Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for The Shrine of St. Therese Public Drinking Water System, Juneau Area, Alaska PWSID # 111523.001

DRINKING WATER PROTECTION REPORT 1601

Alaska Department of Environmental Conservation

February, 2009

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The Drinking Water Protection (DWP) section of the Drinking Water Program is producing Source Water Assessments in compliance with the Safe Drinking Water Act Amendments of 1996. Each assessment includes a delineation of the source water area, an inventory of potential and existing contaminant sources that may impact the water, a risk ranking for each of these contaminants, and an evaluation of the potential vulnerability of these drinking water sources.

These assessments are intended to provide public water systems owners/operators, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The assessments combine information obtained from various sources, including the U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation (DEC), public water system owners/operators, and other public information sources. The results of this assessment are subject to change if additional data becomes available. It is anticipated this assessment will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of public drinking water source. If you have any additional information that may affect the results of this assessment, please contact the DWP staff at the following number: 1-866-956-7656.

February, 2009

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Source Water Assessment for the Shrine of St. Therese Drinking Water System, Juneau Area, Alaska

Drinking Water Protection
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for Shrine of St. Therese is a Class B (transient/non-community) water system that obtains water from Shrine Creek, adjacent to the Shrine and its facilities. The Shrine of St. Therese protection area received an overall susceptibility rating of **Very High**. *A rating of high to very high is typical for all systems with surface water intakes*. Potential and existing sources of the following contaminants were evaluated for the Source Water Assessment: bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. The Glacier Highway was the only potential source of contamination identified for this drinking water source. This evaluation included all available water sampling data submitted to DEC by the system operator. The samples may have been collected from either raw water or post-treated water. Combining the susceptibility of the surface water source with the contaminant risks, this water system has received a vulnerability rating of **Medium** for each of the three contaminant categories. This assessment can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of the Shrine of St. Therese to protect public health.

DRINKING WATER SYSTEM AND AREA OVERVIEW

The public water system for Shrine of St. Therese is a Class B (transient/non-community) water system that obtains water from Shrine Creek, located about 12 road miles north of the Juneau Airport, AK on the Glacier Highway (See Map A in Appendix A). Juneau is located on the mainland of Southeast Alaska along the Gastineau Channel, about 577 air miles southeast of Anchorage. The area surrounding the Juneau Airport receives 54 inches of precipitation annually, including 101 inches of snow. Temperatures range from 44 to 65 degrees Fahrenheit in the summer, and from 25 to 35 degrees Fahrenheit in the winter (ADCCED, 2009).

The municipal water supply in Juneau comes from Last Chance Basin well field on Gold Creek and the Salmon Reservoir. This water is treated and piped to over 90% of Juneau homes. A piped sewage system serves nearly 80% of homes. The landfill is owned by a private firm and electricity is provided by Alaska Electric Light and Power (ADCCED, 2009).

The Shrine of St. Therese public water system operates year-round and obtains water from Shrine Creek, directly adjacent to the Retreat facilities. The system serves 3 residents and 75 non-residents using 5 service connections between May and October. From November to April, the system serves 24 residents.

SHRINE OF ST. THERESE DRINKING WATER PROTECTION AREA

Identifying the pathways most likely for surface contamination to reach water intake areas is the first step in determining the water system's risk. These are initially determined by looking at the drainage area contributing overland water flow to a surface water source intake. The entire drainage area is also known as the "drinking water protection area".

The protection area established for surface water sources by DEC is usually separated into three zones, limited by the watershed boundary. These zones correspond to the overland-flow distance that water travels to get to the source. The DEC Drinking Water Protection Technical Advisory Committee developed guidelines for derivation of these zones in 1998. The following is a summary of the three protection area zones:

Table 1. Definition of 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

The protection area for the Shrine of St. Therese water intake includes Zones A and B. Due to the small size of the watershed, Zone C is unnecessary (see Map A of Appendix A).

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

DWP has completed an inventory of potential and existing sources of contamination within Shrine of St. Therese protection area. This inventory was completed through a search of agency records and other publicly available information. There is a wide array of potential contamination sources to surface water. These contaminants are found within agricultural, residential,

commercial, and industrial areas, but *can also occur within areas that have little or no development.*

For Class B public water system assessments, three categories of drinking water contaminants were inventoried. They include:

- Bacteria and viruses;
- Nitrates and/or nitrites; and
- Volatile organic chemicals.

Sources identified in the Shrine of St. Therese protection area are displayed on Map C of Appendix C and summarized in Table 1 of Appendix B.

RANKING OF CONTAMINANT RISKS

Once potential and existing sources of contamination have been identified, they are assigned a ranking according to what category and level of risk they represent. Ranking of contaminant risks for "potential" or "existing" sources of contamination is a function of the toxicity and the volume of specific contaminants associated with that source. Rankings include:

- Low;
- Medium;
- High; and
- Very High.

The time-of-travel for contaminants within the water is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zone A because of their short life span. Only "Very High" and "High" rankings are inventoried within Zones B and C due to the probability of contaminant dilution by the time the contaminants reach the water intake.

The remaining tables in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

VULNERABILITY OF THE SHRINE OF ST. THERESE DRINKING WATER SYSTEM

Vulnerability of a drinking water source to contamination is a combination of two factors:

- Surface Water Susceptibility; and
- Contaminant risks.

The Surface Water Susceptibility of the source is reached by considering the properties of the water intake and the surrounding area.

Susceptibility of the Surface Water Source – always considered as "high".

+

Adequate Construction of the Intake

+

Runoff Potential Within Zone B

+

Dilution Capacity of the Surface Water

=

Overall Susceptibility

The surface water intake is not buffered from potential and existing contamination and is therefore always considered highly susceptible to contamination.

Table 2. Susceptibility of the Water Source

Category	Score	Rating
Overall Susceptibility	42	Very High

For contaminants, risks to a drinking water source depend on the type, number or density, and distribution of the contaminant sources. The Contaminant Risk score has been derived from an examination of existing, and historical contamination sources that have been detected in the protection area through routine sampling. It also evaluates potential sources of contamination. Flow charts are used to assign a point score, and ratings are assigned in the same way as the susceptibility:

Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 3. Shrine of St. Therese Contaminant Risks

Category	Score	Rating
Bacteria and Viruses	12	Low
Nitrates and/or Nitrites	12	Low
Volatile Organic Chemicals	12	Low

Finally, an overall vulnerability is assigned for each contaminant type by combining each of the contaminant risk with the overall susceptibility:

Susceptibility of the Surface Water Source

+

Contaminant Risks

=

Vulnerability of the Drinking Water Source to Contamination

Table 4 contains the overall vulnerability scores and ratings for each of the three categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

Table 4. Shrine of St. Therese Overall Vulnerability

Category	Score	Rating
Bacteria and Viruses	55	Medium
Nitrates and Nitrites	55	Medium
Volatile Organic Chemicals	55	Medium

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Low** with a road presenting the only risk to the drinking water source.

Coliforms (a type of bacteria) are found naturally in the environment and although they aren't necessarily a health threat, they are an indicator of other potentially harmful bacteria in the water, more specifically, fecal coliforms and E. coli which only come from human and animal fecal waste. Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2003).

Typically, coliform detection in raw water samples collected from surface water sources is normal. Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination. Bacteria and viruses have not been detected during the last five years of sampling at the Shrine of St. Therese (data reviewed in April, 2008).

After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the source, the overall vulnerability of the source to bacteria and virus contamination is considered **Medium**.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is **Low** with a road presenting the only risk to the drinking water source.

The Maximum Contaminant Level (MCL) for nitrates is 10 milligrams per liter (mg/L). The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects (EPA, 2003).

The sampling history for the water source indicates that no nitrates or nitrites have been detected within the last 5 years (data was reviewed in April, 2008).

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the source, the overall vulnerability of the source to contamination is **Medium**.

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Low** with a road presenting the only risk to the drinking water source.

The surface water source at the Shrine of St. Therese has not recently been sampled for volatile organic chemicals (data was reviewed in April, 2008).

After combining the contaminant risk for heavy metals with the natural susceptibility of the source, the overall vulnerability of the well to contamination is **Medium**.

Using the Source Water Assessment

This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of Shrine of St. Therese to protect public health. It is anticipated that Source Water Assessments will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of the drinking water source.

REFERENCES

Alaska Department of Commerce, Community and Economic Development (ADCCED), Accessed 2009 [WWW document]. URL: http://www.commerce.state.ak.us/dca/commdb/CF_COMDB.htm

United States Environmental Protection Agency (EPA), Accessed 2008 [WWW document]. URL: http://www.epa.gov/safewater/contaminants/index.html.

APPENDIX A

Shrine of St. Therese
Drinking Water Protection Area Location Map
(Map A)

Public Water Well System for PWS # 111523.001 Shrine of St. Therese

Legend

Class B Public Water System Well

Groundwater Protection Zones

Zone A Protection Area - Up to 1,000 Feet from Surface Water Body

Zone B Protection Area - Up to 1 Mile from Surface Water Body

Data Sources:
Contaminant Sources, Public Water System Wells, Alaska Department of Environmental Conservation (ADEC)

All other data:
Alaska Statewide Digital Mapping Initiative (SDMI)

Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class B Public Water Systems" published by ADEC

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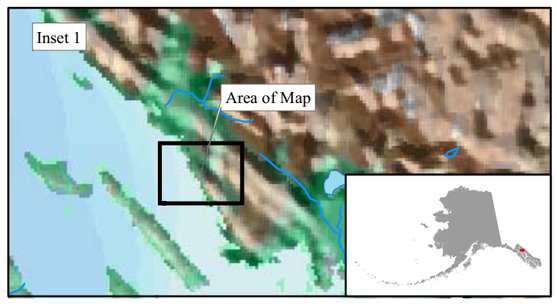


N
W E
S

0 0.25 0.5 1 Miles

Shrine of St. Therese
PWS 111523.001

Appendix A Map A

APPENDIX B

Contaminant Source Inventory and Risk Rankings for Shrine of St. Therese (Tables 1 - 4)

Table 1

Contaminant Source Inventory for
SHRINE OF ST. THERESE

PWSID 111523.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20	A	C	1 road
Highways and roads, paved (cement or asphalt)	X20	X20	B	C	1 road

Table 2

Contaminant Source Inventory and Risk Ranking for SHRINE OF ST. THERESE

Sources of Bacteria and Viruses

PWSID 111523.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 road
Highways and roads, paved (cement or asphalt)	X20	X20	B	Low	C	1 road

Table 3

Contaminant Source Inventory and Risk Ranking for SHRINE OF ST. THERESE Sources of Nitrates/Nitrites

PWSID 111523.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 road
Highways and roads, paved (cement or asphalt)	X20	X20	B	Low	C	1 road

Table 4

Contaminant Source Inventory and Risk Ranking for SHRINE OF ST. THERESE

Sources of Volatile Organic Chemicals

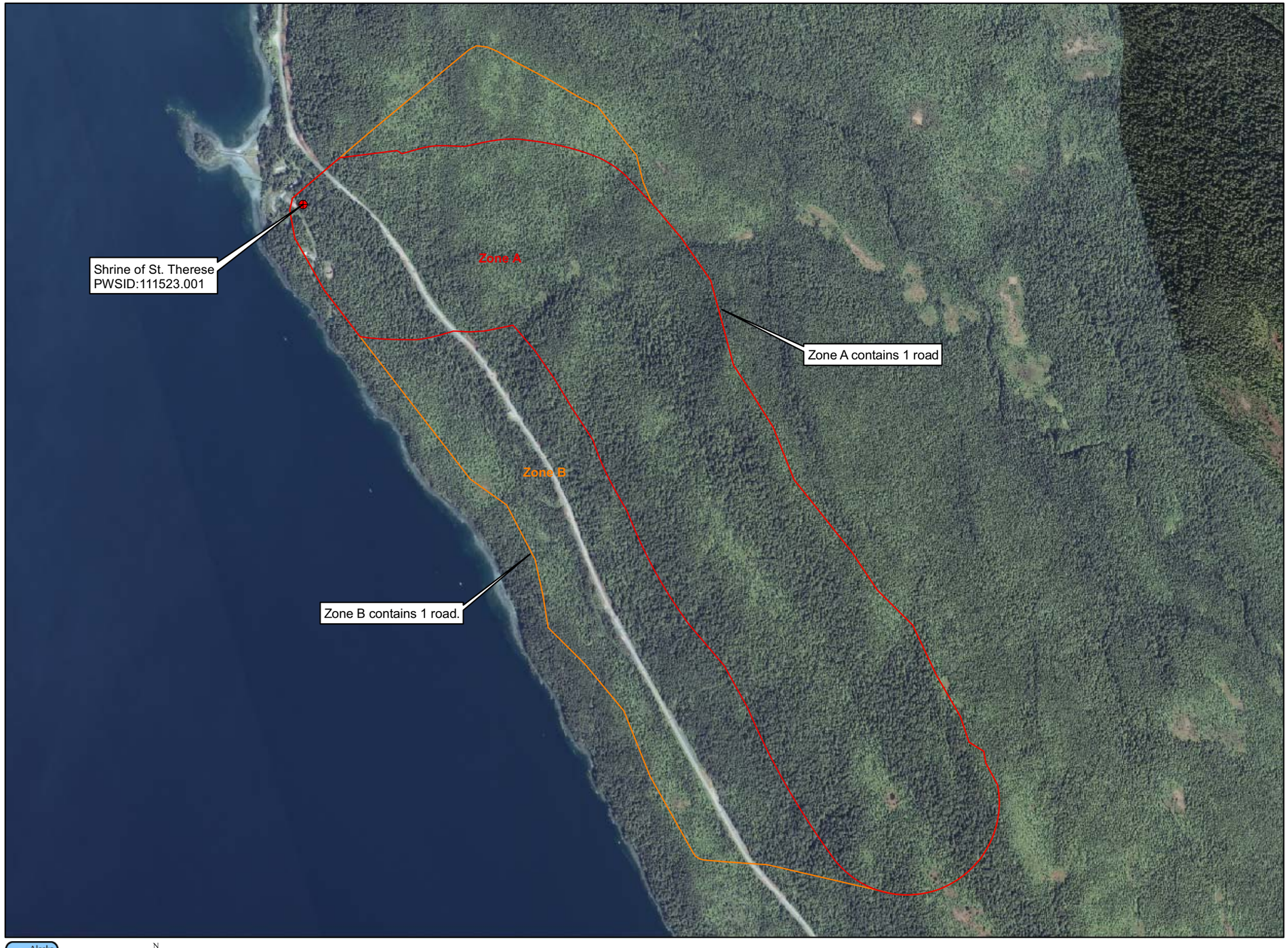
PWSID 111523.001

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Map Number***	***Comments***
Highways and roads, paved (cement or asphalt)	X20	X20	A	Low	C	1 road
Highways and roads, paved (cement or asphalt)	X20	X20	B	Low	C	1 road

APPENDIX C

Shrine of St. Therese
Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map C)

Public Water Well System for PWS # 111523.001 Shrine of St. Therese
Showing Potential and Existing Sources of Contamination



Legend

Class B Public Water System Well

Groundwater Protection Zones

Zone A Protection Area - Up to 1,000 Feet from Surface Water Body

Zone B Protection Area - Up to 1 Mile from Surface Water Body

Data Sources:
Contaminant Sources, Public Water System Wells, Alaska Department of Environmental Conservation (ADEC)

All other data:
Alaska Statewide Digital Mapping Initiative (SDMI)

Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class B Public Water Systems" published by ADEC

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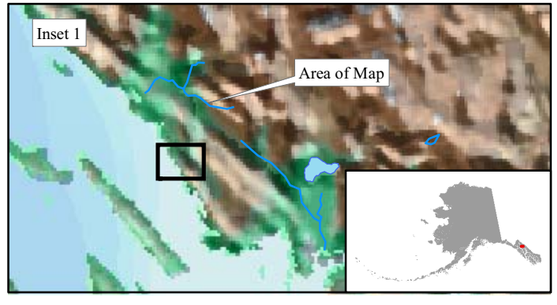

N
W E
S

0 0.25 0.5 1 Miles

Shrine of St. Therese
PWS 111523.001

Appendix C Map C