Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Glenn-Muldoon MHP Drinking Water System,
Anchorage, Alaska
PWSID 213336

November 2006

DRINKING WATER PROTECTION REPORT Report 1587
Alaska Department of Environmental Conservation

Source Water Assessment for Glenn-Muldoon MHP Drinking Water System Anchorage, Alaska PWSID 213336

November 2006

DRINKING WATER PROTECTION REPORT Report 1587

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 (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 the Program Coordinator of DWP, (907) 269-7521.

CONTENTS

TABLES

APPENDICES

Source Water Assessment for Glenn-Muldoon MHP Source of Public Drinking Water, Anchorage, Alaska

Drinking Water Protection
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability of the public water system serving the Glenn-Muldoon MHP to potential contamination. This Class A (community) water system consists of one well off of Glenn Muldoon Trailer Court in Anchorage. The well received a natural susceptibility rating of **Medium**. This rating is a combination of a susceptibility rating of **Medium** for the actual wellhead and a **Medium** rating for the aquifer in which the well is drawing water from. Identified potential and current sources of contamination for the Glenn-Muldoon MHP public water system include: motor vehicle repair shops, injection wells, residential areas, sewerlines with lift stations, roads, and others listed in Table 1 of Appendix B. These are considered as 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 contaminant risk, the public water system for Glenn-Muldoon MHP received an overall vulnerability rating of **High** heavy metals, cyanide, and other inorganic chemicals, **Medium** for VOCs, OOCs, nitrates and/or nitrites, bacteria and viruses, and **Low** for SOCs.

GLENN-MULDOON MHP PUBLIC DRINKING WATER SYSTEM

Glenn-Muldoon MHP public water system is a Class A (community) water system that consists of one well off of the Glenn Hwy on Glenn Muldoon Trailer Court in Anchorage, AK.

Anchorage, located in southcentral Alaska, encompasses 1,698 square miles of land and 264 square miles of water. The area containing a majority of the urban development, commonly referred to as the Anchorage Bowl, encompasses approximately 180 square miles (*Partick, Brabets, and Glass, 1989*) and envelopes the low lands of the area. This area is bounded on the east by the Chugach Mountains and the north, west, and south by the Knik and Turnagain Arms of Cook Inlet (Figure 1). In recent times, urban development has extended eastward along the flanks of the Chugach Mountains. This area, known locally as the Anchorage Hillside, contains development at elevations exceeding 3700 feet in elevation above sea level.

In the Anchorage-area, two principal groundwater flow systems or aquifers exist. The upper unconfined aquifer or water-table aquifer is separated from a lower confined aquifer system by layers of silty, clayey glacially derived sediments (confining layer) [*Ulery and Updike*, 1983]. The lower confined aquifer system consists of a series of hydrologically interconnected layers and lenses of gravel, sand and silt that, collectively, form the confined aquifer. The confining layer ranges from 0 to 270 feet thick throughout the Anchorage-area and generally thins with increasing distance from Cook Inlet, thus pinching out at the mountain front [*Patrick, Brabets, and Glass*, 1989].

Water enters or recharges these two aquifer systems in several different ways. Along the front of the Chugach Mountains, groundwater seeps from fractures in bedrock into the sediments. At these higher elevations, rain and snowmelt also enters the sediments. This area along the mountain front is considered the principal recharge area for wells in the Anchorage-area. Precipitation in the low lands may also percolate directly into the ground. Lastly, aquifers may also be recharged by streams where surface water percolates into surrounding permeable sediments (losing reaches of streams). Groundwater flow in the confined aquifer is generally east to west from the mountain front toward Cook Inlet, except in areas where the direction of flow is influenced by large municipal or industrial production wells. The direction of groundwater flow in the upper unconfined aquifer is more variable due to the influence from surfacial topography as well as its close connection with surface water bodies.

The Glenn-Muldoon MHP public water system serves approximately 300 residents through 128 service connections.

GLENN-MULDOON MHP 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 area that contributes water to the well, the groundwater capture zone. The groundwater capture zone is located in the area circling the well (the area influenced by pumping) and also the area of the water table upgradient of the well, usually forming a parabola shape.

There are many different methods for calculating the size of capture zones. 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 capture zone is then drawn using a water table elevation map (if available) or a land surface elevation map of the area. The capture zone calculated by the DWP is an estimate using the available information and resources, and may differ slightly from the actual capture zone.

The parameters used to calculate the shape of this capture zone are general for the whole alluvial plain and were obtained from various United States Geological Survey (USGS) reports, area well logs, and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

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

The protection areas established for wells are usually separated into two zones, limited by the watershed. These zones correspond to times-of-travel (TOT) of the water moving through the aquifer to the well (plus the factor of safety).

The following is a summary of the two zones for wells and the calculated time-of-travel for each:

Table 1. Definition of Zones

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

The time of travel for contaminants within the water varies with their unique physical and chemical characteristics.

The drinking water protection area outlined for the Glenn-Muldoon MHP 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 Glenn-Muldoon MHP protection area. This inventory was completed through a search of agency records and other publicly available information. 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 Class A public water system assessments, six categories of drinking water contaminants were inventoried. They include:

- 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

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 GLENN-MULDOON MHP 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 protection area.

The Drinking Water Protection 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 protection area.

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 Glenn-Muldoon MHP received a **Medium** susceptibility rating. The most recent sanitary survey (12/18/2001) indicates the well is capped with a sanitary seal, the land surface is sloped away from the well, but the well is not grouted. A sanitary seal prevents potential contaminant 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. Failure to properly grout a well contributes to the risk of contamination.

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 wells and bore holes are penetrating the aquifer and, if applicable, the confining layer.

The aquifer the Glenn-Muldoon MHP well is completed in received a **Medium** susceptibility rating. The aquifer is fairly well confined, which helps protect the well from above and below ground contaminants. However, the presence of boreholes within the protection area may provide contaminants a direct route to the groundwater. Table 2 summarizes the Susceptibility scores and ratings for Glenn-Muldoon MHP.

Table 2: Susceptibility

	Rating
Susceptibility of the Wellhead	Medium
Susceptibility of the Aquifer	Medium
Natural Susceptibility	Medium

The Contaminant Risk has been 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	High
Nitrates and/or Nitrites	High
Volatile Organic Chemicals	High
Heavy Metals, Cyanide, and Other Inorganic Chemicals	Very High
Synthetic Organic Chemicals	Low
Other Organic Chemicals	High

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	Medium
Nitrates and Nitrites	Medium
Volatile Organic Chemicals	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	High
Synthetic Organic Chemicals	Low
Other Organic Chemicals	Medium

Bacteria and Viruses

Class V injection wells in the protection area represent the greatest risk for bacteria and viruses to the drinking water well. For a complete listing of potential sources for bacteria and virus contamination please see Table 2 in Appendix B.

Only a small amount of bacteria and viruses are required to endanger public health. Coliforms 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 coliforms and E. coli which only

come from human and animal fecal waste (EPA, 2006). Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2006). No samples have tested positive for coliforms in recent history.

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 medium.

Nitrates and Nitrites

Class V injection wells in the protection area also represent the greatest risk to nitrates and nitrites for this source of public drinking water. For a complete listing of potential sources for nitrate and nitrite contamination please see Table 3 in Appendix B.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have been detected in recent sampling history for the Glenn-Muldoon MHP well. The detection level was below the maximum contaminant level (MCL = 10mg/L) for nitrates/nitrites. In quantities above the MCL, nitrates/nitrites have been known to cause 'blue baby' syndrome in infants (EPA 2006).

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 medium.

Volatile Organic Chemicals

Class V injection wells, printers, and car washes in the protection area represent the greatest identified risk for volatile organic chemical contamination to this public water system. For a complete listing of potential sources for bacteria and virus contamination please see Table 4 in Appendix B.

Volatile Organic Chemicals have not been detected within 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

Injection wells and printers represent the greatest risk for inorganic chemicals to the well. For a complete listing of potential sources for bacteria and virus contamination please see Table 5 in Appendix B.

In recent sampling both arsenic and antimony were detected. Antimony was detected at a higher level than arsenic but was still below the MCL. The MCL for antimony is 0.006 mg/L. In greater quantities, antimony is known to cause an increase in blood cholesterol level, and a decrease in blood sugar (EPA, 2006).

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

Residential areas represent the greatest risk for synthetic organic chemicals to the well. For a complete listing of potential sources for bacteria and virus contamination please see Table 6 in Appendix B.

Synthetic organic chemicals have not been sampled for in this water system.

After combining the contaminant risk for snythetic organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

Other Organic Chemicals

Class V injection wells represent the greatest risk for other organic chemicals to the well. For a complete listing of potential sources for bacteria and virus contamination please see Table 7 in Appendix B.

Other organic chemicals have not been sampled for in this water system.

After combining the contaminant risk for snythetic organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is medium.

REFERENCES

Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice-Hall, Englewood Cliffs, NJ.

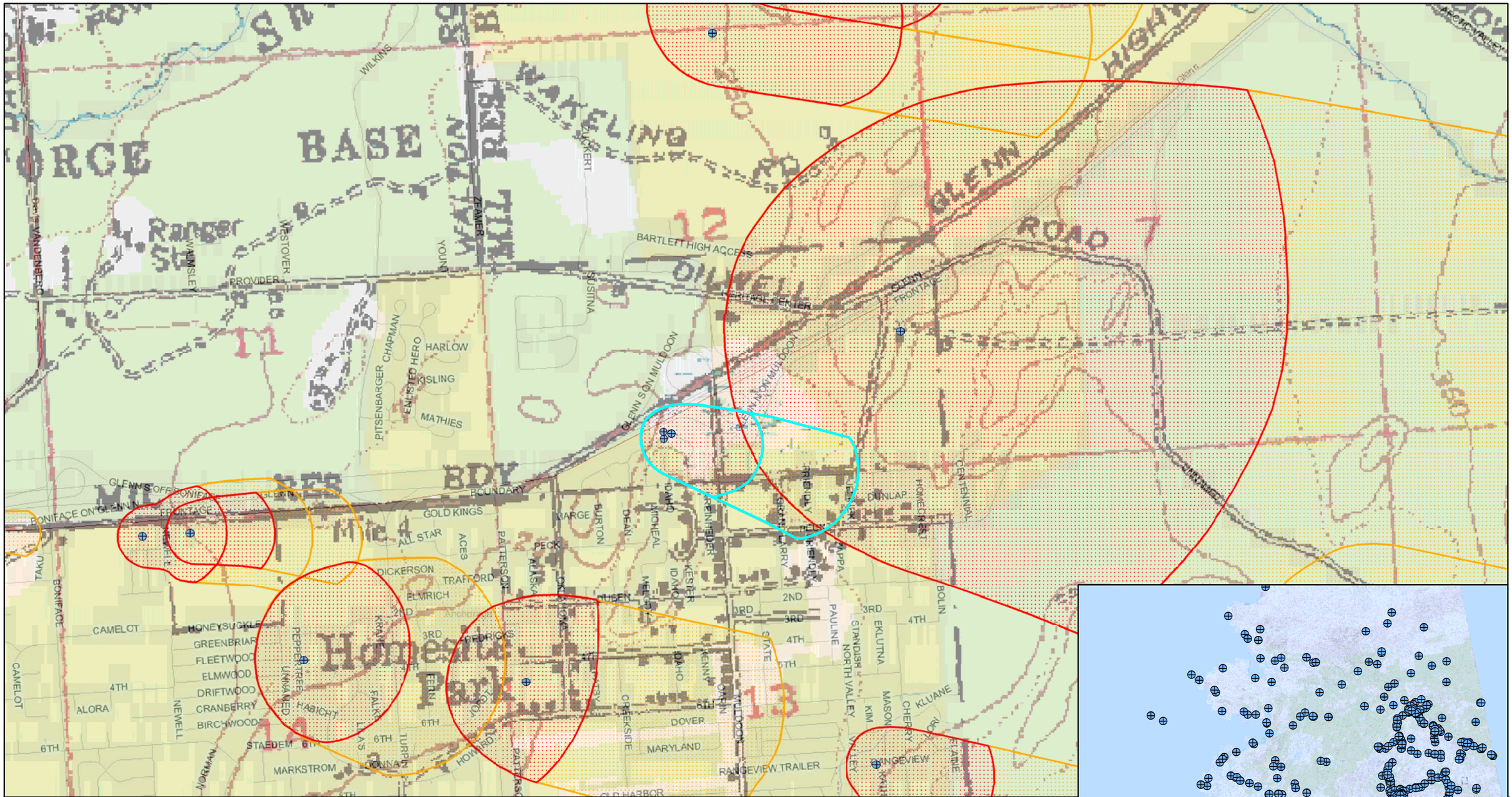
United States Environmental Protection Agency (EPA), 2006 [WWW document]. URL http://www.epa.gov/safewater/mcl.html.

Patrick, L.D., Brabets, T.P., and Glass, R.L., 1989, Simulation of ground-water flow at Anchorage, Alaska: U.S. Geological Survey Water-Resources Investigations Report 88-4139, 41p.

Ulery, C.A. and Updike, R.G, 1983, Subsurface structure of the cohesive facies of the Bootlegger Cove Formation, Sourthwest Anchorage, Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 84, 5 p.

APPENDIX A

Glenn-Muldoon MHP
Drinking Water Protection Area Location Map
(Map 1)



Map 1- Glenn-Muldoon MHP

PWSID: 213336.001, 213336.002 &213336.003

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 1:13,357 Feet 2,600

Data Sources:
MOA: Roads and parcels
Potential Sources of Contamination: ADEC

- Public Water Sources
- Zone A Protection Area
- Zone B Protection Area

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Glenn-Muldoon MHP (Tables 1-7)

Table 1

Contaminant Source Inventory for ***Glenn Muldoon Trailer Court***

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A		
Closed tanks, diesel (underground)	T09	T09-1-2	A		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A		
Dog walking areas/foot trails	X46	X46-1	A		
Car washes with engine or undercarriage cleaning	C08	C08-1	B		
Dry cleaners	C10	C10-1	B		
Florists	C12	C12-1	B		
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (without service department)	C26	C26-1	B		
Motor /motor vehicle repair shops	C31	C31-1-2	B		
Printers, publishers, copiers	C37	C37-1	B		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B		
Residential Areas	R01	R01-1-2	B		Approximately 20 acres of residential area.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-1	B		Gasoline/diesel contaminated soils and groundwater documented in 1990-90 site invest. Site remains open for remediation.
Municipal or city parks (with green areas)	X04	X04-1	B		
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B		

Table 2

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court Sources of Bacteria and Viruses

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Medium		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A	Low		
Dog walking areas/foot trails	X46	X46-1	A	Low		
Dry cleaners	C10	C10-1	B	Low		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Medium		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B	High		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Municipal or city parks (with green areas)	X04	X04-1	B	Medium		
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B	Low		

Table 3

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court Sources of Nitrates/Nitrites

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Medium		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A	Low		
Dog walking areas/foot trails	X46	X46-1	A	Low		
Dry cleaners	C10	C10-1	B	Low		
Florists	C12	C12-1	B	Low		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Medium		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B	High		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Municipal or city parks (with green areas)	X04	X04-1	B	Medium		
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B	Low		

Table 4

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court Sources of Volatile Organic Chemicals

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Low		
Closed tanks, diesel (underground)	T09	T09-1-2	A	Low		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A	Low		
Car washes with engine or undercarriage cleaning	C08	C08-1	B	High		
Dry cleaners	C10	C10-1	B	High		
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (without service department)	C26	C26-1	B	Low		
Motor /motor vehicle repair shops	C31	C31-1-2	B	Medium		
Printers, publishers, copiers	C37	C37-1	B	High		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Low		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B	High		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-1	B	Low		Gasoline/diesel contaminated soils and groundwater documented in 1990-90 site invest. Site remains open for remediation.
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B	Low		

Table 5

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Low		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A	Low		
Car washes with engine or undercarriage cleaning	C08	C08-1	B	Medium		
Motor /motor vehicle repair shops	C31	C31-1-2	B	Medium		
Printers, publishers, copiers	C37	C37-1	B	Medium		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Low		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B	High		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Municipal or city parks (with green areas)	X04	X04-1	B	Low		
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B	Low		

Table 6

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court Sources of Synthetic Organic Chemicals

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Low		
Printers, publishers, copiers	C37	C37-1	B	Low		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Low		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Municipal or city parks (with green areas)	X04	X04-1	B	Low		

Table 7

Contaminant Source Inventory and Risk Ranking for Glenn Muldoon Trailer Court Sources of Other Organic Chemicals

PWSID 213336.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-1-2	A	Low		
Highways and roads, paved (cement or asphalt)	X20	X20-1-10	A	Low		
Car washes with engine or undercarriage cleaning	C08	C08-1	B	Medium		
Motor vehicle dealerships - cars, trucks, motor cycles, ATV's, snow machines, boats (without service department)	C26	C26-1	B	Low		
Motor /motor vehicle repair shops	C31	C31-1-2	B	Medium		
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-3-9	B	Low		
Injection wells (Class V) Industrial Process Water & Water Disposal Wells	D40	D40-1	B	High		
Residential Areas	R01	R01-1-2	B	Low		Approximately 20 acres of residential area.
Highways and roads, paved (cement or asphalt)	X20	X20-11-15	B	Low		

APPENDIX C

Glenn-Muldoon MHP
Drinking Water Protection Area and
Potential and Existing Contaminant Sources
(Map 2)

9 Sewerlines
2 in Zone A
7 in Zone B

15 Roads
11 in Zone A
4 in Zone B

2 Diesel tanks (closed) in Zone A

20 Acres of residential land use (approx.) in Zone B

1 Municipal park in Zone B

1 Industrial process water & water disposal well in Zone B

2 Motorvehicle repair shop in Zone B

1 Trail in Zone A

1 Publisher in Zone B

1 Carwash in Zone B

1 Florist in Zone B

1 Drycleaner in Zone B

1 Leaking underground furel storage tank (closed) in Zone B

GLENN MULDOON TRAILER
GLENN N OFF MULDOON
GLENN N ON MULDOON
FRONTAGE
BOUNDARY
MULDOON
FRIENDLY
GRAND LARRY
JELINEK
PECK
FRIEND

Zone A Protection Area
Zone B Protection Area
X4
X27
C31
Roads
Sewerlines
Public Water Sources
C08
C10
C12
C26
C37
D40
T09
U07
X19

Map 2- Glenn-Muldoon MHP

PWSID: 213336.001, 213336.002 & 213336.003

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 1:2,595 Feet 680

Data Sources:
MOA: Roads and parcels
Potential Sources of Contamination: ADEC