Aldinger Acres Subdivision
Public Water System

PWSID # MT0003552

SOURCE WATER DELINEATION AND ASSESSMENT REPORT

Date of Report: 11/30/03

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INTRODUCTION

This Source Water Delineation and Assessment Report was completed for the Public Water Supply Aldinger Acres Subdivision (PWSID# 003552) by Jenny L. Erickson, a Research Specialist with the Montana Bureau of Mines and Geology under the supervision of Jim Stimson, a Water Quality Specialist with the Montana Department of Environmental Quality (DEQ). Mr. Troy Edam, at (406)-656-4341, is the operator for the Aldinger Acres Subdivision Public Water System.

Purpose

This report is intended to meet the technical requirements for the completion of the delineation and assessment report for the Aldinger Acres Subdivision as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SWDA) Amendments of 1996(P.L. 104-182).

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to protect public drinking water supplies from contamination. A major component of the Montana Source Water Protection Program is "delineation and assessment". Delineation is a process of mapping source water protection areas, which contribute water used for drinking. Assessment involves identifying locations or regions in source water protection areas where contaminants may be generated, stored, or transported, and then determining the relative potential for contamination of drinking water by these sources. The primary purpose of this source water delineation and assessment report is to provide information that helps the Aldinger Acres Subdivision complete a source water protection plan to protect its drinking water source.

Limitations

This report was prepared to assess the impacts from potential contaminant sources to the Aldinger Acres Subdivision public water supply, and is based on published information and information obtained from local residents familiar with the community. The terms "drinking water supply" or "drinking water source" refer specifically to the source of the Aldinger Acres Subdivision water supply and not any other public or private water supply. Also, not every potential or existing source of ground water or surface water contamination in the Aldinger Acres Subdivision area has been identified. Only potential sources of contamination in areas that contribute water to its drinking water source are considered.

The term "contaminant" is used in this report to refer to constituents for which maximum concentration levels (MCLs) have been specified under the national primary drinking water standards, and to certain constituents that do not have MCLs, but are considered to be significant health threats.

Chapter 1
BACKGROUND

The Community

The Aldinger Acres Subdivision is located approximately 6 miles west of the city of Billings. Billings is located in Yellowstone County in south central Montana (Figure 1), east of Bozeman and west of Miles City, along Interstate 90. According to the Census Bureau, the population of Billings is approximately 92,000 (Census, 2002).

Billings, Montana, dubbed the "Magic City" is positioned on the north west bank of the Yellowstone River. In 1877, homesteaders, ranchers, traders and merchants established the Coulson community near present-day Alkali Creek in Billings. In 1882, the Northern Pacific Railroad surveyed the area and renamed it for Frederick Billings, a former president of the Northern Pacific Railroad. Today, Billings is Montana's largest city. Industry, medical, and agriculture form the economic base of Billings.

Major transportation routes in the Billings area are U.S. Highway 3 and Interstate 90 and the Northern Pacific Railroad.

Other major public water supplies in the immediate vicinity of the Aldinger Acres Subdivision include the Wells Garden Estates, the Golden Eagle Water Users Association, the Blue Grass Water Users Association, and the Peter Yegen Jr. Golf Club (Figure 2). Information on additional major public water supplies is available upon request from the DEQ.

Approximately 120 residents utilize the Aldinger Acres Subdivision public water supply. There are 33 single-family units with individual on-site septic systems and drain fields.

Figure 1: Aldinger Acres Subdivision Vicinity Map

Figure 2: Aldinger Acres Subdivision Area Public Water Supplies

Climate

The Billings area has a semi-arid climate with a 30-year average annual precipitation of 15 inches and an annual snowfall of 57 inches (NOAA, 20003). During 1999 and 2000, the area experienced drought with precipitation totals 20-30 percent below normal, respectively. Fifty percent of the precipitation in 1999-2000 occurred as light showers or snowfall (<0.25 inches) and only 15 percent of the precipitation occurred in events with greater than 0.5 inches. The average high and low temperatures at the Billings weather station are 107°(F) and 57°(F) for July and 50°(F) and -2°(F) for January (National Weather Service, 2003). A summary of the available climatic data for the Billings area is presented in Table 1.

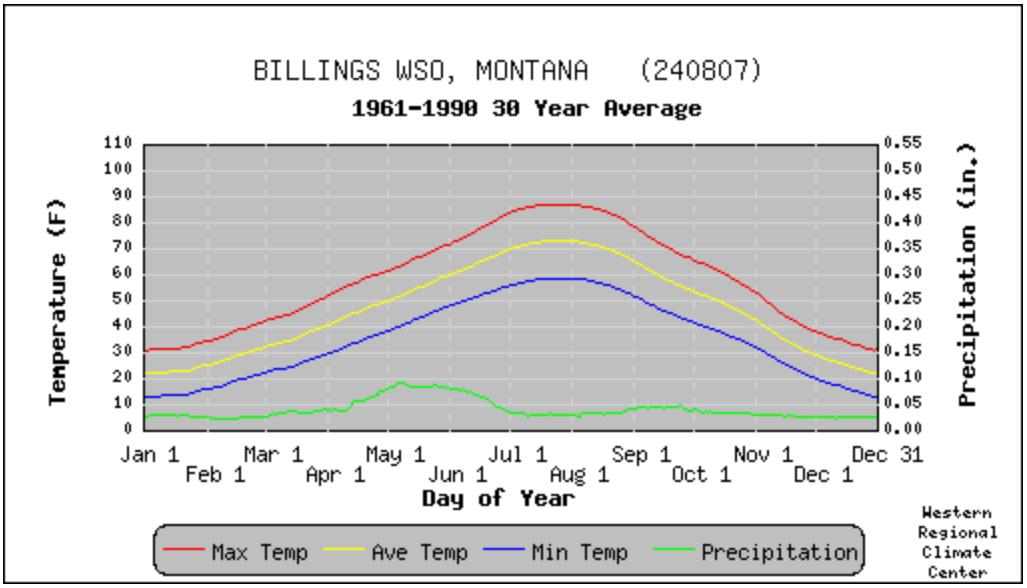
Table 1. Climatic Summary

Billings, Montana (240807)
Period of Record Monthly Climate Summary
Period of Record: 7/ 1/1948 to 3/31/2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	32.4	38.8	45.5	56.6	67.1	76.8	86.3	85.0	72.6	60.4	44.8	35.8	58.5
Average Min. Temperature (F)	13.9	19.4	24.6	33.8	43.4	51.7	58.0	56.7	46.9	37.2	25.9	18.0	35.8
Average Total Precipitation (in.)	0.78	0.62	1.06	1.77	2.29	2.13	1.10	0.89	1.28	1.10	0.73	0.66	14.41
Average Total Snowfall (in.)	10.3	7.2	10.1	9.1	1.7	0.0	0.0	0.0	1.1	4.0	6.6	8.5	58.6
Average Snow Depth (in.)	2	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record.
Max. Temp: 100% Min. Temp: 100% Precipitation: 100% Snowfall: 100% Snow Depth: 100%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu



Geographic setting

Billings is situated between the Great Plains and the Rocky Mountains and is located in the Yellowstone River Valley on the northwest bank of the Yellowstone River in south central Montana. This valley is bounded on the north by a 300-foot-high sandstone cliff formed by the Eagle Sandstone and the Telegraph Creek Formations (Lopez, 2000). The Yellowstone River flows approximately 6.5 miles to the southeast of Aldinger Acres Subdivision. Two major ditches, the Big Ditch and the Snow Ditch are within a quarter of a mile from the Aldinger Acres Subdivision. Hogan's Slough is also a major irrigation ditch that flows approximately one and a half miles southwest from the Aldinger Acres Subdivision (Figure 2). The elevation of the Aldinger Acres Subdivision is approximately 3,280 feet above sea level.

General Description of the Source Water

The source water for the Aldinger Acres Subdivision wells as classified by the MBMG is the Qat3 alluvial gravel, Pleistocene Terrace Level 3 aquifer. The aquifer is gravel underlying terraces about 50 to 90 feet above the present altitude of the Yellowstone River. Ground water occurs in relatively thin (0-30 feet thick) alluvial gravel deposits that underlie four of the terrace surfaces within the valley. The average saturated thickness of the terrace gravel aquifers is 15 feet (Olson and Reiten, 2002). According to the well log taken from the MBMG GWIC, the lithology for Well #1 (GWIC Id# 93000) is 0 to 45 feet brown sand and shale; 45 to 50 feet brown shale; and 50 to 70 feet sand and gravel; Well #2 (GWIC Id#160941) is 0 to 2 feet topsoil; 2 to 50 feet sandy brown clay; 50 to 73 feet sand and gravel; and shale at 73 feet.

The Aldinger Acres Subdivision is located in the Upper Yellowstone Lake Basin Watershed (Figure 7). The typical ground water flow direction within the inventory and recharge region of the Aldinger Acres Subdivision is southeast, towards the Yellowstone River (Olson and Reiten, 2002). The ground water recharge for the Aldinger Acres Subdivision source comes from precipitation, ditch leakage, and flood irrigation percolating into the underlying alluvial aquifer.

Table 2. **Geologic or Hydrologic Maps for the Yellowstone River Valley that include the Aldinger Acres Subdivision in Southern Montana.**

Title or Description	Date	Area Covered	Reference
Yellowstone River Valley, South-Central Montana Changes in the Shallow Ground Water Resources Near Billings, August 1968-1978.	1983	Yellowstone River Valley	Hutchinson, R. D., 1983. Hydrogeologic Map 6. MBMG.
Geologic Map of the Billings 30' x 60' Quadrangle, Montana.	2000	Yellowstone River Valley	Lopez, D. A., 2000. Geologic Map Series No. 59. MBMG.
Hydrogeology of the West Billings Area: Impacts of Land-Use Changes on Water Resources.	2002	West Billings	Olson, J. L. and Reiten, J. C., 2002. Report of Investigation 10. MBMG.

The Public Water Supply

The Aldinger Acres Subdivision is classified as a community system under the Federal Safe Drinking Water Act because the system serves at least 25 year-round residents or provides water through at least 15 service connections. The Aldinger Acres Subdivision serves 120 residents through 33 connections with domestic water and irrigation for landscaping. Water demand is estimated 20,000 gallons per day (gpd) (1997, Sanitary Survey) assuming 50 gallons per day per member as specified for a dwelling consisting of a single-family residence (EPA, 1991).

According to the MBMG GWIC database, Well #1 (WL002) is 70 feet deep with a 6-inch diameter steel casing and 6-inch slot intervals from 60 feet to 65 feet. The well is sealed with "chips/natural/cement" from 0 to 45 feet. Well #1 was completed on May 25, 1985 by Pryor Creek Drilling (Lic. #WWC435). Well #2 (WL003) is 73 feet deep with a 6-inch diameter steel casing from 2 feet above ground to 650 feet. This well has a 5-inch steel casing from 65 feet to 73 feet and has 5-inch slot intervals from 65 feet to 70 feet. Well #2 is sealed with neat cement from 0 to 50 feet and is packed with 3/8" pea gravel from 50 feet to 73 feet. Well #2 was completed on August 30, 1991 by American Drilling (Lic. #WWC344). The Aldinger Acres Subdivision's PWS wells are enclosed in a pump house that also contains a meter, a submersible intake and pump, and six well-mate hydropneumatic tanks (Sanitary Survey, 1997). Currently there is no water treatment being used for the Aldinger Acres Subdivision's PWS. A copy of the well logs is included in Appendix B. The sanitary survey is available upon request from the DEQ.

Water Quality

The source water from the Aldinger Acres Subdivision wells is routinely monitored for compliance with drinking water standards. Compliance with all state and federal drinking standards is based on a variety of different schedules. According to the DEQ water quality monitoring database, the subdivision has had 1 bacteria detect in the last 5 years. The detect occurred on August 24, 1998 in routine sampling. Repeat samples did not detect bacteria and there have been no subsequent detects since that date. No MCL exceedances were noted for any other constituents monitored over the past five years, this includes nitrate. The highest nitrate value recorded at the PWS is 3.14 milligrams per liter (mg/l), and an average value of 2.8 mg/l. While these values are somewhat elevated, they are significantly below the MCL of 10 mg/l.

CHAPTER 2
DELINEATION

The portion of the aquifer that contributes water to Aldinger Acres Subdivision PWS is identified in this chapter. Three management regions are mapped: a 100-foot control zone; a Three-Year Time of Travel inventory/recharge region and a watershed recharge region. Time of travel is a calculated velocity at which ground water travels in a given amount of time under certain criteria.

The goal of management in the control zone is to protect against direct introduction of contaminants into the Aldinger Acres Subdivision's wells or in the immediate surrounding area. The goal of management in the recharge/inventory region is to maintain and improve the quality of ground water that could reach the PWS supply over longer times or with increasing water usage. The management in the control zone and inventory/recharge regions should focus on pollution prevention activities where contaminated water is likely to flow to the PWS wells within a relatively short time period.

Geologic Conditions and Aquifer Characteristics

The following description of geologic conditions in the Yellowstone River Valley is summarized from a map published by the MBMG (Olson and Reiten, 2002). The subdivision is located in the Upper Yellowstone Lake Basin Watershed. The source water aquifer for the Aldinger Acres Subdivision source wells, as classified by the MBMG, is the Qat3 Pleistocene Terrace Level 3 aquifer. This source water aquifer is gravel underlying terraces about 50 to 90 feet above present altitude of the Yellowstone River. The sediments of this aquifer consist of 0-150 feet of silty clay, sandy clay, and clay-bound gravel, overlying 0-65 feet of rounded gravel, pebbles, and cobbles in a silty-to-sandy matrix (Figure 3).

The Aldinger Acres Subdivision's wells are completed in an unconsolidated, semi-confined alluvium with high source water sensitivity to contamination. A shallow unconfined alluvial aquifer is considered highly sensitive to potential contamination sources at the land surface (Montana DEQ, 2000). In an unconfined aquifer, water and contaminants can readily percolate down to the shallow sediments. Deeper sediments are less vulnerable to contamination because conditions become semi-confined as clay layers are encountered. The typical ground water flow of the aquifer is in the direction of the Yellowstone River to the southeast of the Aldinger Acres Subdivision wells location. The ground water recharge for the Aldinger Acres Subdivision comes from precipitation and flood irrigation.

Figure 3: Aldinger Acres Subdivision Hydrogeology

Table 3. List of Geologic or Hydrogeologic Research Activities in the Yellowstone River Valley Area.

Title of Project	Project Finished	Area Covered	Project Objectives
Phase 1 Assessment of Impacts of Non-point Source Pollution on Water Resources in the Middle Yellowstone Alluvial Valley.	Unpublished	Yellowstone River Valley	Assess impacts of non-point source pollution on water resources in the middle Yellowstone alluvial valley.
Geologic Map of the Billings Area, Yellowstone County, Montana. Geologic Map Series No. 61-A	2002	Areas surrounding Billings Montana	Identify the geologic conditions surrounding Billings.
Geologic Map of the Billings 30' x 60' Quadrangle, Montana. Geologic Map Series No. 59.	2000	30' x 60' Quadrangle, of Billings Montana	Identify the different geologic conditions surrounding Billings.
Hydrologic Investigation of the Yellowstone River Valley.	1973	Billings to Park City Montana	Investigate Water Resources of the Yellowstone River Valley.
Yellowstone River Valley, South-Central Montana Changes in the Shallow Ground Water Resources Near Billings, August 1968-1978.	1983	Yellowstone River Valley	Investigate changes in the shallow ground water resources of the Yellowstone River Valley and South-Central Montana.
Characterization of Alluvial Aquifer of the Middle Yellowstone River Area, Montana Ground Water Assessment Atlas, Part B Map 3.	In press (2002)	Middle Yellowstone River area	Characterize the alluvial aquifers of the Yellowstone River Area.
Hydrogeology of the West Billings Area: Impacts of Land-Use Changes on Water Resources, Report of Investigation 10.	2002	West Billings	Characterize the hydrogeology and impacts of land use changes in the West Billings Area.

Conceptual Model and Assumptions
The sediments that comprise the aquifer serving the Aldinger Acres Subdivision are unconsolidated, semi-confined alluvium consisting mostly of cobbles and pebbles with minor amounts of sand and clay. The unconsolidated alluvium has a high capacity to transmit water and contaminants to the wells. Potentiometric maps based on water levels measured in wells around the Aldinger Acres Subdivision source wells indicate that the ground water flow of the aquifer and in the inventory and recharge regions is towards the Yellowstone River in a southeasterly direction (Olson and Reiten, 2002). The aquifer is recharged by precipitation and surface water. Seasonal variation in recharge and water use do have an effect on water levels, but do not significantly influence ground water flow direction.

Well Information
Well information for the Aldinger Acres Subdivision's wells are presented in Table 4.

Table 4. **Source Well Information for Aldinger Acres Water Association Wells #1 and #2.**

Information	**Well #1**	Well #2
PWS Source Code	002	003
MBMG GWIC ID Number	93000	160941
Well Location (T,R,Sec)	T1S, R25E, 03	T1S, R25E, 03
Latitude / Longitude	45.7790, -108.6358	45.7793, -108.6361
Date Completed	May 24, 1985	August 30, 1991
Total Depth	70 feet	73 feet
Perforated Interval	Johnson 60 slot	Tail pipe
Static Water Level	13 feet	12.66 feet
Pumping Water Level	16.5 feet	16.0 feet
Drawdown	3.5 feet	3.34 feet
Test Pumping Rate	100.0 gpm	80.0 gpm
Source Type	Unconsolidated Alluvium (semi-confined)	Unconsolidated Alluvium (semi-confined)

Delineation Results

Methods and Criteria
The Montana DEQ's Source Water Protection Program specifies methods and criteria used to delineate subregions of the source water protection area for the Aldinger Acres Subdivision.

- A 100-foot radius control zone was delineated for the subdivision's source water wells.
- A hydrogeologic mapping and a time-of-travel equation describing uniform ground water flow were

used to delineate an inventory region bounded by a three-year time-of-travel (TOT) distance. The one-year TOT distance is used in Chapter 4 to rate the hazards of potential contaminant sources included in the inventory/recharge region close to the wells. The boundary for the three-year time-of-travel delineates the distance, in the aquifer, that would be traveled by water or contaminants in three years. The boundary limit of the three-year time-of-travel delineates the down-gradient and lateral extent of the capture zone for the Aldinger Acres Subdivision wells (Appendix A: Time-of-Travel Calculations).

- A 45-degree triangular wedge extending up-gradient from the well was used to approximate hydrologic boundaries in order to delineate the inventory/recharge region.
- The recharge region is delineated as the 5-th code hydrologic unit number 10070004.

Time-of-Travel Calculations

Travel distance for one and three years were calculated to approximate the combined long-term effects of one well (Well #1, PWS ID# 03552002) pumped at the average pumping rate, as required under the Montana Source Water Protection Program. The three-year time-of-travel distance delineates the down-gradient and lateral extent of the capture zone for the wells. This distance suggests the approximate distance in the aquifer that would be traveled by water or contaminants in three years.

Estimates including aquifer flow properties, well discharge rate, ambient ground water flow direction, and ground water gradient were used to calculate the distance corresponding to the one- and three-year time-of-travel (Table 5). Aquifer flow properties estimated are hydraulic conductivity, aquifer thickness (MBMG GWIC Well Logs), and effective porosity (Olson and Reiten, 2002). Hydraulic conductivity is a measure of the ability of an aquifer material to transmit water, and porosity is a measure of the percent of the aquifer that water flows through. A hydraulic conductivity (K) value of 90 feet per day (ft/d) was calculated from the report entitled, Characterization of Alluvial Aquifer of the Middle Yellowstone River Area Report, conducted by the MBMG (Olson and Reiten, 2002). The 15 percent effective porosity value used in time-of-travel calculations is typical for sand or gravel in the area of the source wells. Hydraulic gradient was calculated utilizing the contour interval over the distance between the contours in feet, and was determined to be 0.0095. Finally, the pumping rate for Well #1 (GWIC ID #93000) of 19,500 ft^3/day is based upon a six-hour pump test taken by the MBMG, and reflects this test's resultant pumping rate of 100 gpm.

Delineation

A 45-degree triangular wedge extending from the well up-gradient to the three year time-of-travel boundary is included in the inventory region, as required under the Montana Source Water Protection Program. The inventory region encompasses the area that water or contaminants can flow to the Aldinger Acres Subdivision wells over a given period of time. A distance of approximately 6,860 feet corresponds to the three-year time-of-travel (Figure 4). These estimated time-of-travel values are sensitive to the pumping rate used (Table 5).

Limitations

The delineation is based on estimated pumping conditions and ground water flow. Conclusions based on this interpretation are uncertain because the extent and properties of the aquifer, and the direction and rate of ground water flow are not known precisely. The inventory region was expanded to compensate for errors resulting from uncertain aquifer properties and flow conditions. For example, a 45-degree range of ground water flow directions was used to define the lateral boundaries of the inventory region. Also, time-of-travel distances as calculated above are conservative estimates that are based on available data and the professional judgment of the analyst.

Figure 4: Aldinger Acres Subdivision Inventory Region

Table 5. Estimates and Data used to Delineate the Inventory Region for the Aldinger Acres Subdivision.

Input Parameter	Value Used
Aquifer Thickness	20 ft
Hydraulic Conductivity	90 ft/d
Hydraulic Gradient	0.0095
Flow Direction	SE
Effective Porosity	0.15
Pumping Rate	19,250 ft^3pd
One-Year Time-of-Travel	2,577 ft
Three-Year Time-of-Travel	6,860 ft

CHAPTER 3
INVENTORY

Potential sources of contamination were inventoried to assess the susceptibility of Aldinger Acres Subdivision drinking water sources to contamination. Potential sources of all contaminants with primary drinking water standards were identified but a detailed inventory was conducted only for potential sources of contaminants that are the greatest threat to health. Significant potential contaminants in the Aldinger Acres Subdivision include nitrates, herbicides, pesticides, pathogens and synthetic organic compounds (SOCs) (Figure 5, Figure 6 and Figure 7). The inventory for the Aldinger Acres Subdivision focuses on all activities in the control zone, private facilities in the inventory region, and general land uses and large facilities in the recharge region.

Inventory Method

Databases were searched to identify businesses and land uses that are potential sources of regulated contaminants in the inventory region. The following steps were followed:

Step 1: Urban and agricultural land uses were identified from the U.S. Geological Survey, 2000 National Landcover Dataset, Montana.

Step 2: The U.S. EPA's Envirofacts System was queried to identify EPA regulated facilities located in the Inventory Region. This system contains information pertaining to facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). The available reports were browsed for facility information including the Handler/Facility Classification to be used in assessing whether a facility should be classified as a significant potential contaminant source.

Step 3: The Montana Department of Environmental Quality on the Montana Natural Resource Information System Online Interactive Map Builder databases were queried to identify underground storage tanks (USTs), hazardous waste contaminated sites (DEQ Hazardous Waste Site Cleanup Bureau), landfills, septic density, wastewater discharge and abandoned mines in the inventory region. Any information on past releases and present compliance status was noted.

Step 4: A business phone directory was consulted to identify businesses that generate, use, or store chemicals in the inventory region. Equipment manufacturing and/or repair facilities, printing or photographic shops, dry cleaners, farm chemical suppliers, and wholesale fuel suppliers were targeted by Standard Industrial Codes.

Step 5: Major road and rail transportation routes were identified throughout the inventory region.

Step 6: All land uses and facilities that generate, store, or use large quantities of hazardous materials were identified within the recharge region and identified on the base map.

Figure 5: Land Cover Within the Aldinger Acres Subdivision Recharge Region
Figure 6: Septic Density Within the Aldinger Acres Subdivision Inventory Region
Figure 7. Potential Contaminant Sources Within the Aldinger Acres Subdivision Inventory Region

Potential contaminant sources are designated as significant if they fall into one of the following categories:

1) Large quantity hazardous waste generators
2) Landfills
3) Hazardous waste contaminated sites
4) Underground storage tanks
5) Major roads or rail transportation routes
6) Cultivated cropland
7) Animal feeding operations
8) Wastewater lagoons or spray irrigation
9) Septic Systems
10) Sewered residential areas
11) Storm sewer outflows
12) Floor drains, sumps, or dry wells
13) Abandoned or active mines

Inventory Results/Control Zone

The control zone for both wells includes portions of developed lots with septic systems and drainfields, and streets within the subdivision. The on-site septic systems in the control zone pose as a concern for nitrates and pathogens as possible sources of contamination. Irrigation of lawns and the use of lawn chemicals including pesticides, herbicides, and fertilizers could pose a threat to the subdivisions wells and the source water. The location an irrigation canal (the Big Ditch), is also a concern because the ditch is up-gradient from the subdivision's wells and is known to provide recharge to the shallow aquifer system in the area. If the water in the canal were to be come contaminated, it would pose a threat to the source water and the subdivision's water supply.

A 45 to 50 -foot thick clay layer shows up in the well logs of the subdivision's wells and would act as a natural barrier against percolation of surface water and any potential contaminants into aquifer in the vicinity of the subdivision.

Inventory Results/Inventory Region

Land use within the inventory region consists primarily of small and large acreage irrigated cropland at 85% and urban at 15% (Figure 5). The Montana Department of Environmental Quality (DEQ) query system was queried for septic density in the inventory region. The DEQ "Mapper" shows that the septic density in the inventory region is low to moderate and present possible sources of contamination (Figure 6).

The EPA "Enviromapper" was queried to find that there is no wastewater discharge locations, business properties, hazard waste sites, or underground storage tanks in the inventory region. There are no potential contaminant sources from hazardous waste in the inventory region. There are no sewer lines located in the area surrounding the two wells. No animal feeding operations exist within the inventory region, although land has historically been used as animal pasture. Pesticides, herbicides, pathogens and/or SOCs are a possible source of contamination from the irrigated cultivated cropland (Figure 5). No major highways or railways pass through the inventory region.

Table 6. **Significant Potential Contaminant Sources in the Control Zone/Inventory Region of Aldinger Acres Water Association.**

Possible Contaminant Source	Description
Irrigated Pasture, Farm Yards, and Cropland	Possible herbicides, pesticides, pathogens, SOC contamination
Private Home Septic Systems	Possible nitrate and pathogen contamination

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Private Home Septic Systems-Nitrates and pathogens could leach into area ground water from septic tanks, associated piping, and the drain field if malfunctions occur.

Cultivated Cropland-Agricultural chemicals used on cropland could potentially migrate into area ground water.

Inventory Limitations
The potential sources of contaminants for Aldinger Acres Water Association are determined from readily available data and reports. Unregulated activities or unreported contaminant releases may have been missed. The use of multiple sources of data, however, should ensure that the major threats to the source water for Aldinger Acres Subdivision are identified.

Inventory Update
To make this SWDAR a useful document in the years to come, the owners, manager, or the certified water system operator(s) for the public water supply Aldinger Acres Subdivision should update the inventory for his records every year. Changes in land uses or potential contaminant sources should be noted and additions made as needed. A complete inventory should be submitted to DEQ at least every five years to ensure that this report/plan stays current in the public record.

CHAPTER 4
SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by local entities, in this case, Aldinger Acres Subdivision.

The goal of Source Water Management is to protect the source water by 1) controlling activities in the control zone, 2) managing significant potential contaminant sources in the Inventory Region, and 3) ensuring that land use activities in a surface water buffer pose minimal threat to the source water (was not necessary for this PWS). Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by Aldinger Acres Subdivision to reduce susceptibility are recommended.

Susceptibility is determined by considering the hazard rating for each potential contaminant source. Hazard for unconfined wells is based on the criteria identified in Table 7.

Table 7. Determination of Hazard of Potential Contaminant Sources For Unconfined Wells.

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Potential Contaminant Sources	High Hazard	Moderate Hazard	Low Hazard
Point Sources	Within one-year TOT	One to three years TOT	Over three years TOT
Septic Systems	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

The existence of barriers that decrease the likelihood that contaminated water will flow to Aldinger Acres Subdivision's wells also determines susceptibility (Table 8). Barriers can be anything that decreases the likelihood that contaminated water will flow to the Association's wells. Barriers can be engineered structures, management actions, or natural conditions. Examples of engineered barriers are spill catchments structures for industrial facilities and leak detection for underground storage tanks. Emergency planning and best management practices can be considered management barriers. Thick clay-rich soils, a deep water table, or a thick saturated zone above the well intake can be a natural barrier.

Table 8. Susceptibility to specific contaminant sources as determined by hazard and the presence of barriers.

	High Hazard	Moderate Hazard	Low Hazard
No Barriers	Very High Susceptibility	High Susceptibility	Moderate Susceptibility
One Barrier	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Multiple Barriers	Moderate Susceptibility	Low Susceptibility	Very Low Susceptibility

Significant potential contaminant sources in the Aldinger Acres Subdivision wells' control zone and Inventory Region are identified in Table 9 along with their hazard ratings. The 48 feet of brown clay above the aquifer is considered a natural barrier to protect the source water from possible contaminants.

Table 9. Significant potential contaminant sources in the Aldinger Acres Subdivision PWS Inventory Region.

Source	Map Figure ID No.	Potential Contaminants	Hazard	Hazard Rating
Irrigated Pasture, Farm Yards, and Cropland	Figure 6	Herbicides, pesticides, pathogens, and SOCs	Ag chemicals leaching into area ground water	High
On-Site, Private Septic Systems	Figure 7	Nitrates, and pathogens	Leaching to area ground water	High
Other Area Septic Systems	Figure 8	Nitrates and pathogens	Leaching to area ground water	Moderate

The susceptibility of the Aldinger Acres Subdivision wells to each potential contaminant source is assessed separately. The susceptibility ratings for each significant potential contaminant source and each associated contaminant are presented in Table 10. Management recommendations indicate how significant potential contaminant sources could be better managed to prevent impacts to the Aldinger Acres Subdivision wells are also provided in Table 10.

Table 10. Susceptibility Assessment for Significant Potential Contaminant Sources in the Aldinger Acres Subdivision PWS Inventory Region.

Source	Map Figure ID No.	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management Recommendation
Cultivated Cropland	Figure 6	SOC's, nitrates and pathogens	Ag chemicals leaching into area ground water	High	One Clay layer	High	Monitoring Provide Education resources to land owners on proper application and storage of pesticides, herbicides, and fertilizers; encourage the use of Best Management Practices.
On-site Septic Systems	Figure 8	Nitrates and pathogens	Leaching into area ground water	High	One Clay layer	High	Proper Maintenanc and operation.
Other Area Septic Systems	Figure 6	Nitrates and pathogens	Leaching into area ground water	Moderate	Multiple Clay layer Distance from the wells	Low	Proper Maintenanc and operation.

Figure 8. Aerial View of Aldinger Acres Subdivision with 100 Ft. Control Zone

Susceptibility Assessment Results

The following are brief descriptions of the susceptibility assessments for each significant potential contaminant source.

Irrigated Pasture, Farm Yards, and Cropland - Hazard is ranked high because there is more than 50 percent of the irrigated pasture and cropland in the one-year time-of-travel recharge/inventory region of the well. Susceptibility is ranked high because the 48 feet of brown clay above aquifer serves is counted as a barrier.

Septic Systems: Private - Hazard is ranked high because the on-site individual septic systems are located within the inventory region in close proximity to the wells. The overall susceptibility of the wells are ranked as high; one barrier; the 48 feet of brown clay above aquifer serves is counted as a barrier.

Other Area Septic Systems- Hazard is ranked moderate based on septic density. The overall susceptibility of the wells is ranked low; multiple barriers, clay-rich soils and distance from the well were identified.

Management Recommendations

The Aldinger Acres Subdivision Source Water Delineation and Assessment Report was prepared to assist the Aldinger Acres Subdivision PWS owner, PWS operator, and customers to protect the well. The report provides information concerning the aquifer that supplies water to the Aldinger Acres Subdivision wells, identifies the control zone, inventory region, and within each of these protection areas identifies the significant potential contaminants that may impact the PWS well. If the management recommendations included in Table 10 are implemented by the Aldinger Acres Subdivision PWS, they may be considered additional barriers that will reduce the susceptibility of Aldinger Acres Subdivision's wells to specific potential contaminant sources and their associated contaminants. Management recommendations fall into the following categories:

- Education
- Sewage disposal system maintenance and leak detection
- Advanced Septic System Treatment
- Storm water management
- Agricultural Best Management Practices (BMPs)
- Emergency Response Plan
- Source Water Protection Plan

Education – Educational workshops provided to the general public by the city, county, or state promote safe handling and proper storage, transport, use, and disposal of hazardous materials. Ongoing training provided to designated emergency personnel such as the Aldinger Acres Subdivision PWS operator will promote the efficiency and effectiveness of emergency responses to hazardous material spills that may occur in the vicinity of the wells. Likewise, educational workshops provided to rural homeowners will promote the proper maintenance and replacement of residential septic systems. The EPA and the State of Montana can provide educational materials on these topics.

Sewage Disposal System Maintenance and Leak Detection-Proper operation and maintenance of the on-site septic system will reduce the susceptibility of the Aldinger Acres Subdivision wells to contamination from this potential contaminant source.

Advanced Septic System Treatment- Installation of advanced septic treatment systems such as sand filters can limit contamination from this potential contaminant source.

Storm water Management- Storm water planning should address potential contaminant sources and drainage control. Source control can be accomplished through educational programs focusing on residential and

commercial chemical use, disposal, and recycling. Drainage control and pollutant removal can be accomplished through the use of vegetated detention basins at outfall locations. The construction of storm runoff wetlands can go a long way to reducing the amount of non-point pollutants.

Agricultural and Silvicultural Best Management Practices (BMPs)- Promote the use of BMPs that address application and mixing of fertilizers and pesticides. Promote the use of BMPs that are utilized to minimize surface runoff and soil erosion on cultivated fields.

Emergency Response Plan- An emergency response plan would be of significant benefit to the Aldinger Acres Subdivision administrators, operator, and students. The usefulness and effectiveness of an emergency response plan are maximized if the plan contains a clear listing of all emergency contacts, emergency numbers, and resources available within Billings and Yellowstone County to respond to an emergency situation, such as a hazardous material spill, at Aldinger Acres Subdivision.

Source Water Protection Plan- The next phase of source water protection for the Aldinger Acres Subdivision would be for the administrator and water operator to take the information presented in this source water delineation and assessment report and use it to continue the development of a Source Water Protection Plan. The Source Water Protection Plan would clearly identify: 1) strategies to reduce the likelihood of contaminant releases within the inventory region, 2) the procedures to follow (emergency response plan) in the event that the PWS Name wells become threatened by regulated contaminants, and 3) identify alternate sources of drinking water.

CHAPTER 5
MONITORING WAIVERS

Waiver Recommendation

The Aldinger Acres Subdivision PWS currently has no waivers. Given the hydrogeologic setting, the relatively high percentage of agricultural land, and the relatively close proximity of the septic systems within the subdivision to the wells, the Source Water Protection Program does not recommend that the subdivision apply for a water quality waiver. Water quality monitoring will serve as an early warning systems and proactive means to identify contamination problems if they should arise. In the event that the water supply operators desire to apply for a waiver, they should read the following paragraphs thoroughly before submitting the required documentation to the DEQ.

Monitoring Waiver Requirements

The 1986 Amendments to the Safe Drinking Water Act require that community and non-community PWSs sample drinking water sources for the presence of volatile organic chemicals (VOCs) and synthetic organic chemicals (SOCs). The US EPA has authorized states to issue monitoring waivers for the organic chemicals to systems that have completed an approved waiver application and review process. All PWSs in the State of Montana are eligible for consideration of monitoring waivers for several organic chemicals. The chemicals diquat, endothall, glyphosate, dioxins, ethylene dibromide (EDB), dibromochloropropane (DBCP), and polychlorinated biphenyls are excluded from monitoring requirements by statewide waivers.

Use Waivers

A Use Waiver can be allowed if through a vulnerability assessment, it is determined that specific organic chemicals were not used, manufactured, or stored in the area of a water source (or source area). If certain organic chemicals have been used, or if the use is unknown, the system would be determined to be vulnerable to organic chemical contamination and ineligible for a Use Waiver for those particular contaminants.

Susceptibility Waivers

If a Use Waiver is not granted, a system may still be eligible for a Susceptibility Waiver, if through a vulnerability assessment it is demonstrated that the water source would not be susceptible to contamination. Susceptibility is based on prior analytical or vulnerability assessment results, environmental persistence, and transport of the contaminants, natural protection of the source, wellhead protection program efforts, and the level of susceptibility indicators (such as nitrate and Coliform bacteria). The vulnerability assessment of a surface water source must consider the watershed area above the source, or a minimum fixed radius of 1.5 miles up-gradient of the surface water intake. PWSs developed in unconfined aquifers should use a minimum fixed radius of 1.0 mile as an area of investigation fort he use of organic chemicals. Vulnerability assessment of spring water sources should use a minimum fixed radius of 1.0 mile as an area of investigation for the use of organic chemicals. Shallow ground water sources under the direct influence of surface water (GWUDISW) should use the same area of investigation as surface water systems; that is, the watershed area above the source, or a minimum fixed radius of 1.5 miles up-gradient of the point of diversion. The purpose of the vulnerability assessment procedures outlined in this section is to determine which of the organic chemical contaminants are in the area of investigation.

Given the wide range of landforms, land uses, and the diversity of ground water and surface water sources across the state, additional information is often required during the review of a waiver application. Additional information may include well logs, pump test data, or water quality monitoring data from surrounding public

water systems, delineation of zones of influence and contribution to a well, Time-of-Travel or attenuation studies, vulnerability mapping, and the use of computerized ground water flow and transport models. DEQ's PWS section and DEQ Source Water Protection Program will conduct review of an organic chemical monitoring waiver application. Other state agencies may be asked for assistance.

Susceptibility Waiver for Confined Aquifers

Confined ground water is isolated from overlying material by relatively impermeable geologic formations. A confined aquifer is subject to pressures higher than atmospheric pressure that would exist at the top of the aquifer if the aquifer were not geologically confined. A well that is drilled through the impervious layer into a confined aquifer will enable the water to rise in the borehole to a level that is proportional to the water pressure (hydrostatic head) that exists at the top of a confined aquifer.

The susceptibility of a confined aquifer relates to the probability of an introduced contaminant to travel from the source of contamination to the aquifer. Susceptibility of an aquifer to contamination will be influenced by the hydrogeologic characteristics of the soil, vadose zone (the unsaturated geologic materials between the ground surface and the aquifer), and confining layers. Important hydrogeologic controls include the thickness of the soil, the depth of the aquifer, the permeability of the soil and vadose zones, the thickness and uniformity of low permeability and confining layers between the surface and the aquifer, and hydrostatic head of the aquifer. These factors will control how readily a contaminant will infiltrate and percolate toward the ground water.

The Susceptibility waiver has the objective of assessing the potential of contaminants reaching the ground water used by the PWS. A ground water source that appears to be confined from surface infiltration in the immediate area of the wellhead may eventually be affected by contaminated ground water flow from elsewhere in the recharge area. Contaminants could also enter the confined aquifer through improper well construction or abandonment where the well provides a hydraulic connection from the surface to the confined aquifer. The extent of confinement of an aquifer is critical to limiting susceptibility to organic chemical contamination. Regional conditions that define the confinement of a ground water source must be demonstrated by the PWS in order to be considered for a confined aquifer susceptibility waiver. Confinement of an aquifer can be demonstrated by pump test data (storage coefficient), geologic mapping, and well logs. Site-specific information is required to sufficiently represent the recharge area of the aquifer and the zone of contribution to the PWS well. The following information should be provided:

- Abandoned wells in the region (zone of contribution to the well),
- Other wells in the region (zone of contribution to the well),
- Nitrate/Coliform bacteria analytical history of the PWS well,
- Organic chemical analytical history of the PWS well,

Susceptibility Waiver for Unconfined Aquifers

Unconfined aquifers are the most common source of usable ground water. Unconfined aquifers differ from confined aquifers in that the ground water is not regionally contained within relatively impervious geologic strata. As a result, the upper ground water surface or water table in an unconfined aquifer is not under pressure that produces hydrostatic head common to confined aquifers.

Unconfined aquifers are usually locally recharged from surface water or precipitation. In general, ground water flow gradients in unconfined aquifers reflect surface topography, and the residence time of water in the aquifer is comparatively shorter than for water in confined aquifers. Similar water chemistry often exists between unconfined ground water and area surface water, and physical parameters and dissolved constituents can be an indicator of the hydraulic connection between ground water and surface water. Consequently, unconfined aquifers can be susceptible to contamination by organic chemicals migrating from the ground surface to ground water.

The objective of the susceptibility waiver application is to assess the potential of organic chemical migration from the surface to the unconfined aquifer. The general procedures make use of a combination of site-specific information pertaining to the location and construction of the source development, monitoring history of the source, geologic characteristics of the unsaturated soil and vadose zones, and chemical characteristics of the organic chemicals pertaining to their mobility and persistence in the environment. The zone of contribution of the unconfined ground water source must be defined and plotted. This should describe the ground water flow directions, gradients, and a 3-year-time-of-travel. All surface bodies within 1,000 feet of the PWS well(s) must be plotted. Analytical monitoring history of the PWS well and those nearby should be provided as well.

GLOSSARY*

Acute Health Effect. An adverse health effect in which symptoms develop rapidly.

Alkalinity. The capacity of water to neutralize acids.

Aquifer. A water-bearing layer of rock or sediment that will yield water in usable quantity to a well or spring.

Best Management Practices (BMPs). Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

Coliform Bacteria. Bacteria found in the intestinal tracts of animals. Their presence in water is an indicator of pollution and possible contamination by pathogens.

Confined Aquifer. A fully saturated aquifer overlain by a confining unit such as a clay layer. The static water level in a well in a confined aquifer is at an elevation that is equal to or higher than the base of the overlying confining unit.

Confining Unit. A geologic formation that inhibits the flow of water.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Enacted in 1980. CERCLA provides a Federal "Superfund" to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup.

Delineation. A process of mapping source water management areas.

Hardness. Characteristic of water caused by presence of various salts. Hard water may interfere with some industrial processes and prevent soap from lathering.

Hazard. A measure of the potential of a contaminant leaked from a facility to reach a public water supply source. Proximity or density of significant potential contaminant sources determines hazard.

Hydraulic Conductivity. A coefficient of proportionality describing the rate at which water can move through an aquifer.

Inventory Region. A source water management area that encompasses the area expected to contribute water to a public water supply within a fixed distance or a specified ground water travel time.

Maximum Contaminant Level (MCL). Maximum concentration of a substance in water that is permitted to be delivered to the users of a public water supply. Set by EPA under authority of the Safe Drinking Water Act.

Nitrate. An important plant nutrient and type of inorganic fertilizer. In water the major sources of nitrates are septic tanks, feed lots and fertilizers.

Non-point-Source Pollution. Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet.

Pathogens. A bacterial organism typically found in the intestinal tracts of mammals, capable of producing disease.

Point-Source. A stationary location or fixed facility from which pollutants are discharged.

Public Water System. A system that provides piped water for human consumption to at least 15 service connections or regularly serves 25 individuals.

Pumping Water Level. Water level elevation in a well when the pump is operating.

Recharge Region. A source water management region that is generally the entire area that could contribute water to an aquifer used by a public water supply. Includes areas that could contribute water over long time periods or under different water usage patterns.

Resource Conservation and Recovery Act (RCRA). Enacted by Congress in 1976. RCRA's primary goals are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner.

Section Seven Tracking System (SSTS). SSTS is an automated system EPA uses to track pesticide producing establishments and the amount of pesticides they produce.

Source Water Protection Area. For surface water sources, the land and surface drainage network that contributes water to a stream or reservoir used by a public water supply.

Static Water Level (SWL). Water level elevation in a well when the pump is not operating.

Susceptibility (of a PWS). The potential for a PWS to draw water contaminated at concentrations that would pose concern. Susceptibility is evaluated at the point immediately preceding treatment or, if no treatment is provided, at the entry point to the distribution system.

Synthetic Organic Compounds (SOC). Man made organic chemical compounds (e.g. herbicides and pesticides).

Total Dissolved Solids (TDS). The dissolved solids collected after a sample of a known volume of water is passed through a very fine mesh filter.

Transmissivity. The ability of an aquifer to transmit water.

Unconfined Aquifer. An aquifer containing water that is not under pressure. The water table is the top surface of an unconfined aquifer.

Underground Storage Tanks (UST). A tank located at least partially underground and designed to hold gasoline or other petroleum products or chemicals.

Volatile Organic Compounds (VOC). Any organic compound which evaporates readily to the atmosphere.

*** Definitions taken from EPA's Glossary of Selected Terms and Abbreviations (http://www.epa.gov/ceisweb1/ceishome/ceisdocs/glossary/glossary.html)**

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APPENDIX A

Public Water Supply

Summary of Time of Travel Calculations

Property	Symbol	Units	Value Entered
Porosity	n	percent	**0.15**
Hyd Cond	K	ft/day	**90**
Hyd Grad	I	ft/ft	**0.0095**
Pumping Rate	Q	gpm	**100**
		ft3/day	**19,250**
Aquifer Thickness	b	feet	**20**

Distance Up-gradient to Null Point

Null Distance	**Xl**	**feet**	**179.17**
		miles	**0.03**

Lateral limits of Zone of Contribution

Boundary Limits	**Y**	**feet**	**5686.87**
		miles	**0.11**

n/Ki 0.175438596

Time of Travel Calculations

Distance Traveled			Time of Travel	
Feet	miles		Days	Years
1000	0.19		116.85	0.32
100	0.02		3.60	0.01
500	0.09		45.83	0.13
1000	0.19		116.21	0.32
2500	0.47		353.57	0.97
5000	0.95		771.45	2.11
5280	1.00		818.92	2.24
7500	1.42		1197.67	3.28
10000	1.89		1627.41	4.46
10560	2.00		1723.97	4.72
15000	2.84		2492.04	6.82
15840	3.00		2637.71	7.22
21120	4.00		3555.07	9.73
31680	6.00		5395.05	14.77
363	0.07		28.88	0.08
820	0.16		89.84	0.25
2227	0.42		309.06	0.85

1/.97 = 1.030
1.030 x 2,500= 2,577 ft

3/3.28 = 0.9146
0.9146x 7,500= 6,860 ft

Equation for Time of Travel:

1. Alluvium- $V_1 = \frac{Ki}{n}$
2. $t = \frac{X_1}{V_1}$
3. $V_2(3 - \frac{X_1}{V_1}) = X_2$

Where: X = distance (ft)
Ki = [Hydraulic Conductivity (ft/day)] x [Hydraulic Gradient (ft/ft)]
V = velocity (ft/day)
n = porosity

APPENDIX B

Montana Bureau of Mines and Geology
Ground water Information Center Site Report
ALDINGER ACRES SUBDIVISION – WELL 1

Plot this site on a topographic map

Location Information

GWIC Id:	93000	Source of Data:	LOG
Location (TRS):	01S 25E 03 BCBD	Latitude (dd):	45.7790
County (MT):	YELLOWSTONE	Longitude (dd):	-108.6358
DNRC Water Right:	C060465-00	Geomethod:	MAP
PWS Id:	03552002	Datum:	1927
Block:		Certificate of Survey:	
Lot:		Type of Site:	WELL
Addition:	ALDINGER ACRES		
Site Notes:	TRACT LOCATION BASED ON LAT\LONG FROM DEQ.		

Well Construction and Performance Data

Total Depth (ft):	70.00	How Drilled:	FORWARD ROTARY
Static Water Level (ft):	13.00	Driller's Name:	PRYOR CREEK
Pumping Water Level (ft):	16.50	Driller License:	WWC435
Yield (gpm):	100.00	Completion Date (m/d/y):	5/24/1985
Test Type:	PUMP/AIR	Special Conditions:	
Test Duration:	6.00	Is Well Flowing?:	
Drill Stem Setting (ft):		Shut-In Pressure:	
Recovery Water Level (ft):		Geology/Aquifer:	111TRRC
Recovery Time (hrs):		Well/Water Use:	PUBLIC WATER SUPPLY
Well Notes:			

Hole Diameter Information

From	To	Diameter
0.0	70.0	12.0

Casing Information[1]

From	To	Dia	Description
0.0	70.0	6.0	0.280 STEEL

Annular Seal Information

From	To	Description
0.0	45.0	CHIPS/NATURAL/CEMENT

Completion Information[1]

From	To	Dia	Description
60.0	65.0	6.0	JOHNSON 60 SLOT

Lithology Information

From	To	Description
0.0	45.0	BROWN SAND AND SHALE
45.0	50.0	BROWN SHALE
50.0	70.0	SAND AND GRAVEL

[1] - All diameters reported are **inside** diameter of the casing.

APPENDIX B, Cont'd.

Montana Bureau of Mines and Geology
Ground water Information Center Site Report
ALDINGER ACRES SUBDIVISION - WELL 2

Plot this site on a topographic map

Location Information

GWIC Id:	160941	Source of Data:	LOG
Location (TRS):	01S 25E 03 BCBD	Latitude (dd):	45.7793
County (MT):	YELLOWSTONE	Longitude (dd):	-108.6361
DNRC Water Right:		Geomethod:	MAP
PWS Id:	03552003	Datum:	1927
Block:		Certificate of Survey:	
Lot:		Type of Site:	WELL
Addition:	ALDINGER ACRES 3RD FILING		
Site Notes:	TRACT LOCATION BASED ON LAT\LONG FROM DEQ.		

Well Construction and Performance Data

Total Depth (ft):	73.00	How Drilled:	ROTARY
Static Water Level (ft):	12.66	Driller's Name:	AMERICAN
Pumping Water Level (ft):	16.00	Driller License:	WWC344
Yield (gpm):	80.00	Completion Date (m/d/y):	8/30/1991
Test Type:	PUMP	Special Conditions:	
Test Duration:	8.00	Is Well Flowing?:	
Drill Stem Setting (ft):		Shut-In Pressure:	
Recovery Water Level (ft):		Geology/Aquifer:	Not Reported
Recovery Time (hrs):		Well/Water Use:	PUBLIC WATER SUPPLY

Well Notes:

Hole Diameter Information

From	To	Diameter
0.0	50.0	14.0
50.0	73.0	10.0

Casing Information[1]

From	To	Dia	Description
-2.0	65.0	6.0	A53B STEEL
65.0	73.0	5.0	A53B STEEL

Annular Seal Information

From	To	Description
0.0	50.0	NEAT CEMENT
50.0	73.0	3/8 PEA GRAVEL

Completion Information[1]

From	To	Dia	Description
65.0	70.0	5.0	60 SLOT HOWARD SMITH STAINLESS
70.0	73.0	5.0	TAIL PIPE

Lithology Information

From	To	Description
0.0	2.0	TOPSOIL
2.0	50.0	SANDY BROWN

		CLAY
50.0	73.0	SAND AND GRAVEL
73.0	73.0	SHALE

[1] - All diameters reported are **inside** diameter of the casing.

APPENDIX C
– DEQ Water Quality Monitoring Data for Aldinger Acres

PWSID: MT0003552 Name: ALDINGER ACRES SUBDIVISION

City: BILLINGS County: YELLOWSTONE Tot Pop: 100

Pri Src: GW Class: C Last Snty Srv Dt: 06/12/2000 Activity Status: A

Type	Conn's	In Srvc Dts	Eff Begin Dt	Avg Daily Cnt	Type
RS	33	1/1-12/31	06/13/2000	100	R

Administrative Contact
HEFFNER, GERARD
4707 S WOODHAVEN WAY
BILLINGS, MT 59106
406-656-3148

Financial Contact
HEFFNER, GERARD
4707 S WOODHAVEN WAY
BILLINGS, MT 59106
406-656-3148

Operator
EDAM, TROY L
ALDINGER ACRES
4637 SOUTH WOODHAVEN
BILLINGS, MT 59106
406-256-5221

Owner
ALDINGER ACRES SUBDIVISION
4707 S WOODHAVEN WAY
BILLINGS, MT 59106
406-656-3148

Facilities and Entry Points

Status: A 10/26/2000 Fac ID: CH001 COMMON HEADER FOR WELLS 1 2 Src: GW
Lat/Long Dec: DMS:

Smp Pt ID	Status	Description
EP502	A 10/26/2000	EP FOR CH WELLS 1 2

Status: A 02/14/2000 Fac ID: DS001 DISTRIBUTION SYSTEM Src: GW
Lat/Long Dec: DMS:

Smp Pt ID	Status	Description
SP001	A 04/14/2000	

Status: A 10/13/2000 Fac ID: PC001 PRESSURE CONTROL ASSEMBLY Src: GW
Lat/Long Dec: DMS:

Status: A 10/16/2000 Fac ID: WL002 WELL 1 NE Src: GW
Lat/Long Dec: 45.779 DMS: .00 .00
108.6358

Status: A 10/16/2000 Fac ID: WL003 WELL 2 NW Src: GW
Lat/Long Dec: 45.7793 DMS: .00 .00
108.6361

Sample Schedules/Monitoring Requirements

Attention Community and Noncommunity Nontransient systems: the new Disinfection Byproducts Rule has taken effect. Please contact the PWS Section at 444-4400 for additional monitoring requirements.

Fac ID: DS001 Fac Name: DISTRIBUTION SYSTEM Status: A Src: GW

December 29, 2003 9:23 AM

DS001 DISTRIBUTION SYSTEM A GW

Smp Pt ID	Active	Smp Pt Description
SP001	A	

Group	Name	Schd Beg Date	Seas Coll Per	Requirement
3100	COLIFORM, TOTAL (TCR)	01/01/1991	1/1-12/31	1 RT MN

Fac ID: CH001 Fac Name: COMMON HEADER FOR WELLS 1 2 Status: A Src: GW

Smp Pt ID	Active	Smp Pt Description
EP502	A	EP FOR CH WELLS 1 2

Group	Name	Schd Beg Date	Init MP Beg	Seas Coll Per	Requirement
ARSE	CDS ARSENIC	01/01/1999	01/01/1999	1/1-12/31	1 RT 3Y
COMB	CDS RADIUMS COMBINED	01/01/2004	01/01/2004	1/1-12/31	1 RT QT
GRAL	CDS RAD GROSS ALPHA	01/01/2004	01/01/2004	1/1-12/31	1 RT QT
INO1	CDS P2-5 INORGANICS	01/01/1999	01/01/1999	1/1-12/31	1 RT 3Y
NITR	CDS NITRATE NITRITE	01/01/2000	01/01/2000	1/1-12/31	1 RT YR
SOC1	CDS SOC	01/01/1999	01/01/1999	1/1-12/31	1 RT 3Y
VOC1	CDS VOC	01/01/1999	01/01/1999	1/1-12/31	1 RT 3Y

Fac ID: DS001 Fac Name: DISTRIBUTION SYSTEM Status: A Src: GW

Smp Pt ID	Active	Smp Pt Description
SP001	A	

Group	Name	Schd Beg Date	Init MP Beg	Seas Coll Per	Requirement
ASBE	CDS ASBESTOS	01/01/2002	01/01/2002	1/1-12/31	1 RT 9Y
PBCU	CDS LEAD COPPER ONLY	01/01/2002	01/01/2002	6/1-9/30	5 RT 3Y

Bacti Results FROM 01/01/1998 TO 12/29/2003

Collection Dt	Lab Number	Type	Orig Lab #	Code		TCR Presence	Fec/EC Result
11/17/2003	B03110715-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
10/20/2003	B03100992-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
09/10/2003	B03090622-1	RT		3100	COLIFORM, TOTAL (TCR)	A	-
08/13/2003	B03080751-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
07/13/2003	B03070744-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
06/09/2003	B03060488-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
05/29/2003	B03051603-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
05/04/2003	B03050283-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
03/21/2003	B03030881-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
02/25/2003	B03020940-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
01/16/2003	B03010526-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
12/26/2002	B02121230-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-
11/19/2002	B02110875-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-

Collection Dt	Lab Number	Type	Orig Lab #	Code		TCR Presence		Fec/EC Result
10/24/2002	B02101230-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
09/11/2002	B02090519-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
08/21/2002	B02081061-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
07/10/2002	B02070542-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
06/19/2002	B02061122-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
05/16/2002	B02050854-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
04/17/2002	B02040831-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
02/20/2002	B02020695-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
01/16/2002	B02010217-001	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
12/10/2001	001-01-60853	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
11/14/2001	001-01-60132	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
10/10/2001	001-01-58932	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
09/20/2001	001-01-58224	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
08/16/2001	001-01-57105	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
07/17/2001	001-01-55923	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
06/11/2001	001-01-54519	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
05/11/2001	001-01-53590	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
04/11/2001	001-01-52707	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
03/12/2001	001-01-51746	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
02/06/2001	001-01-50862	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
01/10/2001	001-01-50238	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
12/07/2000	001-00-60500	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
11/28/2000	001-00-60134	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
10/17/2000	001-00-59004	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
09/19/2000	001-00-58039	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
08/09/2000	001-00-56677	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
07/10/2000	001-00-55623	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
06/20/2000	001-00-54985	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
05/16/2000	001-00-53806	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
04/21/2000	001-00-53094	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
03/20/2000	52079	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
02/16/2000	51265	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
01/12/2000	0150312	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
12/13/1999	59861	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
11/30/1999	99-09790	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
10/26/1999	99-08963	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
10/04/1999	99-08113	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
07/13/1999	99-05437	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
06/14/1999	99-04489	RT		3100	COLIFORM, TOTAL (TCR)	A	-	
05/12/1999	9903543	RT		3100	COLIFORM, TOTAL (TCR)	A	-	

Collection Dt	Lab Number	Type	Orig Lab #	Code		TCR Presence	Fec/EC Result
04/12/1999	99-02624	RT		3100	COLIFORM, TOTAL (TCR)	A -	
03/17/1999	9902070	RT		3100	COLIFORM, TOTAL (TCR)	A -	
03/01/1999	99-01676	RT		3100	COLIFORM, TOTAL (TCR)	A -	
02/16/1999	99-01276	RT		3100	COLIFORM, TOTAL (TCR)	A -	
01/25/1999	W9900692	RT		3100	COLIFORM, TOTAL (TCR)	A -	
01/19/1999	99-00594	RT		3100	COLIFORM, TOTAL (TCR)	A -	
12/09/1998	W9811147	RT		3100	COLIFORM, TOTAL (TCR)	A -	
11/16/1998	W9810561	RT		3100	COLIFORM, TOTAL (TCR)	A -	
10/21/1998	98-09876	RT		3100	COLIFORM, TOTAL (TCR)	A -	
09/16/1998	98-08776	RT		3100	COLIFORM, TOTAL (TCR)	A -	
09/16/1998	98-08777	RT		3100	COLIFORM, TOTAL (TCR)	A -	
09/16/1998	98-08778	RT		3100	COLIFORM, TOTAL (TCR)	A -	
09/16/1998	98-08779	RT		3100	COLIFORM, TOTAL (TCR)	A -	
09/15/1998	98-08765	RT		3100	COLIFORM, TOTAL (TCR)	A -	
08/31/1998	98-08136	RP	98-07905	3100	COLIFORM, TOTAL (TCR)	A -	
08/31/1998	98-08137	RP	98-07905	3100	COLIFORM, TOTAL (TCR)	A -	
08/31/1998	98-08138	RP	98-07905	3100	COLIFORM, TOTAL (TCR)	A -	
08/31/1998	98-08139	RP	98-07905	3100	COLIFORM, TOTAL (TCR)	A -	
08/24/1998	98-07905	RT		3100	COLIFORM, TOTAL (TCR)	P +	
08/24/1998	98-07905	RT		3013	COLIFORM, FECAL	P	+
07/27/1998	98-06898	RT		3100	COLIFORM, TOTAL (TCR)	A -	
06/10/1998	05297	RT		3100	COLIFORM, TOTAL (TCR)	A -	
05/20/1998	W8-04539	RT		3100	COLIFORM, TOTAL (TCR)	A -	
04/22/1998	W8-03531	RT		3100	COLIFORM, TOTAL (TCR)	A -	
03/23/1998	W8-02561	RT		3100	COLIFORM, TOTAL (TCR)	A -	
02/02/1998	W8-01146	RT		3100	COLIFORM, TOTAL (TCR)	A -	
01/20/1998	W8-00597	RT		3100	COLIFORM, TOTAL (TCR)	A -	

Chemical Results FROM 01/01/1998 TO 12/29/2003

Fac ID: CH001 Fac Name: COMMON HEADER FOR WELLS 1 2 Avl: P Status: A Src: GW
Smp Pt ID: EP502 Status: A Description:EP FOR CH WELLS 1 2 Src Typ: FN

Analyte/CAS No		Code	Analyte Name	Type	Collection Dt	Lab	Sample Number	Result	
IOC		1038	NITRATE+NITRITE (AS N)	RT	07/01/2002	08	B02070008-001-N502	2.39	MG/L
IOC		1038	NITRATE+NITRITE (AS N)	RT	07/18/2001	08	01-56021-1-N502	2.65	MG/L
IOC		1038	NITRATE+NITRITE (AS N)	RT	07/10/2000	MIS	00-55624-1-I502	3.14	MG/L
IOC	7440-36-0	1074	ANTIMONY	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L
IOC	7440-39-3	1010	BARIUM	RT	12/02/1998	MIS	C9812-104869-I502	0.008	MG/L
IOC	7440-41-7	1075	BERYLLIUM	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L
IOC	7440-43-9	1015	CADMIUM	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L
IOC	7440-47-3	1020	CHROMIUM	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L
IOC	16984-48-8	1025	FLUORIDE	RT	12/02/1998	MIS	C9812-104869-I502	0.60	MG/L
IOC	7439-97-6	1035	MERCURY	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L
IOC	7440-02-0	1036	NICKEL	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005	MG/L

Fac ID: CH001 Fac Name: COMMON HEADER FOR WELLS 1 2 Avl: P Status: A Src:
Smp Pt ID: EP502 Status: A Description:EP FOR CH WELLS 1 2 Src Typ: FN

Analyte/CAS No		Code	Analyte Name	Type	Collection Dt	Lab	Sample Number	Result
IOC		1038	NITRATE+NITRITE (AS N)	RT	12/02/1998	MIS	C9812-104869-I502	2.84 MG/L
IOC	7782-49-2	1045	SELENIUM	RT	12/02/1998	MIS	C9812-104869-I502	0.003 MG/L
IOC	7440-28-0	1065	THALLIUM	RT	12/02/1998	MIS	C9812-104869-I502	< MRL .0005 MG/L
OC	630-20-6	2966	1,1,1,2-TETRACHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	71-55-6	2981	1,1,1-TRICHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	79-34-5	2968	1,1,2,2-TETRACHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	79-00-5	2985	1,1,2-TRICHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-34-3	2978	1,1-DICHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-35-4	2977	1,1-DICHLOROETHYLENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	563-58-6	2410	1,1-DICHLOROPROPENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	87-61-6	2420	1,2,3-TRICHLOROBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	96-18-4	2414	1,2,3-TRICHLOROPROPANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	120-82-1	2378	1,2,4-TRICHLOROBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	95-63-6	2418	1,2,4-TRIMETHYLBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	107-06-2	2980	1,2-DICHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	78-87-5	2983	1,2-DICHLOROPROPANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	108-67-8	2424	1,3,5-TRIMETHYLBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	142-28-9	2412	1,3-DICHLOROPROPANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	594-20-7	2416	2,2-DICHLOROPROPANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	93-72-1	2110	2,4,5-TP (SILVEX)	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000002 MG/L
OC	94-75-7	2105	2,4-D	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000001 MG/L
OC	16655-82-6	2068	3-HYDROXYCARBOFURAN	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	116-06-3	2047	ALDICARB	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	1646-88-4	2044	ALDICARB SULFONE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	1646-87-3	2043	ALDICARB SULFOXIDE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000008 MG/L
OC	309-00-2	2356	ALDRIN	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	1912-24-9	2050	ATRAZINE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000001 MG/L
OC	50-32-8	2306	BENZO (A) PYRENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000001 MG/L
OC	58-89-9	2010	BHC-GAMMA (LINDANE)	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .00000002 MG/L
OC	108-86-1	2993	BROMOBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-27-4	2943	BROMODICHLOROMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-25-2	2942	BROMOFORM	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	74-83-9	2214	BROMOMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	23184-66-9	2076	BUTACHLOR (MACHETE)	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	63-25-2	2021	CARBARYL	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	1563-66-2	2046	CARBOFURAN	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000009 MG/L
OC	56-23-5	2982	CARBON TETRACHLORIDE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	57-74-9	2959	CHLORDANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000002 MG/L
OC	75-00-3	2216	CHLOROETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	67-66-3	2941	CHLOROFORM	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	74-87-3	2210	CHLOROMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000002 MG/L
OC	156-59-2	2380	CIS-1,2-DICHLOROETHYLENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	10061-02-6	2228	CIS-1,3-DICHLOROPROPENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-99-0	2031	DALAPON	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .001 MG/L
OC	103-23-1	2035	DI(2-ETHYLHEXYL) - ADIPATE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000006 MG/L
OC	117-81-7	2039	DI(2-ETHYLHEXYL) - PHTHALATE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000006 MG/L
OC	74-95-3	2408	DIBROMOMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	1918-00-9	2440	DICAMBA	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-71-8	2212	DICHLORODIFLUOROMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	75-09-2	2964	DICHLOROMETHANE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	60-57-1	2070	DIELDRIN	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	88-85-7	2041	DINOSEB	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	72-20-8	2005	ENDRIN	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .00000001 MG/L
OC	100-41-4	2992	ETHYLBENZENE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .0000005 MG/L
OC	76-44-8	2065	HEPTACHLOR	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .00000004 MG/L
OC	1024-57-3	2067	HEPTACHLOR EPOXIDE	RT	12/02/1998	MIS	C9812-104869-V502	< MRL .00000002 MG/L

Fac ID: CH001 Fac Name: COMMON HEADER FOR WELLS 1 2 Avl: P Status: A Src:
Smp Pt ID: EP502 Status: A Description:EP FOR CH WELLS 1 2 Src Typ: FN

Analyte/CAS No	Code	Analyte Name	Type	Collection Dt	Lab	Sample Number	Result
OC 118-74-1	2274	HEXACHLOROBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000001 MG/L
OC 87-68-3	2246	HEXACHLOROBUTADIENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 77-47-4	2042	HEXACHLOROCYCLOPENTADIENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000001 MG/L
OC 98-82-8	2994	ISOPROPYLBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 16752-77-5	2022	METHOMYL	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 72-43-5	2015	METHOXYCHLOR	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000001 MG/L
OC 51218-45-2	2045	METOLACHLOR	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 21087-64-9	2595	METRIBUZIN (SENCOR)	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 108-90-7	2989	MONOCHLOROBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 104-51-8	2422	N-BUTYLBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 103-65-1	2998	N-PROPYLBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 91-20-3	2248	NAPHTHALENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 95-49-8	2965	O-CHLOROTOLUENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 95-50-1	2968	O-DICHLOROBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 23135-22-0	2036	OXAMYL (VYDATE)	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .000002 MG/L
OC 106-43-4	2966	P-CHLOROTOLUENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 106-46-7	2969	P-DICHLOROBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 99-87-6	2030	P-ISOPROPYLTOLUENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 87-86-5	2326	PENTACHLOROPHENOL	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000004 MG/L
OC 1918-02-1	2040	PICLORAM	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000001 MG/L
OC 1336-36-3	2383	POLYCHLORINATED BIPHENYLS (PCB)	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000001 MG/L
OC 1918-16-7	2077	PROPACHLOR	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 135-98-8	2428	SEC-BUTYLBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 122-34-9	2037	SIMAZINE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .00000007 MG/L
OC 100-42-5	2996	STYRENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 98-06-6	2426	TERT-BUTYLBENZENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 127-18-4	2987	TETRACHLOROETHYLENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 108-88-3	2991	TOLUENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 8001-35-2	2020	TOXAPHENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .000001 MG/L
OC 156-60-5	2979	TRANS-1,2-DICHLOROETHYLENE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 75-69-4	2218	TRICHLOROFLUOROMETHANE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 75-01-4	2976	VINYL CHLORIDE	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 108-38-3	2995	XYLENE, META	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 95-47-6	2997	XYLENE, ORTHO	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 106-42-3	2962	XYLENE, PARA	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 1330-20-7	2955	XYLENES	RT	12/02/1998	MIG	C9812-104869-V502	< MRL .0000005 MG/L
OC 15972-60-8	2051	ALACHLOR (LASSO)	RT	12/02/1998	MIG2	C9812-104869EP502V	< MRL .0005 MG/L
OC 71-43-2	2990	BENZENE	RT	12/02/1998	MIG2	C9812-104869EP502V	< MRL .0005 MG/L
OC 541-73-1	2967	M-DICHLOROBENZENE	RT	12/02/1998	MIG2	C9812-104869EP502V	< MRL .0005 MG/L
OC 10061-02-6	2224	TRANS-1,3-DICHLOROPROPENE	RT	12/02/1998	MIG2	C9812-104869EP502V	< MRL .0005 MG/L
OC 79-01-6	2984	TRICHLOROETHYLENE	RT	12/02/1998	MIG2	C9812-104869EP502V	< MRL .0005 MG/L

Fac ID: DS001 Fac Name: DISTRIBUTION SYSTEM Avl: P Status: A Src: GW
Smp Pt ID: SP001 Status: A Description: Src Typ: FN

Analyte/CAS No	Code	Analyte Name	Type	Collection Dt	Lab	Sample Number	Result
RA	4000	GROSS ALPHA, INCLDNG RA, EXCLDNG RN	RT	01/21/2000	MIG	00-50508-R001	< MRL 1 PICIL

Violations & Enforcements FROM 01/01/1998 TO 12/29/2003

Viol Date	Comp Beg	Comp End	Fed FY	Viol No	Type	Sev	Cate	Code	Name
05/18/2003	04/01/2003	04/30/2003	2003	3	23	MJ	MON	3100	COLIFORM, TOTAL (TCR)
2003	54966	07/16/2003	SOX	ST COMPLIANCE ACHIEVED					

Viol Date	Comp Beg	Comp End	Fed FY	Viol No	Type	Sev	Cate	Code	Name
	2003 54965	05/21/2003	SIE		ST PUBLIC NOTIF REQUESTED				
	2003 54964	05/21/2003	SIA		ST VIOLATION/REMINDER NOTICE				
07/22/2002	01/01/1999	12/31/2001	2002	3	03	MJ	MON	ARSE	CDS ARSENIC
	2002 54956	07/25/2002	SIE		ST PUBLIC NOTIF REQUESTED				
	2002 54955	07/25/2002	SIA		ST VIOLATION/REMINDER NOTICE				
07/09/2002	01/01/1999	12/31/2001	2002	3	03	MJ	MON	IN01	CDS P2-5 INORGANICS
	2002 54958	07/12/2002	SIE		ST PUBLIC NOTIF REQUESTED				
	2002 54957	07/12/2002	SIA		ST VIOLATION/REMINDER NOTICE				
07/02/2002	01/01/1999	12/31/2001	2002	3	03	MJ	MON	SOC1	CDS SOC
	2002 54960	07/05/2002	SIE		ST PUBLIC NOTIF REQUESTED				
	2002 54959	07/05/2002	SIA		ST VIOLATION/REMINDER NOTICE				
06/26/2002	01/01/1999	12/31/2001	2002	3	03	MJ	MON	VOC1	CDS VOC
	2002 54962	06/29/2002	SIE		ST PUBLIC NOTIF REQUESTED				
	2002 54961	06/29/2002	SIA		ST VIOLATION/REMINDER NOTICE				
04/18/2002	03/01/2002	03/31/2002	2002	3	23	MJ	MON	3100	COLIFORM, TOTAL (TCR)
	2002 54953	06/11/2002	SOX		ST COMPLIANCE ACHIEVED				
	2002 54290	04/21/2002	SIE		ST PUBLIC NOTIF REQUESTED				
	2002 54289	04/21/2002	SIA		ST VIOLATION/REMINDER NOTICE				
06/09/2000	01/01/1999	12/31/1999	2000	3	03	MJ	MON	1040	NITRATE (AS N)
	2004 54967	10/17/2003	SOX		ST COMPLIANCE ACHIEVED				
	2000 1238	06/19/2000	SIE		ST PUBLIC NOTIF REQUESTED				
	2000 1237	06/19/2000	SIA		ST VIOLATION/REMINDER NOTICE				
10/18/1999	09/01/1999	09/30/1999	1999	3	23	MJ	MON	3100	COLIFORM, TOTAL (TCR)
	1999 7386	10/29/1999	SIA		ST VIOLATION/REMINDER NOTICE				
10/01/1999	08/01/1999	08/31/1999	1999	3	23	MJ	MON	3100	COLIFORM, TOTAL (TCR)
	1999 7250	10/04/1999	SIA		ST VIOLATION/REMINDER NOTICE				
07/07/1999	01/01/1996	12/31/1998	1999	3	03	MJ	MON	1005	ARSENIC