A Source Water Assessment (SWA) for

Allakaket Public Water System (WL001), PWS ID # 300816.001

What is an SWA?

The Drinking Water Protection group of the Drinking Water Program is producing Source Water Assessments (SWAs) in compliance with the Safe Drinking Water Act (SDWA) Amendments of 1996. Each SWA includes:

- A delineation of the drinking water source area;
- Inventory of potential and existing sources of contamination;
- Risk ranking for the identified contaminants;
- Evaluation of the overall vulnerability to the PWS source.

What is a Protection Area?

The most probable area for contamination to reach the drinking water well is within the drinking water protection area (DWPA). The DWPA for a groundwater source is the area around the well (the area influenced by pumping) and also the area upgradient of the well, usually forming a parabola shape. Because releases of contaminants within the DWPA are most likely to impact the well, this area will serve as the focus for voluntary protection efforts.

The DWPAs established for wells by DEC are separated into 2 zones, limited by the watershed. The following is a summary of the two zones for wells and the estimated time-of-travel for each:

Zone	Definition
A	Several months time-of-travel
B	Less than the 2 year time-of-travel

Table 1: Public Water System Source Information

PWS Name	**Allakaket Public Water System**
PWS ID Number	300816.001
State Asgn ID No.	WL001
Facility Name	WL Allakaket PWS
Source Type	Groundwater
Federal Classification	Community Water System
Total Depth of Well (ft bls*)	73
Static Water Level (ft bls*)	22.4
Aquifer Type	Semi-Confined
Aquifer Formation	Bedrock

*"ft bls" = feet below land surface

Executive Summary

The public water system for Allakaket is a Community Water System (CWS) consisting of one well in Allakaket, Alaska. An assessment of the susceptibility of the wellhead and aquifer to contamination, and the vulnerability of the public water system to potential and existing contamination were evaluated as of September, 2012. The wellhead received a susceptibility rating of **Low** and the aquifer received a susceptibility rating of **Medium**. Combining these two ratings produces a **Low** rating for the natural susceptibility of the well. Identified potential and existing sources of contamination for the Allakaket Public Water System (WL001) include sewage lagoons, roads, a washeteria, a landfill, residential areas, nonresidential heating oil tanks, DEC-recognized Contaminated Sites, bulk fuel stations, an airstrip, pipelines and an electric power generation facility. These are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals (VOCs), heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals (SOCs), and other organic chemicals (OOCs).

Combining the natural susceptibility of the well with the six (6) contaminant risk categories, the public water system for Allakaket Public Water System (WL001) received an overall vulnerability rating of **High** for bacteria and viruses**,** and nitrates and/or nitrites; and a **Medium** for VOCs, heavy metals, cyanide and other inorganic chemicals, SOCs and OOCs.

Introduction

Source Water Assessments (SWAs) are intended to provide public water system operators, owners, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. Allakaket Public Water System (WL001)'s SWA is a tool to be used as the foundation or "stepping stone" to comprehensive management and protection of its groundwater resource. Protecting the quality of your drinking water is a sensible investment.

Drinking Water Protection Area (DWPA)

For groundwater sources, a combination of a numerical flow model and natural factors such as drainage divides, subsurface barriers, and manmade structures are used to determine the size and shape of the DWPA. The orientation of the DWPA is typically drawn using a groundwater surface, or a land surface, elevation map. Because of uncertainties and changing site conditions, a factor of safety is added in calculating the size of the protection areas. (See Allakaket Public Water System (WL001)'s DWPA on Map1 of the Appendices.)

Natural Susceptibility

Susceptibility of a groundwater source is a measure of a water supply's potential to become contaminated based on information gathered on the wellhead and the aquifer.

Natural Susceptibility (Wellhead and Aquifer)

The **susceptibility of a wellhead** to the introduction of contaminants to the drinking water is determined by, but not limited to, the following risk factors: presence of a sanitary seal, protection from flooding, and presence of adequate grouting.

The wellhead for Allakaket Public Water System (WL001) received a **Low** susceptibility rating. The most recent sanitary survey (completed in September 8, 2010) indicates that the well is capped with a sanitary seal, the land surface is sloped away from the well, and the well is properly grouted. A sanitary seal prevents potential contaminants from entering the well while sloping of the land surface and grouting help to prevent potential contaminants from traveling down the outside of the well casing and into the aquifer.

A flood on the Koyukuk River in August of 1994 inundated Allakaket with two to more than ten feet deep of water. Swiftly moving flood water can carry large debris that could loosen well hardware, dislodge well construction materials or distort casing. A well that is not properly capped and grouted is more likely to be contaminated.

The **susceptibility of an aquifer** to the introduction of contaminants is determined by, but not limited to, the following risk factors: whether the aquifer is confined or unconfined, whether the well is completed in unconsolidated or fractured bedrock, whether other wells and bore holes are penetrating the aquifer and, if applicable, the characteristics of the confining layer.

The Allakaket Public Water System (WL001) draws water from a semi-confined aquifer. It received a **Medium** susceptibility rating because confined and semi-confined aquifers are less susceptible to potential groundwater quality impacts posed by the migration of surface water contaminants downward from the surface.

The **Natural Susceptibility** of the well to contamination is **Low**. Table 2 summarizes the susceptibility ratings for Allakaket Public Water System (WL001).

Table 2: Susceptibility Ratings

	Rating
Susceptibility of the wellhead	**Low**
+	
Susceptibility of the Aquifer	**Medium**
=	
Natural Susceptibility	**Low**

Inventory of Potential and Existing Sources Contamination

The Drinking Water Protection (DWP) group has completed an inventory of potential and existing sources of contamination within the DWPA for the Allakaket Public Water System (WL001) well. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water aquifer include a wide range of categories and types. Potential drinking water contaminants are found within agricultural, residential, commercial, and industrial areas, but can also occur within areas that have little or no development.

The identified potential sources of contamination are summarized in Table 3 and are portrayed in Map 2 of the Appendices.

Table 3: Contaminant Source Inventory

Contaminant Source Type	*Contaminant Source ID*	*Zone*	*Map Number*	*Comments*
Domestic wastewater treatment plant disposal ponds/lagoons	D02	A	2	New Allakaket Sewage Lagoon
Highways and roads, paved (cement or asphalt)	X20	A	2	Identified 1 road within Zone A: Water Well Rd/Old Runway Rd/Boat Launch Access Rd
Laundromats without dry cleaning	C22	B	2	Allakaket Washeteria
Domestic wastewater treatment plant disposal ponds/lagoons	D02	B	2	Old Allakaket Sewage Lagoon
Landfills (municipal; Class III)	D51	B	2	Allakaket Landfill
Residential Areas	R01	B	2	Identified approximate 15 acres of residential areas within Zone B.
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Alaska Power Company
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Telephone
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Offices
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Police Station
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Post Office
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	Satellite
Tanks, heating oil, nonresidential (aboveground)	T14	B	2	School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	ADOT&PF Allakaket Airport Fueling Facility (New Airport); Hazard ID# 3225; Status - Cleanup Complete; Contaminant - DRO; ETM GW Ingestion Rating -Low Potential Exposure as of 4/15/2008.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	Allakaket School; Hazard ID# 2312; Status - Active; Contaminant - DRO, GRO; ETM GW Ingestion Rating - High Potential Exposure as of 8/27/2010.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	City of Allakaket Diesel Tank Farm; Hazard ID# 4545; Status - Active; Contaminant - DRO; ETM GW Ingestion Rating -Low Potential Exposure as of 1/7/2008.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	Allakaket Abandoned Diesel Pipelines; Hazard ID# 25625; Status - Active; Contaminant - DRO, Mixed Xylenes, GRO; ETM GW Ingestion Rating - High Potential Exposure as of 3/11/2011.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	Allakaket Old Generator Shack; Hazard ID# 25627; Status - Active; Contaminant - GRO, DRO; ETM GW Ingestion Rating - Low Potential Exposure as of 3/21/2011.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	2	Allakaket Former City Power House; Hazard ID# 25630; Status - Active; Contaminant - DRP; ETM GW Ingestion Rating - High Potential Exposure as of 3/22/2011.
Petroleum product bulk station/terminals	X11	B	2	Bulk Fuel Storage
Petroleum product bulk station/terminals	X11	B	2	Bulk Fuel Storage
Airports	X14	B	2	New Allakaket Airport
Highways and roads, paved (cement or asphalt)	X20	B	2	Identified 12 roads within Zone B: 2nd Ave, 3rd Ave, A St, B St, C St, Front St, Housing Rd, Main Rd, Runway Rd, School Dr, Un Trail, and Washeteria Rd.
Pipelines (oil and gas)	X28	B	2	Pipeline Start/Header
Electric power generation (fossil fuels)	X36	B	2	Alaska Power Company

Contaminant Risks

Inventoried contaminant sources are sorted by the Drinking Water Protection (DWP) group according to the six (6) major categories of contaminants regulated for drinking water: 1) bacteria and viruses; 2) nitrates and/or nitrites; 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals; 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs). The contaminant sources are then given a ranking (within each category) according to the degree of risk posed to human health based on the volume, toxicity, persistence, and the mobility of the contaminants involved.

Table 4: Contaminant Risk Rankings

Contaminant Source Type	*Contaminant Source ID*	*Zone*	*Risk Ranking*					
			Bacteria & Viruses	*Nitrates / Nitrites*	*VOCs*	*Inorganic Chemicals**	*SOCs*	*OOCs*
Domestic wastewater treatment plant disposal ponds/lagoons	D02	A	High	High	Low	Low	Low	Low
Highways and roads, paved (cement or asphalt)	X20	A	Low	Low	Low	Low	None	Low
Laundromats without dry cleaning	C22	B	Low	Low	Low	None	None	None
Domestic wastewater treatment plant disposal ponds/lagoons	D02	B	High	High	Low	Low	Low	Low
Landfills (municipal; Class III)	D51	B	High	Very High	High	High	Very High	Very High
Residential Areas	R01	B	Low	Low	Low	Low	Low	Low
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Tanks, heating oil, nonresidential (aboveground)	T14	B	None	None	Low	Low	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Medium	None	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Very High	None	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Medium	None	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Very High	None	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Medium	None	None	None
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	B	None	None	Very High	None	None	None

Table 4: Contaminant Risk Rankings (Continued)

Contaminant Source Type	Contaminant Source ID	Zone	Risk Ranking					
			Bacteria & Viruses	Nitrates / Nitrites	VOCs	Inorganic Chemicals*	SOCs	OOCs
Petroleum product bulk station/terminals	X11	B	None	None	Very High	Low	Low	High
Petroleum product bulk station/terminals	X11	B	None	None	Very High	Low	Low	High
Airports	X14	B	None	Low	High	Low	Medium	Medium
Highways and roads, paved (cement or asphalt)	X20	B	Low	Low	Low	Low	None	Low
Pipelines (oil and gas)	X28	B	None	None	Medium	Low	None	High
Electric power generation (fossil fuels)	X36	B	None	None	Medium	Medium	None	High
Overall Risk Ranking			**Very High**	**Very High**	**Very High**	**Medium**	**High**	**Very High**

** Includes Heavy Metals, Cyanide and Other Inorganic Chemicals*

The contaminant risk for bacteria and viruses and nitrates and/or nitrites is **Very High.** The risk is driven by sewage lagoons and a landfill located within the DWPA. Bacteria and viruses and nitrates and/or nitrites have not been detected in source waters.

The contaminant risk for VOCs is **Very High.** The risk is driven by the bulk fuel stations and the following contaminated sites: Allakaket School, Allakaket Abandoned Diesel Pipelines and the Allakaket Former City Power House located within the DWPA. VOCs have not been detected in source waters.

The contaminant risk for heavy metals, cyanide and other inorganic chemicals is **Medium.** The risk is primarily attributed to the landfill located within the DWPA and the detection of inorganic chemicals during recent sampling. Small concentrations of barium, chromium, fluoride, nickel and arsenic have been detected in source water at levels well below the allowable limit (or MCL).

The contaminant risks for SOCs and OOCs are **High** and **Very High**, respectively. The risks are both driven by the landfill located within the DWPA. The water system has not sampled for SOCs/OOCs and currently has a monitoring waiver that covers SOCs/OOCs.

Overall Vulnerability of the Drinking Water Source to Contamination

An overall vulnerability is determined for each water system by combining each of the contaminant risk scores with the natural susceptibility score:

Overall Vulnerability of the Drinking Water Source to Contamination = Natural Susceptibility + Contaminant Risks

Table 5 summarizes the overall vulnerability ratings for each of the six (6) categories of drinking water contaminants.

Table 5: Overall Vulnerability

Category	Rating
Bacteria and Viruses	**High**
Nitrates and/or Nitrites	**High**
Volatile Organic Chemicals	**Medium**
Heavy Metals, Cyanide, and Other Inorganic Chemicals	**Medium**
Synthetic Organic Chemicals	**Medium**
Other Organic Chemicals	**Medium**

Using the Source Water Assessment

This assessment of contaminant risks and source vulnerability can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of Allakaket Public Water System to protect public health. Communities can use the Source Water Assessment (SWA) to create a *drinking water protection plan* to manage the identified potential and existing sources of regulated drinking water contaminants and to prevent or minimize new contaminant threats in the drinking water protection area.

Allakaket Public Water System can use a number of different drinking water protection methods to limit or prevent contamination of its drinking water source.

- Non-Regulatory Options include:
    - Public education about where drinking water comes from and the effects of contaminants is probably the most effective and least costly method of protection;
    - Household hazardous waste collection - household hazardous wastes are usually generated in small amounts but can have a big impact on the environment;
    - The source water assessment report is a tool that can be used to prioritize protection strategies identified in a drinking water protection plan;
    - Taking proactive measures towards proper waste storage and disposal can help eliminate the need to find an alternative drinking water source by preventing source water contamination;
    - Conservation easements - easements can assist in protecting the area by limiting development;
    - Make a written plan on what you will do if an accidental spill happens that could contaminate your source of drinking water; and
    - Local drinking water protection plan (an example or template is available from DEC).

- Regulatory Options include:
    - Source protection regulations prohibiting the presence or use of all or specific chemicals within the drinking water protection area;
    - Zoning ordinances to control development within the different protection areas around the source;
    - Subdivision ordinance; and
    - Operating standards for industrial and other activities within the different protection areas around the source.

Source Water Assessments can be updated to reflect any changes in the vulnerability and/or susceptibility of the Allakaket Public Water System (WL001) drinking water source. The data that is used to generate the Source Water Assessment is updated on an on-going basis as identified in the field or if changes are identified and brought to the attention of the Drinking Water Program.

Where to go from here?

The Source Water Assessment (SWA) is a comprehensive evaluation of the potential risk of contamination to the public water system and the source(s) of drinking water used by the system. Identifying potential sources of contamination and the vulnerability of the public water system is an important first step in protecting the drinking water source from contamination. However, in order to prevent contamination from occurring, action must be taken by the water system owner and/or operator. The SWA can be used by the public water system to educate the local community and to prioritize community-driven protection strategies. Inviting community members, council members, and local government officials to help develop a Drinking Water Protection Plan is one essential component towards successful drinking water protection efforts. For questions regarding, or assistance to begin, the process of developing a Drinking Water Protection Plan, please contact the Drinking Water Protection group at #1-866-956-7656.

Other Resources

The Drinking Water Protection group, the EPA, and local organizations are available to help you build on this Source Water Assessment report as you continue to improve drinking water protection in your community.

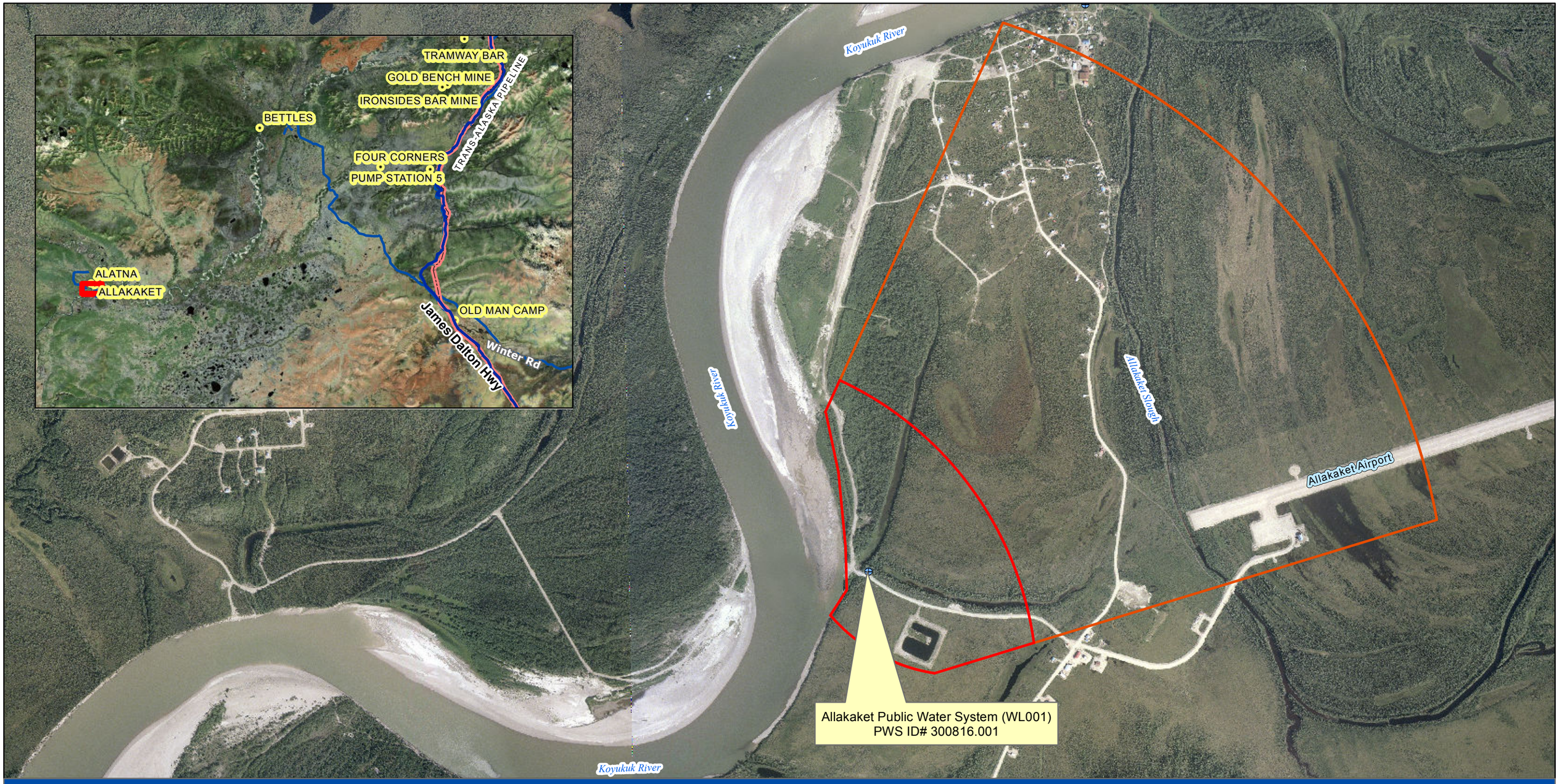
DEC, Drinking Water Protection - http://dec.alaska.gov/eh/dw/DWP/source_water.html
EPA, Drinking Water Protection - http://cfpub.epa.gov/safewater/sourcewater/index.cfm
Groundwater Foundation - http://www.groundwater.org
ARWA (Alaska Rural Water Association) - http://www.arwa.org
Groundwater Protection Council- http://www.gwpc.org
National Ground Water Association: http://ngwa.org/

Appendices

- Allakaket Public Water System (WL001) Drinking Water Protection Area Location Map (Map 1)
- Allakaket Public Water System (WL001) Drinking Water Protection Area with Potential and Existing Contaminant Sources (Map 2)
- Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Appendices

Allakaket Public Water System (WL001) Drinking Water Protection Area Location Map (Map 1)



Map 1 - Allakaket Public Water System (WL001)

PWS ID# 300816.001

Public Drinking Water Systems

- Class A Water Systems (C/NTNC)
- Class B Water Systems (TNC)
- Class C Water Systems (State Regulated)

Drinking Water Protection Areas

- Zone A (Several Months Time of Travel)
- Zone B (2 Year Time of Travel)

1:12,000

Inset: 1:924,400

N W E S

0 0.15 0.3 0.6 Miles

Data Sources:

Aerial Imagery: A WMS-compliant map server provided by the Alaska Mapped program (http://www.alaskamapped.org) and UAF-GINA (http://www.gina.alaska.edu)

Public Drinking Water System Sources and Drinking Water Protection Areas: Alaska Department of Environmental Conservation

Created by Anne Gleason on 3/8/2012

Allakaket Public Water System (WL001) Drinking Water Protection Area with Potential and Existing Contaminant Sources (Map 2)

Potential/Existing Sources of Contamination (Zone B):
- 1 Washeteria, C22
-1 Sewage Lagoon, D02
- 1 Landfill, D51
- 7 Non-Residential Heating Oil Tanks, T14
- 2 Bulk Stations/Terminals, X11
- 1 Airport, X14
-1 Pipeline, X28
- 1 Power Generation Facility, X36
- 6 ADEC-Recognized Contaminated Sites, U04
- 12 Roads, X20
- Approximately 15 acres Residential Areas, R02

Potential/Existing Sources of Contamination (Zone A):
- 1 Sewage Lagoon, D02
- ! Road, X20

Allakaket Public Water System (WL001)
PWS ID# 300816.001

1:12,000
0 0.125 0.25 0.5 Miles

1:7,560

1:3,720

Map 2 - Allakaket Public Water System (WL001)

PWS ID# 300816.001

Public Drinking Water Systems
- Class A Water Systems (C/NTNC)
- Class B Water Systems (TNC)
- Class C Water Systems (State Regulated)

Drinking Water Protection Areas
- Zone A (Several Months Time of Travel)
- Zone B (2 Year Time of Travel)

Potential/Existing Sources of Contamination
- C22, Laundromats without dry cleaning
- C31, Motor /motor vehicle repair shops
- D02, Domestic wastewater treatment plant disposal ponds/lagoons
- D51, Landfills (municipal; Class III)
- E10, Quarries (sand, gravel, rock, other)
- T14, Tanks, heating oil, nonresidential (aboveground)
- X01, Cemeteries
- X11, Petroleum product bulk station/terminals
- X14, Airports
- X28, Pipelines (oil and gas)
- X36, Electric power generation (fossil fuels)
- X40, Medical/veterinary facilities
- U04, Contaminated Sites

N W E S

Data Sources:

Aerial Imagery: A WMS-compliant map server provided by the Alaska Mapped program (http://www.alaskamapped.org) and UAF-GINA (http://www.gina.alaska.edu)

Public Drinking Water System Sources, Drinking Water Protection Areas, Potential/Exsiting Sources of Contamination and Contaminated Sites: Alaska Department of Environmental Conservation

Created by Anne Gleason on 3/9/2012

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Spread filter fabric under object being washed.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Spill cleanup material should be stocked near liquid transfer area and employees should be trained in emergency spill response procedures and correct use of spill clean up materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a sump or holding tank is used for spill containment, its contents should be pumped out and disposed of appropriately.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Drip pans should be provided underneath hose and pipe connections and other leak prone areas during liquid transfer operations. Drip pans should be cleaned regularly and stored nearby transfer area.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A trained employee should be present during loading and unloading of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Use a temporary storm drain cover during transfer of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Pumps and hoses used for liquid transfer should be in good condition.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Cover transfer area with roof to avoid rain contact.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A designated area for liquid transfer could be paved and sloped to a sump or holding tank to facilitate capture.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a liquid transfer area can not be paved, then a containment/run-on structure such as a curb, dike or berm should be provided.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Implement an inventory control system to track purchase and consumption of liquids.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If paving the fuel transfer area, use Portland Cement because asphalt deteriorates.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Do not hose down maintenance repair areas. Instead sweep weekly to collect dirt and use absorbent pads to collect spills.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If transfer occurs at temporary site, a tarp, cloth or drip pan should be used.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Drain all fluids from wrecked vehicles and remove coolants.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Sweep all driveways and gutters that show an accumulation of materials.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A catch basin insert filter should be used during rainy weather.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Painting, finishing and coating materials should be stored in areas protected from the rain .	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Never clean brushes, equipment into storm drain, gutters, ditch, stream or other water body.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Properly dispose of hazardous wastes.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Wood treatment should not occur during rain or when rain is expected.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Keep treated wood away from surface drainage areas.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Agricultural Activities				
Maintain ground cover.	Agricultural Sources (A01-A10)			
Practice conservation tillage.	Agricultural Sources (A01-A10)			
Practice conservation coverage.	Agricultural Sources (A01-A10)			
Utilize contour farming.	Agricultural Sources (A01-A10)			
Plant critical areas.	Agricultural Sources (A01-A10)			
Plant and maintain vegetative buffers and filter strips.	Agricultural Sources (A01-A10)			
Practice conservation irrigation.	Agricultural Sources (A01-A10)			
Use integrated pest management activities.	Agricultural Sources (A01-A10)			
If possible crops should be planted away from surface drainages.	Agricultural Sources (A01-A10)			
Contact NRCS for developing fertilization schedules.	Agricultural Sources (A01-A10)			
Proper pesticide application should be followed.	Agricultural Sources (A01-A10)			
Never apply pesticides, herbicides, fungicides when rain is expected.	Agricultural Sources (A01-A10)			
Do not apply chemicals when it is windy.	Agricultural Sources (A01-A10)			
Use manual pest control procedures.	Agricultural Sources (A01-A10)			
Pesticide application should not occur within 200 of surface water.	Agricultural Sources (A01-A10)			
Store pesticide, herbicides and fungicides in protected areas.	Agricultural Sources (A01-A10)			
Compost material should be kept away from surface drainage.	Agricultural Sources (A01-A10)			

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
General BMP's for all Activities				
Avoid the activity or reduce its occurrence.	All	All	All	All
Move the activity indoors.	All	All	All	All
Use less material.	All	All	All	All
Use least toxic material available.	All	All	All	All
Create and maintain vegetative areas near activities.	All	All	All	All
Locate activities as far as possible from surface drainage paths.	All	All	All	All
Keep storm drain systems clean.	All	All	All	All
Reduce, reuse and recycle as much as possible.	All	All	All	All
Be an advocate for stormwater pollution prevention.	All	All	All	All
Report Violators.	All	All	All	All
Cleaning, Washing and Industrial Activities				
Cleaning and washing of tools, engines and manufacturing equipment .	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Illicit connections to stormwater drains should be eliminated.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Employees should be educated.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
All wastewater should be dishcharged to a holding tank, process treatment system, or sanitary sewer. Never discharge to septic system or stormwater drains.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If soaps and detergents are used, use least toxic chemical capable of doing the job. Use non-phosphate detergents, if possible.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Limit the amount of water used for washing activities to limit the potential runoff of carrying pollutants beyond the designated wash pad or capture system.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Recycle wash water for subsequent washings.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Implement one of following stormwater treatment BMP's:	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Oil water separator.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Wet vault for settling.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Infiltration Basin.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Filtration for media designed for pollutant present.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Catch basin with a filter insert for pressure washing.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Paved wash area should be swept daily.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Greasy buildup on cooking equipment must be removed and properly disposed of prior to washing to reduce the amount of material that can contaminate runoff.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Use a tub or similar device to contain washwater.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If activity can not be moved indoors or contained by a tub, the washing area must drain to a sanitary sewer, holding tank or process treatment system and provisions should be made to prevent stormwater run-off onto the washing area.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If a holding tank is used, the contents must be pumped and disposed of appropriately.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
A cover should be placed over wash area to prevent rain from falling on dirty equipment and producing contaminated runoff.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Take vehicles to commercial car wash.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Designated wash areas must be marked well, with signs indicated where and how washing should occur. Any inlets to sanitary sewer or storm drain should be marked "No Dumping".	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Clean catch basins regularly.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Consider washing vehicles less frequently.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
If pressure washing waste water doesn't collect in a centralized area, such as an area that is very flat, or you are on a grassed area, a tarp should be placed under the washing area to collect paint chips and other debris that may be loosened by the spray.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous
Pressure washing of boats should occur where runoff control can be achieved.	Waste Water Disposal (D01-D62)	Industrial (I01-I36)	Commercial Activities (C01-C44)	Miscellaneous

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Fuel Storage				
Replace leaking and deteriorating tanks with good tanks.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Tanks should have overflow detection.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Spilled liquids should be collected and disposed appropriately.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Use double walled tanks.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Do not store containers in direct contact with the ground.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Use funnels to pour fuel.	Petroleum Storage Tanks (T01-T24)	Miscellaneous		
Demolitions				
Schedule demolitions to take part in dry part of year.				
Light spraying of water can control some of the dust.				
Logging				
Preserve vegetation along streams.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Logging road should have crushed rock or spall apron construction.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Avoid logging on steep slopes.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Drainage ditches and culverts should direct runoff into vegetated areas or stormwater treatment systems.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Mining/Natural Resource Extraction:				
If the material is appropriate, use excavated spoil material to form compacted beams along the down slope sides to contain runoff.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Semi-permanent stockpiles should be seeded to promote vegetation growth to limit erosion from stockpiles.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Use detention ponds to promote settling of suspended solids or infiltration basins to filter suspended solids, to clean up runoff before it leaves the site.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
Use anchorage tarps to cover stockpiles at small-scale mining operations.	Natural Resource Extraction Activities (E01-E12)	Miscellaneous		
		Miscellaneous		
Residential BMP's				
Wash your car directly over your lawn or make sure wash water drains to a vegetative area. This allows the water and soap to soak into the ground instead of running off into a local water body.	Residential Sources (R01-R09)	Miscellaneous		
Select soap without phosphates.	Residential Sources (R01-R09)	Miscellaneous		
Sweep driveways and street gutters before washing vehicle to clean up dirt, leaves, trash and other materials that may flow to the storm drain along with your wash water.	Residential Sources (R01-R09)	Miscellaneous		
Commercial products are available that allow you to clean a vehicle without water.	Residential Sources (R01-R09)	Miscellaneous		
Use a nozzle on your hose to save water.	Residential Sources (R01-R09)	Miscellaneous		
Do not wash your car is rain is expected.	Residential Sources (R01-R09)	Miscellaneous		
Consider not washing your car at home.	Residential Sources (R01-R09)	Miscellaneous		
Recycle all oils, antifreeze, solvents and batteries.	Residential Sources (R01-R09)	Miscellaneous		
Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a water body. Eventually, it will make its way to local surface waters or groundwater.	Residential Sources (R01-R09)	Miscellaneous		
Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Keep wastes in separate containers and properly labeled.	Residential Sources (R01-R09)	Miscellaneous		
To dispose of oil filters, punch a hole in the top and let drain for 24 hours. This is where a large funnel in the tip of your oil storage container will come in handy. After draining, wrap in 2 layers of plastic and dispose of in your regular garbage or recycle by taking it to the household hazardous waste line.	Residential Sources (R01-R09)	Miscellaneous		
Use care in draining and collecting antifreeze.	Residential Sources (R01-R09)	Miscellaneous		
Perform your service activities on concrete or asphalt.	Residential Sources (R01-R09)	Miscellaneous		
If doing body work outside, be sure to use a tarp to catch material resulting from grinding, sanding and painting. Double bag wastes.	Residential Sources (R01-R09)	Miscellaneous		
Follow manufacturer's directions when applying fertilizers.	Residential Sources (R01-R09)	Miscellaneous		
Consider planting a vegetative buffer zone.	Residential Sources (R01-R09)	Miscellaneous		

Best Management Strategies for Potential Contaminants Identified within a Drinking Water Source Protection Area

Best Management Strategies (BMP's)	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's	Contaminant Source ID's
Store all fertilizers and pesticides in covered location.	Residential Sources (R01-R09)	Miscellaneous		
Compost yard clippings.	Residential Sources (R01-R09)	Miscellaneous		
Pull weeds instead of spraying.	Residential Sources (R01-R09)	Miscellaneous		
Work fertilizers into the soil.	Residential Sources (R01-R09)	Miscellaneous		
Dispose of hazardous material and their containers properly.	Residential Sources (R01-R09)	Miscellaneous		
Store hazardous material off of the ground and away from children.		Miscellaneous		
Use ground cloths and drip pans when working outdoors with hazardous materials.	Residential Sources (R01-R09)	Miscellaneous		
Let latex paints dry before placing in garbage.	Residential Sources (R01-R09)	Miscellaneous		
Use less toxic products whenever possible.	Residential Sources (R01-R09)	Miscellaneous		
Follow manufacturer's directions in the use of all materials.	Residential Sources (R01-R09)	Miscellaneous		
When hazardous material are used, place inside a tub or bucket to minimize spills.	Residential Sources (R01-R09)	Miscellaneous		
Properly maintain septic systems.	Residential Sources (R01-R09)	Miscellaneous		
Monitor septic systems for signs of failure: odors, surface sewage or green areas.	Residential Sources (R01-R09)	Miscellaneous		
Pump septic systems out every two to five years depending on hydraulic loading.	Residential Sources (R01-R09)	Miscellaneous		
Garbage disposal increase the need for increase pumping of solids.	Residential Sources (R01-R09)	Miscellaneous		
Household chemicals such as solvents, drain cleaners, oils, pants, pharmaceuticals, and pesticides can interfere with the proper operation of septic systems.	Residential Sources (R01-R09)	Miscellaneous		
Vehicles and heavy equipment should be kept off the drainfield.	Residential Sources (R01-R09)	Miscellaneous		
Trees should not be planted in drainfield.	Residential Sources (R01-R09)	Miscellaneous		
Clean up your dog poop and horse manure.				
Wells and Boreholes				
Identify abandoned wells and boreholes and properly decommission.	Wells and Boreholes (W01-W09)	Miscellaneous		
Assure that all wells and boreholes are properly grouted and are securely sealed.	Wells and Boreholes (W01-W09)	Miscellaneous		
Assure that all wells and boreholes are properly constructed.	Wells and Boreholes (W01-W09)	Miscellaneous		
Educate community about the implications of abandoned wells.	Wells and Boreholes (W01-W09)	Miscellaneous		
Natural Products Processing/Storage				
Storage of soil, wood chips, saw dust, gravel, sand, salt should be covered.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Store solid and food wasted in containers and check for leaks.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Restrict animal access to stream or lakes by fences.	Natural Products Processing/Storage (N01-N10)	Miscellaneous		
Military Activities				
Assure all Military activities follow State and Federal guidelines.	Military Activities			
Uncontrolled Sites				
Assure all Military activities follow State and Federal guidelines.	Uncontrolled Sites			
Educate community about the implications of the uncontrolled sites.	Uncontrolled Sites			