and to limit their costs and liabilities.¹

Table 1: Primary Contact Information for Triview MD

PWS	D PWS Name	Name	Title	Address	Phone	Website
1218	0 Triview MD	Valerie Remington	District Manager	16055 Old Forest Point, Suite 300 Monument, CO 80132	719-488- 6868	www.triviewmetro.com

Purpose of the Source Water Protection Plan

The Source Water Protection Plan (SWPP) is a tool for the Triview MD to ensure clean and high quality drinking water sources for current and future generations. This Source Water Protection Plan is designed to:

- Create an awareness of the community's drinking water sources and the potential risks to surface water and/or groundwater quality within the watershed;
- Encourage education and voluntary solutions to alleviate pollution risks;
- Promote management practices to protect and enhance the drinking water supply;
- Provide for a comprehensive action plan in case of an emergency that threatens or disrupts the community water supply.

Developing and implementing source water protection measures at the local level (i.e. county and municipal) will complement existing regulatory protection measures implemented at the state and federal governmental levels by filling protection gaps that can only be addressed at the local level.

¹ The information contained in this Plan is limited to that available from public records and the Triview MD at the time that the Plan was written. Other potential contaminant sites or threats to the water supply may exist in the Source Water Protection Area that are not identified in this Plan. Furthermore, identification of a site as a "potential contaminant site" should not be interpreted as one that will necessarily cause contamination of the water supply.

Protection Plan Development

The Colorado Rural Water Association's (CRWA) Source Water Protection Specialist, Kimberly Mihelich, helped facilitate the source water protection planning process. The goal of the CRWA's Source Water Protection Program is to assist rural and small communities served by public water systems to reduce or eliminate the potential risks to drinking water supplies through the development of Source Water Protection Plans, and provide assistance for the implementation of prevention measures.

The source water protection planning effort consisted of a series of public planning meetings and individual meetings. Information discussed at the meetings helped the Triview MD develop an understanding of the issues affecting source water protection for the community. The Steering Committee then made recommendations for management approaches to be incorporated into the Source Water Protection Plan. In addition to the planning meetings, data and other information pertaining to Source Water Protection Area was gathered via public documents, internet research, phone calls, emails, and field trips to the protection area. A summary of the meetings is represented below.

Date	Purpose of Meeting
November 13, 2013	Field tour of Triview MD's Source Water Protection Areas, water treatment plant and drinking water intakes
May 5, 2014	Initial planning meeting with Triview MD to develop and review list of stakeholders and review the SWPP planning process and set timeline.
June 26, 2014	First Stakeholder Meeting – Presentation on the process of developing a Source Water Protection Plan for the Triview MD. Review of the State's Source Water Assessment for Triview MD.
August 12, 2014	Second Stakeholder Meeting – Discussion and prioritization of potential sources of contamination and other issues of concern.
September 16, 2014	Third Stakeholder Meeting – Continue discussion and prioritization of potential sources of contamination and other issues of concern.
October 21, 2014	Fourth Stakeholder Meeting – Identify Best Management Practices.
December 16, 2014	Fifth Stakeholder Meeting – Finalize Source Water Protection Plan. Develop Action Plan for implementation of Best Management Practices.

Table 2: Planning Meetings

Stakeholder Participation in the Planning Process

Local stakeholder participation is vitally important to the overall success of Colorado's Source Water Assessment and Protection (SWAP) program. Source water protection was founded on the concept that informed citizens, equipped with fundamental knowledge about their drinking water source and the threats to it, will be the most effective advocates for protecting this

valuable resource. Local support and acceptance of the Source Water Protection Plan is more likely where local stakeholders have actively participated in the development of their Protection Plan.

The Triview MD's source water protection planning process attracted interest and participation from thirteen stakeholders including water operators, local government, and neighboring water system representatives. During the months of June 2014 through December 2014, five stakeholder meetings were held at the Triview MD office located in Monument, CO to encourage local stakeholder participation in the planning process. Stakeholders were notified of meetings via letters, email, and phone calls. Input from these participants was greatly appreciated.

Steering Committee

During the development of this Plan, a volunteer Steering Committee was formed from the stakeholder group to develop and implement this Source Water Protection Plan. Specifically, the Steering Committee's role in the source water protection planning process was to advise the Triview MD in the identification and prioritization of potential contaminant sources as well as management approaches that can be voluntarily implemented to reduce the risks of potential contamination of the untreated source water. All members attended at least one Steering Committee meeting and contributed to planning efforts from their areas of experience and expertise. Their representation provided diversity and led to a thorough Source Water Protection Plan. The Triview MD and the Colorado Rural Water Association are very appreciative of the participation and expert input from the following participants.

Stakeholder	Title	Affiliation	Steering Committee Member
Valerie Remington	District Manager	Triview MD	Х
Grant Sharp	Operations Superintendent	Triview MD	Х
Larry Bennett	Streets/Parks Technician	Triview MD	Х
John Baker	Streets/Parks Technician	Triview MD	Х
Glenn Butts	Water Operator	Triview MD	Х
Rod Wilson	Water Operator	Triview MD	Х
Steve Sheffield	Water Department Superintendent	Town of Monument	Х
Nick Harris	Chief Water Operator	Town of Monument	Х
Dennis Phillips	Water Tech II	Town of Monument	
Mike McCarthy	Environmental Health Program Manager	El Paso County Public Health	х

Table 3: Stakeholders and Steering Committee Members

Max Kirschbaum	Operations Manager	El Paso County Public Services Department	
David Waldner	Manager of Engineering	Mountain View Electric Association	
Darryl Edwards	Member Services Manager	Mountain View Electric Association	

Development and Implementation Grant

The Triview MD has been awarded a \$5,000 Development and Implementation Grant from the Colorado Department of Public Health and Environment (CDPHE). This funding is available to public water systems and representative stakeholders committed to developing and implementing a source water protection plan. A one to one financial match (cash or in-kind) is required. The Triview MD was approved for this grant in July 2013, and it expires on August 31, 2015. Triview MD intends on the funds to implement management approaches that are identified in this Plan.

WATER SUPPLY SETTING

Location and Description

Triview MD is a special district that was formed in 1985 as a "quasi-municipal corporation and political subdivision of the State of Colorado" (Triview Metropolitan District, 2014). The Triview MD is located in northern El Paso County on the front range of the Rocky Mountains. The service boundaries cover an area of approximately 2,580 acres. Primary access to the District is through Interstate 25. The majority of Triview MD's source waters lie within the District's boundaries. Land use within these lands consists mostly of residential development. Currently Triview MD has permitted 1,260 taps, but projections by the Triview MD estimate that growth will increase over the next 25 to 30 years with complete build-out eventually expanding to include over 2600 residential units as well as commercial, office, and industrial facilities.



Figure 1: Location of Triview MD in El Paso County, Colorado

Physical Characteristics

The area around Triview MD is generally a transition between the Great Plains and the South Rocky Mountains. The area is comprised of gently rolling hills, generally sloping from east to west. Elevations range from approximately 6900 to 7500 feet above sea level. Characteristic native vegetation ranges from grasslands and shrubs to ponderosa pine and Rocky Mountain Douglas fir forests (USDA Natural Resource Conservation Service, 2007). The climate around Triview MD and its source waters is semi-arid. The precipitation generally is low to moderate with an estimated annual precipitation averaging approximately 21 inches.

Hydrologic Setting

The Triview MD obtains its drinking water from seven wells drilled into the Denver Basin Aquifer System. As illustrated in Figures 2 and 3, the Denver Basin is comprised of layered geologic formations. Within this, four aquifers are statutory defined: Dawson, Denver, Arapahoe, and Laramie-Fox Hills. Triview MD has water rights to the Denver (the second highest) and Arapahoe (the second lowest and the Laramie-Fox Hills aquifers (the lowest). The Front Range constitutes the recharge area for the Denver Basin. Groundwater flow is predominantly from south to north; however, in northern El Paso County a groundwater divide diverts flows to the south.

The Denver Formation consists of a 800- to 1000-foot thick sequence of shale, silty claystone, and interbedded sandstone along with beds of lignite and carbonaceous siltstone and shale common. It contains the Denver aquifer, which is a generally confined aquifer and the least permeable of the Denver Basin aquifers. The Arapahoe Formation consists of a 400- to 700-foot-thick sequence of interbedded conglomerate, sandstone, siltstone, and shale. It contains the Arapahoe aquifer, which extends over an area of about 4,300 square miles or about two-thirds the area of the Denver Basin aquifer system. It is a generally confined aquifer and the most permeable of the Denver Basin Aquifers. The Laramie-Fox Hills aquifer is comprised of the Laramie Formation, which is comprised of impermeable shale along with fine sandstone and bituminous coal seams, and the Fox Hills Formation, which is comprised of sandstone and siltstone interbedded with shale. The Laramie-Fox Hills aquifer is generally confined and moderately permeable (USGS, 1995).

Triview MD has not petitioned the Water Quality Control Commission for the establishment of a classified ground water area and associated site-specific ground water quality standards for its ground water intakes.



Figure 2: General geologic cross section through the Denver Basin



Figure 3: General location of Triview MD's wells as they relate to the Denver Basin Aquifer System

Groundwater Protection

Groundwater protection is managed as two separate issues of quantity and quality in Colorado. Quantity issues are managed through the Colorado Division of Water Resources/Office of the State Engineer. The Division of Water Resources administers and enforces all surface and groundwater rights throughout the State of Colorado, issues water well permits, approves construction and repair of dams, and enforces interstate compacts. The Division of Water Resources is also the agency responsible for implementing and enforcing the statutes of the Groundwater Management Act passed by the Legislature as well as implementing applicable rules and policies adopted by the Colorado Groundwater Commission and the State Board of Examiners of Water Well Construction and Pump Installation Contractors.

The CDPHE's Colorado Water Quality Control Commission is responsible for promulgating groundwater and surface water classifications and standards. Colorado's Water Quality Control Commission has established basic standards for groundwater regulations that apply a framework for groundwater classifications and water quality standards for all waters within their jurisdictions. Standards are designed to protect the associated classified uses of water or a designated use. The groundwater classifications are applied to groundwaters within a specified area based upon use, quality and other information as indicated in the CDPHE Water Quality Control Commission's Regulation No. 41, "The Basic Standards for Ground Water." Statewide standards have been adopted for organic chemicals and radionuclides. Significant areas of the state have been classified for site specific use classification and the remainder of the state's groundwater is protected by interim narrative standards.

Classifications and standards are implemented by seven separate state agencies through their rules and regulations for activities that they regulate. Regulated activities include mining and reclamation, oil and gas production, petroleum storage tanks, agriculture, Superfund sites, hazardous waste generation and disposal, solid waste disposal, industrial and domestic wastewater discharges, well construction and pump installation, and water transfers.

Colorado has proactive groundwater protection programs that include monitoring groundwater for agricultural chemicals and pesticides, issuing groundwater discharge permits; voluntary cleanup program, permitting for large hog farm operations, and educational programs. In addition, water wells must have a permit and meet minimum standards of construction and pump installation.

Water Quality Data

Triview MD routinely monitors their drinking water for contaminants in accordance with Federal and State laws. An annual water quality report called a Consumer Confidence Report (CCR) is completed once a year and distributed to its consumers. A CCR includes all information and sample data a public water system has collected in the previous calendar year. Triview MD's 2013 CCR indicated no violations, significant deficiencies, or formal enforcements actions necessary as Triview MD did not exceed any maximum contaminant levels (MCL) or maximum residual levels (MRDL) (Triview MD, 2014) set by the CDPHE.

Drinking Water Supply Operations

Water Supply and Infrastructure

Triview Metropolitan District's source water supply comes from the Denver and Arapahoe aquifers. The water is treated at two water treatment plants, A-Plant and B-Plant. A-Plant is fed by Wells D-1 and A-1 and is treated by using two TR105A Trident filters. Each can be operated with a range of 95 Gallons per Minute (GPM) to 175 GPM. B-Plant is fed by Wells A-4, A-8, A-7, and D-7 and is treated by using five TR210A Trident filters. At the time of this SWPP, Triview MD is in the process of drilling a seventh well, D-4, which will also feed B-Plant. Each can be operated with a range of 175 GPM to 350 GPM. Both types of filters operate in the same manner. Sodium hypochlorite is added to raw water to disinfect and oxidize iron and manganese. Polymer is added prior to entering the filters to aid in flocculation. This chemically dosed raw water enters the Adsorption Clarifier, where an upflow treatment process combines flocculation and clarification in a single unit. From the Adsorption Clarifier, flow passes through the Trident Mixed Media filtration chamber, after which it is collected by the Microfloc underdrain. From there, the finished water from both plants is pumped to a 1,500,000 gallon concrete ground storage tank and/or the DS001 entry point where it enters the distribution system.

ID (assigned by CDPHE)	Source Name	Aquifer Name	Permit Number	Year Drilled	Well Depth	First Draw	Yield (GPM)
121840-001	A-1	Arapahoe	47302-F	1997	1503'	1399.9'	300
121840-004	D-1	Denver	54145-F	2000	840'	684.8'	200
121840-006	A-7	Arapahoe	55152-F	2001	1755'	1617.4'	300
121840-007	D-7	Denver	60057-F	2003	1220'	1142'	200
121840-010	A-4	Arapahoe	60177-F	2003	1520'	1426'	300
121840-011	A-8	Arapahoe	65673-F	2007	1560'	1426′	300
TBD	D-4	Denver	TBD	2014	1040'	TBD	TBD

Table 4: Triview MD Groundwater Supply Information



Figure 4: Sketch of Triview MD's Water Sources



Figure 5: Process Schematic of Triview MD's Water Treatment Plants



Figure 6: Map of Triview MD's Distribution System

Water Supply Demand Analysis

The Triview MD serves an estimated 1260 connections and approximately 3150 residents and other users in the service area annually. The water system currently has the capacity to produce 1,946 acre-feet per year and the ability to produce 2,016,000 gallons per day. Current estimates by the water system indicate that the average daily demand is approximately 607,000 gallons per day, and that the average peak daily demand is approximately 1,200,000 gallons per day. Using these estimates, the water system has a surplus average daily demand capacity of 1,130,366 gallons per day and a surplus average peak daily demand capacity of 537,366 gallons per day.

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

The Triview MD recognizes that potential contamination of its ground water source(s) could potentially result in having to treat the ground water and/or abandon the water source if treatment proves to be ineffective or too costly. To understand the potential financial costs associated with such an accident, Triview MD evaluated what it might cost to replace one of its water sources (i.e., replacement of the intake structure and the associated infrastructure) if this occurs. The evaluation did not attempt to estimate treatment costs, which can be variable depending on the type of contaminant(s) that need(s) to be treated. The evaluation indicated that it could cost \$600,000 to \$800,000 in today's dollars to replace one of its water sources.

The potential financial and water supply risks related to the long-term disablement of one or more of the community's water sources are a concern to the Steering Committee. As a result, the Steering Committee believes the development and implementation of a source water protection plan for Triview MD can help to reduce the risks posed by potential contamination of its water source(s). Additionally, the Triview MD has developed an emergency response plan to coordinate rapid and effective response to any emergency incident that threatens or disrupts the community water supply.

OVERVIEW OF COLORADO'S SWAP PROGRAM

Source water assessment and protection came into existence in 1996 as a result of Congressional reauthorization and amendment of the Safe Drinking Water Act. The 1996 amendments required each state to develop a source water assessment and protection (SWAP) program. The Water Quality Control Division, an agency of the Colorado Department of Public Health and Environment (CDPHE), assumed the responsibility of developing Colorado's SWAP program. The SWAP program protection plan is integrated with the Colorado Wellhead Protection Program that was established in amendments made to the federal Safe Drinking Water Act (EPA Office of Ground Water and Drinking Water, 1996) in 1986.

Colorado's SWAP program is an iterative, two-phased process designed to assist public water systems in preventing potential contamination of their untreated drinking water supplies. The two phases include the Assessment Phase and the Protection Phase as depicted in the upper and lower portions of Figure 7, respectively.



Figure 7: Source Water Assessment and Protection Phases

Source Water Assessment Phase

The Assessment Phase for all public water systems consists of four primary elements:

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

The Assessment Phase involves understanding where the Triview MD's source water comes from, what contaminant sources potentially threaten the water sources, and how susceptible each water source is to potential contamination. The susceptibility of an individual water source is analyzed by examining the properties of its physical setting and potential contaminant source threats. The resulting analysis calculations are used to report an estimate of how susceptible each water source is to potential contamination. A Source Water Assessment Report was provided to each public water system in Colorado in 2004 that outlines the results of this Assessment Phase.

Source Water Protection Phase

The Protection Phase is a voluntary, ongoing process in which all public water systems have been encouraged to voluntarily employ preventative measures to protect their water supply from the potential sources of contamination to which it may be most susceptible. The Protection Phase can be used to take action to avoid unnecessary treatment or replacement costs associated with potential contamination of the untreated water supply. Source water protection begins when local decision-makers use the source water assessment results and other pertinent information as a starting point to develop a protection plan. As depicted in the lower portion of Figure 7, the source water protection phase for all public water systems consists of four primary elements:

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

The water system and the community recognize that the Safe Drinking Water Act grants no statutory authority to the Colorado Department of Public Health and Environment or to any other state or federal agency to force the adoption or implementation of source water

protection measures. This authority rests solely with local communities and local governments. The source water protection phase is an ongoing process as indicated in Figure 7. The evolution of the SWAP program is to incorporate any new assessment information provided by the public water supply systems and update the protection plan accordingly.

SOURCE WATER PROTECTION PLAN DEVELOPMENT

Source Water Assessment Report Review

The Triview MD has reviewed the Source Water Assessment Report (Appendices B and C) along with the Steering Committee. These Assessment results were used as a starting point to guide the development of appropriate management approaches to protect the source waters of Triview MD from potential contamination. A copy of the Source Water Assessment Report for Triview MD can be obtained by contacting the Triview MD or by downloading a copy from the CDPHE's SWAP program website located at: http://www.colorado.gov/cs/Satellite/CDPHE-WQ/CBON/1251596793639.

Defining the Source Water Protection Area

A source water protection area is the surface and subsurface areas from which contaminants are reasonably likely to reach a water source. The purpose of delineating a source water protection area is to determine the recharge area that supplies water to a public water source. Delineation is the process used to identify and map the area around a pumping well that supplies water to the well or spring, or to identify and map the drainage basin that supplies water to a surface water intake. The size and shape of the area depends on the characteristics of the aquifer and the well, or the watershed. The source water assessment area that was delineated as part of the Triview MD's Source Water Assessment Report provides the basis for understanding where the community's source water and potential contaminant threats originate, and where the community has chosen to implement its source water to potential contaminant to manage the susceptibility of their source water to potential contaminant.

After carefully reviewing their Source Water Assessment Report and the CDPHE's original delineation of the Source Water Assessment Area for each of the Triview MD's sources, the Steering Committee requested a re-delineation by CDPHE before accepting it as their Source Water Protection Area for this Source Water Protection Plan. The original source water assessment area included information for only one of Triview MD's wells. The Triview MD provided updated intake locations and well log information to CDPHE, who then used a groundwater flow model to delineate a new source water assessment area for each well. These new assessment areas were accepted by the Steering Committee as Triview MD's Source water Protection Areas.

The Triview MD's Source Water Protection Areas are defined as:

- 1. Zone 1 is defined as a 500 foot radius around each wellhead.
- 2. **Zone 2** is defined by calculating the distance from each wellhead through which a parcel of water travels over a two year time period or 2 year time of travel (TOT).
- 3. **Zone 3** is defined by calculating the distance from each wellhead through which a parcel of water travels over a five year time period or 5 year time of travel (TOT).



The Source Water Protection Areas are illustrated in the following maps.

Figure 8: Triview MD's Source Water Protection Areas



Figure 9: Triview MD's SWPA for Wells A4 and D4



Figure 10: Triview MD's SWPAs for Wells A1, D1, LFH1, A7, D7 and A8

Potential Contaminant Source Inventory and Other Issues of Concern

Many types of land uses have the potential to contaminate source waters: spills from tanks, trucks, and railcars; leaks from buried containers; failed septic systems, buried or injection of wastes underground, use of fertilizers, pesticides, and herbicides, road salting, as well as urban and agricultural runoff. While catastrophic contaminant spills or releases can wipe out a water resource, groundwater degradation can result from a plethora of small releases of harmful substances. According to the USEPA, nonpoint-source pollution (when water runoff moves over or into the ground picking up pollutants and carrying them into surface and groundwater) is the leading cause of water quality degradation (Ground Water Protection Council, 2007).



Figure 11: Schematic drawing of the potential source of contamination to surface and groundwater

In 2001 – 2002, as part of the Source Water Assessment Report, a contaminant source inventory was conducted by the Colorado Department of Public Health and Environment to identify selected potential sources of contamination that might be present within the source water assessment areas. Discrete² contaminant sources were inventoried using selected state and federal regulatory databases including: mining and reclamation, oil and gas production, above and underground petroleum tanks, Superfund sites, hazardous waste generators, solid waste disposal, industrial and domestic wastewater dischargers, and water well permits. Dispersed contaminant sources were inventoried using then recent land use / land cover and transportation maps of Colorado, along with selected state regulatory databases. The contaminant inventory was completed by mapping the potential contaminant sources with the aid of a Geographic Information System (GIS).

The State's contaminant source inventory consisted of draft maps, along with a summary of the discrete and dispersed contaminant sources inventoried within the source water assessment area. The Triview MD was asked, by CDPHE, to review the inventory information, field-verify

² The WQCD's assessment process used the terms "discrete" and "dispersed" potential sources of contamination. A discrete source is a facility that can be mapped as a point, while a dispersed source covers a broader area such as a type of land use (crop land, forest, residential, etc.).

selected information about existing and new contaminant sources, and provide feedback on the accuracy of the inventory. Through this Source Water Protection Plan, the Triview MD is reporting its findings to the CDPHE.

After much consideration, discussion, and input from local stakeholders, the Triview MD and the Steering Committee have developed a more accurate and current inventory of contaminant sources located within the Source Water Protection Area. In addition to the discrete and dispersed contaminant sources identified in the contaminant source inventory, the Steering Committee has also identified other issues of concern that may impact the Triview MD's drinking water sources. Upon completion of this contaminant source inventory, the Triview MD has decided to adopt it in place of the original contaminant source inventory provided by the CDPHE.

	A4	D4	A1	D1	LFH1	A7	D7	A8
MVEA Anderson Substation (Spills)	Х	х						
Vandalism	Х	х	х	Х	Х	Х	Х	Х
Cattle Grazing	х	Х						
Future Development/Construction						х	х	
Residential Practices			х	Х	Х	Х	Х	Х
Roads (Maintenance/Accidents)	Х	х	х	х	х	х	х	х
Private Wells						Х	Х	
Septic Systems						Х	Х	Х

Table 5: Contaminant Source Inventory & Additional Issues of Concern for Each Drinking Water Intake

Priority Strategy

After developing a contaminant source inventory and list of issues of concern that is more accurate, complete, and current, the Steering Committee utilized CRWA's SWAP Risk Assessment Matrix (Appendix D) to assist with the prioritization of this inventory for the implementation of the Best Management Practices outlined in this Source Water Protection Plan (see Table 9).

The Triview MD and Steering Committee considered the following criteria when estimating the risk of contaminant sources and issues of concern.

- 1. **Impact to the Public Water System** The risk to the source waters increases as the impact the water system increases. The impact is determined by:
 - Migration Potential or Proximity to the Water Source The migration potential generally has the greatest influence on whether a contaminant source could provide contaminants in amounts sufficient for the source water to become contaminated at concentrations that may pose a health concern to consumers of the water. Shorter migration paths and times of travel mean less chance for dilution or degradation of the contaminant before it reaches water sources. The proximity of a potential contaminant source of contamination to the Triview MD's water sources was considered relative to the three sensitivity zones in the Source Water Protection Area (i.e. Zone 1, Zone 2, and Zone 3).
 - **Contaminant Hazard** The contaminant hazard is an indication of the potential human health danger posed by contaminants likely or known to be present at the contaminant source. Using the information tables provided by CDPHE (see Appendices E-H), the Steering Committee considered the following contaminant hazard concerns for each contaminant source:
 - Acute Health Concerns Contaminants with acute health concerns include individual contaminants and categories of constituents that pose the most serious immediate health concerns resulting from short-term exposure to the constituent. Many of these acute health concern contaminants are classified as potential cancer-causing (i.e. carcinogenic) constituents or have a maximum contaminant level goal (MCLG) set at zero (0).
 - Chronic Health Concerns Contaminants with chronic health concerns include categories of constituents that pose potentially serious health concerns due to long-term exposure to the constituent. Most of these chronic health concern contaminants include the remaining primary

drinking water contaminants.

- Aesthetic Concerns Aesthetic contaminants include the secondary drinking water contaminants, which do not pose serious health concerns, but cause aesthetic problems such as odor, taste or appearance.
- **Potential Volume** The volume of contaminants at the contaminant source is important in evaluating whether the source water could become contaminated at concentrations that may pose a health concern to consumers of the water in the event these contaminants are released to the source water. Large volumes of contaminants at a specific location pose a greater threat than small volumes.
- Probability of Occurrence The risk to the source waters increases as the relative probability of damage or loss increases. The regulatory compliance history for regulated facilities and operational practices for handling, storage, and use of contaminants were utilized to evaluate the likelihood of release.

The Triview MD and Steering Committee determined whether each PSOC or issue of concern is in the water system's Direct Control (i.e. water system can take direct measures to prevent), Indirect Control (i.e. water system cannot directly control the issue, but can work with another person or entity to take measures to prevent) or No Control (i.e. PSOC or issue of concern is outside the control of the public water system and other entities). This determination of control in conjunction with the estimation of risk to the source water(s), helped guide the prioritization of the contaminant source inventory and of issues of concern in a way that best fits the needs and resources of the community. The Triview MD and Steering Committee ranked the potential contaminant source inventory and issues of concern in the following way: Table 6: Potential Sources of Contamination and Issues of Concern Prioritization Table

Potential Source of Contamination or Issue of Concern	Controllable (Direct, Indirect, No)	Impact to Water System (Minor, Moderate, Major)	Probability of Occurrence (Unlikely, Possible, Likely, Very Likely)	Risk (Very Low, Low, Intermediate, High, Very High)	Priority Ranking
Vandalism	No	Moderate	Possible	Intermediate	1
Residential Practices	No	Moderate	Possible	Intermediate	2
Septic Systems	Indirect	Minor	Unlikely	Very Low	3
MVEA Anderson Substation	No	Minor	Unlikely	Very Low	3
Cattle Grazing	No	Minor	Unlikely	Very Low	3
Future Development/Construction	Direct	Minor	Unlikely	Very Low	3
Road Maintenance/Accidents	Indirect	Minor	Unlikely	Very Low	3
Private Wells	No	Minor	Unlikely	Very Low	3

Susceptibility Analysis of Water Sources

The Triview MD's Source Water Assessment Report contained a susceptibility analysis³ to identify how susceptible an untreated water source could be to contamination from potential sources of contamination inventoried within its source water assessment area. The analysis looked at the susceptibility posed by individual potential contaminant sources and the collective or total susceptibility posed by all of the potential contaminant sources in the source water assessment area. The CDPHE developed a susceptibility analysis model for surface water sources and ground water sources under the influence of surface water, and another model for groundwater sources. Both models provided an objective analysis based on the best available information at the time of the analysis. The two main components of the CDPHE's susceptibility analysis are:

- 1. **Physical Setting Vulnerability Rating** This rating is based on the ability of the surface water and/or groundwater flow to provide a sufficient buffering capacity to mitigate potential contaminant concentrations in the water source.
- 2. **Total Susceptibility Rating** This rating is based on two components: the physical setting vulnerability of the water source and the contaminant threat.

³ The susceptibility analysis provides a screening level evaluation of the likelihood that a potential contamination problem could occur rather than an indication that a potential contamination problem has or will occur. The analysis is NOT a reflection of the current quality of the untreated source water, nor is it a reflection of the quality of the treated drinking water that is supplied to the public.

Upon review of the susceptibility analysis, the Steering Committee determined that the Physical Setting Vulnerability Rating and the Total Susceptibility Rating needed updated to more accurately reflect the current situation. The Steering Committee created a better analysis through discussion, on-site observation, and review of historical data involving stakeholders and experts.

Source ID #	Source Name	Source Type	Total Susceptibility Rating	Physical Setting Vulnerability Rating
121840-001	A-1	Groundwater	Moderately Low	Moderately Low
121840-004	D-1	Groundwater	Moderately Low	Moderately Low
121840-006	A-7	Groundwater	Moderately Low	Moderately Low
121840-007	D-7	Groundwater	Moderately Low	Moderately Low
121840-010	A-4	Groundwater	Moderately Low	Moderately Low
121840-011	A-8	Groundwater	Moderately Low	Moderately Low
TBD	D-4	Groundwater	Moderately Low	Moderately Low

Table 7: Updated Susceptibility Analysis

DISCUSSION OF POTENTIAL CONTAMINANT SOURCES AND ISSUES OF CONCERN

The following section provides a brief description of potential contaminant sources and issues of concern that have been identified in this plan, describes the way in which they threaten the water source(s) and outlines best management practices.

Vandalism

Although there have been no major acts of terrorism or vandalism to the Triview MD's water supplies, this is still a concern for the Steering Committee. The potential for these acts are low, however, this is a high priority concern because impacts from vandalism could be huge. Water infrastructure could be targeted directly or water can be contaminated through the introduction of poisonous chemicals or disease-causing biological agents (Gleick, 2006). The Steering Committee recommends taking preventative measures by displaying signage around storage tanks and treatment facilities and at the roadways that lead to the watershed that states "Municipal Water Supply: Tampering With This Facility is a Federal Offense and developing outreach material that explains the importance of source water protection.

Vandalism Best Management Practices Recommendations:

- 1. Continue to inspect watershed and intakes for signs of physical damage, such as vandalism.
- 2. Display signage that states "tampering with this facility is a federal offense" at roadways leading to the SWPA, intakes and diversions, and on water storage tanks.
- 3. Develop outreach material that explains the importance of Triview MD's source water protection.

Residential Practices

Triview MD's Source Water Protection Areas includes many residential dwellings. Common household practices may cause pollutants to runoff residential property and enter the surface or groundwater as indicated in Figure 12 below. Prevention of surface and groundwater contamination requires education, public involvement, and people motivated to help in the effort. Public education will help people understand the potential threats to their drinking water source and motivate them to participate as responsible citizens to protect their valued resources.



Figure 12: Common residential practices that may be potential sources of contamination to surface or groundwater

Residential Practices Best Management Practices Recommendations:

- 1. Develop outreach material that explains the importance of Triview MD's source water protection and distribute to residents.
- 2. Post a copy of the SWPP on Triview MD's website.

Septic Systems

There is one residential area within Triview MD's SWPA for wells A-7 and D-7 that relies on onsite wastewater treatment systems (OWTS) or septic systems to dispose of their sewage. A septic system is a type of onsite wastewater system consisting of a septic tank that collects all the sewage and a leach field that disperses the liquid effluent onto a leach field for final treatment by the soil.

When onsite wastewater systems are properly designed, constructed, and maintained, they effectively reduce or eliminate most human health or environmental threats posed by pollutants such as nitrogen, phosphorus, and disease-causing bacteria and viruses in household wastewater. However, they require regular maintenance or they can fail. Unapproved, aging, and failing septic systems can have a large impact on the quality and safety



Figure 13: Schematic of a septic system

of a water supply. The failure to pump solids that accumulate in the septic tank can eventually clog the lines and cause untreated wastewater to back up into the home, to surface on the ground, or to seep into groundwater. If managed improperly, these residential septic systems can contribute excessive nutrients, bacteria, pathogenic organisms, and chemicals to the groundwater. However, because there are such a low number of septic systems in the SWPA, the impact to Triview MD's drinking water sources is probably minor.

In El Paso County individual sewage disposal systems are permitted by the El Paso County Health Department. The County Health Department administers and enforces the standards, rules, and regulations outlined in the State of Colorado's Revised Statute 25-10-105 by the Colorado Water Quality Control Commission. El Paso County requires that a permit be issued for the installation, repair, replacement or alteration of any new or existing OWTS in El Paso County.

Septic System Best Management Practices Recommendations:

1. Identify properties within SWPA with septic systems and develop mailing list to educate the property owner on the link between good septic practices and protecting source water.

Mountain View Electric Association Anderson Substation (Spills)

The Mountain View Electric Association (MVEA) is an electric cooperative that provides electric service to several counties throughout eastern Colorado. Their Anderson Substation, which is an electrical distribution substation, lies within the SWPAs for Triview MD's Wells A4 and D4 less than 500 feet from the intakes. The Steering Committee is concerned with a spill event at this substation affecting Triview MD's intakes; however, the likelihood is very low. The facility has not experienced any reportable oil spill events or leaks, and the probability of multi-equipment failures is very remote. The maximum oil discharge in a leak or spill event is generally expected to be the storage capacity of the largest piece of equipment. The largest probable spill event at Anderson Substation is 4,894 gallons of oil. The substation has a 12 inch berm and precast concrete cable trenches to form a barrier to stall or reduce flow of oil. In addition, the substation yard is surfaced with 4 inches of crushed rock mingled w/ pea gravel, to further impede oil flows (Mountain View Electric Association, September 2008).

Table 8: Reportable Equipment at MVEA's Anderson Substation

Reportable Equipment	Quantity of This Type	Possible Failure Mode(s) of Equipment:	Oil Quantity In Each Device	Oil Type	Direction of Flow
3Ø Power Transformer	1	Tank rupture, valve failure	4830 Gallons	Mineral	Southwest
3Ø Power Transformer	1	Tank rupture, valve failure	4864 Gallons	Mineral	Southwest
3Ø Load Tap Changer	1	Tank rupture, valve failure	280 Gallons	Mineral	Southwest
3Ø Load Tap Changer	1	Tank rupture, valve failure	345 Gallons	Mineral	Southwest

Substation Best Management Practices Recommendations:

- 1. Share copies of the Triview MD SWPP and contact information with MVEA.
- 2. Encourage MVEA to notify Triview MD water operators in the event of a reportable spill and/or leak.

Cattle Grazing

Land around Triview MD's SWPAs for Wells A4 and D4 is used minimally for livestock (cattle) grazing. While this grazing activity is a low concern to the Steering Committee, this activity can impact water quality. The most common water quality impacts for Triview MD's water sources could include pathogen contamination, sedimentation, and trampling/trailing near water sources. Animal waste contains many pollutants that can contaminate surface and ground waters used as drinking water sources. Pathogens found in animal waste can infect humans if ingested. Organisms like *Cryptosporidium, Giardia lamblia,* and *Salmonella* can induce symptoms ranging from skin sores to chest pain. *E. coli,* which causes diarrhea and abdominal gas, can cause serious illness and even death. *Cryptosporidium* is of particular concern because it is highly resistant to disinfection with chlorine. This protozoan causes gastrointestinal illness that lasts 2 to 10 days in healthy individuals but can be fatal in people with weakened immune systems.

Animal wastes can also contribute to nitrates in drinking water. Consumption of nitrates can cause methemoglobinemia (blue baby syndrome) in infants, which reduces the ability of the blood to carry oxygen. If left untreated, methemoglobinemia can be fatal. Because of this health risk, EPA set a drinking water maximum contaminant level (MCL) of 10 milligrams per liter or parts per million for nitrate measured as nitrogen (U.S. Environmental Protection Agency, 2001).

Cattle Grazing Best Management Practices Recommendations:

1. Develop outreach material that explains the importance of Triview MD's source water protection as it relates to cattle grazing.

Future Development and Construction

Future development within Triview MD will occur over the next 25 to 30 years. The District currently has permitted 1,260 taps with the potential to build out to 2600 residential units. There will be various levels of development activity within Triview MD during this period. The potential from construction activities to impact Triview MD's intakes are low, however, stormwater runoff from construction sites can carry harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients.

The EPA's National Pollutant Discharge Elimination System (NPDES) Stormwater Program regulates stormwater discharges from potential sources including construction activities. Operators of construction sites are required to receive an NPDES permit before they can discharge in an effort to prevent stormwater runoff from washing harmful pollutants into local surface water such as streams, river, lakes or coastal waters (US Environmental Protection Agency, 2014). In Colorado, the CPDHE is the authorized agency to implement the NPDES Stormwater Program.

Future Development and Construction Best Management Practices Recommendations:

- 1. Provide El Paso County Development Services Division and the Town of Monument with GIS mapping information of the Source Water Protection Areas and encourage them to overlay this area on their land use maps.
- 2. Keep informed and participate in land use hearings or meetings regarding lands within the SWPAs.

Accidents and Maintenance along Roadways

There are many roadways in Triview MD's SWPAs and are used primarily for residential and business access. The District is responsible for the maintenance and improvement of most of the roads; however, there are a few county roads that the El Paso County Public Services Department is responsible for. In particular, the Steering Committee is most concerned with Baptist Road, which is a county owned road, as it lies within Zone 1 of the SWPA for Well A8.

<u>Maintenance</u>

El Paso County Public Services Department is responsible for the maintenance and improvement of Baptist Road within the SWPA for Triview's Well A8. This includes road grading, patching, reconstruction, snow plowing, etc. El Paso County does not perform anti-icing along Baptist Road, only deicing. They primarily use an 85/15 mix of sand/salt (coarse rock salt). Because Baptist Road can be a difficult area to de-ice due to the orientation of the road and the amount of traffic it sees, they occasionally use a liquid de-icer called Hico-Thaw, which is a calcium chloride product. This chemical is used sparingly. Street sweepers are used after snow/ice events to remove salt/sand residue and enhance safety.

Weed control is most commonly achieved through mechanical means (i.e. mowing), however, 2014 was the first time El Paso County has employed an herbicide along Baptist Road for weed control. The County's noxious weed control contractor, Colorado Vegetation Management, sprayed the medians on Baptist Road. The contractor reported the following usage rate (Max Kirschbaum, 2014):

- 10 lb. per acre: Diuron 80DF
- 6 oz. per acre: Perspective
- 2 quarts per acre: Round-up
- 1 quart per acre: 2-4 D Amine

Potential Spills/Accidents

Vehicular spills may occur along the transportation routes within the source water protection areas from trucks that transport fuels, waste, and other chemicals that have a potential for contaminating the source waters. Chemicals from accidental spills are often diluted with water, potentially washing the chemicals into the soil and infiltrating into the groundwater and/or running off into surface waters. Roadways are also frequently used for illegal dumping of hazardous or other potentially harmful wastes.

Roadways Best Management Practices Recommendations:

- 1. Provide El Paso County Public Works Department, Colorado Vegetation Management, and emergency responders with a copy of the Source Water Protection Plan and map of the protection area. Encourage them to use road Best Management Practices to prevent road materials from entering the source waters.
- 2. Encourage emergency responders to notify Triview Water Operators in the event of a spill and/or accident near their SWPA

Private Wells

There are two private water wells within the source water protection areas for Triview MD's Wells D7 and A7. These wells lie approximately 900 feet from the wells. The wells were both constructed in 1996 and drilled into the Dawson Aquifer at depths of 430 and 440 feet. Designated use for both wells is household use only. Well log data for permits #172132 and #172739 were obtained from the Colorado Division of Water Resources (Colorado Division of Water Resources, 2014). Private wells can be a direct route for contaminants to enter the groundwater if not properly cased and maintained. Contaminants that infiltrate from the surface are more likely to pollute old, shallow, uncased or abandoned wells.

Private Wells Best Management Practices Recommendations:

- 1. Share copies of the SWPP and outreach material that explains the importance of source water protection with owners of private wells within or near SWPA.
- 2. Stay informed on the status of private wells that exist within the Source Water Protection Areas.



Figure 14: Water Well Statuses near Triview Wells A7 and D7 SWPAs

SOURCE WATER PROTECTION MEASURES

Best Management Practices

The Steering Committee reviewed and discussed several possible best management practices (BMPs) that could be implemented within the Source Water Protection Area to help reduce the potential risks of contamination to the community's source water. The Steering Committee established a "common sense" approach in identifying and selecting the most feasible source water management activities to implement locally. The focus was on selecting those protection measures that are most likely to work for the community. The best management practices were obtained from multiple sources including: Environmental Protection Agency, Colorado Department of Public Health and Environment, Natural Resources Conservation Service, and other source water protection plans.

The Steering Committee recommends the best management practices listed in Table 9, "Source Water Protection Best Management Practices" be considered for implementation by:

- Triview MD
- Town of Monument
- El Paso County
- Mountain View Electric Association
- Private Landowners
- Colorado Rural Water Association

Evaluating Effectiveness of Best Management Practices

The Triview MD is committed to developing a tracking and reporting system to gauge the effectiveness of the various source water best management practices that have been implemented. The purpose of tracking and reporting the effectiveness of the source water best management practices is to update water system managers, consumers, and other interested entities on whether or not the intended outcomes of the various source water best management practices are being achieved, and if not, what adjustments to the Source Water Protection Plan will be taken in order to achieve the intended outcomes. It is further recommended that this Plan be reviewed at a frequency of once every three to five years or if circumstances change resulting in the development of new water sources and source water protection areas, or if new risks are identified.

The Triview MD is committed to a mutually beneficial partnership with the Colorado Department of Public Health and Environment in making future refinements to their source water assessment and to revise the Source Water Protection Plan accordingly based on any major refinements.

Table 9: Source Water Protection Best Management Practices

Issues	Best Management Practices	Implementers
Vandalism	1. Continue to inspect watershed and intakes for signs of physical damage, such as	1. Triview MD
	 Display signage that states "tampering with this facility is a federal offense" at 	2. Triview MD
	roadways leading to the SWPA, intakes and diversions, and on water storage tanks.	
	3. Develop outreach material that explains the importance of Triview MD's source	3. Triview MD, Colorado Rural
	water protection.	Water Association
Residential Practices	1. Develop outreach material that explains the importance of Triview MD's source	1. Triview MD
	water protection and distribute to residents	
	2. Post a copy of the SWPP on Triview MD's website.	2. Triview MD
Septic Systems	1. Identify properties within SWPA with septic systems and develop mailing list to	1. Triview MD
	educate the property owner on the link between good septic practices and	
	protecting source water.	
MVEA Anderson	1. Share copies of the Triview MD SWPP and contact information with MVEA	1. Triview MD
Substation	2. Encourage MVEA to notify Triview MD water operators in the event of a reportable	2. TRIVIEW MID/MIVEA
Cattle Crasing	spill and/or leak	
Cattle Grazing	1. Develop outreach material that explains the importance of Triview MD's source	1. TRIVIEW MD
Future Land Lice	Water protection as it relates to cattle grazing. Provide El Pase County Development Services Division and the Town of Monument	1 Triviou MD: El Dasa County
Puture Land Use –	1. Provide El Paso County Development Services Division and the Town of Monument with CIS mapping information of the Source Water Protection Areas and encourage	1. The wind, El Paso County
Development/construction	them to overlay this area on their land use mans	Division: Town of Monument
	 Keen informed and participate in land use hearings or meetings regarding lands 	2 Triview MD
	within the SWPAs.	2
Local & County Roads	1. Provide El Paso County Public Works Department, Colorado Vegetation	1. Triview MD
(Maintenance/Accidents)	Management, and emergency responders with a copy of the Source Water	
	Protection Plan and map of the protection area. Encourage them to use road Best	
	Management Practices to prevent road materials from entering the source waters.	
	2. Encourage emergency responders to notify Triview Water Operators in the event of	2. Triview MD
	a spill and/or accident near their SWPA	
Private Wells	1. Share copies of the SWPP and outreach material that explains the importance of	1. Triview MD
	source water protection with owners of private wells within or near SWPA.	
	2. Stay informed on the status of private wells that exist within the Source Water	2. Triview MD
	Protection Areas.	

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APPENDICES⁴

- A. Source Water Assessment Report
- B. Source Water Assessment Report Appendices
- C. CRWA's SWAP Risk Assessment Matrix
- D. Table A-1 Discrete Contaminant Types
- E. Table A-2 Discrete Contaminant Types (SIC Related)
- F. Table B-1 Dispersed Contaminant Types
- G. Table C-1 Contaminants Associated with Common PSOC's

 $^{^{\}rm 4}$ All appendices are located on the CD version of this SWPP.