Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for the Anaktuvuk Pass/District Drinking Water System, Anaktuvuk Pass, Alaska

PWSID # 350235.001

June 2004

DRINKING WATER PROTECTION PROGRAM REPORT 1335
Alaska Department of Environmental Conservation

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The Drinking Water Protection Program (DWPP) 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 DWPP, (907) 269-7521.

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Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Anaktuvuk Pass/District Public Water System (PWS) has two wells. The well (PWS No. 350235.001) has been used as a drinking water source since it was drilled in June of 1994. This report is exclusively for PWS No. 350235.001.

The well is a Class A (community and non-transient non-community) water system located in Anaktuvuk Pass, Alaska. Available records indicate that the system has a 300,000 gallon storage tank and that the drinking water source is treated with calcium hypochlorite. This system operates year round and serves approximately 300 residents through 150 service connections. The wellhead received a susceptibility rating of **Low** and the aquifer received a susceptibility rating of **Very High**. Combining these two ratings produce a **Medium** rating for the natural susceptibility of the well.

Identified potential and current sources of contaminants for the public drinking water source include: fuel tanks, ADEC recognized contaminated sites, power generation facilities, a landfill, and water treatment facilities. A detailed inventory can be found in Table 1 of Appendix B. These identified potential and existing sources of contamination are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals contaminant categories.

Overall, the well received a vulnerability rating of **High** for bacteria and viruses, nitrates and nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals.

PUBLIC DRINKING WATER SYSTEM

The Anaktuvuk Pass/District PWS well is a Class A (community/non-transient/non-community) public water system in Anaktuvuk Pass, Alaska (Sec. 18, T015S, R002E, Umiat Meridian, see Map A of Appendix A). The community of Anaktuvuk Pass is at an elevation of 2,200 feet on the divide between the Anaktuvuk and John Rivers in the central Brooks Range. The community has a population of 319 (ADCED, 2003). Average annual precipitation in Anaktuvuk Pass is 11 inches, including approximately 63 inches of snowfall. Temperatures can be as extreme as -56 to 91°F.

Most households in Anaktuvuk Pass have water delivered by truck to holding tanks. Honeybuckets are used for sewage disposal, which are hauled by the Borough (ADCED, 2003). Anaktuvuk Pass residents rely on the North Slope Borough for electricity, which is powered by diesel. Residents dispose of refuse at the community landfill, which is operated by the North Slope Borough.

According to information supplied by ADEC for the Anaktuvuk Pass/District PWS, the depth of the well is 165 feet below the ground surface. Based on available well construction details, it is assumed that the well is screened in an unconfined aquifer. The well is not located within a floodplain.

Information acquired from a November 1996 sanitary survey for the PWS indicated that the land surface was sloped away from the well. Generally, land surfaces that slope away from the wellhead promote surface water drainage, which reduces the potential of contaminant migration down the well casing annulus. The sanitary survey indicates that the well is grouted according to ADEC regulations. Proper grouting provides added protection against contaminants traveling along the well casing annulus and into source waters.

Anaktuvuk Pass is located in the Endicott Mountains of the Brooks Range. It resides on the divide between the Anaktuvuk and John Rivers. The village of Anaktuvuk Pass lies between the boulder strewn course of Contact Creek, a tributary of the John River, and a steep sided glacial kame terrace.

The Anaktuvuk Pass valley is U-shed, which is typical of glaciated mountain valleys. It forms a corridor 12 miles long and 2 to 4 miles in width. From the valley, mountain peaks rise abruptly

reaching heights up to 6,000 feet. The steep serrated walls of these mountains are composed of limestone.

The valley floor is composed of glacial till in the form of moraines, kames, eskers and other glacial features. Under the surface organic mat, the soils tend to be loamy fine sand overlying coarse grained alluvial and glaciofluvial gravels.

Permafrost in the area is continuous. It is estimated to be at least 1,000 feet deep (VRCA Environmental Services, 1991).

DRINKING WATER PROTECTION AREA

In order to evaluate whether a drinking water source is at risk, we must first evaluate what are the most likely pathways for surface contamination to reach the groundwater. 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 recharge area. This area is designated as the drinking water protection area (DWPA). Because releases of contaminants within the protection area are most likely to impact the drinking water well, this area will serve as the focus for voluntary protection efforts. An analytical calculation was used to determine the size and shape of the DWPA for the Anaktuvuk Pass/District PWS. The input parameters describing the attributes of the aquifer in this calculation were adopted from Groundwater (Freeze and Cherry, 1979). Available geology and groundwater contours were also considered to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at a meaningful protection area.

The protection areas established for wells by the ADEC are usually separated into four 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 (Please refer to the Guidance Manual for Class A Public Water Systems for additional information).

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 four protection area zones for wells and the calculated time-of-travel for each:

Table 1. Definition of Zones

Zone	Definition
A	¼ the distance for the 2-yr. time-of-travel
B	Less than the 2 year time-of-travel
C	Less Than the 5 year time-of-travel
D	Less than the 10 year time-of-travel

The DWPA for the Anaktuvuk Pass/District PWS was determined using an analytical calculation and includes Zones A, B, C, and D (See Map A of Appendix A).

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within the Anaktuvuk Pass/District PWS 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 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 C 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 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 function of toxicity and volumes of specific contaminants associated with that source. Rankings include:

- Low,
- Medium,
- High, and
- Very High.

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zones A and B because of their short life span. Only "Very High" and "High" rankings are inventoried within the outer Zone D due to the probability of contaminant dilution by the time the contaminants get to the well. Tables 2 through 7 in Appendix B contain the ranking of 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 chemicals.

VULNERABILITY OF THE DRINKING WATER SYSTEM

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

- Natural susceptibility, and
- Contaminant risks.

Appendix D contains fourteen charts, which together form the 'Vulnerability Analysis' for a source water assessment for a public drinking water source. Chart 1 analyzes the 'Susceptibility of the Wellhead' to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the 'Susceptibility of the Aquifer' to contamination by looking at the naturally occurring attributes of the water source and influences on the groundwater system that might lead to contamination. Chart 3 analyzes 'Contaminant Risks' for the drinking water source with respect to bacteria and viruses. The 'Contaminant Risks' portion of the analysis considers potential sources of contaminants as well as a review of contamination that has or may have occurred, but has not arrived or been detected at the well. Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses'. Charts 5 through 14 contain the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals, respectively.

A score for the Natural Susceptibility is reached by considering the properties of the well and the aquifer.

Susceptibility of the Wellhead (0 – 25 Points)
(Chart 1 of Appendix D)

+

Susceptibility of the Aquifer (0 – 25 Points)
(Chart 2 of Appendix D)

=

Natural Susceptibility (Susceptibility of the Well)
(0 – 50 Points)

A ranking is assigned for the Natural Susceptibility according to the point score:

Natural Susceptibility Ratings	
40 to 50 pts	Very High
30 to < 40 pts	High
20 to < 30 pts	Medium
< 20 pts	Low

The Anaktuvuk Pass/District PWS's water well is completed in an unconfined aquifer. Unconfined aquifers are more susceptible to potential groundwater quality impacts posed by the migration of surface water contaminants downward from the surface. Table 2 shows the susceptibility scores and ratings for this PWS.

Table 2. Susceptibility

	Score	**Rating**
Susceptibility of the Wellhead	0	Low
Susceptibility of the Aquifer	25	Very High
Natural Susceptibility	25	Medium

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. This score has been derived from an examination of existing and historical contamination that has been detected at the drinking water source 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 for the natural susceptibility:

Contaminant Risk Ratings	
40 to 50 pts	Very High
30 to < 40 pts	High
20 to < 30 pts	Medium
< 20 pts	Low

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

Table 3. Contaminant Risks

Category	Score	Rating
Bacteria and Viruses	50	Very High
Nitrates and/or Nitrites	50	Very High
Volatile Organic Chemicals	50	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	45	Very High
Synthetic Organic Chemicals	50	Very High
Other Organic Chemicals	50	Very High

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

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

Vulnerability of the
Drinking Water Source to Contamination (0 – 100).

Again, rankings are assigned according to a point score:

Overall Vulnerability Ratings	
80 to 100 pts	Very High
60 to < 80 pts	High
40 to < 60 pts	Medium
< 40 pts	Low

Table 4 contains the overall vulnerability scores (0 – 100) and ratings for each of the six categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

Table 4. Overall Vulnerability

Category	Score	Rating
Bacteria and Viruses	75	High
Nitrates and Nitrites	75	High
Volatile Organic Chemicals	75	High
Heavy Metals, Cyanide and Other Inorganic Chemicals	70	High
Synthetic Organic Chemicals	75	High
Other Organic Chemicals	75	High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Very High**. The risk is primarily attributed to the presence of wastewater treatment facilities, a large capacity septic system, and a landfill in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 2 – Appendix B).

Coliforms (a 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, 2002). Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination.

No positive bacteria counts have been reported in recent (within five years) sampling events (See Chart 3 – Contaminant Risks for Bacteria and Viruses in Appendix D). Only a small amount of bacteria and viruses are required to endanger public health.

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 contaminant risk for nitrates and nitrites is **Very High**. The risk to this source of public drinking water is primarily attributed to the presence of wastewater treatment facilities, a large capacity septic system, and a landfill in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 3 – Appendix B).

Nitrates are very mobile, moving at approximately

the same rate as water. The sampling history for this well indicates that low levels of nitrates have been detected in recent sampling events, however they did not exceed the MCL of 10 mg/L. Nitrate concentrations in uncontaminated groundwater are typically less than 2 mg/L; therefore, nitrate concentrations above 2 mg/L may be indicative of man-made sources (See Chart 5 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D).

Nitrate levels are often derived from the decomposition of organic matter in soils. Consequently, the presence of nitrates may be attributed to the landfill in Zone A.

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

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Very High**. The risk is primarily attributed to the presence of DEC recognized contaminated sites, a bulk fuel station, and a landfill in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 4 – Appendix B).

Recent sampling results indicated low levels of Xylenes, however they do not exceed its MCL of 10 mg/L (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D). A xylene is any of a group of very similar organic compounds. They are clear liquids with a sweet odor. The greatest use of xylenes is as a solvent which is much safer than benzene. Other uses include: in gasoline as part of the BTX component (benzene-toluene-xylene); Xylene mixtures are used to make phthalate plasticizers, polyester fiber, film and fabricated items. Short-term: EPA has found xylenes to potentially cause the following health effects when people are exposed to it at levels above the MCL for relatively short periods of time: disturbances of cognitive abilities, balance, and coordination. Long-term: Xylenes has the potential to cause the following effects from a lifetime exposure at levels above the MCL: damage to the central nervous system, liver and kidneys (EPA, 2004).

Other possible sources of volatile organic chemicals include facilities with automobiles, residential areas, fuel tanks, and roads. See Table 4 in Appendix B for a complete listing.

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 **High**.

Heavy Metals, Cyanide and Other Inorganic Chemicals

The contaminant risk for heavy metals, cyanide and other inorganic chemicals is **Very High**. The risk is primarily attributed to the presence of sulfate in recent sampling events and the presence of a landfill in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 5 – Appendix B).

Based on review of recent sampling records for this PWS, moderate levels of lead and low levels of sulfate have been detected, however they have not exceeded their MCL of .015 and 250 mg/L, respectively (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

The reported concentrations of lead are likely attributed to the water treatment/conveyance system.

The source of sulfates are unknown.

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

The contaminant risk for synthetic organic chemicals is **Very High**. The risk is primarily attributed to a landfill located in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 6 – Appendix B).

No recent sampling data was available in ADEC records for the Anaktuvuk Pass/District PWS (See Chart 11 – Contaminant Risks for Synthetic Organic Chemicals in Appendix D).

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

Other Organic Chemicals

The contaminant risk for other organic chemicals is **Very High**. The risk is primarily attributed to the presence of a landfill and electric power generation facilities in Zone A. Several other potential

contaminant sources are also found within the protection area (see Table 7 – Appendix B).

No recent sampling data was available in ADEC records for the Anaktuvuk Pass/District PWS (See Chart 13 – Contaminant Risks for Other Organic Chemicals in Appendix D).

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

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 the community of Anaktuvuk Pass 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 Community and Economic Development (ADCED), 2003 [WWW document]. URL: http://www.dced.state.ak.us/cbd/commdb/CF_COMDB.htm

Alaska Department of Environmental Conservation, Contaminated Sites Database, 2003 [WWW database], URL http://www.state.ak.us/dec/dspar/csites/cs_search.htm

Alaska Department of Environmental Conservation, Leaking Underground Storage Tank Database, 2003 [WWW database], URL http://www.dec.state.ak.us/spar/stp/ust/search/fac_search.asp

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

United States Environmental Protection Agency (EPA), 2002 [WWW document]. URL http://www.epa.gov/safewater/mcl.html.

United States Environmental Protection Agency (EPA, Office of Water) Technical Fact sheet on Dichloromethane. Retrieved June 2004, http://www.epa.gov/safewater/contaminants/dw_contamfs/toluene.html

VRCA Environmental Services and RZA-AGRA, 1991, Information from Bioremediation Project, Anaktuvuk Pass Power Plant, Used Oil and Diesel Fuel Spill.

APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

APPENDIX B

Contaminant Source Inventory and Risk Ranking (Tables 1-7)

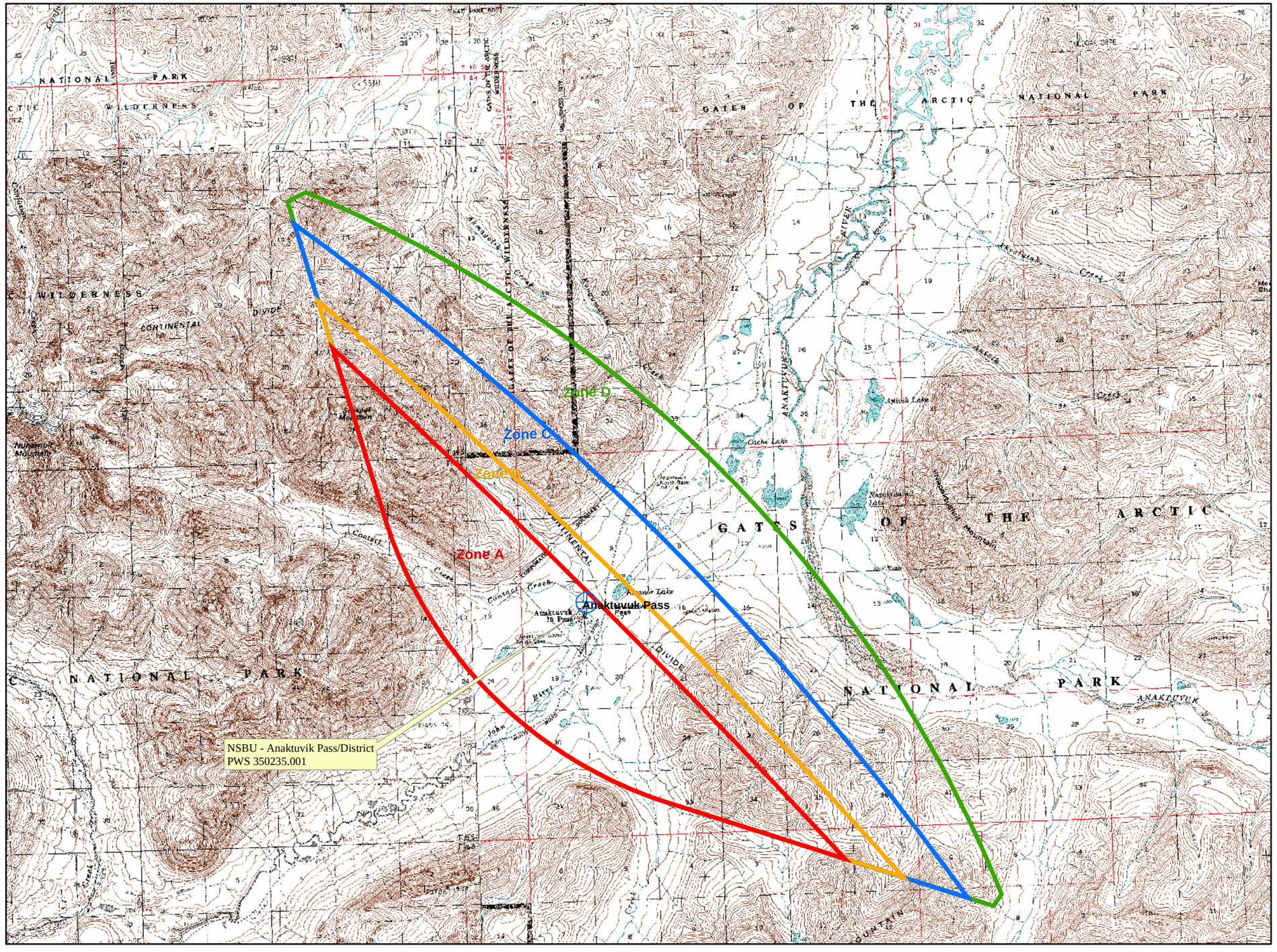
APPENDIX C

Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map C)

APPENDIX D

Vulnerability Analysis for Public Drinking Water Source (Charts 1-14)

Public Water Well System for PWS #350235.001 NSBU - Anaktuvik Pass/District



LEGEND

Public Water System Well

Hydrography/Physical

- Parcels
- Stream
- Lake or Pond
- Contours

Transportation

- Primary Route (Class 1)
- Secondary Route (Class 2)
- Road (Class 3)
- Road (Class 4)
- Road (Class 5, Four-wheel drive)

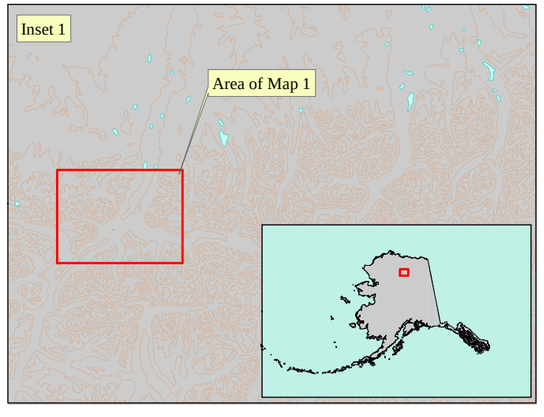
Groundwater Protection Zones

- Zone A Protection Area– Several Months Travel Time
- Zone B Protection Area– 2 Years Travel Time
- Zone C Protection Area– 5 Years Travel Time
- Zone D Protection Area– 10 Years Travel Time

Data Sources:
- Contaminant Sources, Public Water System Wells, Contours
  Alaska Department of Environmental Conservation (ADEC)
- Critical Facilities, Federal Emergency Management Agency (FEMA)

All other data:
- United States Geological Survey (USGS)
- Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class A Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or validity of the data provided.



NSBU - Anaktuvik Pass/District
350235.001
Appendix A Map A

Table 1

Contaminant Source Inventory for
NSBU - Anaktuvuk Pass / Dist.

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	C	Washeteria
Motor /motor vehicle repair shops	C31	C31-01	A	C	Service/Maintenance Shop
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	C	NSB SD-NUNAMIUT SCHOOL
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	C	Assume 80 or less pit toilets/outhouses in Zone A
Landfills (municipal; Class III)	D51	D51-01	A	C	Landfill/Incinerator
Tanks, heating oil, residential (above ground)	R08	R08-01	A	C	Assume 84 or less residential heating oil tanks in Zone A
Tanks, diesel (above ground)	T06	T06-01	A	C	Generator
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	C	Power Generation Facility
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	C	Hospital/Clinic/ER
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	C	Radio Transmitter
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	C	Teachers Quarters
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	C	Telephone
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	C	Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	C	Community Freezer
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	C	Community Hall
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	C	Community Storage Shed
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	C	Fire Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	C	Library

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	C	Museum
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	C	Offices
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	A	C	Police Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	C	Satellite
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	C	School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	C	Anaktuvuk Pass Pumphouse Reckey # - 1994310106704 Petroleum contamination from chronic leaks and spills from fuel transfers. Pumphouse serves all village fuel needs.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Cemeteries	X01	X01-01	A	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	C	Park
Glycol (disposal or storage)	X07	X07-01	A	C	
Petroleum product bulk station/terminals	X11	X11-01	A	C	Fuel Storage Tanks (>500gal)

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Airports	X14	X14-01	A	C	Airport
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 20 or less roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	C	Power Generation Facility
Electric power generation (fossil fuels)	X36	X36-02	A	C	Anaktuvuk Pass Power Plant
Electric power generation (fossil fuels)	X36	X36-03	A	C	
Firehouses	X38	X38-01	A	C	Fire Station
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	C	

Table 2

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Bacteria and Viruses

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	Washeteria
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Medium	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	NSB SD-NUNAMIUT SCHOOL
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 80 or less pit toilets/outhouses in Zone A
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 80 or less pit toilets/outhouses in Zone A
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill/Incinerator
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	Park
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Medium	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	Medium	C	

Table 3

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Nitrates/Nitrites

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	Washeteria
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Medium	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	NSB SD-NUNAMIUT SCHOOL
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 80 or less pit toilets/outhouses in Zone A
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 80 or less pit toilets/outhouses in Zone A
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill/Incinerator
Cemeteries	X01	X01-01	A	Medium	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	Park
Airports	X14	X14-01	A	Low	C	Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	Low	C	

Table 4

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Volatile Organic Chemicals

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	Washeteria
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	Service/Maintenance Shop
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	NSB SD-NUNAMIUT SCHOOL
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 80 or less pit toilets/outhouses in Zone A
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 80 or less pit toilets/outhouses in Zone A
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill/Incinerator
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 84 or less residential heating oil tanks in Zone A
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 84 or less residential heating oil tanks in Zone A
Tanks, diesel (above ground)	T06	T06-01	A	Medium	C	Generator
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	Power Generation Facility
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	Hospital/Clinic/ER
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Radio Transmitter
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	Teachers Quarters
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	Telephone
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	Community Freezer
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	Community Hall

Table 4 (continued)

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Volatile Organic Chemicals

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	Community Storage Shed
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	Fire Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	Library
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	Museum
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	Low	C	Offices
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	A	Low	C	Police Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	Low	C	Satellite
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	Low	C	School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	High	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	High	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	High	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	High	C	Anaktuvuk Pass Pumphouse Reckey # - 1994310106704 Petroleum contamination from chronic leaks and spills from fuel transfers. Pumphouse serves all village fuel needs.

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist.

Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	High	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Petroleum product bulk station/terminals	X11	X11-01	A	Very High	C	Fuel Storage Tanks (>500gal)
Airports	X14	X14-01	A	High	C	Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	Power Generation Facility
Electric power generation (fossil fuels)	X36	X36-02	A	Medium	C	Anaktuvuk Pass Power Plant
Electric power generation (fossil fuels)	X36	X36-03	A	Medium	C	
Firehouses	X38	X38-01	A	Low	C	Fire Station
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	Low	C	

Table 5

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	Service/Maintenance Shop
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	NSB SD-NUNAMIUT SCHOOL
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 80 or less pit toilets/outhouses in Zone A
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 80 or less pit toilets/outhouses in Zone A
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill/Incinerator
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	Power Generation Facility
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	Hospital/Clinic/ER
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Radio Transmitter
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	Teachers Quarters
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	Telephone
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	Community Freezer
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	Community Hall
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	Community Storage Shed
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	Fire Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	Library
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	Museum

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist.

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	Low	C	Offices
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	A	Low	C	Police Station
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	Low	C	Satellite
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	Low	C	School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Anaktuvuk Pass Pumphouse Reckey # - 1994310106704 Petroleum contamination from chronic leaks and spills from fuel transfers. Pumphouse serves all village fuel needs.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Cemeteries	X01	X01-01	A	Low	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	Park

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist.

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Glycol (disposal or storage)	X07	X07-01	A	Low	C	
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Fuel Storage Tanks (>500gal)
Airports	X14	X14-01	A	Low	C	Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	Power Generation Facility
Electric power generation (fossil fuels)	X36	X36-02	A	Medium	C	Anaktuvuk Pass Power Plant
Electric power generation (fossil fuels)	X36	X36-03	A	Medium	C	
Firehouses	X38	X38-01	A	Low	C	Fire Station
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	Low	C	

Table 6

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Synthetic Organic Chemicals

PWSID 350235.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	NSB SD-NUNAMIUT SCHOOL
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill/Incinerator
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Anaktuvuk Pass Pumphouse Reckey # - 1994310106704 Petroleum contamination from chronic leaks and spills from fuel transfers. Pumphouse serves all village fuel needs.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Cemeteries	X01	X01-01	A	Medium	C	Cemetery

Table 6 (continued)

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Synthetic Organic Chemicals

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	Park
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Fuel Storage Tanks (>500gal)
Airports	X14	X14-01	A	Medium	C	Airport
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Hospital/Clinic/ER
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-02	A	Low	C	

Table 7

Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist. Sources of Other Organic Chemicals

PWSID 350235.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	Service/Maintenance Shop
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	Sewage Lagoon
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Waste Water Treatment Facility
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	NSB SD-NUNAMIUT SCHOOL
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill/Incinerator
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Anaktuvuk Pass Power Plant Reckey # - 1990310103101 8,000 gallon diesel spill originally reported 2/1/90. Contaminated soil and groundwater extend over much of adjacent school grounds.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Anaktuvuk Pass Pumphouse Reckey # - 1994310106704 Petroleum contamination from chronic leaks and spills from fuel transfers. Pumphouse serves all village fuel needs.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Chevron Tigkukpuk #1 Reckey # - 1996310102401 Oil exploration pad located 18 miles north of Anaktuvuk Pass in the Brooks Range. Reserve Pit water contained 220 ppb Cr and 400 ppb Al, both in excess of drinking water and water quality standards.

Table 7 (continued)

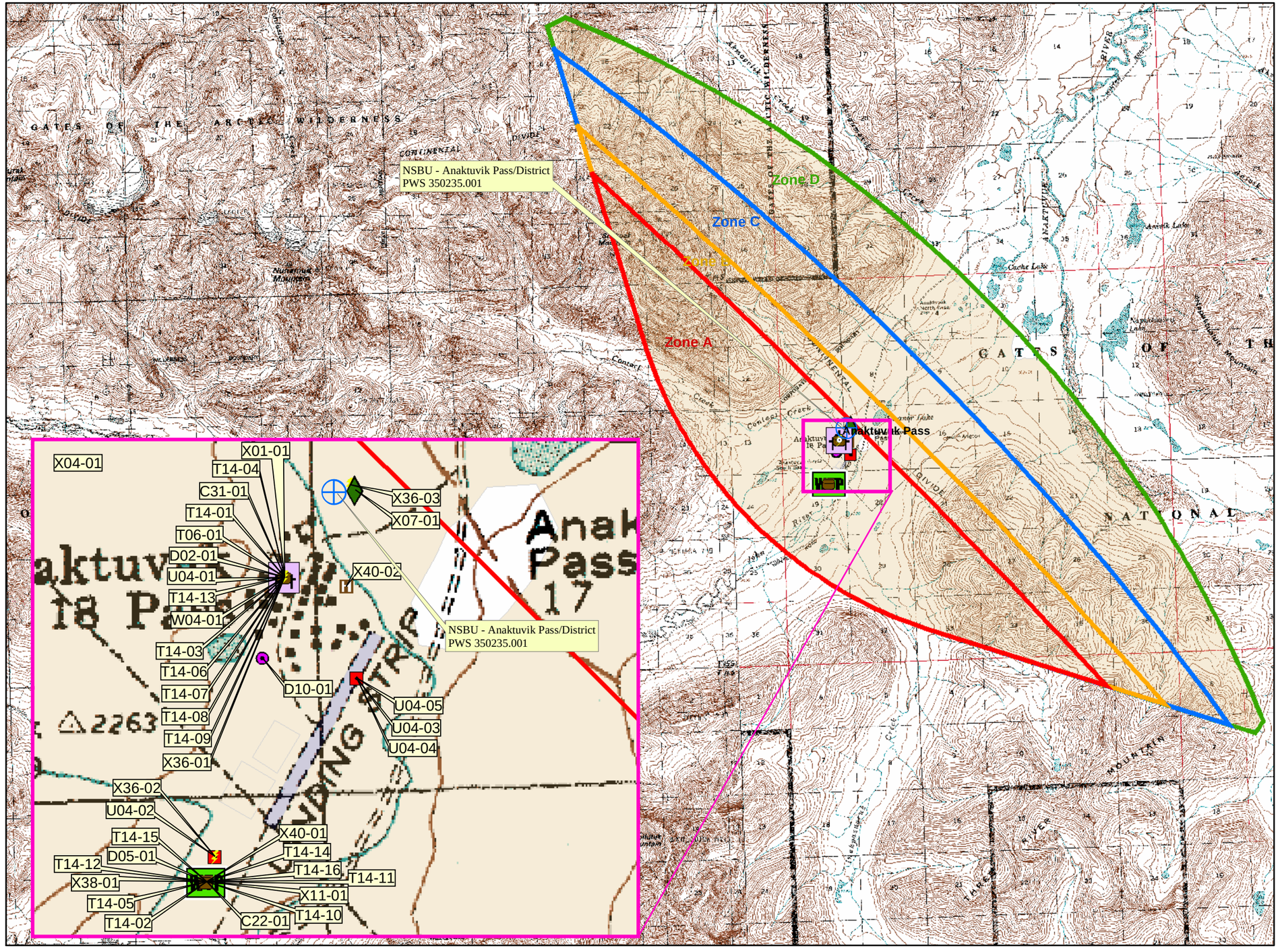
Contaminant Source Inventory and Risk Ranking for NSBU - Anaktuvuk Pass / Dist.

Sources of Other Organic Chemicals

PWSID 350235.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Petroleum product bulk station/terminals	X11	X11-01	A	High	C	Fuel Storage Tanks (>500gal)
Airports	X14	X14-01	A	Medium	C	Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 20 or less roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	High	C	Power Generation Facility
Electric power generation (fossil fuels)	X36	X36-02	A	High	C	Anaktuvuk Pass Power Plant
Electric power generation (fossil fuels)	X36	X36-03	A	High	C	

Public Water Well System for PWS #350235.001 NSBU - Anaktuvik Pass/District
Showing Existing and Potential Sources of Contamination



LEGEND

Public Water System Well

Hydrography/Physical

- Parcels
- Stream
- Lake or Pond
- Contours

Transportation

- Primary Route (Class 1)
- Secondary Route (Class 2)
- Road (Class 3)
- Road (Class 4)
- Road (Class 5, Four-wheel drive)

Groundwater Protection Zones

- Zone A Protection Area– Several Months Travel Time
- Zone B Protection Area– 2 Years Travel Time
- Zone C Protection Area– 5 Years Travel Time
- Zone D Protection Area– 10 Years Travel Time

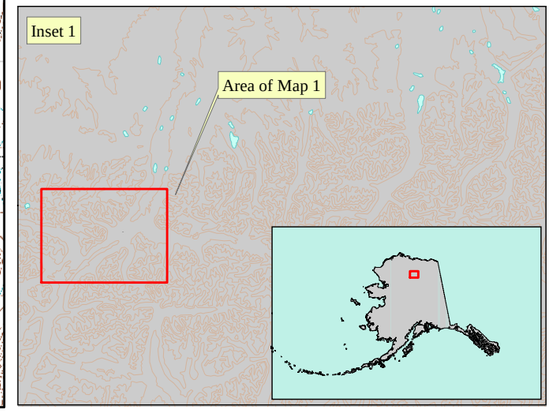
Existing or Potential Contaminant Sources

- Laundromats without dry cleaning (C22)
- Motor/motor vehicle repair shop (C31)
- Domestic wastewater treatment plant (D05)
- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Tanks, diesel (aboveground) (T06)
- Tanks, heating oil, nonresidential (aboveground) (T14)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Mineral, oil, and gas exploration boreholes (W04)
- Cemetery (X01)
- Glycol (X07)
- Petroleum product bulk storage or terminal (X11)
- Electric Power Generation (fossil fuels) (X36)
- Firehouses (X38)
- Medical/veterinary facilities (X40)
- Domestic Wastewater Treatment Plant Disposal Lagoon (D02)
- Landfills (Municipal, Class III) (D51)
- Municipal or City Parks (X04)
- Airport or landing strip (X14)

Data Sources:
- Contaminant Sources, Public Water System Wells, Contours
  Alaska Department of Environmental Conservation (ADEC)
- Critical Facilities, Federal Emergency Management Agency (FEMA)

All other data:
- United States Geological Survey (USGS)
- Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class A Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or validity of the data provided.



NSBU - Anaktuvik Pass/District
350235.001
Appendix C Map C

Chart 1. Susceptibility of the wellhead - Anaktuvik Pass/District (PWS No. 350235.001)

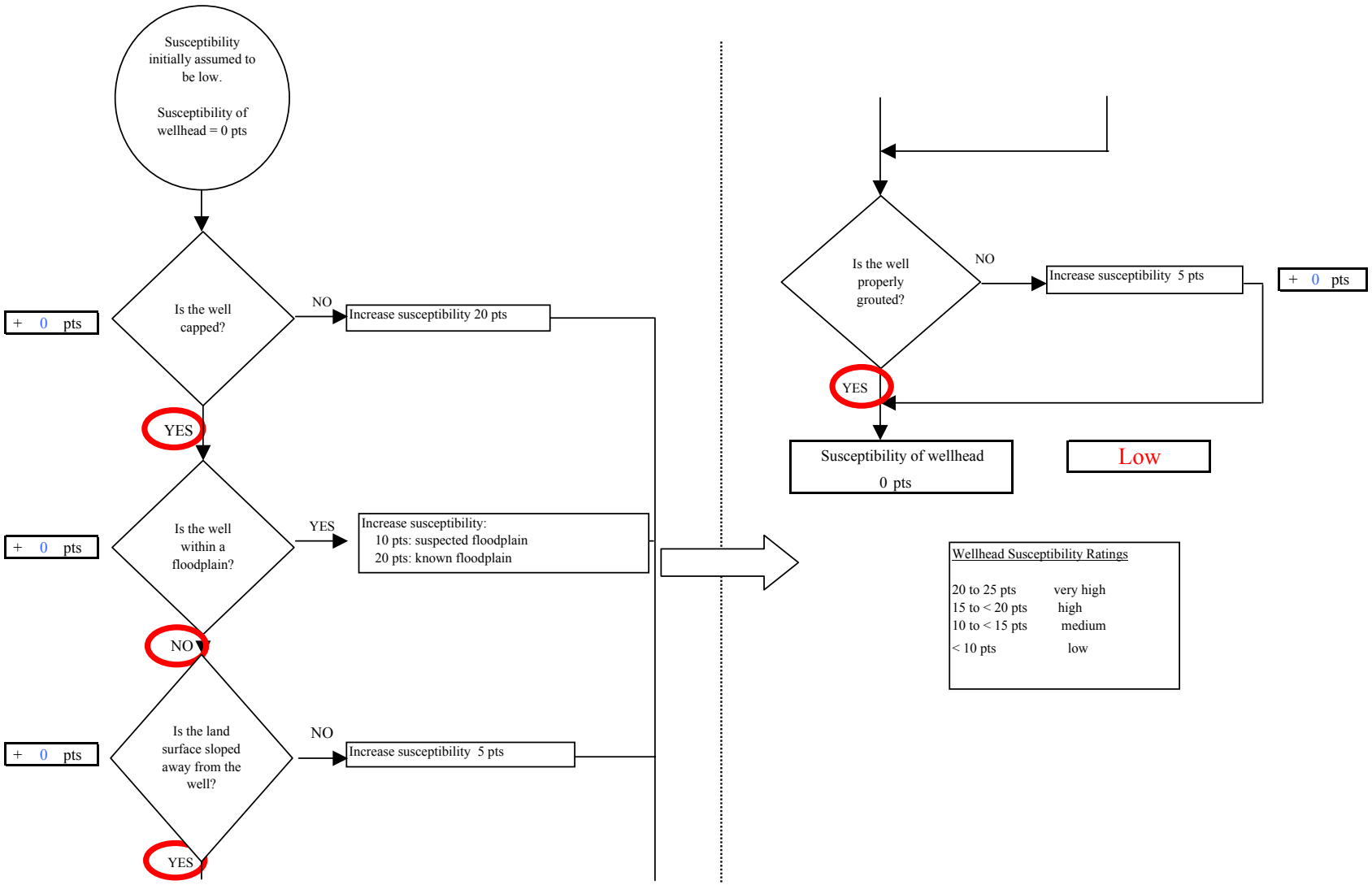


Chart 2. Susceptibility of the aquifer Anaktuvik Pass/District (PWS No. 350235.001)

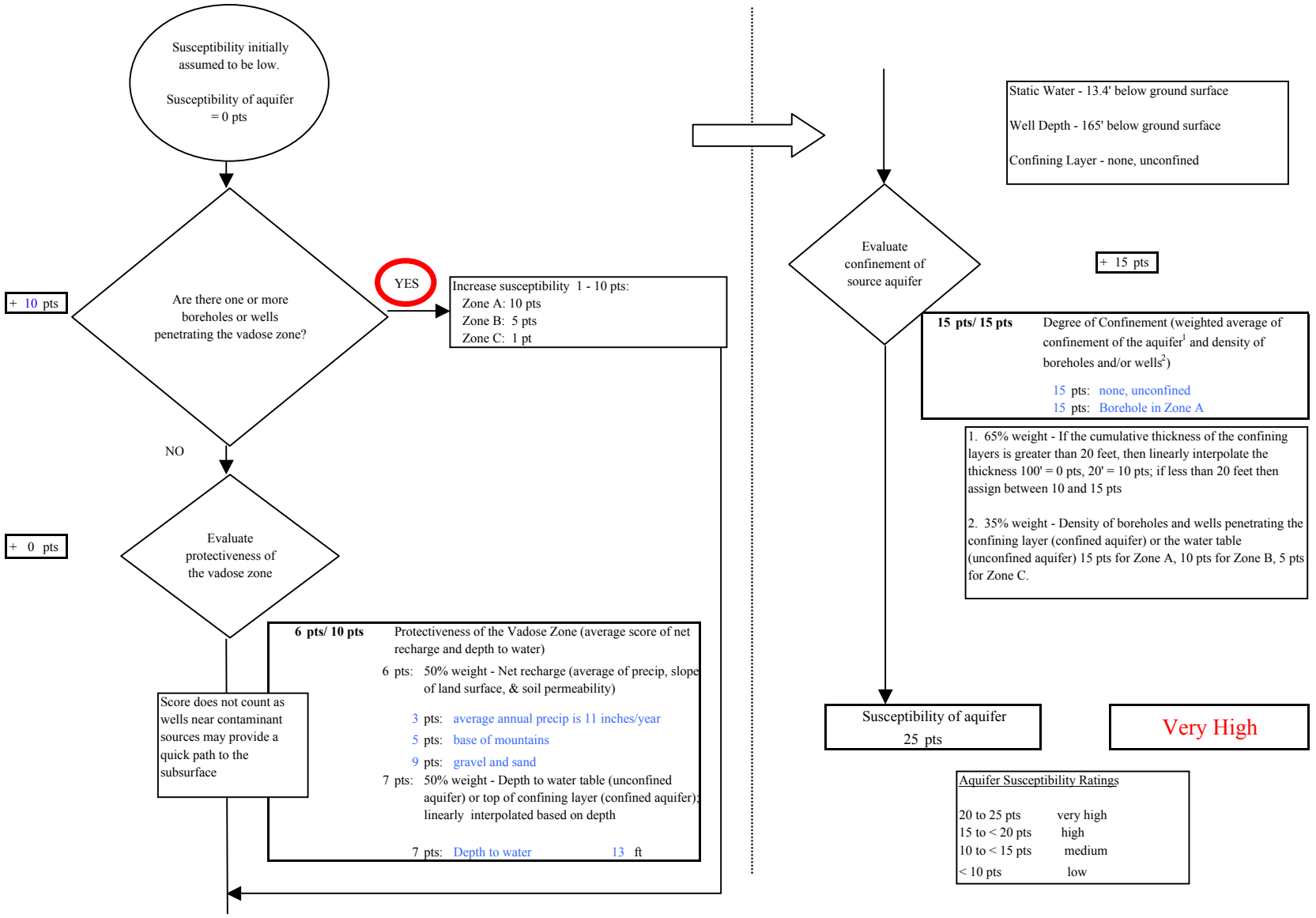
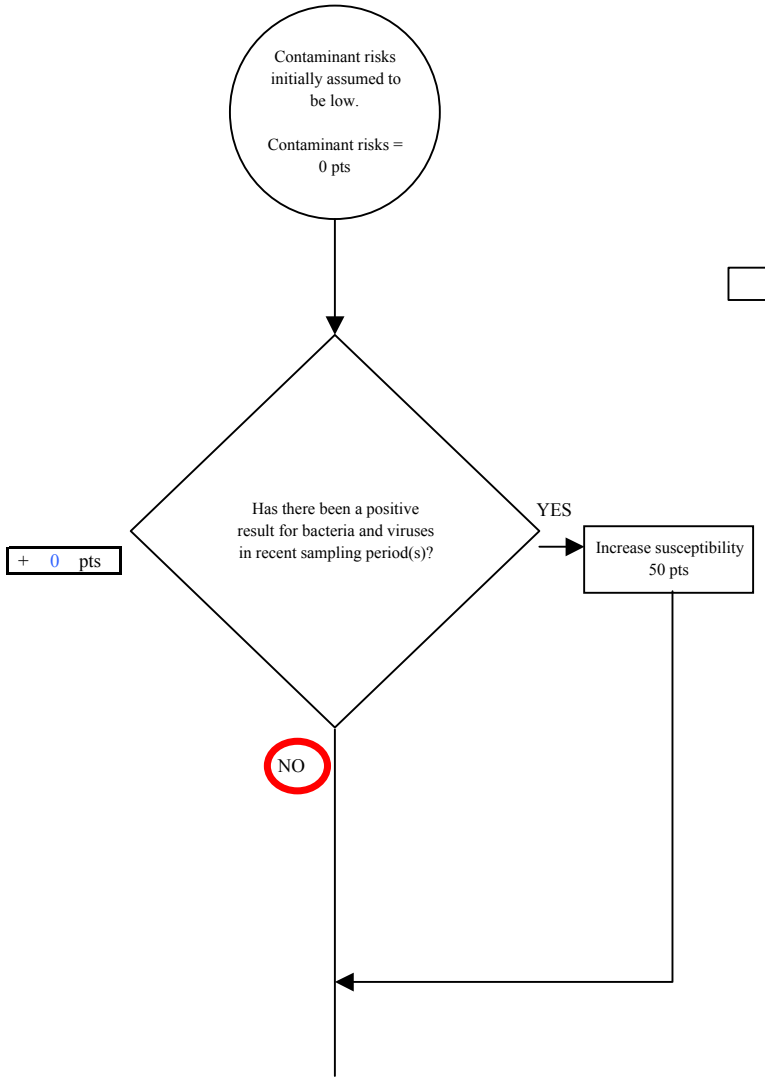
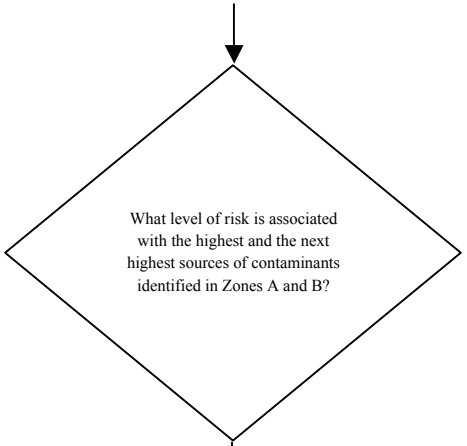


Chart 3. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Bacteria & Viruses





+ 40 pts

Risk Rankings for Contaminant Sources Identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	3	0	3
Medium(s)	6	0	6
Low(s)	2	0	2

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 40

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

Chart 3. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Bacteria & Viruses

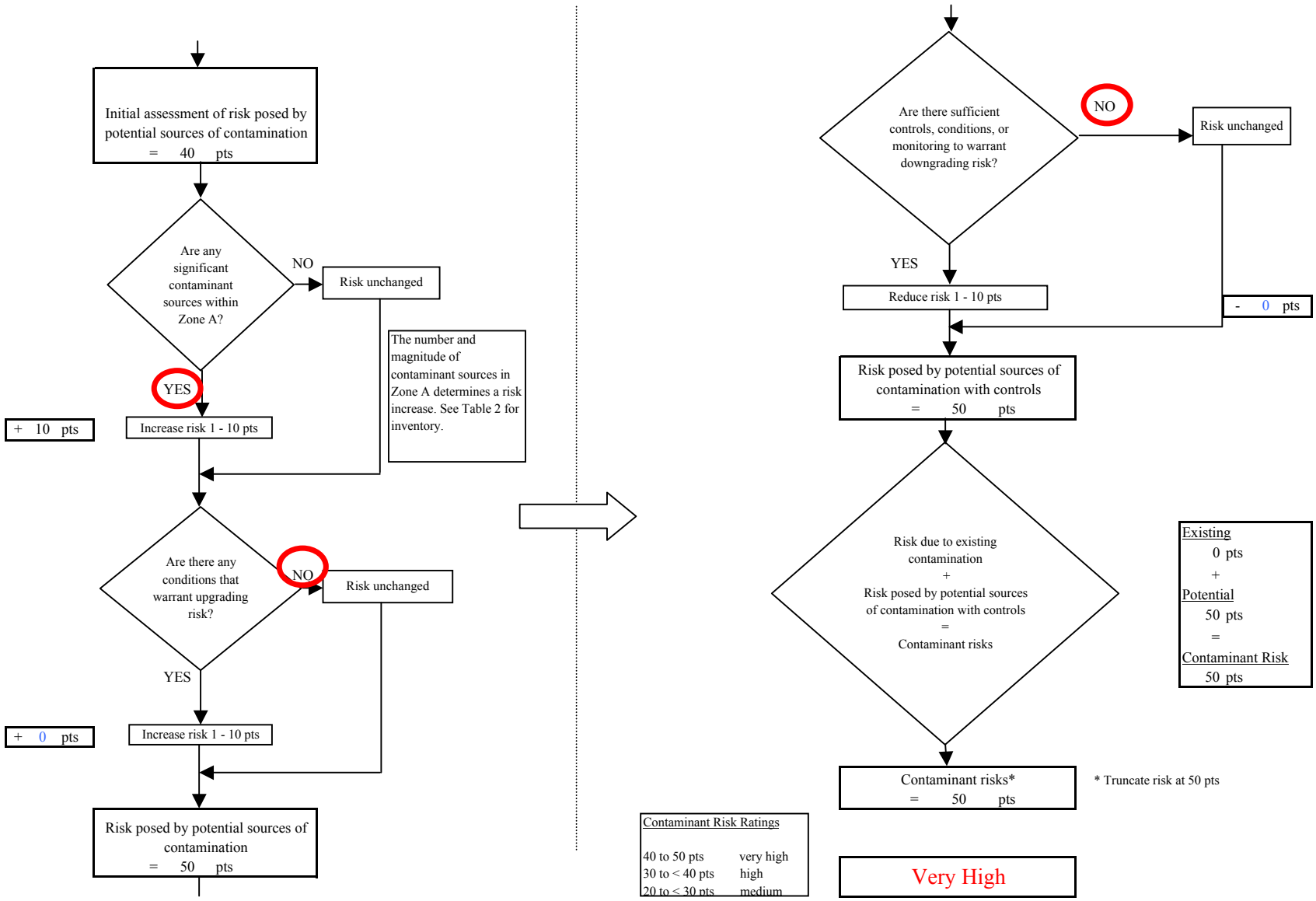


Chart 4. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Bacteria & Viruses

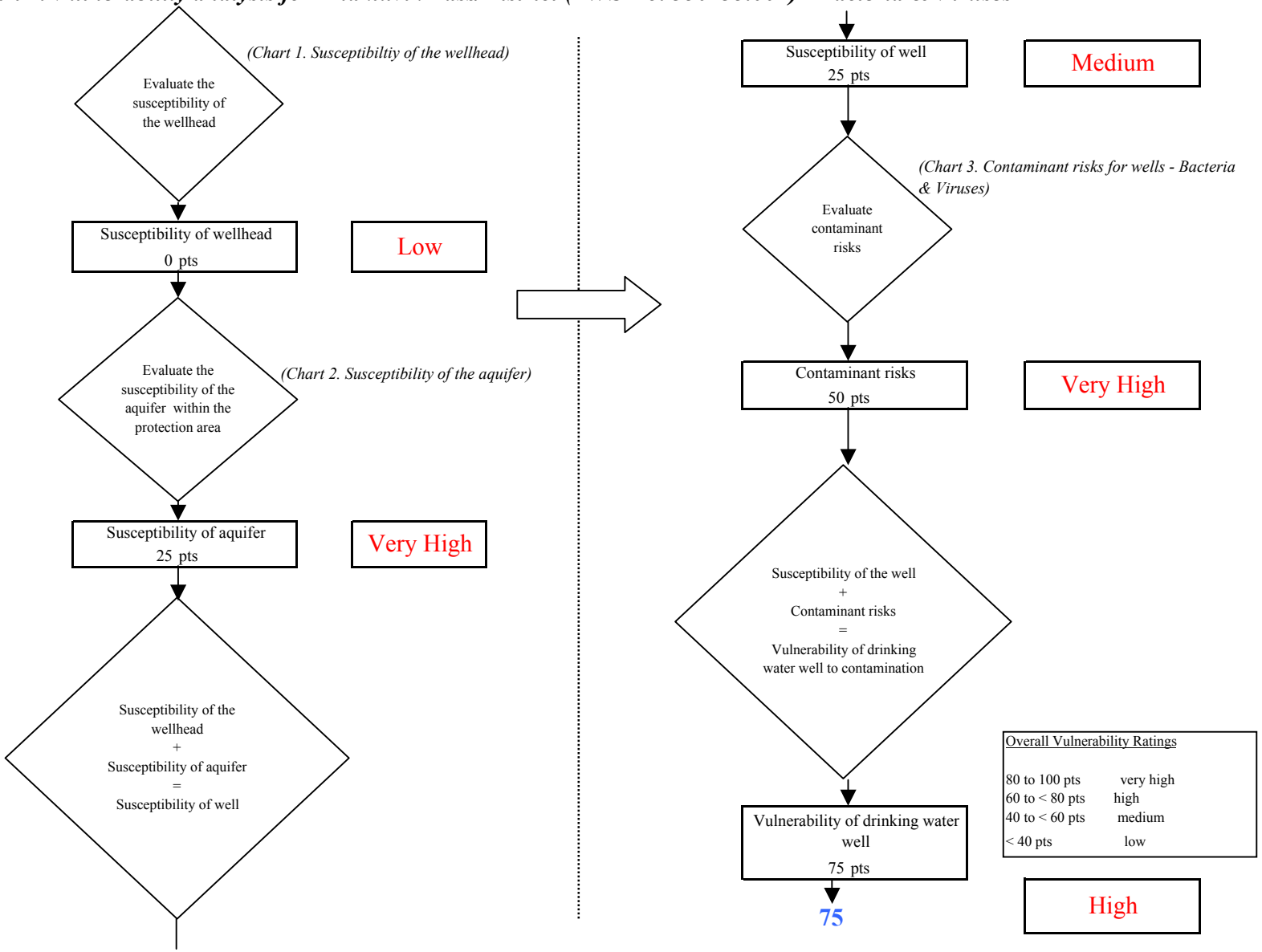


Chart 5. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Nitrates and Nitrites

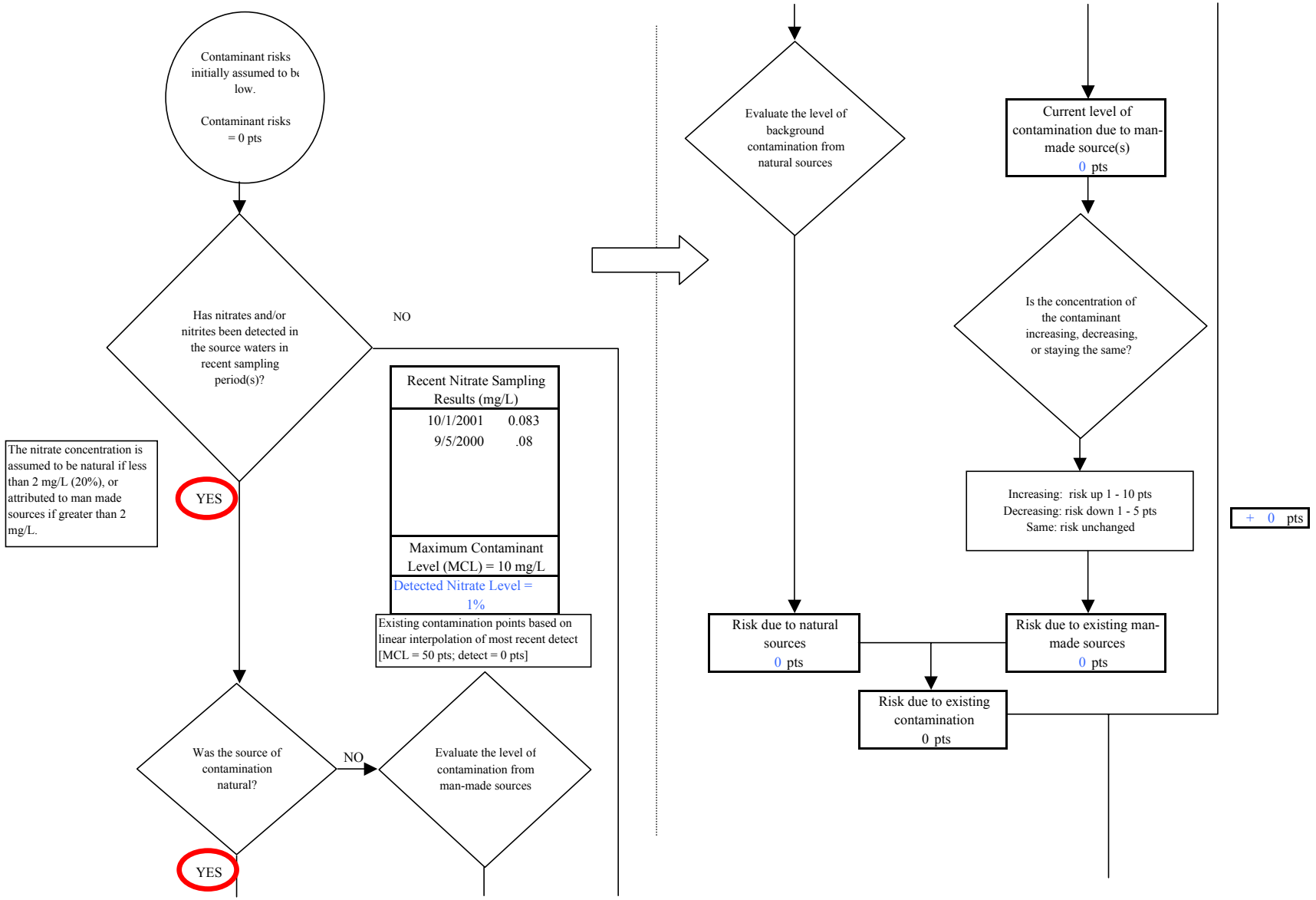


Chart 5. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Nitrates and Nitrites

+ 50 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	2	0	2
Medium(s)	5	0	5
Low(s)	5	0	5

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 50

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individua contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

Initial assessment of risk posed by potential sources of contamination = 50 pts

Is the source aquifer fractured rock or karst?

YES

NO

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 10 pts

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 3 for inventory.

Chart 5. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Nitrates and Nitrites

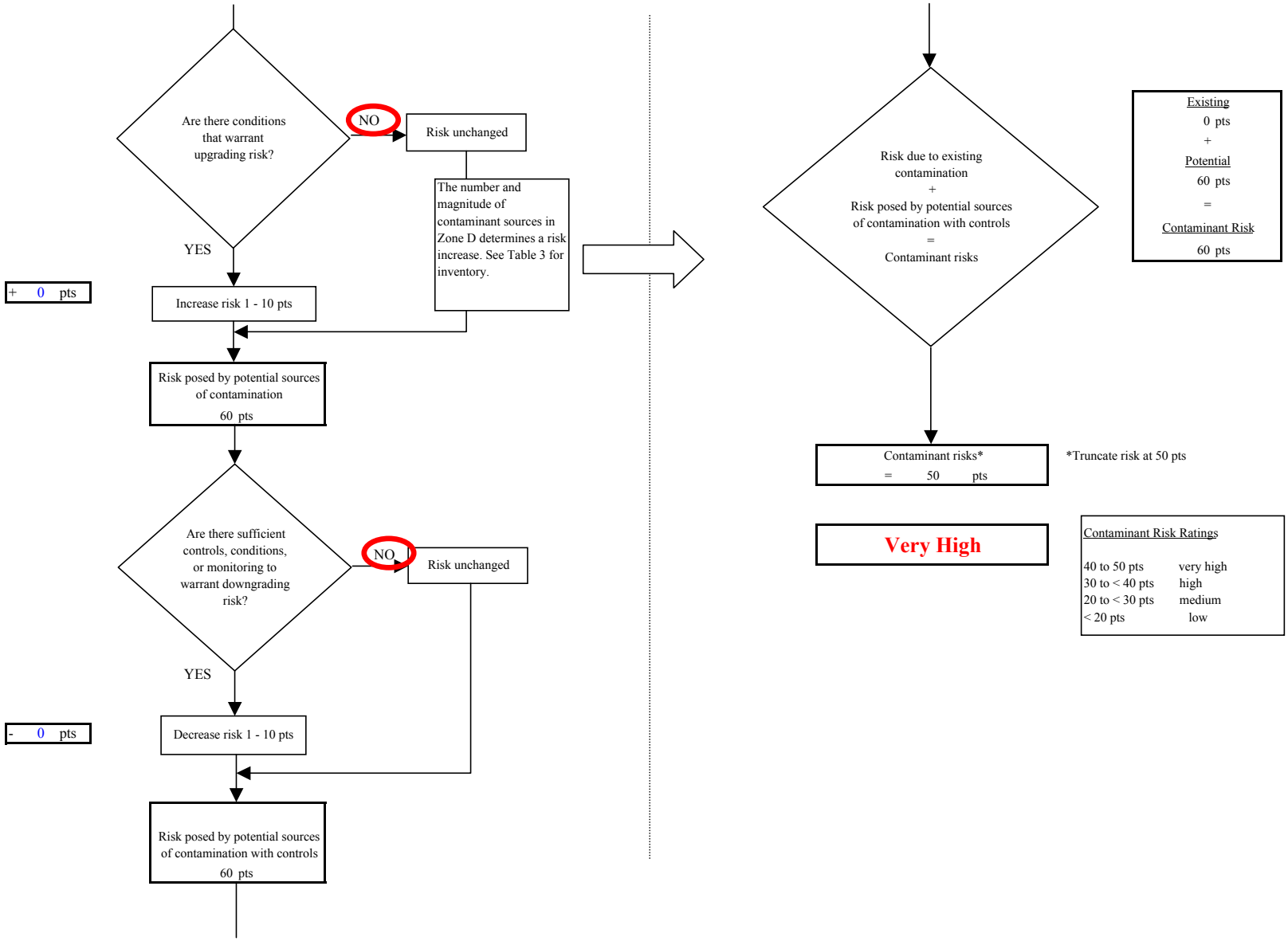


Chart 6. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Nitrates and Nitrites

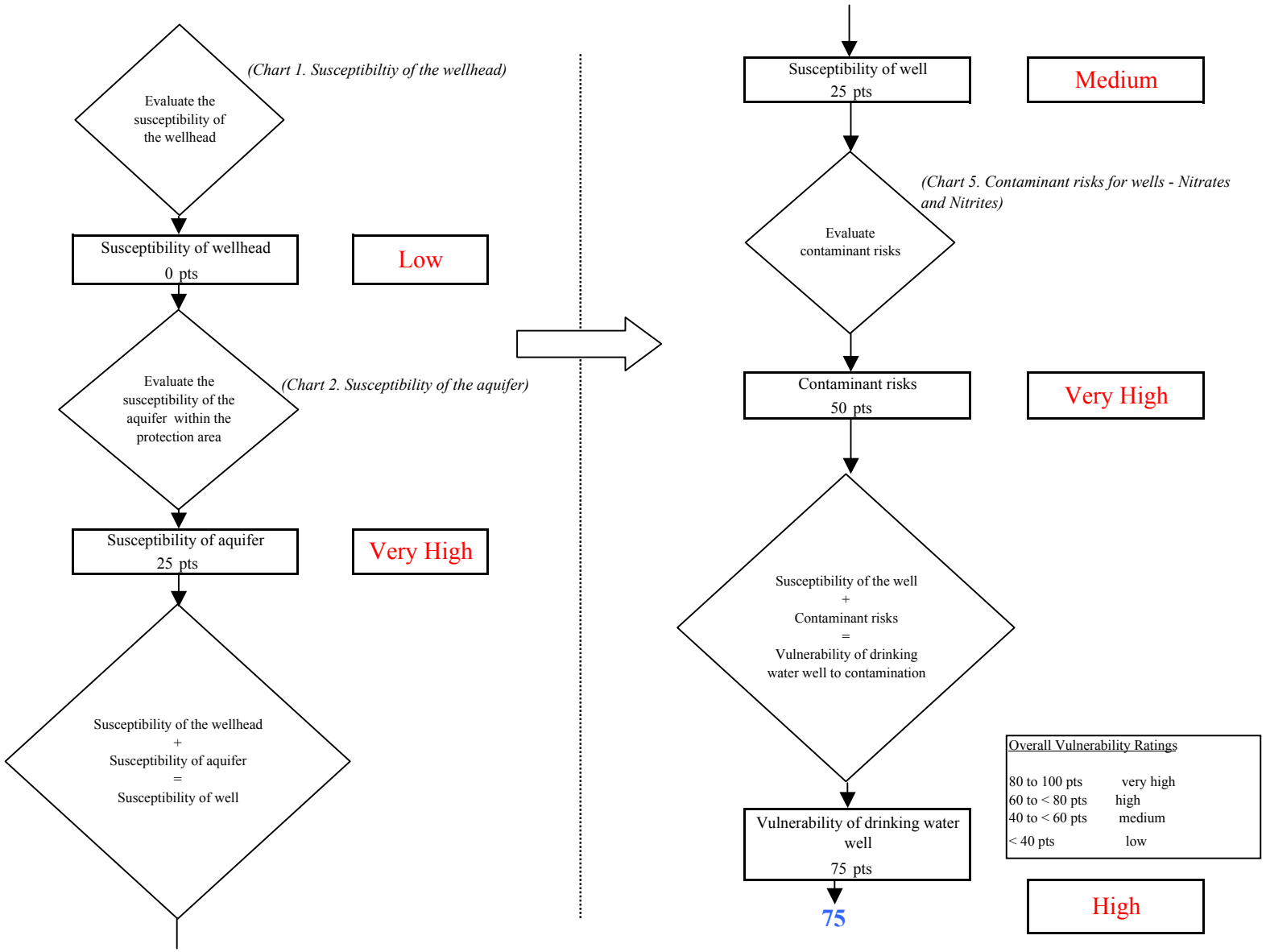


Chart 7. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Volatile Organic Chemicals

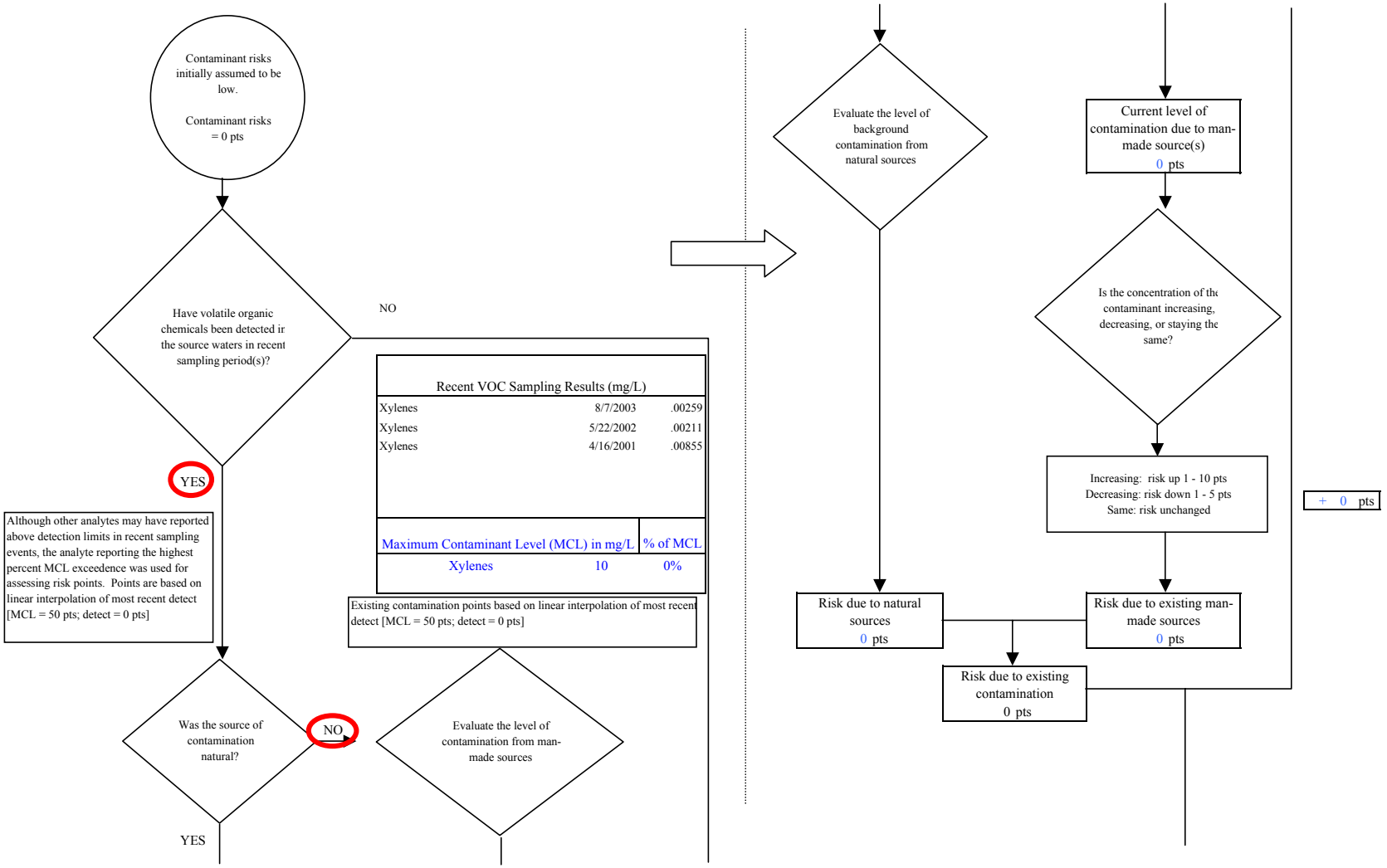
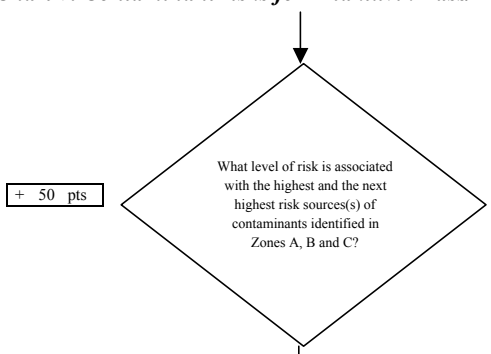


Chart 7. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Volatile Organic Chemicals



+ 50 pts

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	7	0	7
Medium(s)	7	0	7
Low(s)	26	0	26

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	**≥** 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 50

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in tl CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

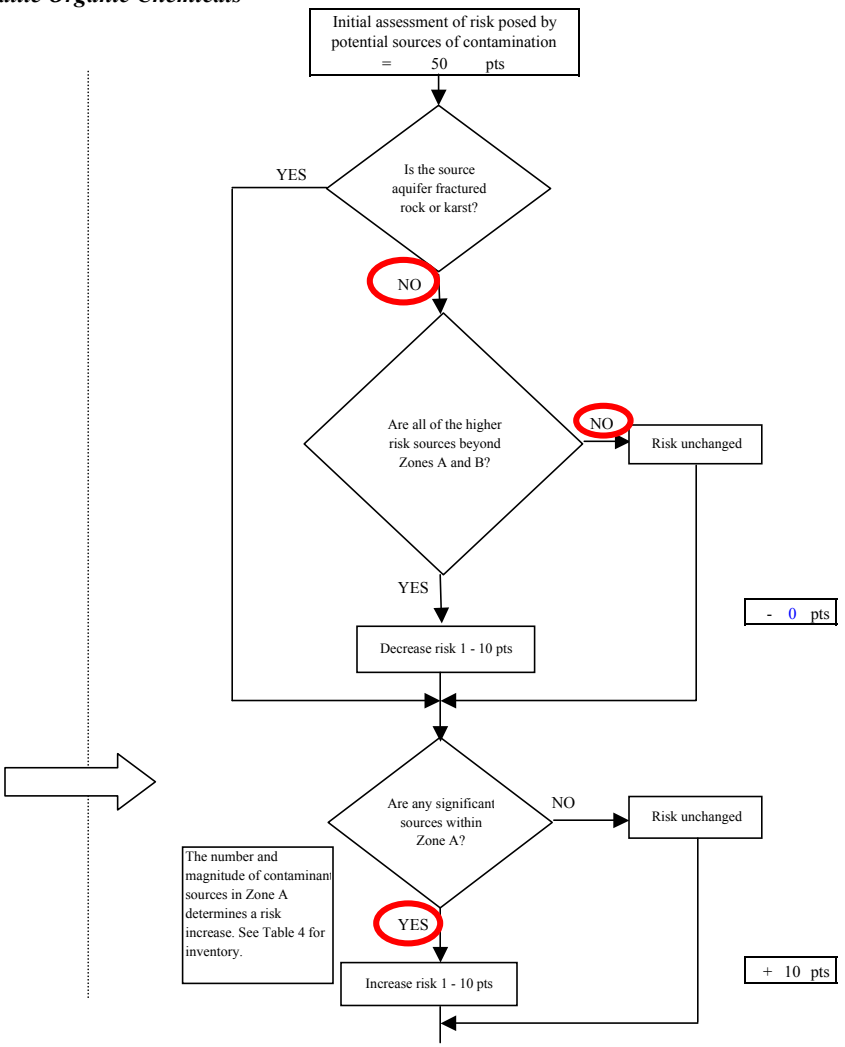


Chart 7. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Volatile Organic Chemicals

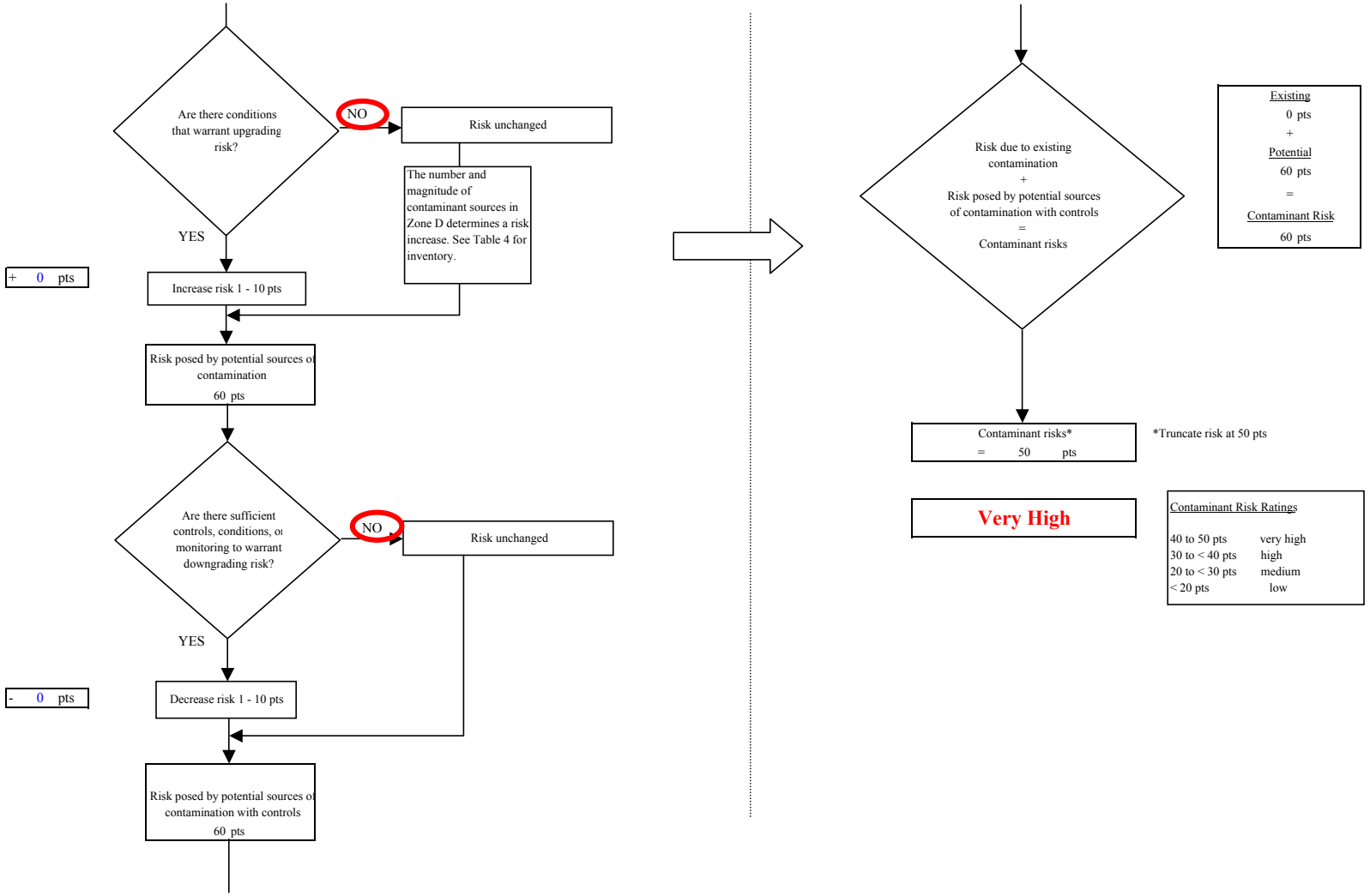


Chart 8. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Volatile Organic Chemicals

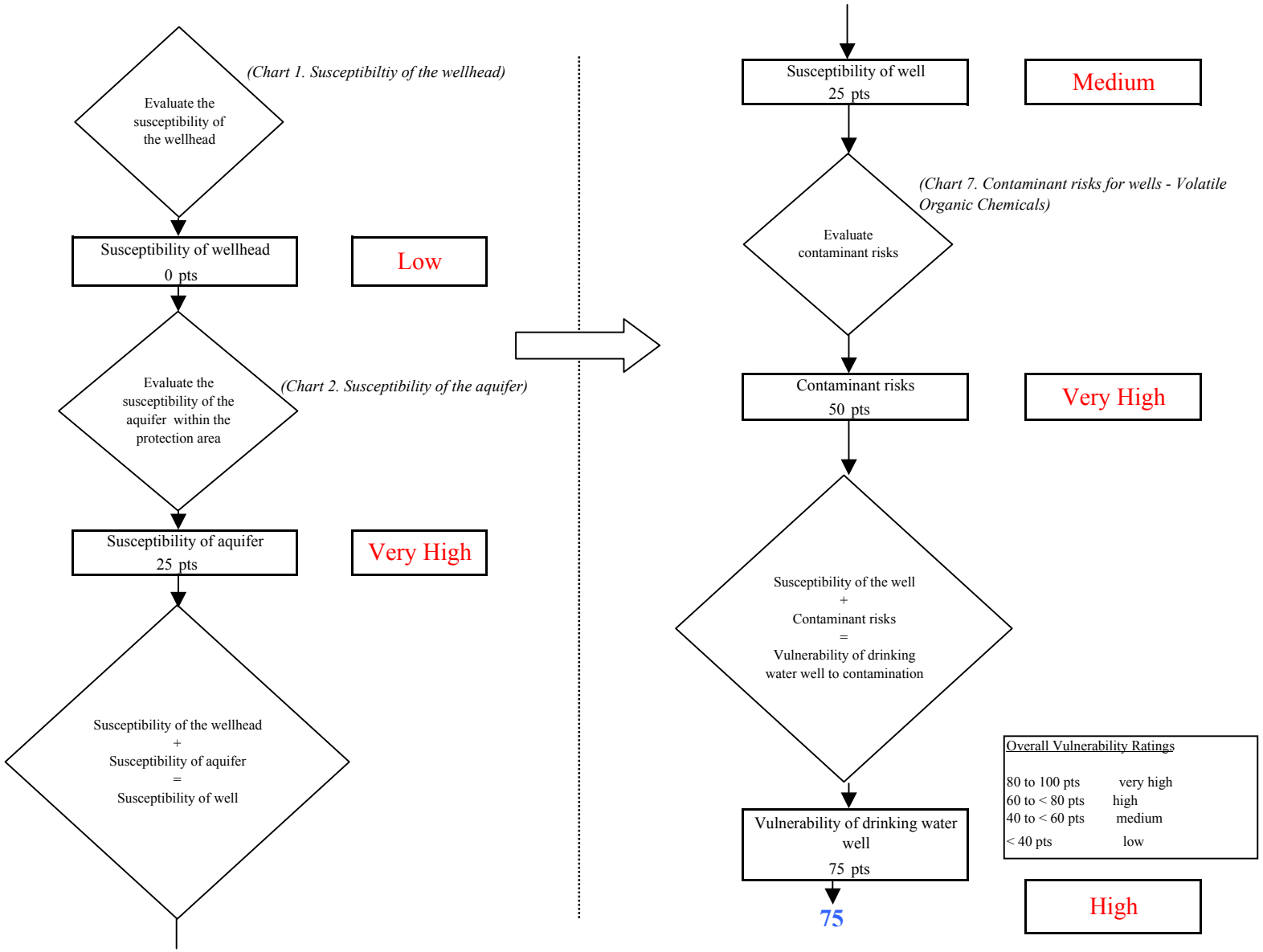


Chart 9. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

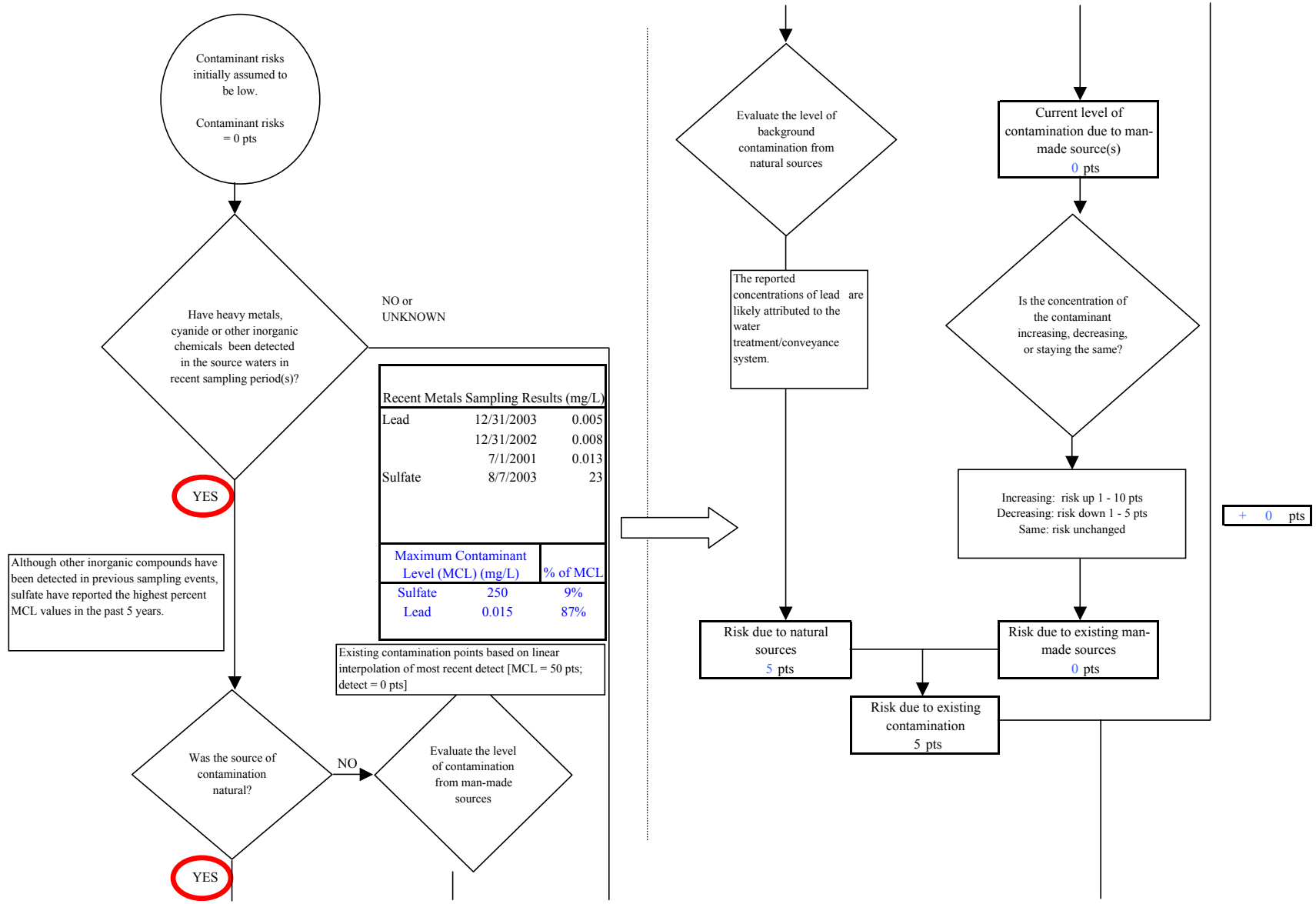
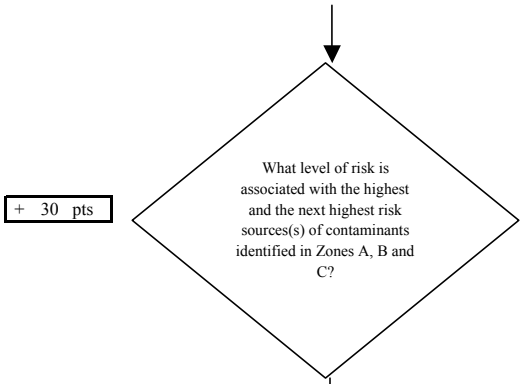


Chart 9. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals



+ 30 pts

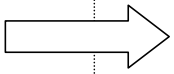
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	1	0	1
Medium(s)	4	0	4
Low(s)	35	0	35

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 30

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



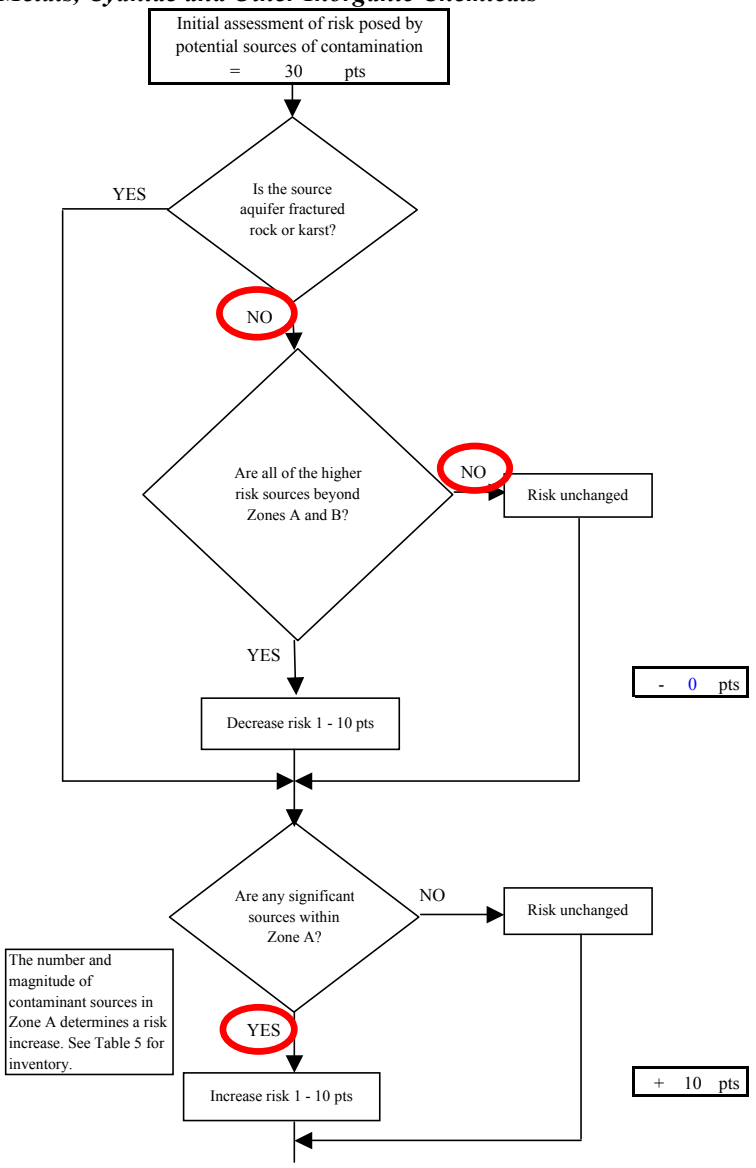


Chart 9. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

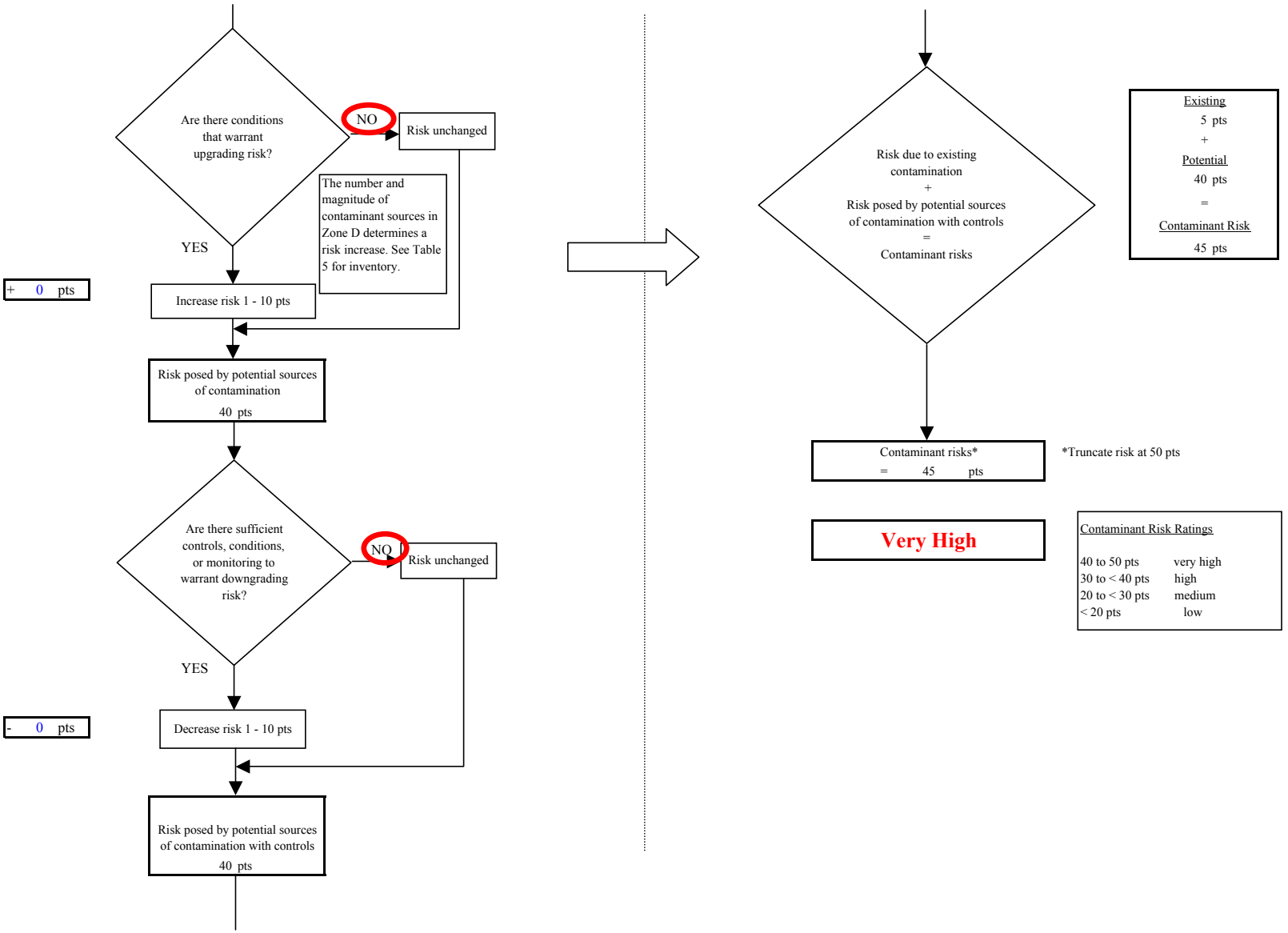


Chart 10. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

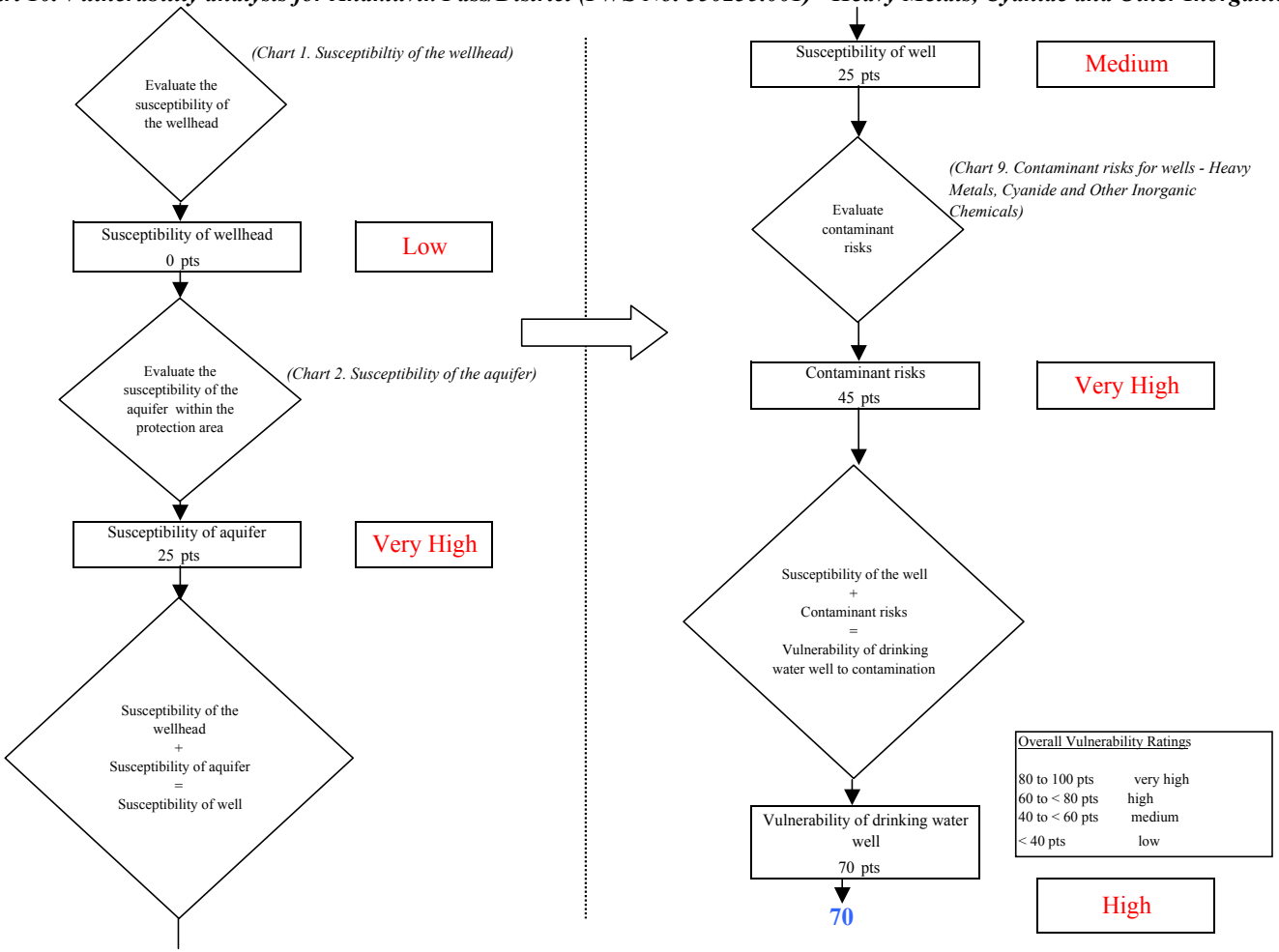


Chart 11. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Synthetic Organic Chemicals

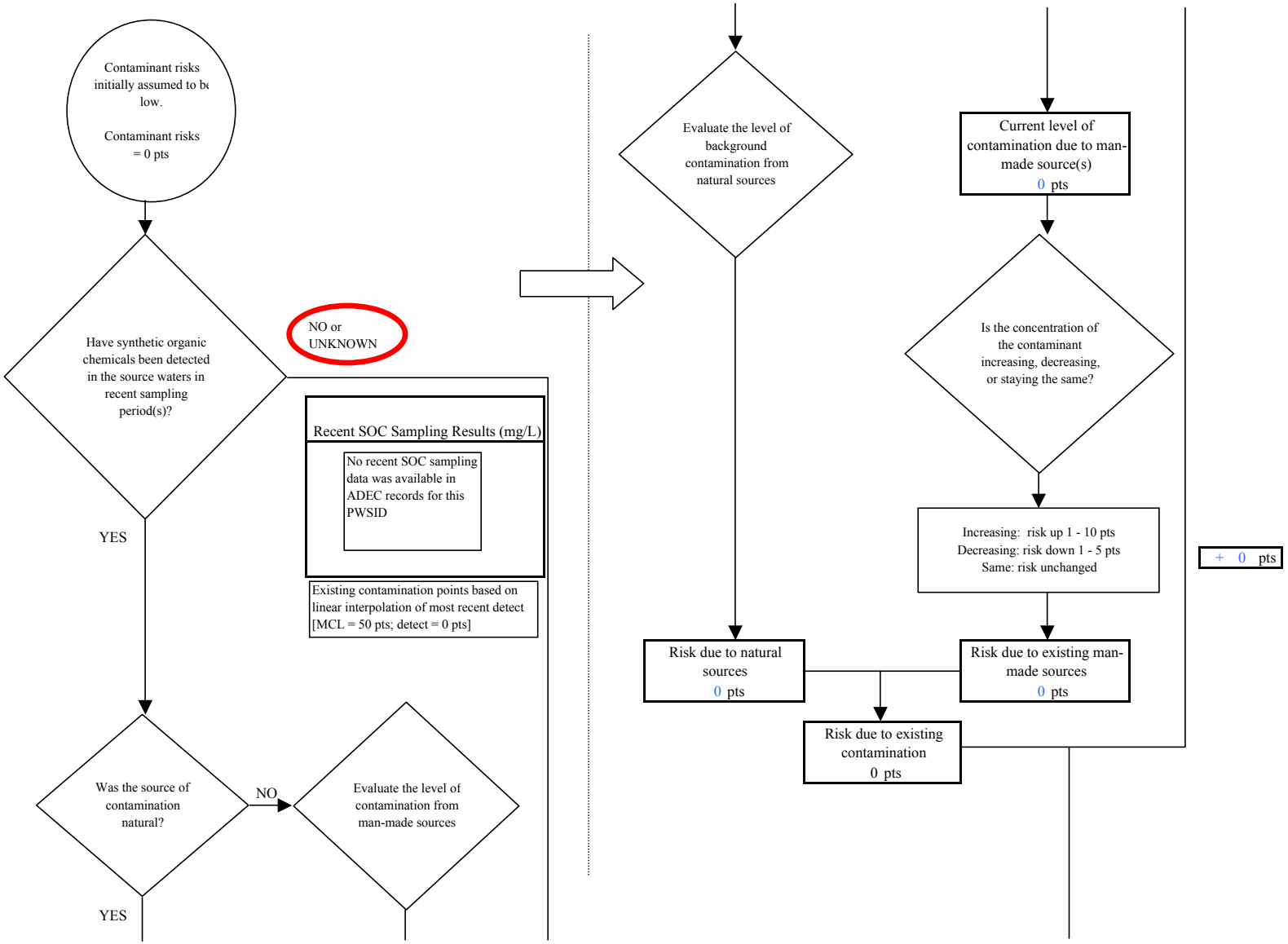
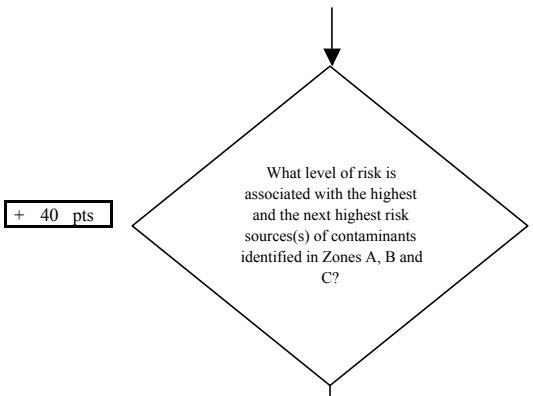


Chart 11. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Synthetic Organic Chemicals



+ 40 pts

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	0	0	0
Medium(s)	2	0	2
Low(s)	12	0	12

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 40

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individua contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 6 for inventory.

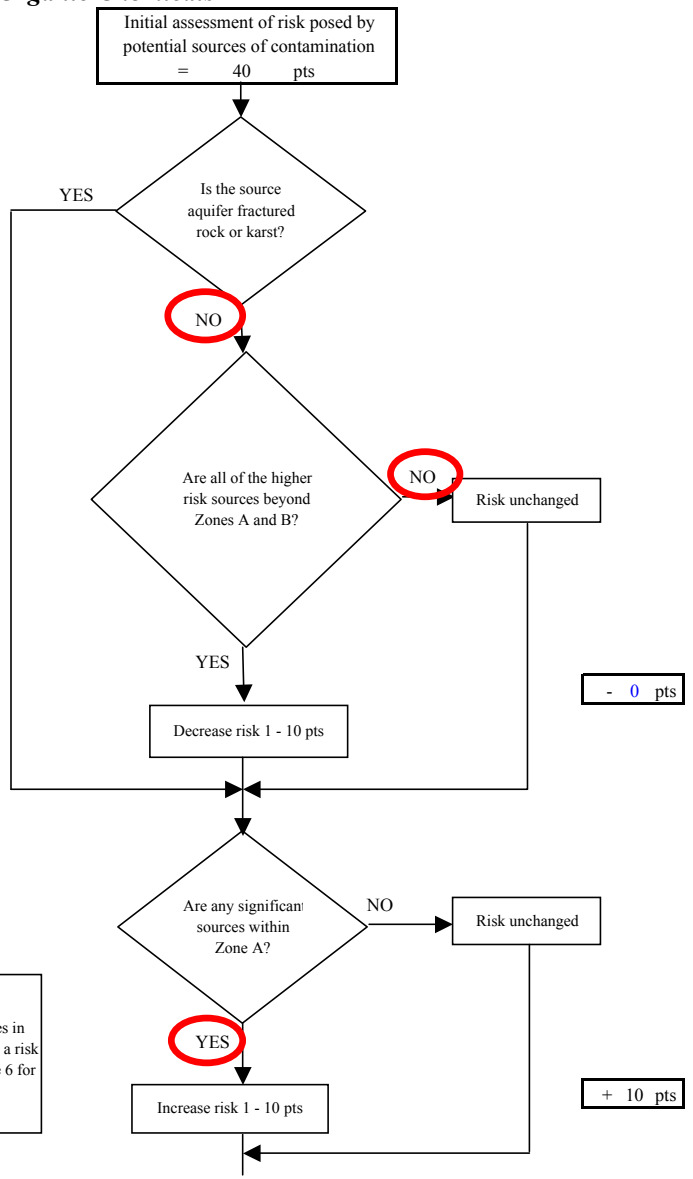


Chart 11. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Synthetic Organic Chemicals

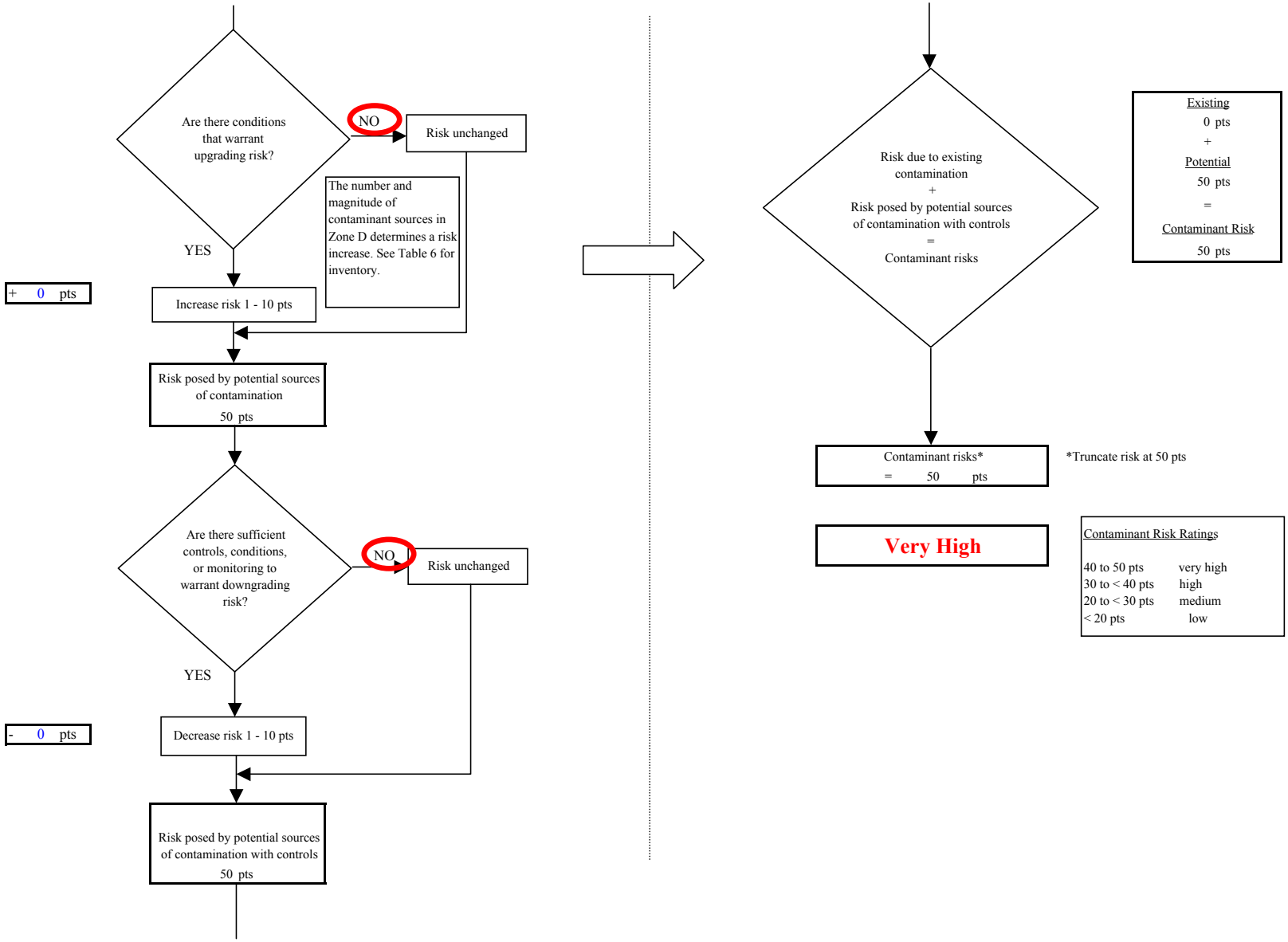


Chart 12. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Synthetic Organic Chemicals

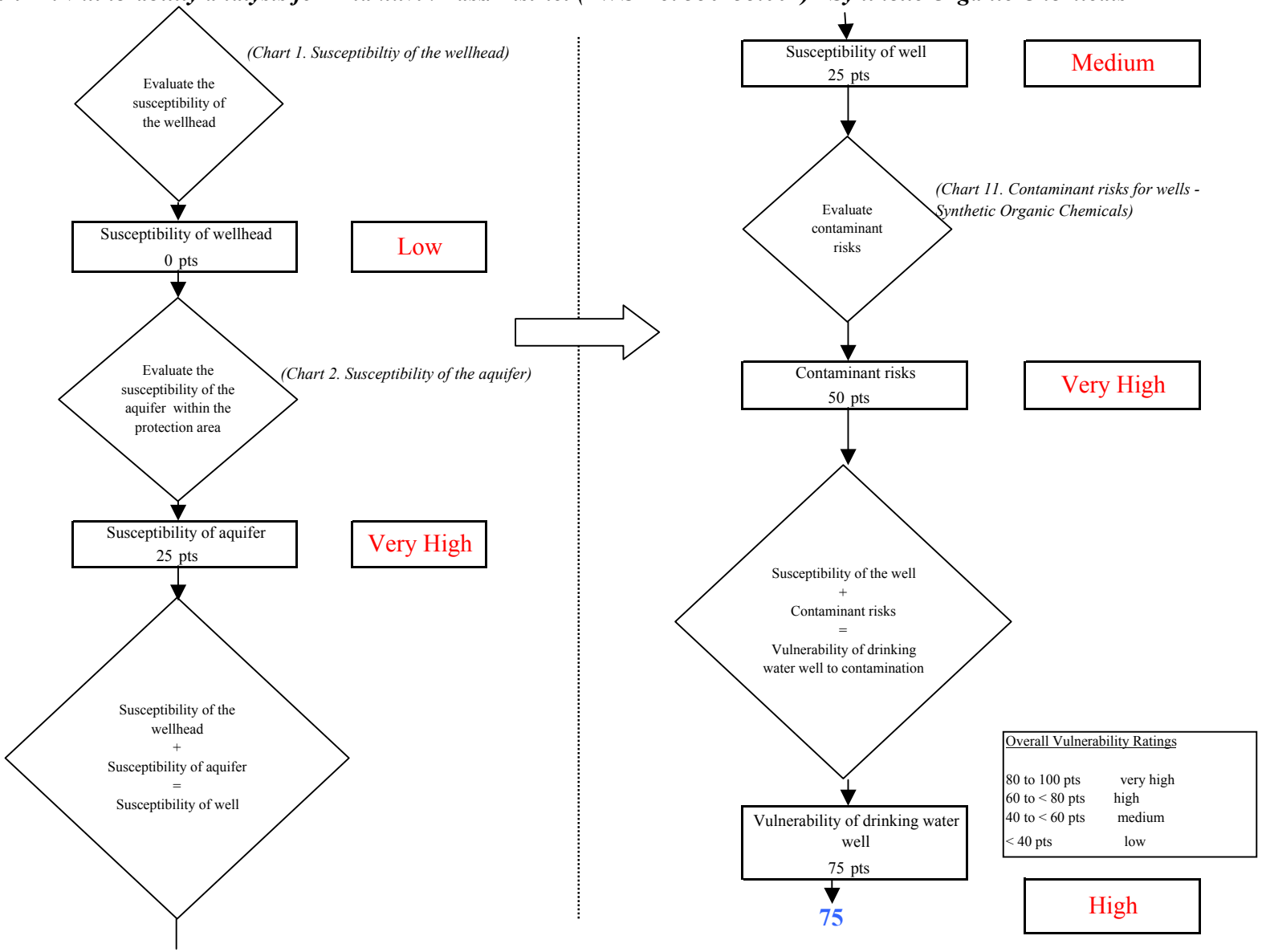


Chart 13. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Other Organic Chemicals

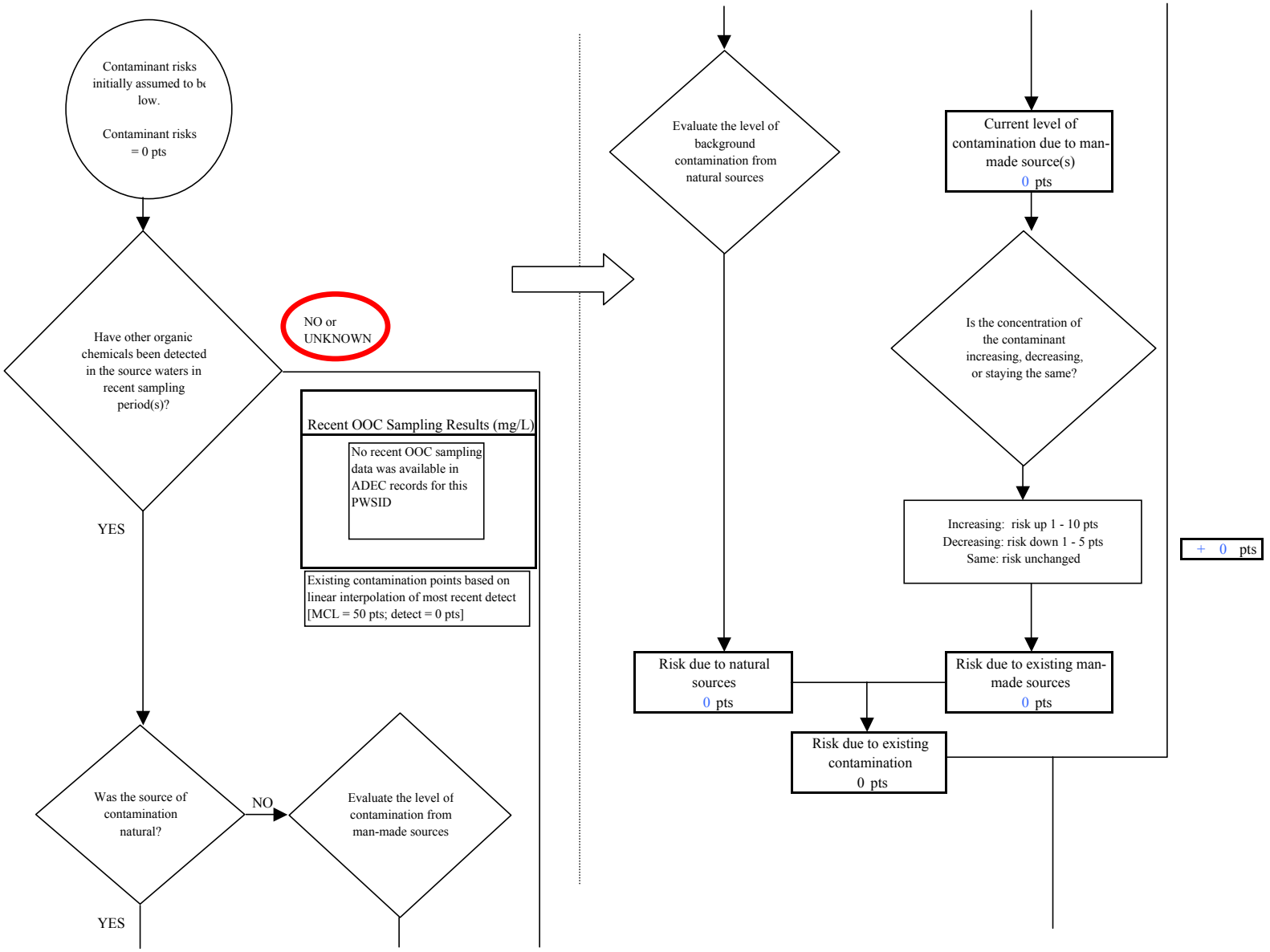


Chart 13. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Other Organic Chemicals

+ 50 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	4	0	4
Medium(s)	2	0	2
Low(s)	9	0	9

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score 50

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individua contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.

Initial assessment of risk posed by potential sources of contamination = 50 pts

Is the source aquifer fractured rock or karst?

YES

NO

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 10 pts

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 7 for inventory.

Chart 13. Contaminant risks for Anaktuvik Pass/District (PWS No. 350235.001) - Other Organic Chemicals

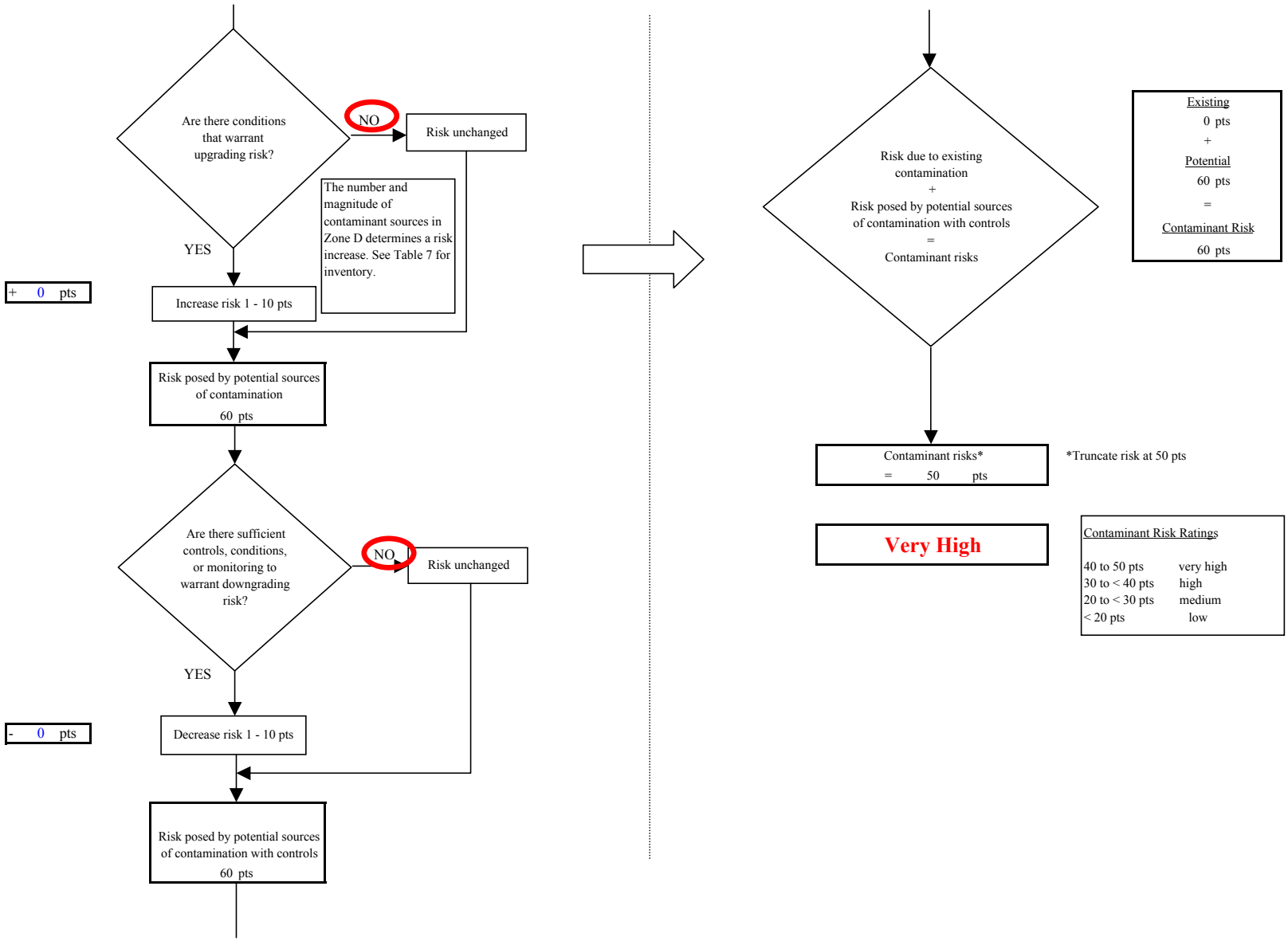


Chart 14. Vulnerability analysis for Anaktuvik Pass/District (PWS No. 350235.001) - Other Organic Chemicals