A Source Water Assessment (SWA) for

PWSID #340345 ELIM – IN001 (Elim Creek Gallery) and IN002 (Spring Source)

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 intake is within the drinking water protection area (DWPA). The DWPA for a surface water source is determined by the drainage area contributing overland water flow to the surface water source intake. Because releases of contaminants within the DWPA are most likely to impact the intake, this area will serve as the focus for voluntary protection efforts.

The DWPAs established for surface water sources by DEC are separated into 3 zones, limited by the watershed. These zones correspond to the overland-flow distance that water travels to get to the source. The following is a summary of the three protection area zones:

Zone	Definition
A	Areas within 1000-ft of lakes or streams
B	Areas within 1-mile of lakes or streams
C	The watershed boundary

Natural Susceptibility

The natural susceptibility of a surface water source is a measure of a water supply's potential to become contaminated based on information gathered on the intake structure and conditions contributing to overland flow in the vicinity of the surface water body.

Table 1: Public Water System Source Information

PWS Name	***Elim Water System***	
PWS ID Number	*340345*	
Federal Classification	*Community Water System*	
State Asgn ID No.	IN001	IN002
Facility Name	IN Elim Creek Gallery	IN Spring Source
Source Type	Surface Water	Surface Water
River/Stream Discharge	<20,000 cfs*	N/A

*"cfs" = cubic feet per second

Executive Summary

The public water system (PWS) for ELIM is a Community water system that obtains surface water from two intake sources, IN001 (Elim Creek Gallery) and IN002 (Spring Source), in Elim, Alaska. The drinking water protection area (DWPA) for IN001 is approximately 3.5 square miles in size and received a source susceptibility rating of **Very High**. *A rating of High to Very High is typical for a surface water source system.* The drinking water protection area (DWPA) for IN002 is approximately 1.3 square miles in size and received a source susceptibility rating of **Low**. Existing and potential sources of contamination identified within the DWPAs for IN001 AND IN002 include: beaver habitat, Elim airport, residential heating oil tanks, roads, and residential areas. Potential sources of contamination include those posing a risk of 1) bacteria and viruses; 2) nitrates and/or nitrites (nitrates); 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals (inorganics); 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs).

Combining the natural susceptibility of the surface water source with the six (6) contaminant risk categories listed above gave the following vulnerability ratings:

- ELIM IN001 received an overall vulnerability rating of **Very High** for bacteria and viruses, **Very High** for nitrates, **High** for VOCs, **Medium** for inorganics, **High** for SOCs, and **High** for OOCs.
- ELIM IN002 received an overall vulnerability rating of **Medium** for bacteria and viruses, **Medium** for nitrates, **Low** for VOCs, **Low** for inorganics, **Low** for SOCs, and **Low** for OOCs.

Introduction

Source Water Assessments (SWA) reports are intended to provide public water system (PWS) operators, owners, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The SWA report for ELIM IN001 AND IN002 is a tool to be used as the foundation or "stepping stone" to comprehensive management and protection of its surface water resource. Protecting the quality of your drinking water is a sensible investment.

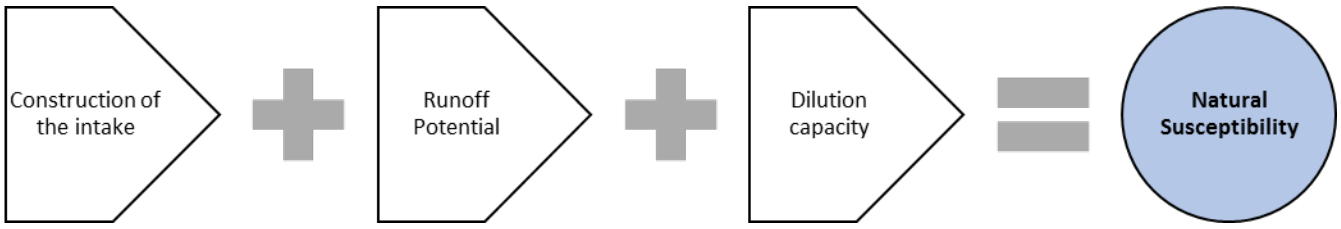
Drinking Water Protection Area (DWPA)

The size and shape of a DWPA varies with the specific characteristics of the source and the geography of the surrounding landscape. The DWPA is drawn by determining the area contributing water to the surface water source. This area consists of the watershed or basin that it is located in, plus all watersheds drained by tributaries flowing into the surface water source. (See Map1 of the Appendices)

Natural Susceptibility (Surface Water Source)

The natural susceptibility of a surface water source to the introduction of contaminants is determined by, but not limited to, the following risk factors: the general adequacy of intake construction, the potential for runoff or flooding, and the capacity of the surface water body to dilute contaminants.

Based on the most recent sanitary surveys (completed January 2014) and properties of the surrounding area, the Natural Susceptibility of the surface water source for ELIM IN001 received a rating of Very High. The rating is elevated due to the relatively low flow of the Elim Creek and its ability to dilute contamination. The Natural Susceptibility of the surface water source for ELIM IN002 received a rating of Medium.



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 ELIM IN001 AND IN002 surface water source. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water source 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 2 and are portrayed in Map 2 of the Appendices.

Table 2: Contaminant Source Inventory

Contaminant Source Type	Contaminant Source ID	Zone	Comments
Beaver/muskrat/otter habitat	B01-01	A	Beaver habitat
Tanks, heating oil, residential (above ground)	R08-01	A	Residential heating oil tanks
Airports	X14-01	A	Elim airport
Highways and roads, dirt/gravel	X24-01-20	A	Highways and Roads dirt/gravel. Assumed less than 20
Residential Areas	R01-01-50	B	Residential area
Tanks, heating oil, residential (above ground)	R08-02	B	Residential heating oil tanks
Tanks, heating oil, residential (above ground)	R08-03	B	Residential heating oil tanks
Tanks, heating oil, residential (above ground)	R08-04	B	Residential heating oil tanks
Tanks, heating oil, residential (above ground)	R08-05	B	Residential heating oil tanks
Tanks, heating oil, residential (above ground)	R08-06	B	Residential heating oil tanks
Highways and roads, dirt/gravel	X24-21-70	B	Highways and Roads dirt/gravel. Assumed less than 50

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 (nitrates); 3) volatile organic chemicals (VOCs); 4) heavy metals, cyanide, and other inorganic chemicals (inorganics); 5) synthetic organic chemicals (SOCs); and 6) other organic chemicals (OOCs). The potential contaminant sources are then given a ranking (within each category) according to the density of sources within the DWPA, the PWS sampling history, as well as the degree of risk posed to human health based on the volume, toxicity, persistence, and the mobility of the contaminants involved. The contaminant risk rankings are summarized in Table 3.

Table 3: Contaminant Risk Rankings

Contaminant Source Type	Contaminant	Zone	Bacteria	Nitrates	VOCs	Inorganics	SOCs	OOCs
Beaver/muskrat/otter habitat	B01-01	A	Medium	Low	N/A	N/A	N/A	N/A
Tanks, heating oil, residential (above ground)	R08-01	A	N/A	N/A	Medium	N/A	N/A	N/A
Airports	X14-01	A	N/A	Low	High	Low	Medium	Medium
Highways and roads, dirt/gravel	X24-01-20	A	Low	Low	Low	Low	N/A	Low
Residential Areas	R01-01-50	B	Low	Low	Low	Low	Low	Low
Tanks, heating oil, residential (above ground)	R08-02	B	N/A	N/A	Medium	N/A	N/A	N/A
Tanks, heating oil, residential (above ground)	R08-03	B	N/A	N/A	Medium	N/A	N/A	N/A
Tanks, heating oil, residential (above ground)	R08-04	B	N/A	N/A	Medium	N/A	N/A	N/A
Tanks, heating oil, residential (above ground)	R08-05	B	N/A	N/A	Medium	N/A	N/A	N/A
Tanks, heating oil, residential (above ground)	R08-06	B	N/A	N/A	Medium	N/A	N/A	N/A
Highways and roads, dirt/gravel	X24-21-70	B	Low	Low	Low	Low	N/A	Low
*Contaminant Category Risk Ranking**			*Very High*	*Very High*	*Medium*	*Low*	*Medium*	*Medium*

** Scores based on additional factors, such as sampling history, and number/density of sources.*

The contaminant risk ranking for Bacteria and Viruses is ***Very High***. This risk ranking is driven primarily by the beaver habitat and the density of residential areas and roads in the DWPA. Bacteria and Viruses have not been detected in previous sampling events in the past 5 years.

The contaminant risk ranking for Nitrates is ***Very High***. This risk ranking is driven primarily by the beaver habitat, Elim airport, and the density of residential areas and roads in the DWPA. Nitrates have been detected as high as 3.56% of the maximum contaminant level (MCL; 10 miligrams per liter (mg/L)). An increasing or decreasing trend is not apparent. Sources of nitrate and/or nitrite may include runoff from fertilizer use, leaking from septic tanks, sewage, and/or erosion from natural deposits. A relatively low concentration and absence of a clear trend implies that the source is natural, rather than anthropogenic. Potential health effects include serious illness and, if untreated, death for infants below the age of six months; symptoms include a shortness of breath and blue-baby syndrome.

The contaminant risk ranking for VOCs is ***Medium***. This risk ranking is driven primarily by the beaver habitat, Elim airport, residential heating oil tanks, and the density of residential areas and roads in the DWPA. No VOCs have been detected in recent years.

The contaminant risk ranking for Inorganics is ***Low***. This risk ranking is driven primarily by the Elim airport and the density of residential areas and roads in the DWPA. No potential sources were identified. No Inorganics have been detected in recent years.

The contaminant risk ranking for SOCs is ***Medium***. This risk ranking is driven primarily by the Elim airport and the density of residential areas in the DWPA. The PWS has not sampled for SOCs and received a monitoring waiver for the 2011-2013, 2008-2010, 2005-2007 compliance periods.

The contaminant risk ranking for OOCs is ***Medium***. This risk ranking is driven primarily by the Elim airport and the density of residential areas in the DWPA. The PWS has not sampled for SOCs and received a monitoring waiver for the 2011-2013, 2008-2010, 2005-2007 compliance periods.

Overall Vulnerability of the Drinking Water Source to Contamination

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

Overall Vulnerability = Natural Susceptibility + Contaminant Risks

Table 4 summarizes the overall vulnerability ratings for each of the six (6) categories of drinking water contaminants.

Table 4: Overall Vulnerability for IN001 (Elim Creek Gallery)

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

Table 4: Overall Vulnerability for IN002 (Spring Source)

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

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 ELIM 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.

ELIM 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 protection areas around the source;
- Subdivision ordinance; and
- Operating standards for industrial and other activities within the protection areas around the source.

Source Water Assessments can be updated to reflect any changes in the vulnerability and/or susceptibility of the ELIM IN001 AND IN002 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/DWP_main.html
EPA, Drinking Water Protection - http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/
ARWA (Alaska Rural Water Association) - http://www.arwa.org

Appendices

- ELIM IN001 AND IN002 Drinking Water Protection Area Location Map (Map 1)
- ELIM IN001 AND IN002 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