Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for MSBSD Career Center Public Drinking Water System, Wasilla, Alaska PWSID# 223023.001

DRINKING WATER PROTECTION REPORT 1849

Alaska Department of Environmental Conservation

December, 2008

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The Drinking Water Protection (DWP) team 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 (ADEC), 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 DWP staff at #1-866/956-7656.

December, 2008

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Drinking Water Protection

Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for MSBSD Career Center is a Non-Transient Non-Community (NTNC) water system consisting of one well located at 2472 N Seward Meridian Pkwy, Wasilla, Alaska. The susceptibility of the wellhead and aquifer to contamination, and the vulnerability of the public water system to potential and existing sources of contamination were evaluated as of December 2008. The wellhead received a susceptibility rating of **Low** and the aquifer received a susceptibility rating of **Very High**. Combining these two ratings produces a **High** rating for the natural susceptibility of the well. Identified existing and potential sources of contamination for the MSBSD Career Center public drinking water system include one agricultural croplands (hay), livestock pastures, septic systems, residential areas, other water supply wells, and roads. 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 MSBSD Career Center received an overall vulnerability rating of **High** for bacteria and viruses**, Very High** for nitrates and/or nitrites, **Medium** for VOCs, **High** for heavy metals, cyanide, and other inorganic chemicals, **High** for SOCs, and **Medium** for OOCs.

MSBSD Career Center PUBLIC DRINKING WATER SYSTEM

MSBSD Career Center public water system is a Non-Transient Non-Community (NTNC) water system. The system consists of one well located at 2472 N Seward Meridian Pkwy, Wasilla, Alaska (See Map 1 of Appendix A). Wasilla is located north of Anchorage in the Matanuska-Susitna Borough which is in Southcentral Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is approximately 80,088, and Wasilla's current population is approximately 7,028 (ADCCED 2008). Communities located within the Borough include: Big Lake, Buffalo Soapstone, Butte, Chase, Chickaloon, Farm Loop, Fishhook, Gateway, Glacier View, Houston, Knik River, Knik-Fairview, Lake Louise, Lakes, Lazy Mountain, Meadow Lakes, Palmer, Petersville, Point MacKenzie, Skwentna, Susitna, Sutton-Alpine, Talkeetna, Tanaina, Trapper Creek, Wasilla, Willow and Y (ADCCED 2008. The majority of homes use individual water wells and septic systems, although the City operates a piped water and sewer system (ADCCED 2008). Refuse collection is provided by a private company, for disposal in the Mat-Su Borough landfill. Residents also drop refuse at the Borough landfill in Palmer (ADCCED 2008).

A lake covered the Susitna River valley lowland during glacial times. The deposition of glacial silts and clays played an important part in the makeup of the soils of the area.

Most of the soils in the area provide good sources of sand, gravel and topsoil. The deposition of silt, clay and organic "muck" in old lakes and depressions means that some areas have soil conditions that vary over relatively short distances. The U.S. Soil Conservation Service has mapped seven soil associations in and around Wasilla.

The Homestead and Knik soil types predominate the Wasilla area, with smaller areas of Coal Creek, Jacobsen, Kalambach, Salamatof, and Slikok soil types. MSBSD Career Center is located within the Knik Silt Loam soil type.

According to the most recent sanitary survey (completed 10/23/2007) for this water system, the depth of the well is estimated at 101 feet below land surface (bls), with the casing terminating at 95 feet bls. It is screened in silt, sand, and gravel. The well does not penetrate a significant cumulative thickness of confining layers; therefore, it is assumed to be completed in an unconfined aquifer, or an aquifer that is at or near atmospheric pressure.

The MSBSD Career Center public water system serves approximately five-hundred and fifty (550) non-residents through one (1) approved service connection, according to the latest sanitary survey (completed 10/23/2007).

MSBSD Career Center DRINKING WATER PROTECTION AREA

The pathways most likely for surface contamination to reach the groundwater are identified as the first step in determining a drinking water system's risk. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and well.

The most probable area for contamination to reach the drinking water well is the drinking water protection area. The drinking water protection area is the area circling 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 protection area are most likely to impact the well, this area will serve as the focus for voluntary protection efforts.

There are many different methods for calculating the size of protection areas. Drinking Water Protection (DWP) uses a combination of two simple groundwater flow equations, the Thiem and uniform flow equations for all groundwater wells screened in unconsolidated material. The orientation of the protection zone is then drawn using a water table elevation map (if available) or a land surface elevation map of the area. The protection zone calculated by the DWP is an estimate using the available information and resources, and may differ slightly from the actual capture zone. Because of uncertainties and changing site conditions, a factor of safety is added to the protection zone to form the drinking water protection area for the well.

The parameters used to calculate the shape of this protection area are general for the Matanuska-Susitna lowlands and were obtained from various Alaska Department of Natural Resources (DNR) reports, various United States Geological Survey (USGS) reports, area well logs, and the textbook *Groundwater* by Freeze and Cherry (1979).

The drinking water protection areas (DWPAs) established for wells by the DEC are usually separated into two zones, limited by the watershed. These zones correspond to differences in the time-of-travel (TOT) of the water moving through the aquifer to the well. An analytical calculation was used to determine the size and shape of the protection area. The input parameters describing the attributes of the aquifer in this calculation were adopted from the State of Alaska Department of Water Resources (*Jokela et. al., 1990*) ant the U.S. Geological Survey (*Moran and Solin, 2006*).

The unconfined aquifer (water table) levels in the area of the MSBSD Career Center water system (Jokela, et al., 1990; Moran and Solin, 2006) are primarily influenced by recharge from the Talkeetna Mountains. The protection areas were drawn based on these regional assumptions combined with topographic contours. Groundwater in the unconfined aquifer of this area generally flows north to south.

Because of uncertainties and changing site conditions, a factor of safety is added to the drinking water protection area for the well.

The time of travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. The following is a summary of the two protection area zones for wells and the calculated time-of-travel for each:

Table 1. Definition of Zones

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

The DWPA for the MSBSD Career Center found on Map 1 of Appendix A will serve as the focus for voluntary protection efforts.

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

Drinking Water Protection (DWP) has completed an inventory of potential and existing sources of contamination within the MSBSD Career Center DWPA. 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.

For the basis of all NTNC public water system assessments, the following six categories of drinking water contaminants were inventoried:

- Bacteria and viruses;
- Nitrates and/or nitrites;
- Volatile organic chemicals;
- Heavy metals, cyanide, and other inorganic chemicals;
- Synthetic organic chemicals; and
- Other organic chemicals.

The sources are displayed on Map 2 of Appendix C and summarized in Table 1 of Appendix B.

RANKING OF CONTAMINANT RISKS

Once the potential and existing sources of contamination have been identified, they are each

assigned a ranking according to what type and level of risk they represent. Ranking of contaminant risks for a "potential" or "existing" source of contamination is a combination of toxicity and volume associated with that source. Rankings include:

- Low
- Medium
- High
- Very High

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant.

Tables 2 through 7 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals and other organic chemical

VULNERABILITY OF MSBSD Career Center PUBLIC DRINKING WATER SYSTEM

The vulnerability of public drinking water systems to regulated contaminants is determined by assessing the susceptibility of the wellhead, the susceptibility of the aquifer and the potential contaminant sources identified within the DWPA.

Drinking Water Protection staff developed a vulnerability assessment tool that assigns a vulnerability risk ranking based upon various factors associated with the well, aquifer and potential and existing contaminants identified within the DWPA.

Factors contributing to the susceptibility of the wellhead are: whether the sanitary seal in place, protection from flooding, and if the well casing is properly grouted.

The wellhead for the MSBSD Career Center received a **Low** susceptibility rating. The most recent sanitary survey (completed 10/23/2007) 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.

Factors contributing to the susceptibility of the aquifer are: 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, and the characteristics of the confining layer.

The aquifer that the MSBSD Career Center well is completed in received a **Very High** susceptibility rating. The aquifer is unconfined, shallow, and composed of unconsolidated material (silt, sand, and gravel).

Table 2 summarizes the susceptibility scores and ratings for MSBSD Career Center.

Table 2. Susceptibility

	Rating
Susceptibility of the Wellhead	Low
Susceptibility of the Aquifer	Very High
Natural Susceptibility	High

The Contaminant Risk was derived from an evaluation of the routine sampling results of the water system and the presence of potential sources of contamination. Contaminant risks to a drinking water source depend on the type and distribution of contaminant sources.

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

Table 3. Contaminant Risks

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

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

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

Table 4 contains the overall ratings for each of the six categories of drinking water contaminants.

Table 4. Overall Vulnerability

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

Bacteria and Viruses

The injection wells (Class V) large-capacity septic system (Drainfield Disposal Method) and livestock pastures in the protection area represent the greatest risk for bacteria and viruses to the drinking water well.

Only a small amount of bacteria and viruses are required to endanger public health. Coliform bacteria are found naturally in the environment and although they aren't necessarily a health threat, it is an indicator of other potentially harmful bacteria in the water, more specifically, fecal coliform bacteria and E. coli which only come from human and animal fecal waste (EPA, 2002). Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2002). No total coliform or fecal coliform have been detected for this well. After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **High**.

Nitrates and Nitrites

The injection wells (Class V) large-capacity septic system (Drainfield Disposal Method), agricultural cropland, and livestock pastures in the protection area represent the greatest risk for nitrates and nitrites to this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have been detected within source waters at up to 23% of the maximum contaminant level (MCL) of 10 mg/L.

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

Volatile Organic Chemicals

Roads, residential areas, and septic systems in the protection area represent the greatest risk for volatile organic chemicals (VOCs) to the well.

VOCs have not been detected in the source waters. After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **Medium**.

Heavy Metals, Cyanide, and Other Inorganic Chemicals

Agricultural cropland in the protection area represents the greatest risk for inorganic chemicals to the well.

Heavy metals, cyanide, and other inorganic chemicals have been detected in the source waters. Beryllium was detected at up to 17% of the maximum contaminant levels (MCL) of 0.004 mg/L.

After combining the contaminant risk for heavy metals, cyanide and other inorganic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **High**.

Synthetic Organic Chemicals

Agricultural cropland in the protection area represents the greatest risk for synthetic organic chemicals (SOCs) to the well.

The well has no sampling history for SOCs. After combining the contaminant risk for SOCs with the natural susceptibility of the well, the overall vulnerability of the well to contamination is **High**.

Other Organic Chemicals

Roads, residential areas, and septic systems in the protection area represent the greatest risk for other organic chemicals (OOCs) to the well.

The well has no sampling history for OOCs. After combining the contaminant risk for OOCs with the natural susceptibility of the well, 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 MSBSD Career Center 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 MSBSD Career Center drinking water source.

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Moran, E.H. and Solin, G.L., 2006, Preliminary water-table map and water-quality data for part of the Matanuska-Susitna Valley, Alaska, 2005; U.S. Geological Survey Open-File Report 2006-1209, 43 p.

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

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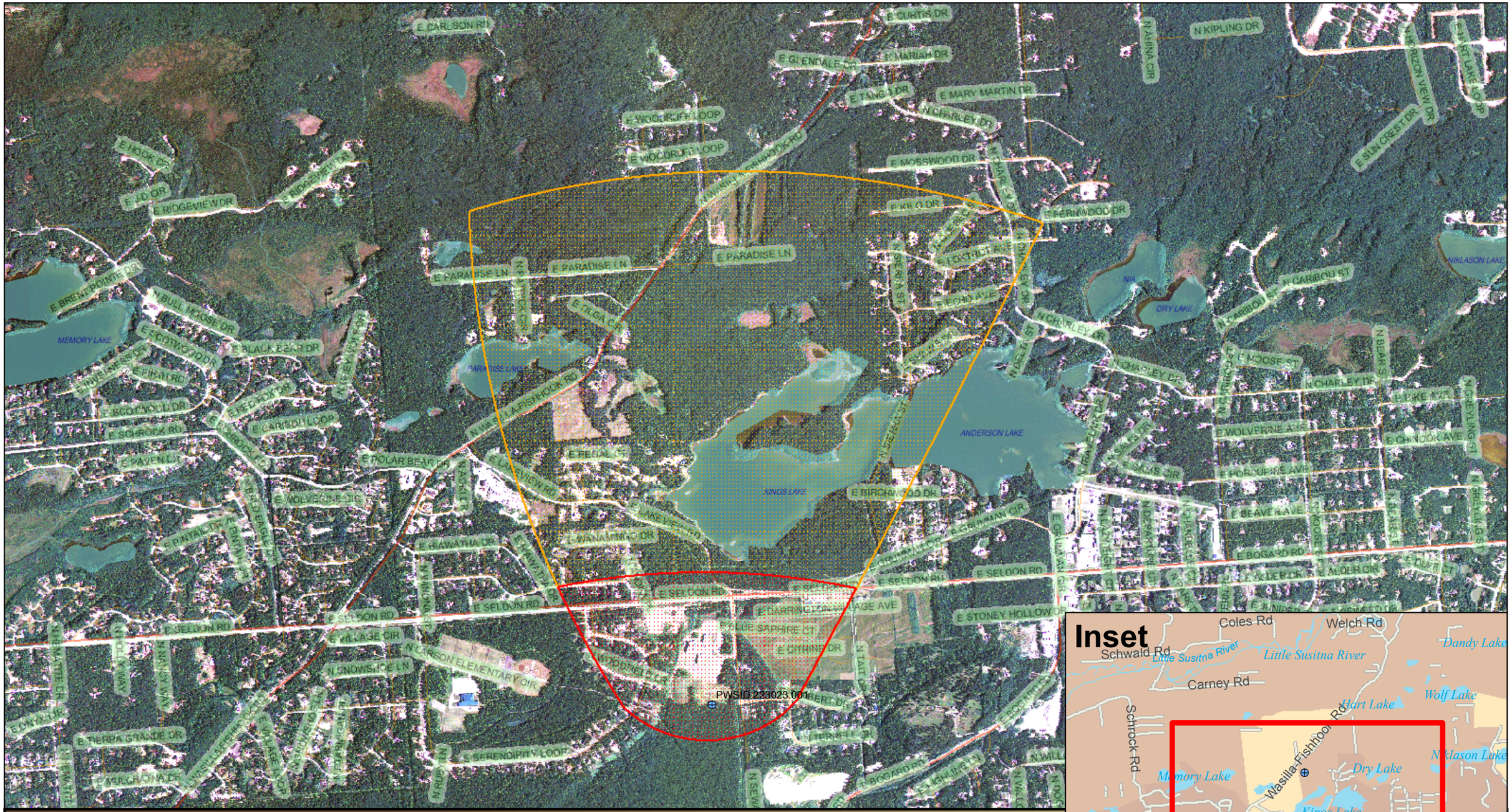
APPENDIX A

MSBSD Career Center
Drinking Water Protection Area Location Map
(Map 1)



Map 1- MSBSD Career Center

PWSID: 223023.001

Alaska DEC

0 — 1 Miles

1 inch equals 1,500 feet

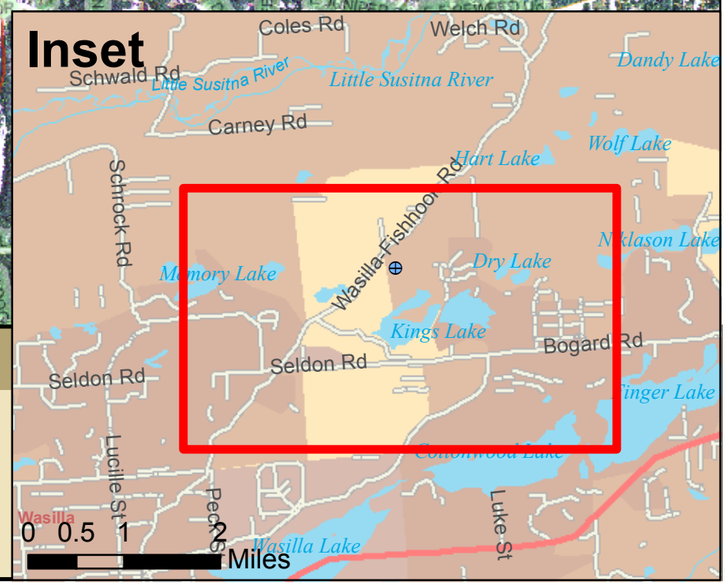
Data Sources:
Boroughs: Roads and parcels (raods data shifted slightly)
Public Water Systems: DEC
Potential Sources of Contamination: DEC
Map Date: December 1, 2008

Identified Public Water Sources

- Class A (Federal Classification: Community (C), or Non-Transient Non-Community (NTNC))
- Class B (Federal Classification: Non-Community (NC), or Transient Non-Community (TNC))

Drinking Water Protection Areas

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



APPENDIX B

Contaminant Source Inventory and Risk Ranking for MSBSD Career Center (Tables 1-7)

Table 1

Contaminant Source Inventory for
MSBSD CAREER CENTER - WELL

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Livestock pastures	A08	A08	A	2	Approximately 5 acres; About 5 horses; Field-verified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	2	11 septic systems.
Water supply wells	W09	W09	A	2	1 water supply well (with different owner than current well).
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	2	11 Minor; 1 Major.
Cropland	A02	A02	B	2	Hay; 15-20 acres; 50 years; Use 2,4-D annually with spreader (qty unk) - no on-site storage or disposal. From SOC/OOC Waiver App.
Livestock pastures	A08	A08-1	B	2	Approximately 22 acres; horses, cattle (50 head); Field-verified.
Livestock pastures	A08	A08-2	B	2	5-10 horses; 15-20 acres; 50 years; SOC/OOC App.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	2	99 septic systems.
Water supply wells	W09	W09-1-4	B	2	4 water supply wells (with different owner than current well).
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	2	21 Minor; 1 Major.

Table 2

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL Sources of Bacteria and Viruses

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Livestock pastures	A08	A08	A	Medium	2	Approximately 5 acres; About 5 horses; Field-verified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	High	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	Low	2	11 Minor; 1 Major.
Livestock pastures	A08	A08-1	B	Medium	2	Approximately 22 acres; horses, cattle (50 head); Field-verified.
Livestock pastures	A08	A08-2	B	Medium	2	5-10 horses; 15-20 acres; 50 years; SOC/OOC App.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	High	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	Low	2	21 Minor; 1 Major.

Table 3

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL Sources of Nitrates/Nitrites

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Livestock pastures	A08	A08	A	Medium	2	Approximately 5 acres; About 5 horses; Field-verified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	High	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	Low	2	11 Minor; 1 Major.
Cropland	A02	A02	B	High	2	Hay; 15-20 acres; 50 years; Use 2,4-D annually with spreader (qty unk) - no on-site storage or disposal. From SOC/OOC Waiver App.
Livestock pastures	A08	A08-1	B	Medium	2	Approximately 22 acres; horses, cattle (50 head); Field-verified.
Livestock pastures	A08	A08-2	B	Medium	2	5-10 horses; 15-20 acres; 50 years; SOC/OOC App.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	High	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	Low	2	21 Minor; 1 Major.

Table 4

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL Sources of Volatile Organic Chemicals

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	Low	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	Low	2	11 Minor; 1 Major.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	Low	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	Low	2	21 Minor; 1 Major.

Table 5

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	Low	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	Low	2	11 Minor; 1 Major.
Cropland	A02	A02	B	Medium	2	Hay; 15-20 acres; 50 years; Use 2,4-D annually with spreader (qty unk) - no on-site storage or disposal. From SOC/OOC Waiver App.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	Low	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	Low	2	21 Minor; 1 Major.

Table 6

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL Sources of Synthetic Organic Chemicals

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Livestock pastures	A08	A08	A	Low	2	Approximately 5 acres; About 5 horses; Field-verified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	Low	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Cropland	A02	A02	B	High	2	Hay; 15-20 acres; 50 years; Use 2,4-D annually with spreader (qty unk) - no on-site storage or disposal. From SOC/OOC Waiver App.
Livestock pastures	A08	A08-1	B	Low	2	Approximately 22 acres; horses, cattle (50 head); Field-verified.
Livestock pastures	A08	A08-2	B	Low	2	5-10 horses; 15-20 acres; 50 years; SOC/OOC App.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	Low	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.

Table 7

Contaminant Source Inventory and Risk Ranking for MSBSD CAREER CENTER - WELL Sources of Other Organic Chemicals

PWSID 223023.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10	A	Low	2	1 large-capacity septic system.
Residential Areas	R01	R01	A	Low	2	Approximately 130 acres.
Septic systems (serves one single-family home)	R02	R02-1-11	A	Low	2	11 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-12	A	Low	2	11 Minor; 1 Major.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-1-5	B	Low	2	5 large-capacity septic systems.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Residential Areas	R01	R01	B	Low	2	Approximately 750 acres.
Septic systems (serves one single-family home)	R02	R02-1-99	B	Low	2	99 septic systems.
Highways and roads, paved (cement or asphalt)	X20	X20-1-22	B	Low	2	21 Minor; 1 Major.

APPENDIX C

MSBSD Career Center
Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map 2)

Zone B:
5 inferred large-capacity septic systems (D10);
99 inferred residential septic systems (R02);
Approximately 750 acres of residential propoerty (R01);
21 minor roads (X20);
1 major road (X20);
Water supply well(s) (W09) (with different owner than current well).

Zone A:
1 inferred large-capacity septic system (D10);
11 inferred residential septic systems (R02);
Approximately 130 acres of residential property (R01);
11 minor roads (X20);
1 major road (X20);
Water supply well(s) (W09) (with different owner than current well).

PWSID 223023.001

Map 2- MSBSD Career Center

PWSID: 223023.001

Alaska DEC

0 — 1 Miles

1 inch equals 1,177 feet

Data Sources:
Boroughs: Roads and parcels (roads data slightly shifted)
Public Water Systems: DEC
Potential Sources of Contamination: DEC
Map Date: December 2, 2008

Legend

Identified Public Water Systems

- Class A Water Systems (Community, or Non-transient non-community)
- Class B Water Systems (Non-community, or Transient non-community)

Drinking Water Protection Area

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

Identified Existing and Potential Sources of Contamination

- A02, Cropland
- A08, Livestock pastures

Inferred septics

- Residential Septics (R02)
- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)

Roads

- MAJOR
- MINOR
- NOT CONST'D