Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for the Noatak Community Drinking Water System, Noatak, Alaska

PWSID # 340159.001

July 2004

DRINKING WATER PROTECTION PROGRAM REPORT 1325
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 Noatak Community Public Water System (PWS) has two wells. This well (PWS No. 340159.001) has been used as drinking water source since it was drilled in April of 2003. This report contains information exclusively for PWS No. 340159.001.

The well is a Class A (community and non-transient non-community) water system located on the west bank of the Noatak River and northeast of the community of Noatak, Alaska. Available records indicate that the system has a 50,000-gallon welded steel tank and that the drinking water source is not treated. This system operates year round and serves approximately 250 residents through approximately 60 service connections. The wellhead received a susceptibility rating of **Very High** and the aquifer received a susceptibility rating of **Very High**. Combining these two ratings produce a **Very High** 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, bulk fuel facilities, pipelines, a wastewater treatment plant, and a landfill. 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 **Very 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 Noatak Community PWS well is a Class A (community/non-transient/non-community) public water system. The system is located on the west bank of the Noatak River and northeast of the community of Noatak, Alaska (Sec. 16, T025N, R019W, Kateel River Meridian, see Map A of Appendix A). Noatak is located 55 miles north of Kotzobue and 70 miles north of the Arctic Circle. The community has a population of 428 (ADCED, 2003). Total annual precipitation in Noatak is 10-13 inches, including approximately 48 inches of snowfall. Temperatures can be as extreme as -59 to 75°F.

A piped, recirculating water and sewer distribution system serves 77 homes. The remaining community residents haul water and utilize honeybuckets for sewage disposal (ADCED, 2003). Noatak residents rely on the AVEC for electricy, which is powered by diesel. Residents dispose of refuse at the community landfill which is operated by the Village Council.

According to information supplied by ADEC for the Noatak PWS, the depth of the well is 42 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 located within a floodplain.

ADEC records indicate 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. Records also indicate 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.

The village of Noatak is situated in the low relief, poorly drained, wet tundra lowlands of the Noatak River, part of the Arctic Coastal Plain. This area was submerged until recent geological time, it is a morass of lakes, streams, and muskegs underlain by continuous permafrost. The central area of the community is located on a low bluff overlooking the Noatak River. The bluff is the eroded edge of an old river terrace that now stands about 20 feet above the modern floodplain. The nearest relief to the Village is the Mulgrave Hills, which lie approximately 10

miles northwest of Noatak with an elevation of 1,800 feet.

Noatak is in a deep permafrost area with a 3 foot active layer in the summer. Soil borings in the area indicate that soils consist of muck, underlain by frozen clay, sand and gravel (Indian Health Service, 1980).

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 Noatak Community 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 Noatak Community 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 Noatak Community 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 4 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 Noatak Community 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	20	Very High
Susceptibility of the Aquifer	25	Very High
Natural Susceptibility	45	Very High

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	44	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	95	Very High
Nitrates and Nitrites	95	Very High
Volatile Organic Chemicals	95	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	90	Very High
Synthetic Organic Chemicals	95	Very High
Other Organic Chemicals	95	Very High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Very High**. The risk is primarily attributed to the presence of a wastewater treatment plant, a landfill, and an injection well located 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 **Very 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 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 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. Although the nitrate source in unknown, such occurrences may be attributed to septic systems or other sources.

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 **Very High.**

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Very High**. The risk is primarily attributed to the presence of three bulk fuel stations 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 Benzene and Toluene. Benzene is an aromatic hydrocarbon that is produced by the burning of natural products. It is a component of products derived from coal and petroleum and is found in gasoline and other fuels. Benzene is used in the manufacture of plastics, detergents, pesticides, and other chemicals. The presence of benzene is indicative of source water conditions, and therefore risk points were assigned (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

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 **Very 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 Barium 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, low levels of barium have been detected, but have not exceeded the MCL of 2.0 mg/L (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

The source of barium is unknown, however is most likely indicative of source water conditions. Barium is a lustrous, machinable metal, which exists in nature only in ores containing mixtures of elements. It is used in making a wide variety of electronic components, in metal alloys, bleaches, dyes, fireworks, ceramics and glass. In particular, it is used in well drilling operations where it is directly released into the ground (EPA, 2002).

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 **Very 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 Noatak Community 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 **Very 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 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 Noatak Community 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 **Very 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 Noatak 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.

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Indian Health Service 1980, Information from Project Summary, Sanitation Facilities Construction, Village of Noatak, Alaska, , Project AN-81-234.

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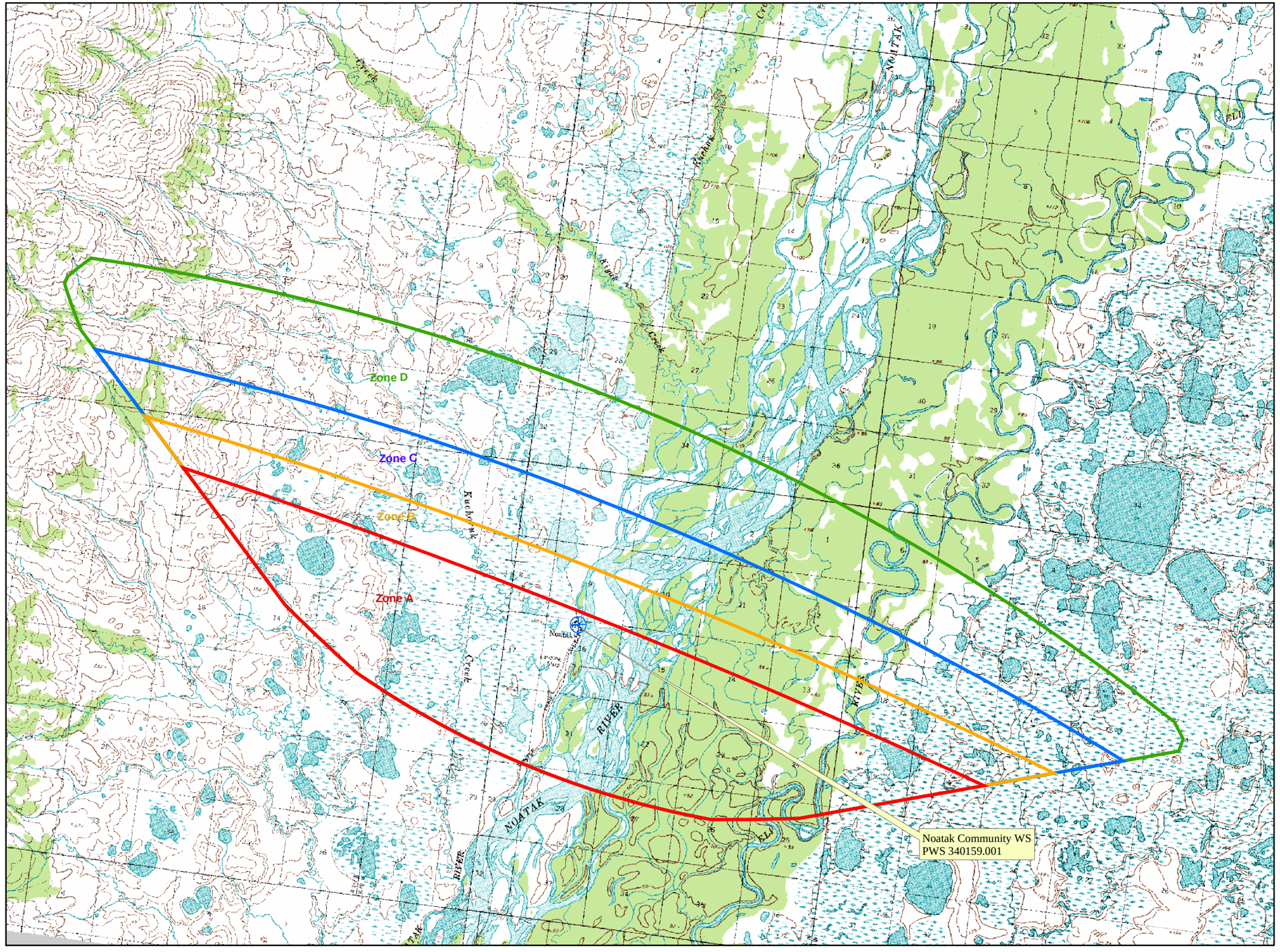
APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

Public Water Well System for PWS #340159.001 Noatak Community WS



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)

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.

0 0.45 0.9 1.8 2.7 3.6 Miles

Noatak Water System
PWS 340159.001
Appendix A Map A

APPENDIX B

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

Table 1

Contaminant Source Inventory for
Noatak Community WS

PWSID340159.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Motor /motor vehicle repair shops	C31	C31-01	A	C	DOT Maintenance Shop at Airport
Motor /motor vehicle repair shops	C31	C31-02	A	C	School 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 (Drainfie Disposal Method)	D10	D10-01	A	C	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	C	Landfill
Tanks, heating oil, residential (above ground)	R08	R08-01	A	C	Assume 40 or less residential aboveground heating oil tanks in Zone A
Tanks, diesel (above ground)	T06	T06-01	A	C	School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	C	AVEC storage
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	C	AVEC Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	C	Esther Barger Memorial Health Clinic
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	C	Noatak Native Store
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	C	OTZ Telephone Co-op
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	C	Teachers Quarters 1
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	C	Teachers Quarters 2
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	C	Noatak Friends Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	C	Red Building
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	C	Noatak Search and Rescue
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	C	Alaska Army National Guard
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	C	IRA Office

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	C	VPSO Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	A	C	Post Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	C	School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	C	Village
Tanks, heating oil, nonresidential (aboveground)	T14	T14-17	A	C	Elementary School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-18	A	C	Middle School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	C	Noatak Federal Scout Armory
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	C	AKARNG Noatak FSA
Cemeteries	X01	X01-01	A	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	C	Noatak National Preserve
Petroleum product bulk station/terminals	X11	X11-01	A	C	AVEC Tank Farm
Petroleum product bulk station/terminals	X11	X11-02	A	C	Noatak Native Store Tank Farm
Petroleum product bulk station/terminals	X11	X11-03	A	C	School Tank Farm
Airports	X14	X14-01	A	C	Noatak Airport
Airports	X14	X14-01	A	C	Noatak Landing Strip
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 1 - 20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	C	Oil or Natural Gas Pipeline--End
Pipelines (oil and gas)	X28	X28-02	A	C	Oil or Natural Gas Pipeline--Start
Electric power generation (fossil fuels)	X36	X36-01	A	C	AVEC storage
Electric power generation (fossil fuels)	X36	X36-02	A	C	AVEC Power Plant
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	C	Esther Barger Memorial Health Clinic
Municipal or city parks (with green areas)	X04	X04-02	B	C	Noatak National Preserve
Municipal or city parks (with green areas)	X04	X04-03	C	C	Noatak National Preserve

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Municipal or city parks (with green areas)	X04	X04-04	D	C	Noatak National Preserve

Table 2

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Bacteria and Viruses

PWSID 340159.001

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	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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	Noatak National Preserve
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1 - 20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Medium	C	Esther Barger Memorial Health Clinic
Municipal or city parks (with green areas)	X04	X04-02	B	Medium	C	Noatak National Preserve

Table 3

Contaminant Source Inventory and Risk Ranking for Noatak Community WS Sources of Nitrates/Nitrites

PWSID 340159.001

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	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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill
Cemeteries	X01	X01-01	A	Medium	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	Noatak National Preserve
Airports	X14	X14-01	A	Low	C	Noatak Landing Strip
Airports	X14	X14-01	A	Low	C	Noatak Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1 - 20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Esther Barger Memorial Health Clinic
Municipal or city parks (with green areas)	X04	X04-02	B	Medium	C	Noatak National Preserve
Municipal or city parks (with green areas)	X04	X04-03	C	Medium	C	Noatak National Preserve

Table 4

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Volatile Organic Chemicals

PWSID 340159.001

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	DOT Maintenance Shop at Airport
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	School 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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 40 or less residential aboveground heating oil tanks in Zone A
Tanks, diesel (above ground)	T06	T06-01	A	Medium	C	School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	AVEC storage
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	AVEC Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Esther Barger Memorial Health Clinic
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	Noatak Native Store
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	OTZ Telephone Co-op
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	Teachers Quarters 1
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	Teachers Quarters 2
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	Noatak Friends Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	Red Building
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	Noatak Search and Rescue
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	Alaska Army National Guard

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	IRA Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	Low	C	VPSO Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	A	Low	C	Post Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	Low	C	School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	Low	C	Village
Tanks, heating oil, nonresidential (aboveground)	T14	T14-17	A	Low	C	Elementary School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-18	A	Low	C	Middle School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	High	C	Noatak Federal Scout Armory No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	High	C	AKARNG Noatak FSA No Reckey number in database
Petroleum product bulk station/terminals	X11	X11-01	A	Very High	C	AVEC Tank Farm
Petroleum product bulk station/terminals	X11	X11-02	A	Very High	C	Noatak Native Store Tank Farm
Petroleum product bulk station/terminals	X11	X11-03	A	Very High	C	School Tank Farm
Airports	X14	X14-01	A	High	C	Noatak Airport
Airports	X14	X14-01	A	High	C	Noatak Landing Strip
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1 - 20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	Medium	C	Oil or Natural Gas Pipeline--End
Pipelines (oil and gas)	X28	X28-02	A	Medium	C	Oil or Natural Gas Pipeline--Start
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	AVEC storage
Electric power generation (fossil fuels)	X36	X36-02	A	Medium	C	AVEC Power Plant

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Esther Barger Memorial Health Clinic

Table 5

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 340159.001

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	DOT Maintenance Shop at Airport
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	School 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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	High	C	Landfill
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	AVEC storage
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	AVEC Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Esther Barger Memorial Health Clinic
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	Noatak Native Store
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	OTZ Telephone Co-op
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	Teachers Quarters 1
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	Teachers Quarters 2
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	Noatak Friends Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	Red Building
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	Noatak Search and Rescue
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	Alaska Army National Guard
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	IRA Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	A	Low	C	VPSO Office

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

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	T14-14	A	Low	C	Post Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	A	Low	C	School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-16	A	Low	C	Village
Tanks, heating oil, nonresidential (aboveground)	T14	T14-17	A	Low	C	Elementary School
Tanks, heating oil, nonresidential (aboveground)	T14	T14-18	A	Low	C	Middle School
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Noatak Federal Scout Armory No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	AKARNG Noatak FSA No Reckey number in database
Cemeteries	X01	X01-01	A	Low	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	Noatak National Preserve
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	AVEC Tank Farm
Petroleum product bulk station/terminals	X11	X11-02	A	Low	C	Noatak Native Store Tank Farm
Petroleum product bulk station/terminals	X11	X11-03	A	Low	C	School Tank Farm
Airports	X14	X14-01	A	Low	C	Noatak Airport
Airports	X14	X14-01	A	Low	C	Noatak Landing Strip
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1 - 20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	Low	C	Oil or Natural Gas Pipeline--End
Pipelines (oil and gas)	X28	X28-02	A	Low	C	Oil or Natural Gas Pipeline--Start
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	AVEC storage
Electric power generation (fossil fuels)	X36	X36-02	A	Medium	C	AVEC Power Plant

Table 5 (continued)

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

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*
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Esther Barger Memorial Health Clinic
Municipal or city parks (with green areas)	X04	X04-02	B	Low	C	Noatak National Preserve
Municipal or city parks (with green areas)	X04	X04-03	C	Low	C	Noatak National Preserve

Table 6

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Synthetic Organic Chemicals

PWSID 340159.001

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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Noatak Federal Scout Armory No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	AKARNG Noatak FSA No Reckey number in database
Cemeteries	X01	X01-01	A	Medium	C	Cemetery
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	Noatak National Preserve
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	AVEC Tank Farm
Petroleum product bulk station/terminals	X11	X11-02	A	Low	C	Noatak Native Store Tank Farm
Petroleum product bulk station/terminals	X11	X11-03	A	Low	C	School Tank Farm
Airports	X14	X14-01	A	Medium	C	Noatak Airport
Airports	X14	X14-01	A	Medium	C	Noatak Landing Strip
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	Esther Barger Memorial Health Clinic
Municipal or city parks (with green areas)	X04	X04-02	B	Low	C	Noatak National Preserve
Municipal or city parks (with green areas)	X04	X04-03	C	Low	C	Noatak National Preserve

Table 7

Contaminant Source Inventory and Risk Ranking for Noatak Community WS

Sources of Other Organic Chemicals

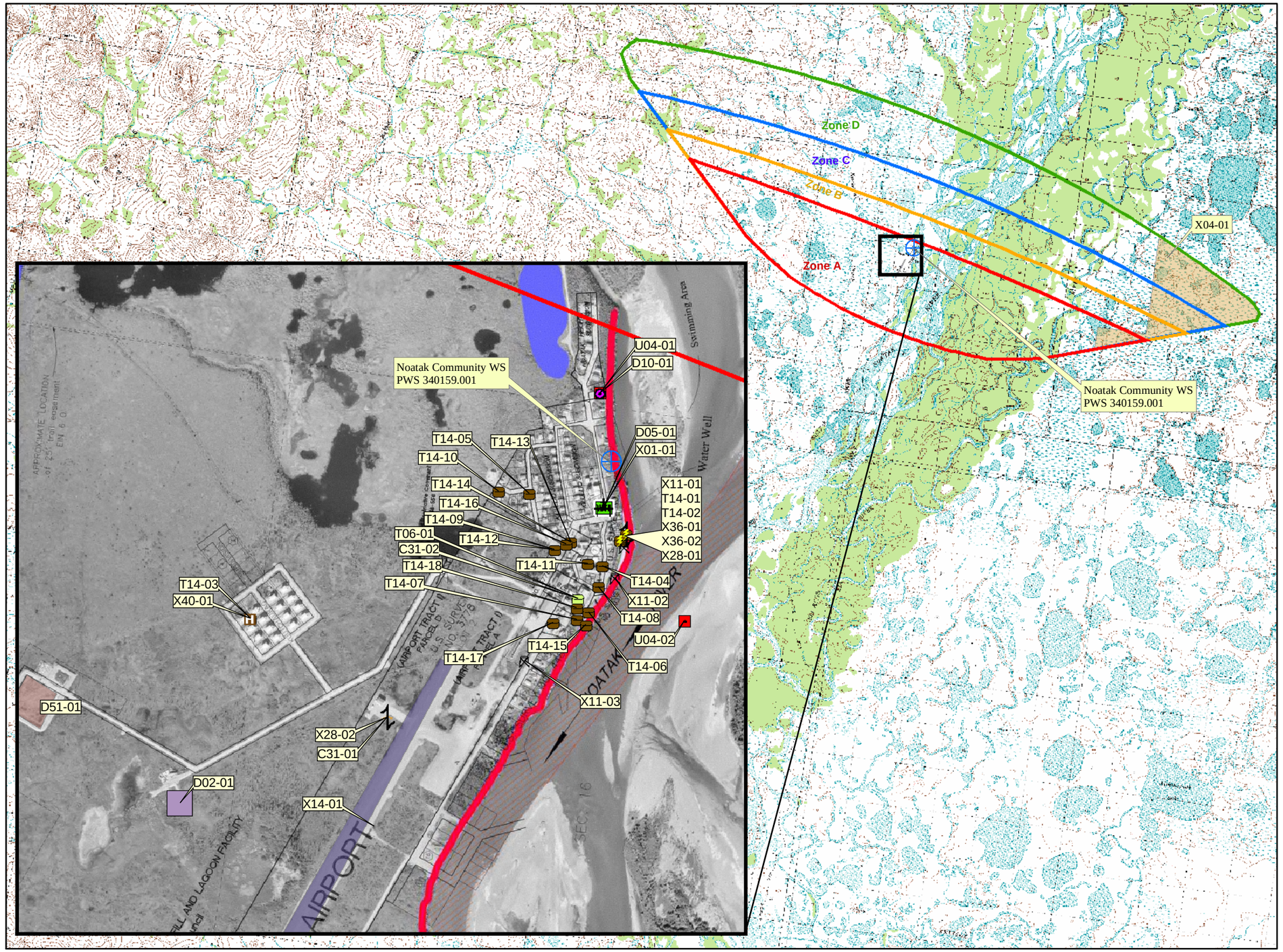
PWSID 340159.001

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	DOT Maintenance Shop at Airport
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	School 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	Noatak PHS Water Project
Landfills (municipal; Class III)	D51	D51-01	A	Very High	C	Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Noatak Federal Scout Armory No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	AKARNG Noatak FSA No Reckey number in database
Petroleum product bulk station/terminals	X11	X11-01	A	High	C	AVEC Tank Farm
Petroleum product bulk station/terminals	X11	X11-02	A	High	C	Noatak Native Store Tank Farm
Petroleum product bulk station/terminals	X11	X11-03	A	High	C	School Tank Farm
Airports	X14	X14-01	A	Medium	C	Noatak Landing Strip
Airports	X14	X14-01	A	Medium	C	Noatak Airport
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1 - 20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	High	C	Oil or Natural Gas Pipeline--End
Pipelines (oil and gas)	X28	X28-02	A	High	C	Oil or Natural Gas Pipeline--Start
Electric power generation (fossil fuels)	X36	X36-01	A	High	C	AVEC storage
Electric power generation (fossil fuels)	X36	X36-02	A	High	C	AVEC Power Plant

APPENDIX C

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

Public Water Well System for PWS #340159.001 Noatak Community WS
Sources of Existing or Potential 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)

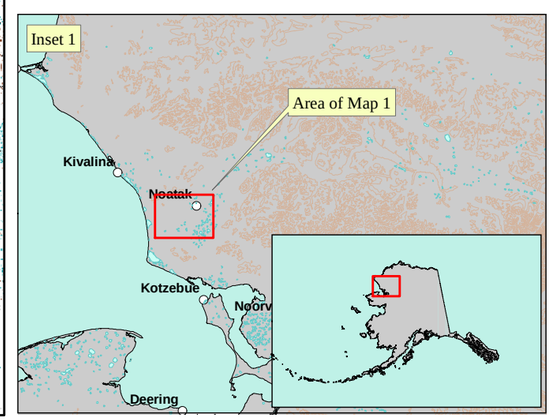
Groundwater Protection Zones

- 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

- Motor/motor vehicle repair shops (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, non-residential, aboveground (T14)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Cemetery (X01)
- Petroleum product bulk station/terminal (X11)
- Pipelines (oil and gas) (X28)
- Power Generation Facility (fossil fuel) (X36)
- Medical/veterinary facilities (X40)
- Domestic wastewater treatment ponds/lagoons (D02)
- Landfill, municipal, Class III (D51)
- Municipal or city parks (with green areas) (X04)
- Airports or landing strips (X14)

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



Noatak Water System
PWS 340159.001
Appendix C Map C

APPENDIX D

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

Chart 1. Susceptibility of the wellhead - Noatak Community WS (PWS No. 340159.001)

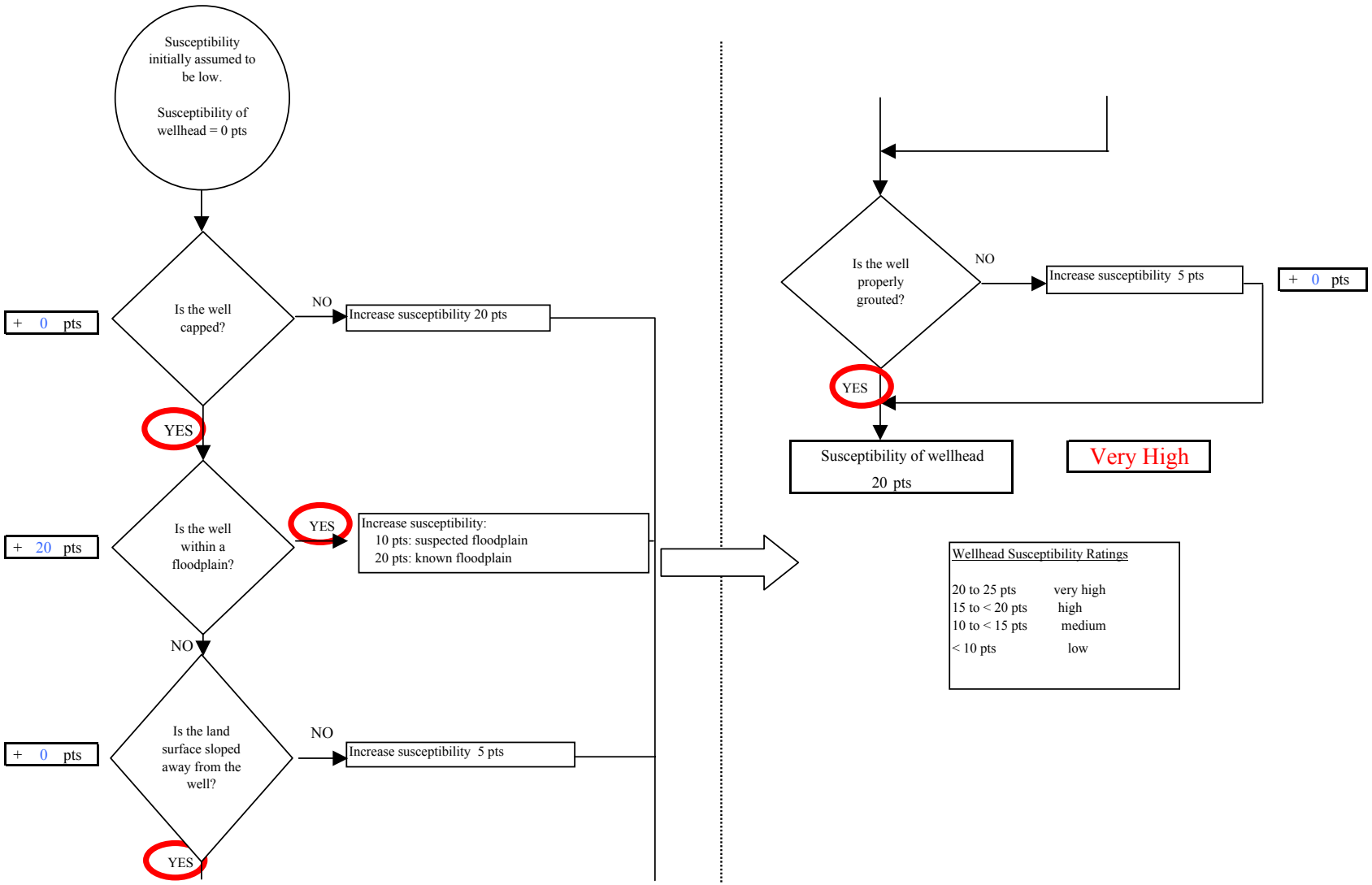


Chart 2. Susceptibility of the aquifer Noatak Community WS (PWS No. 340159.001)

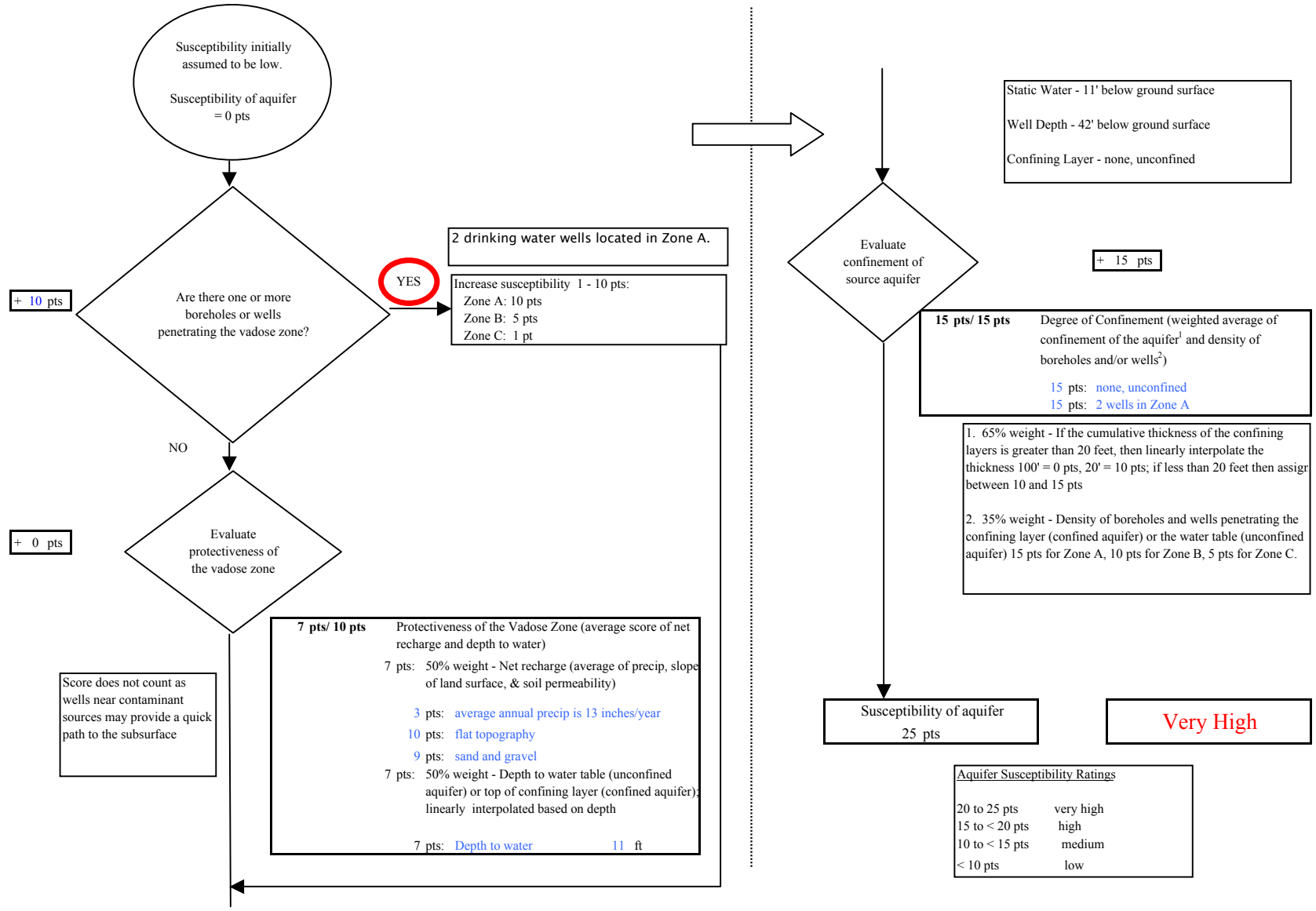
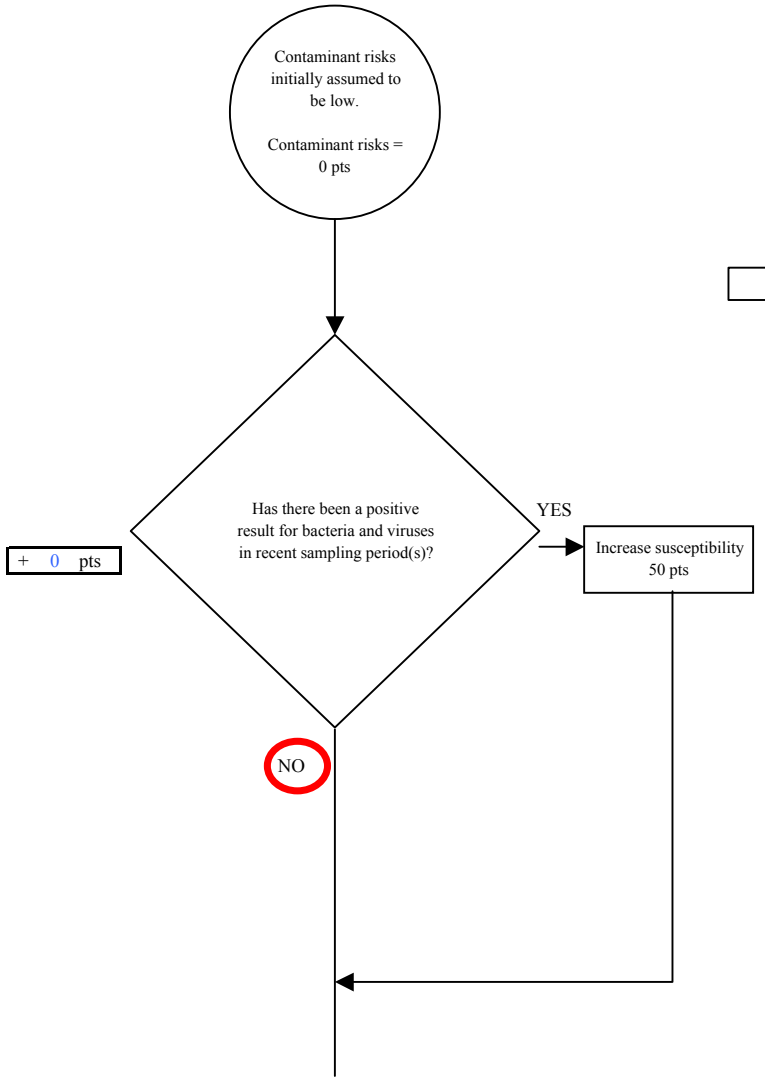
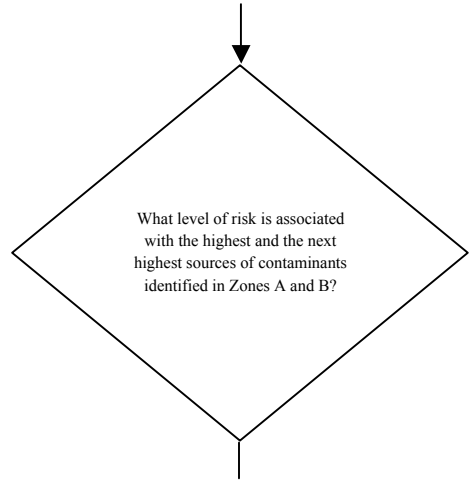


Chart 3. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Bacteria & Viruses





+ 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)	3	1	4
Low(s)	1	0	1

	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 Noatak Community WS (PWS No. 340159.001) - Bacteria & Viruses

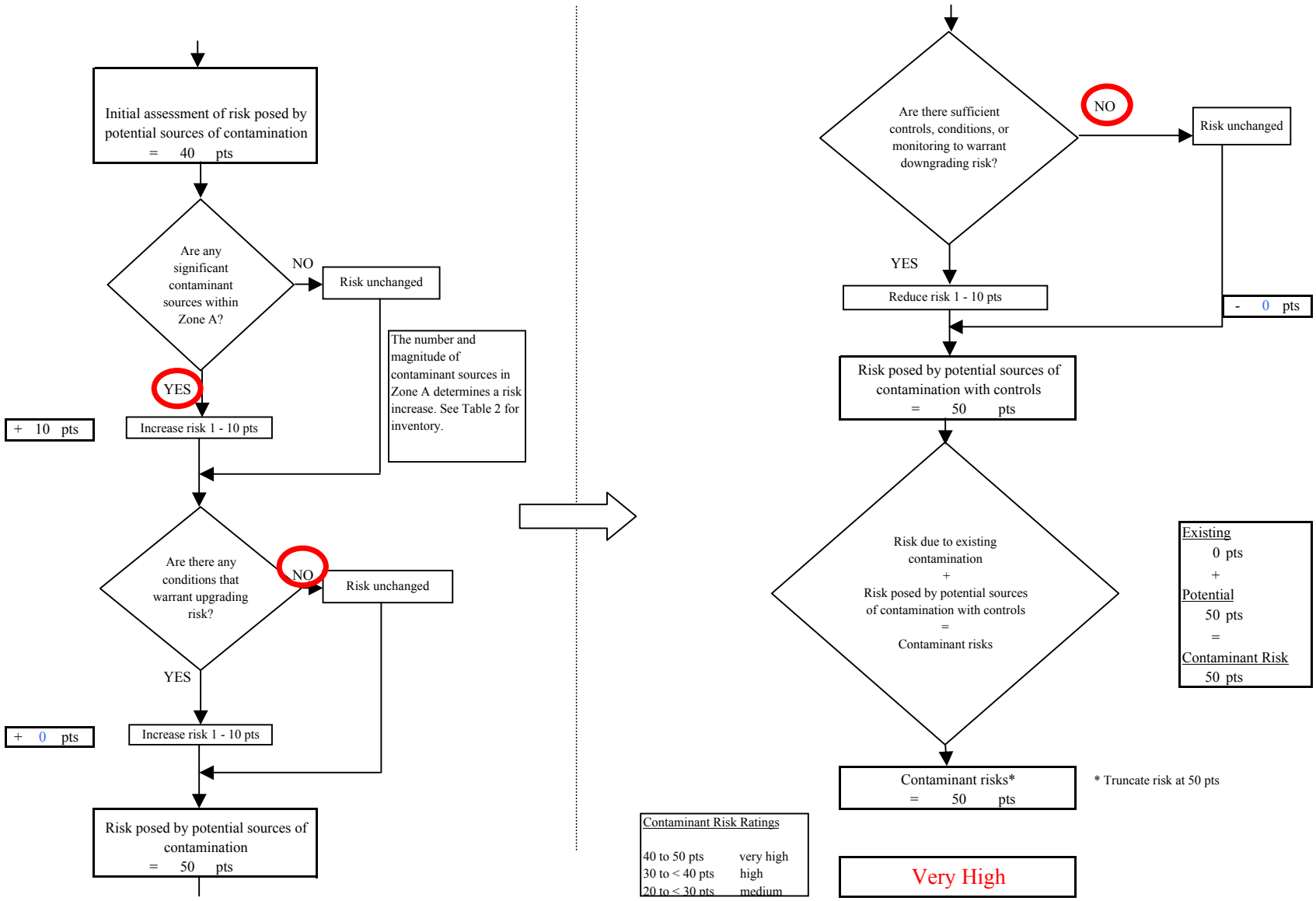


Chart 4. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Bacteria & Viruses

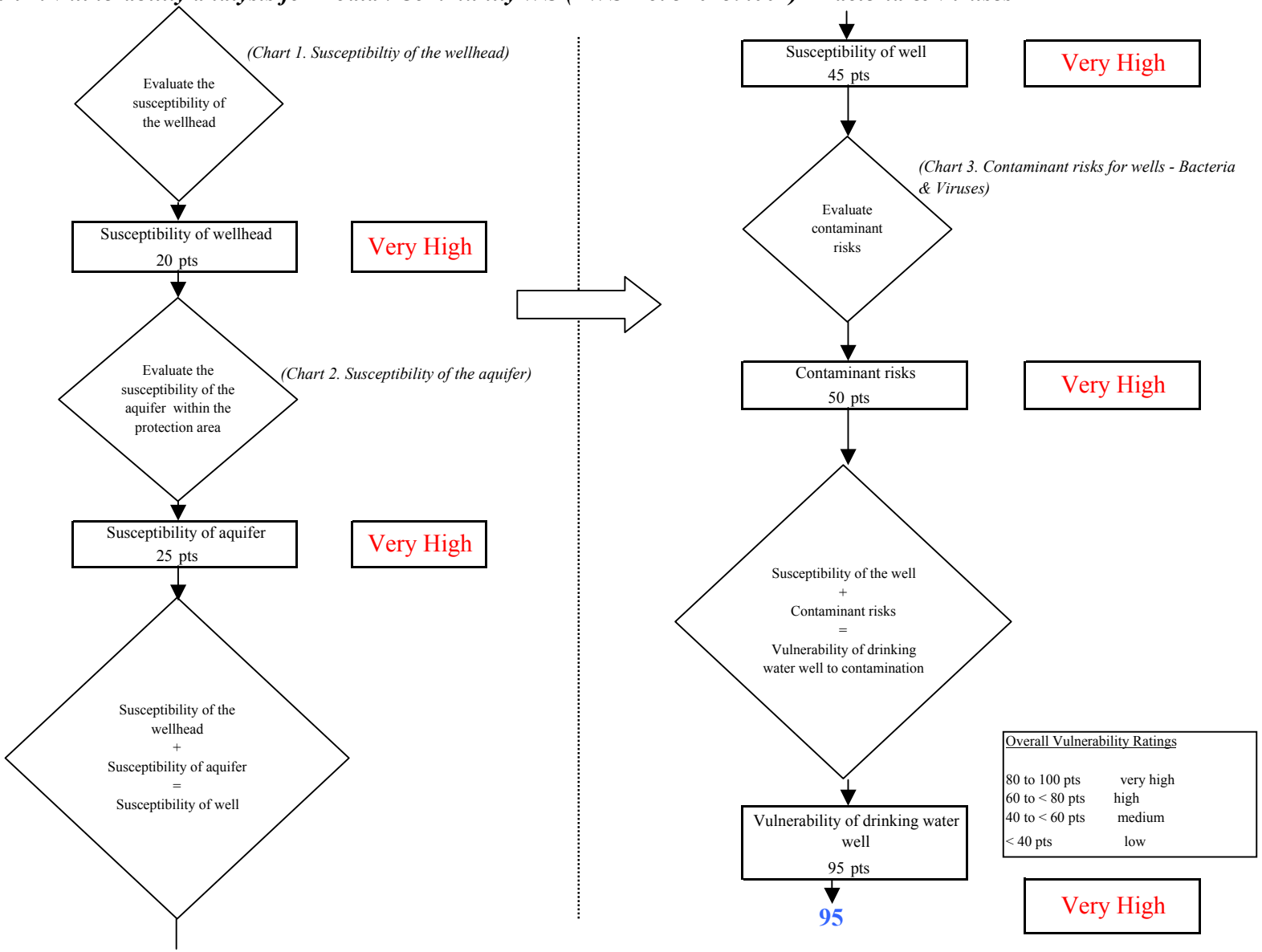


Chart 5. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Nitrates and Nitrites

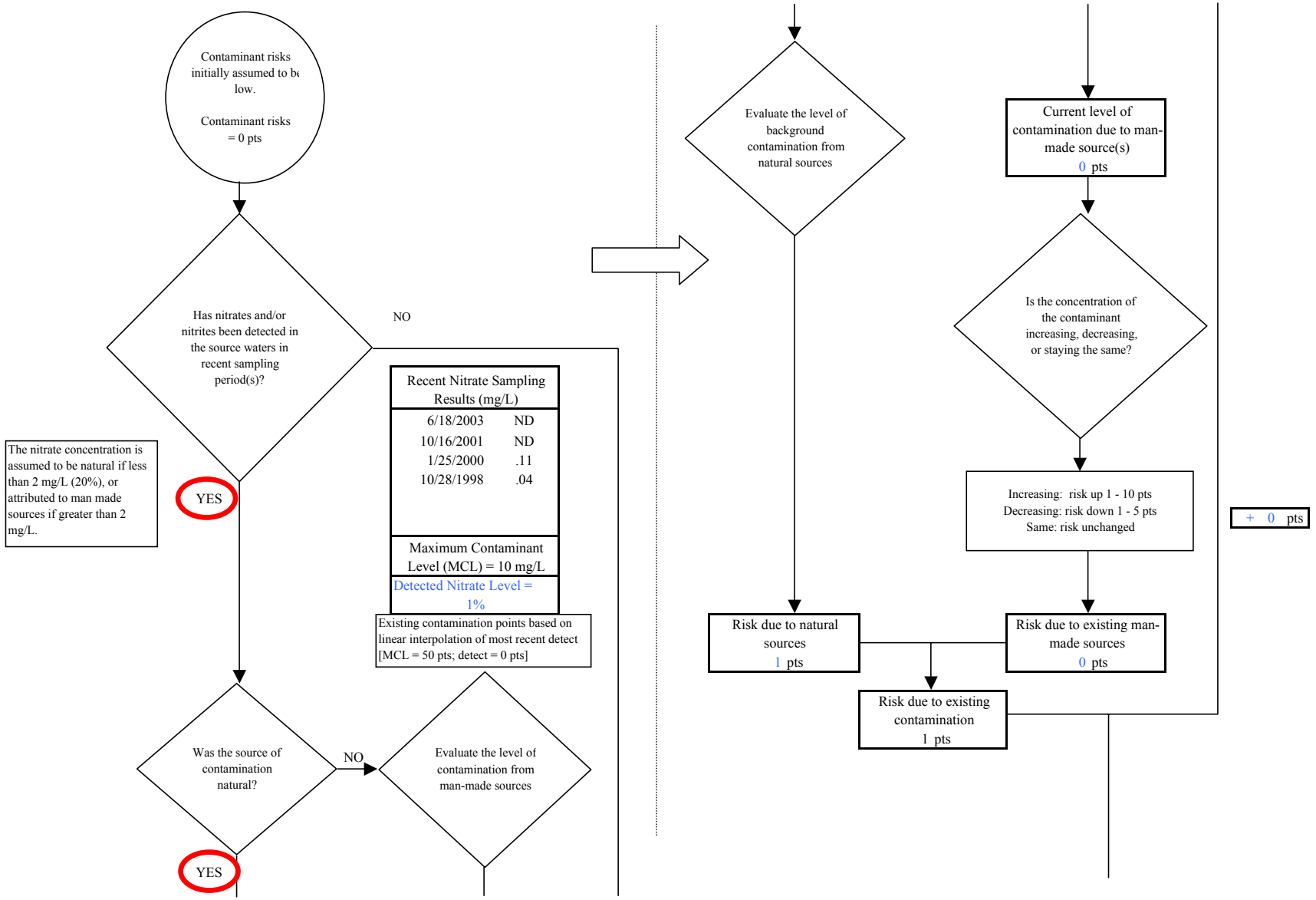
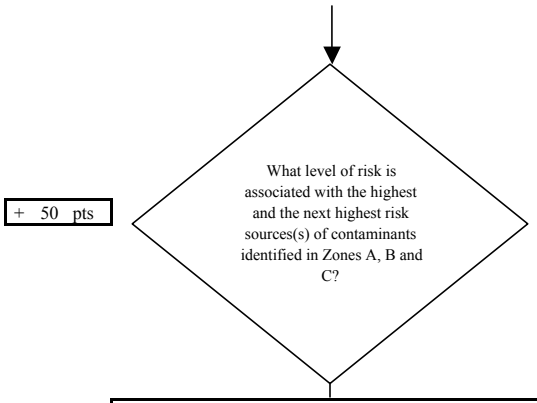


Chart 5. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Nitrates and Nitrites



+ 50 pts

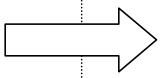
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	2	0	2
Medium(s)	3	2	5
Low(s)	4	0	4

	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.



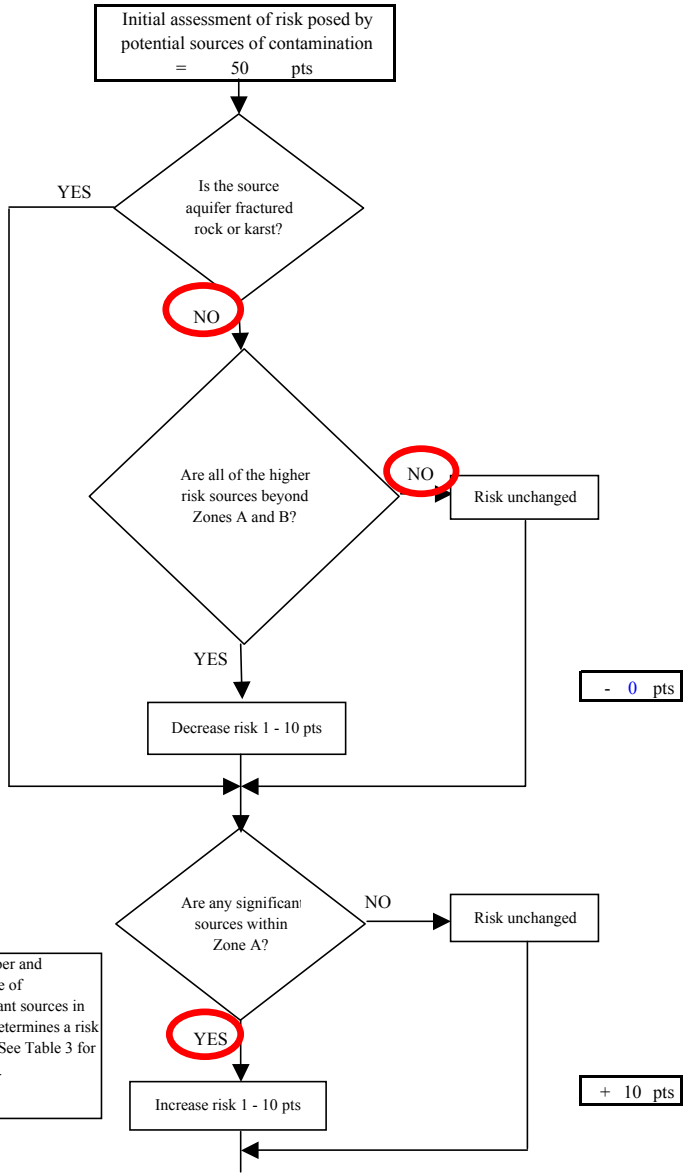


Chart 5. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Nitrates and Nitrites

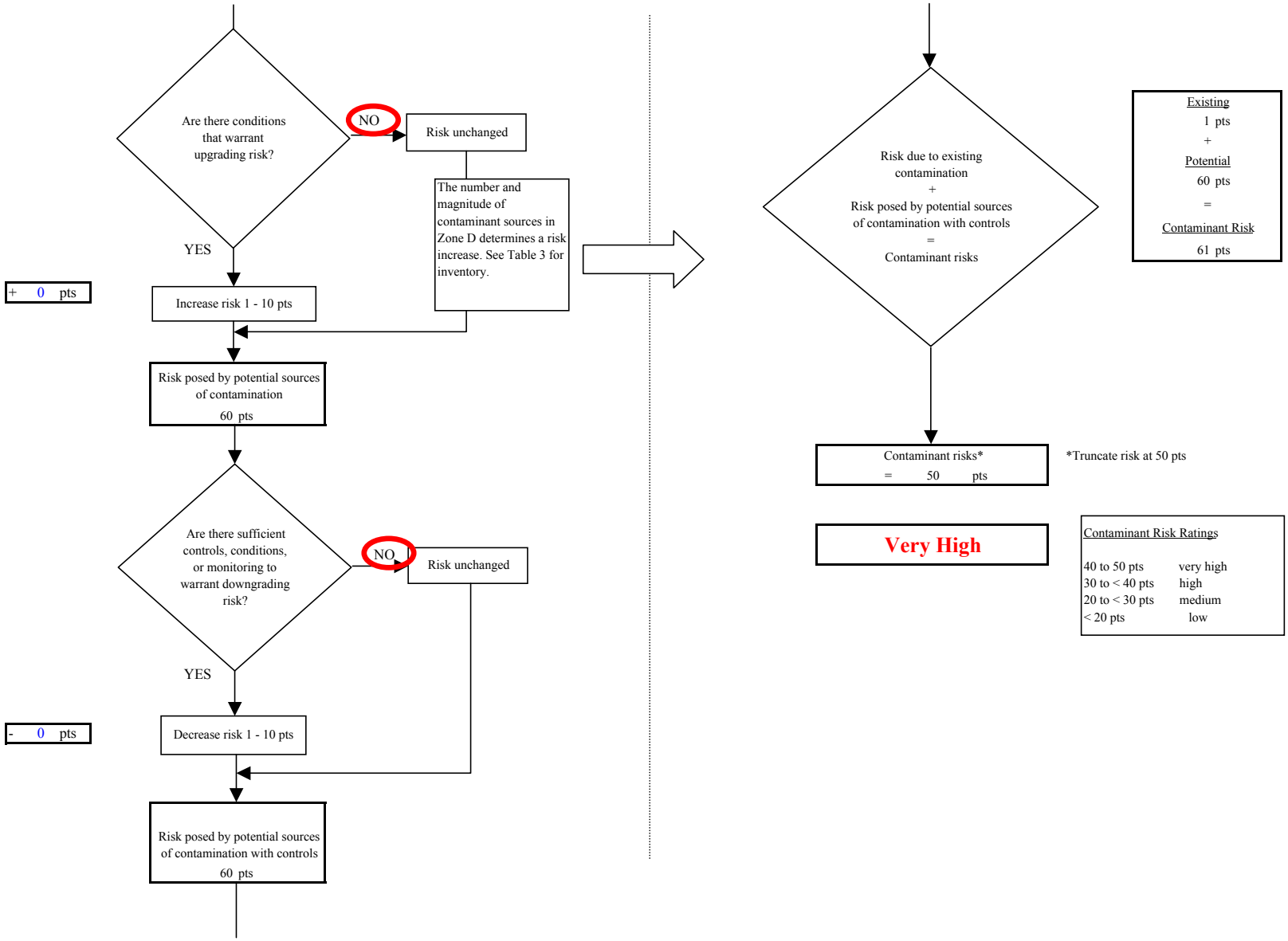


Chart 6. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Nitrates and Nitrites

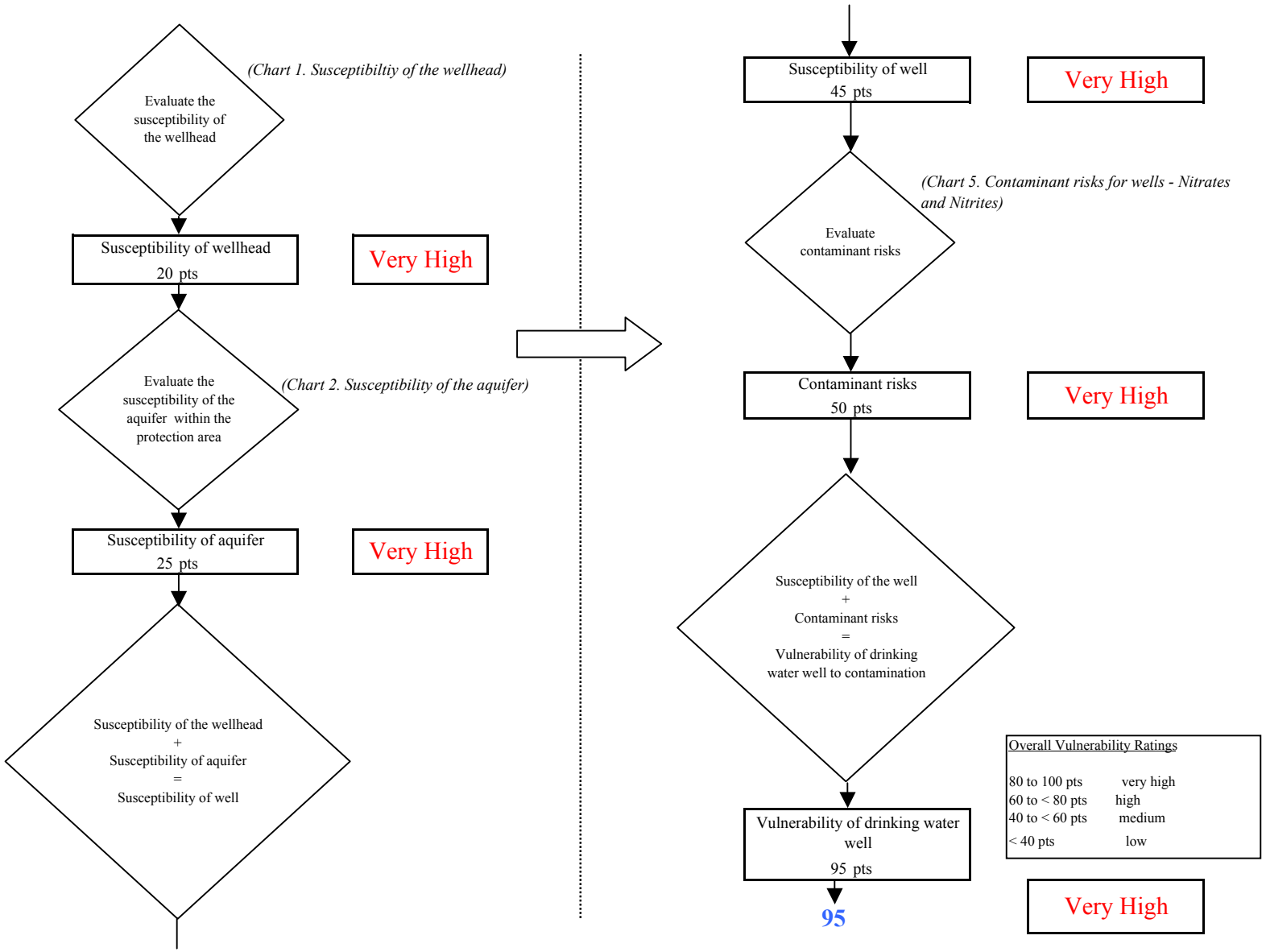


Chart 7. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Volatile Organic Chemicals

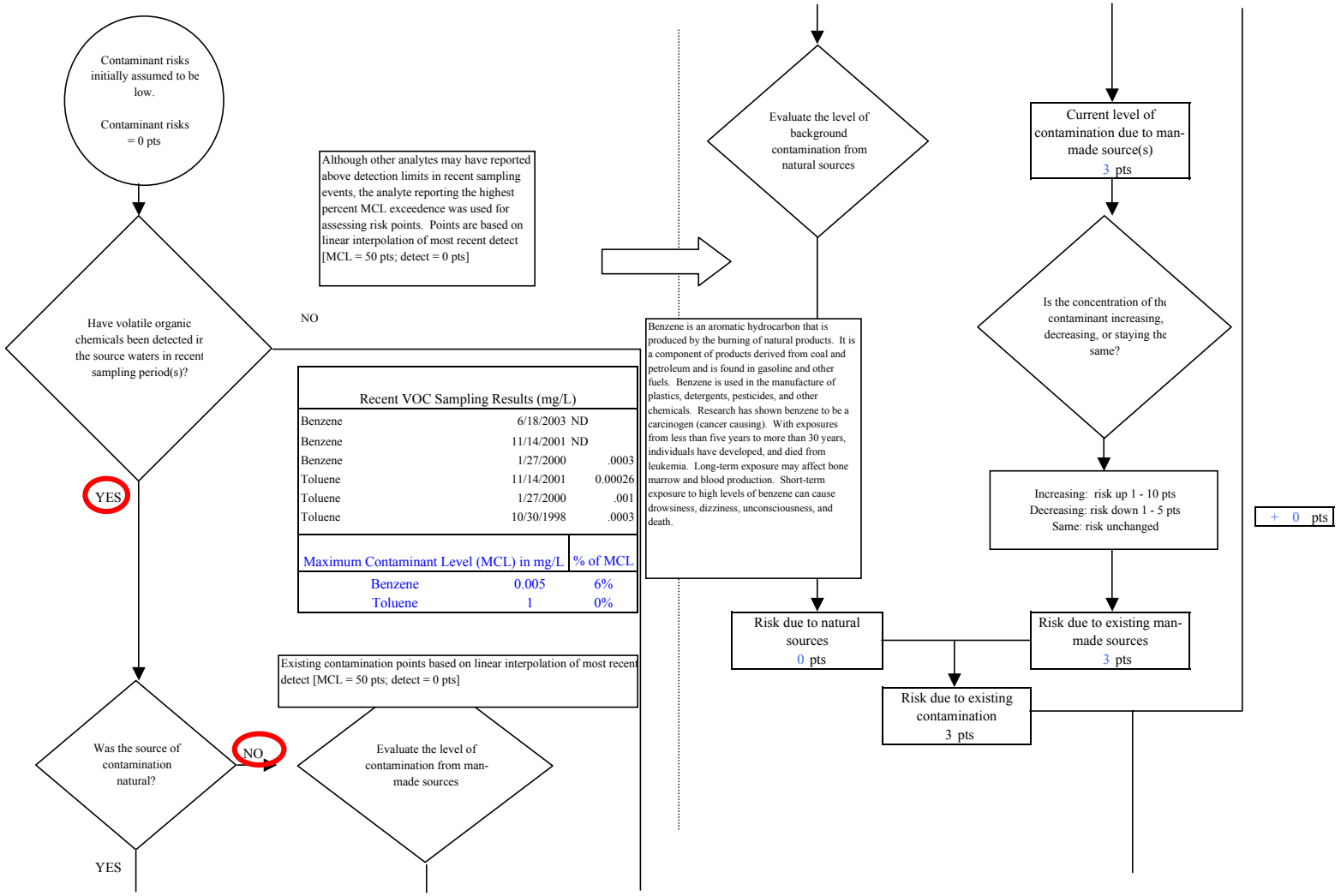
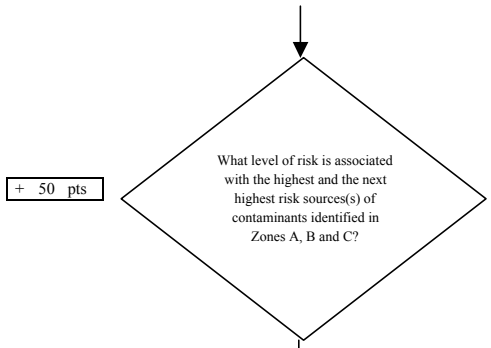


Chart 7. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Volatile Organic Chemicals



+ 50 pts

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

	Zone A	Zones B&C	Total
Very Highs(s)	3	0	3
High(s)	5	0	5
Medium(s)	47	0	47
Low(s)	23	0	23

	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.

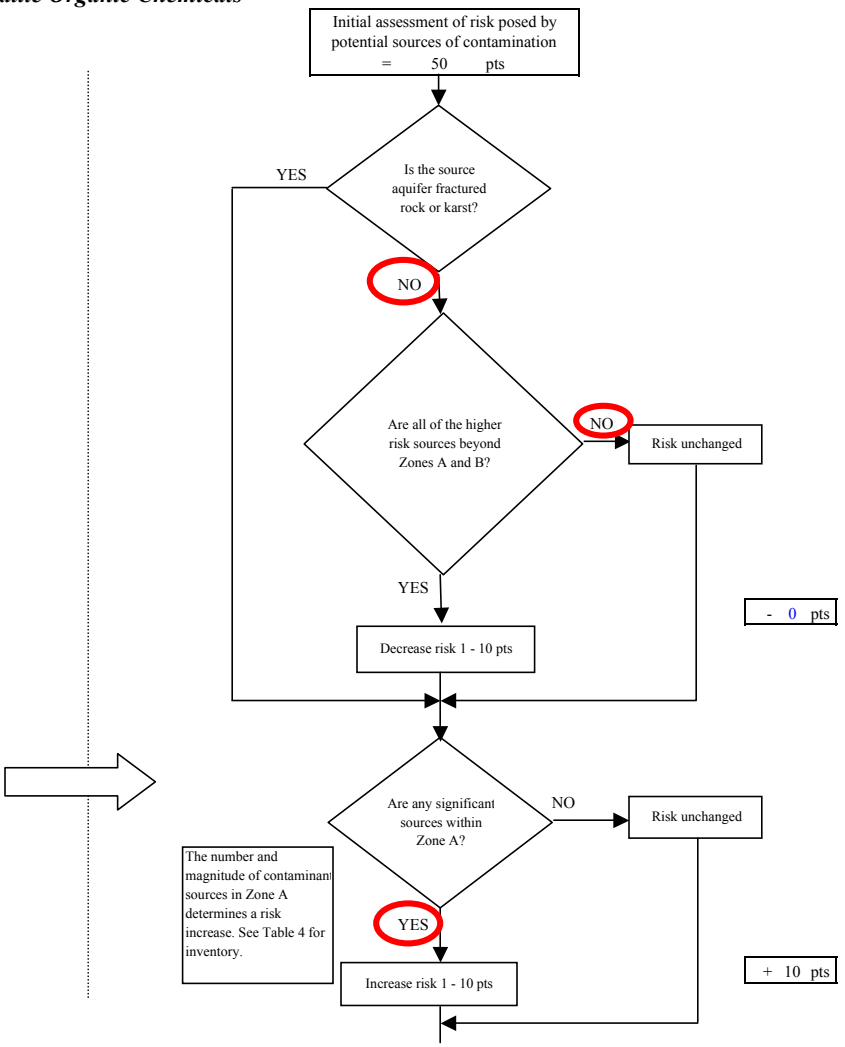


Chart 7. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Volatile Organic Chemicals

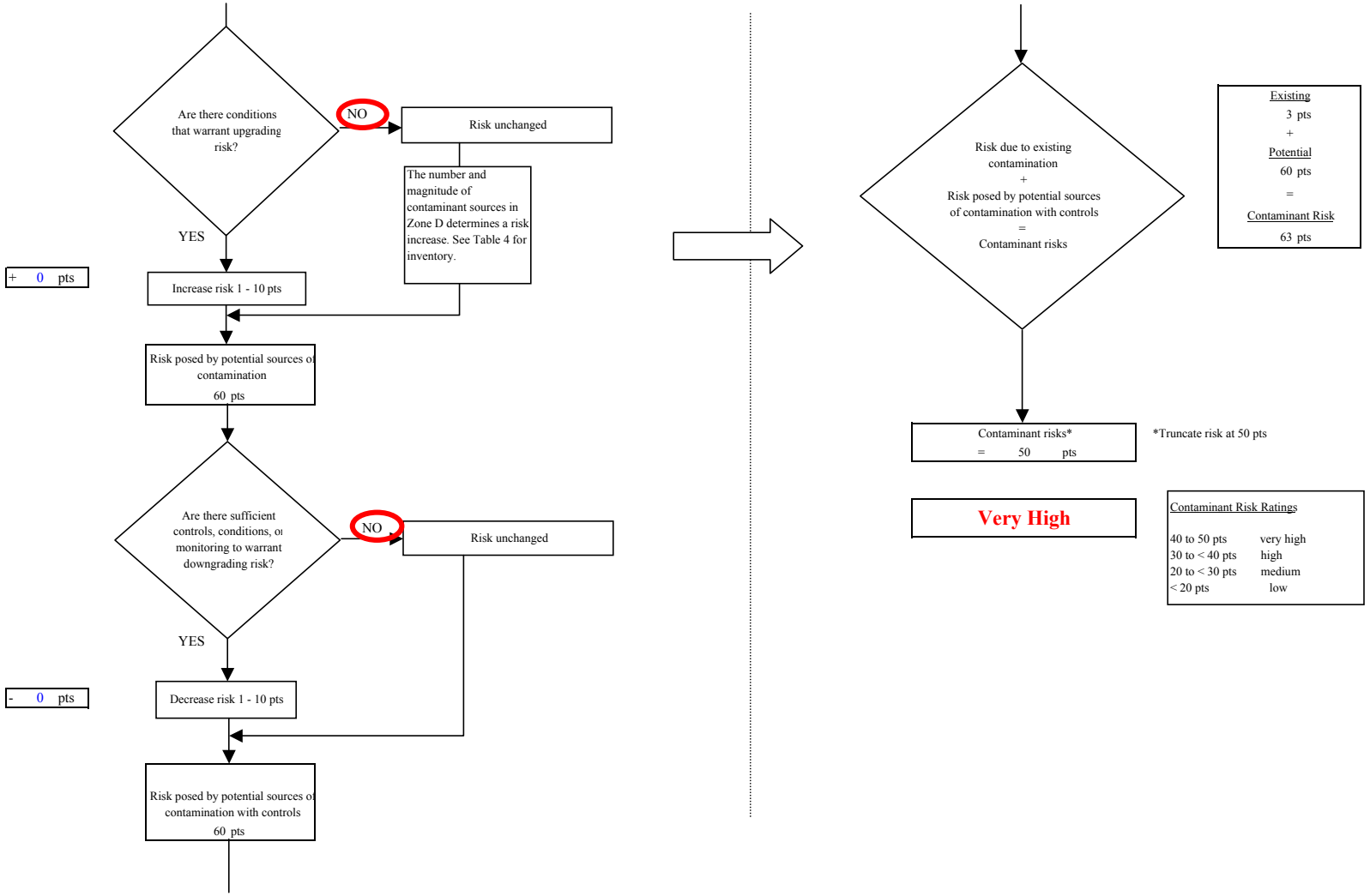


Chart 8. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Volatile Organic Chemicals

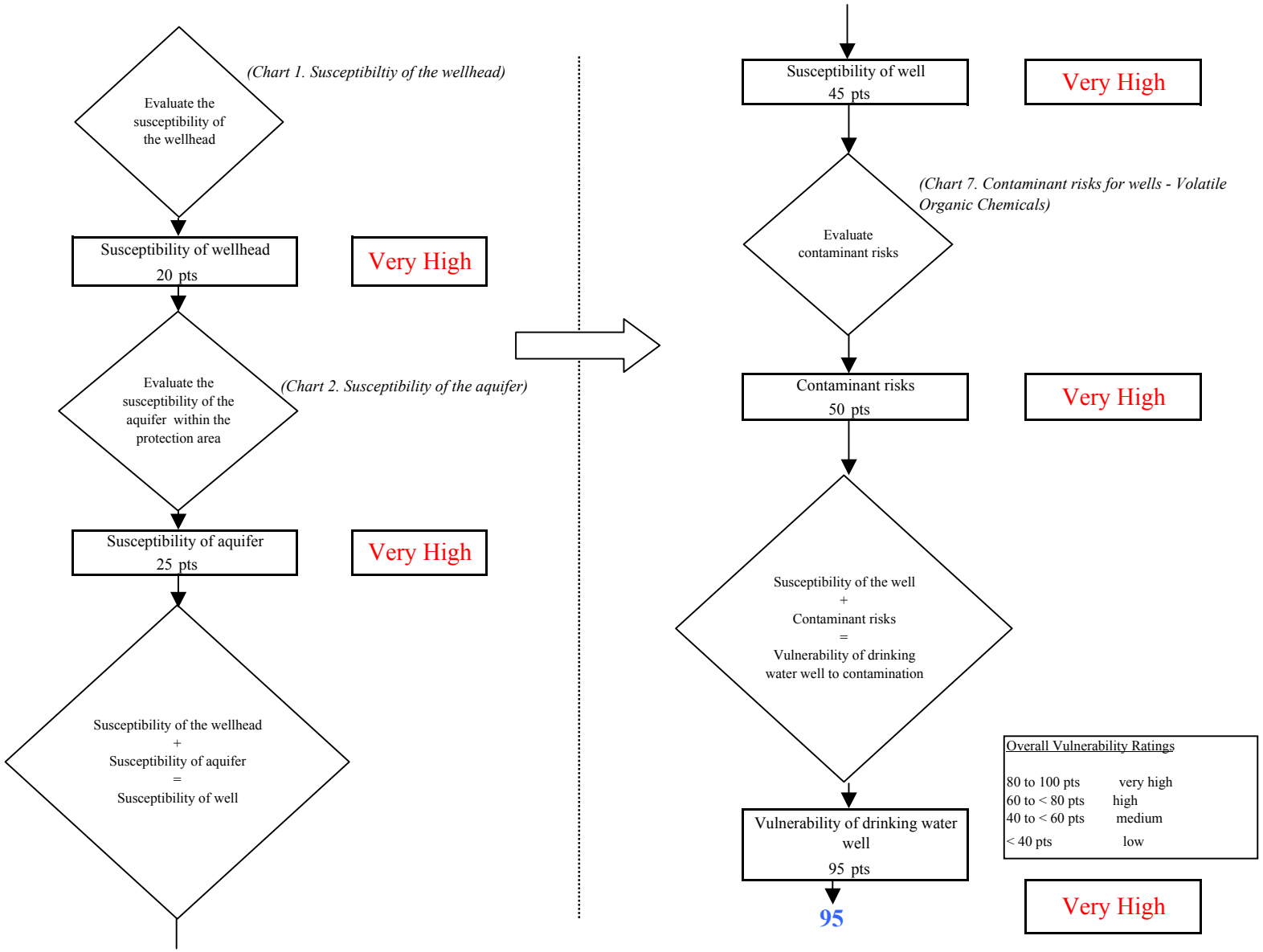


Chart 9. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

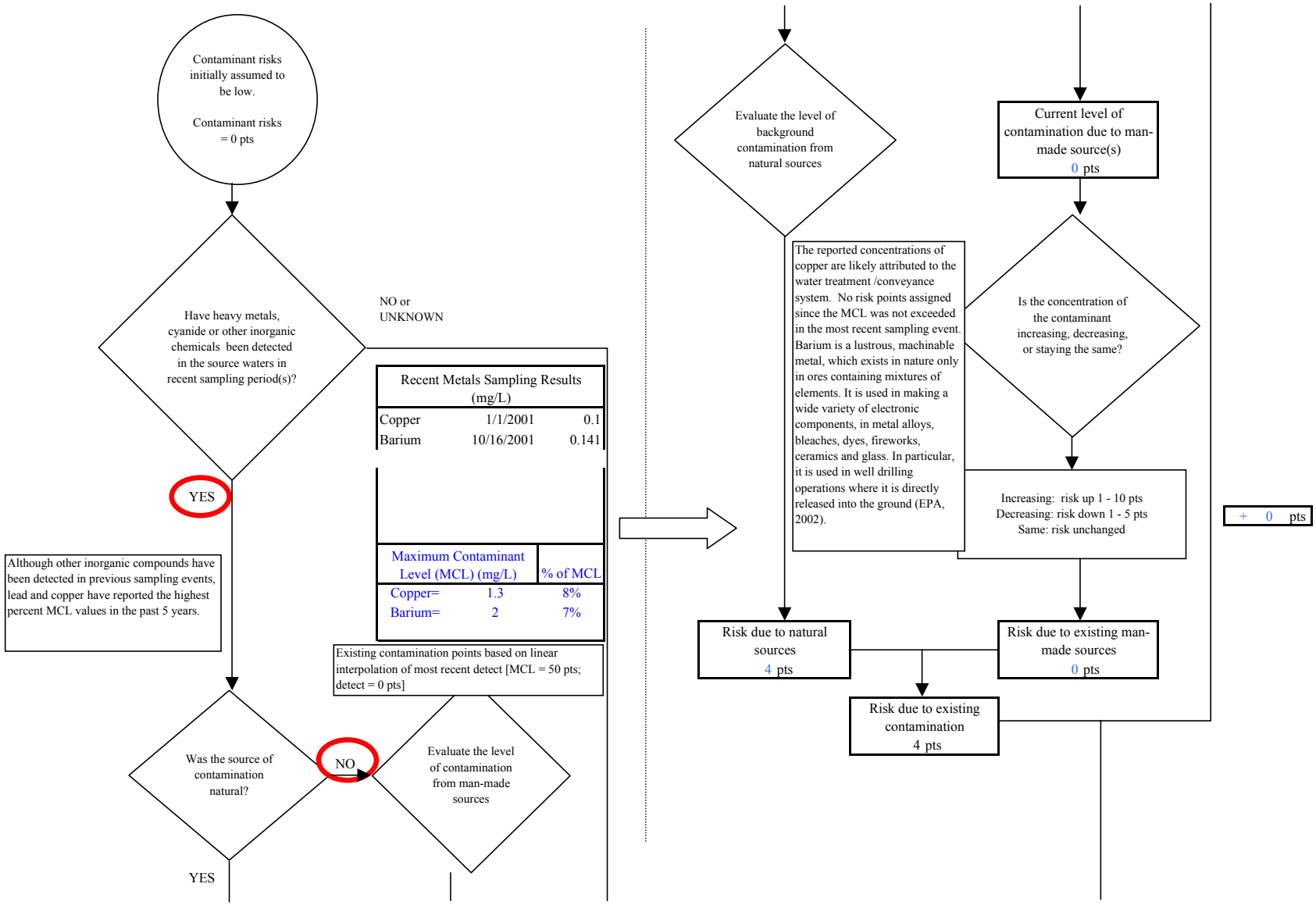


Chart 9. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

+ 30 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)	0	0	0
High(s)	1	0	1
Medium(s)	4	0	4
Low(s)	34	2	36

	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.

Initial assessment of risk posed by potential sources of contamination = 30 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 5 for inventory.

Chart 9. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

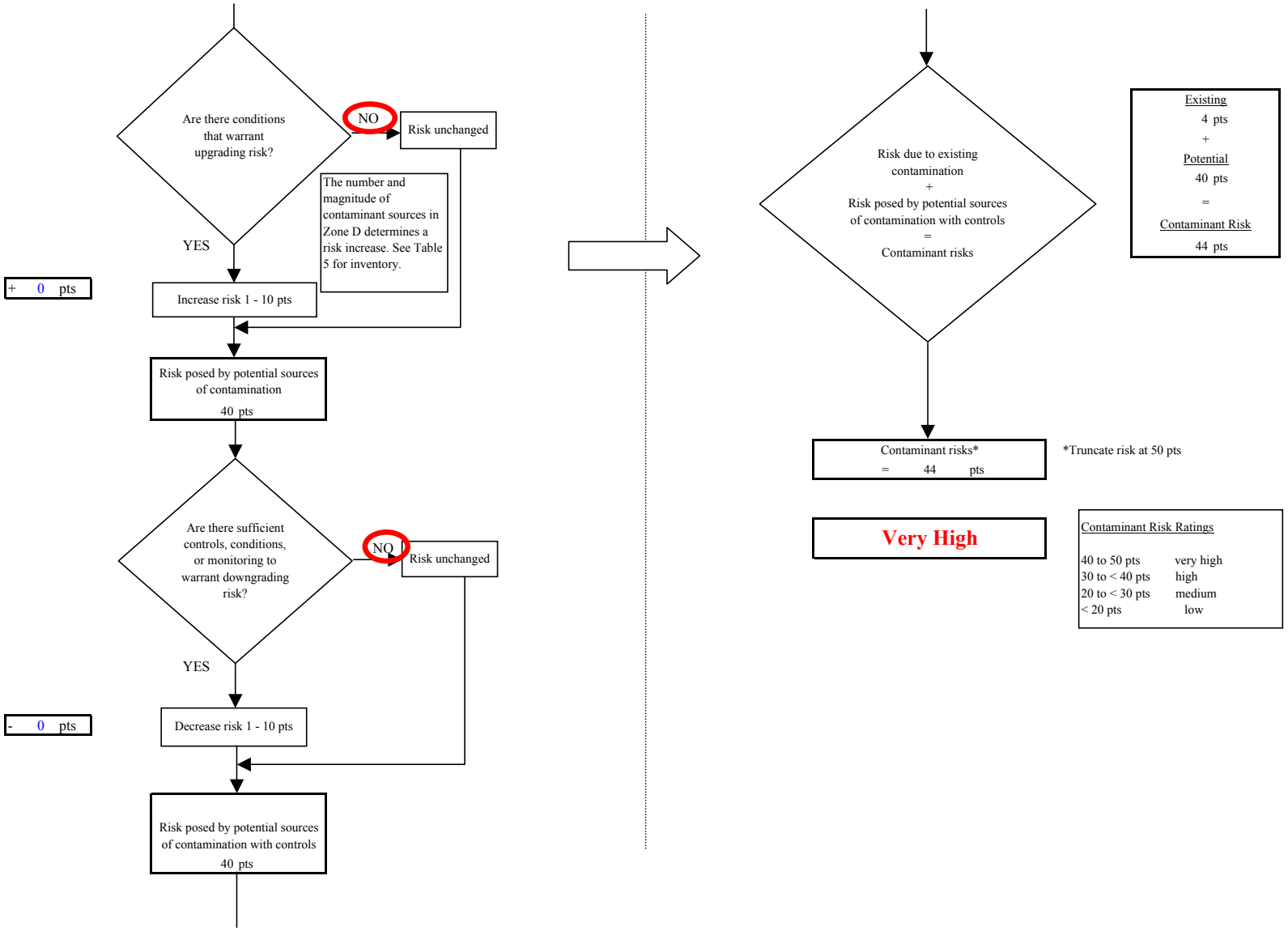


Chart 10. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

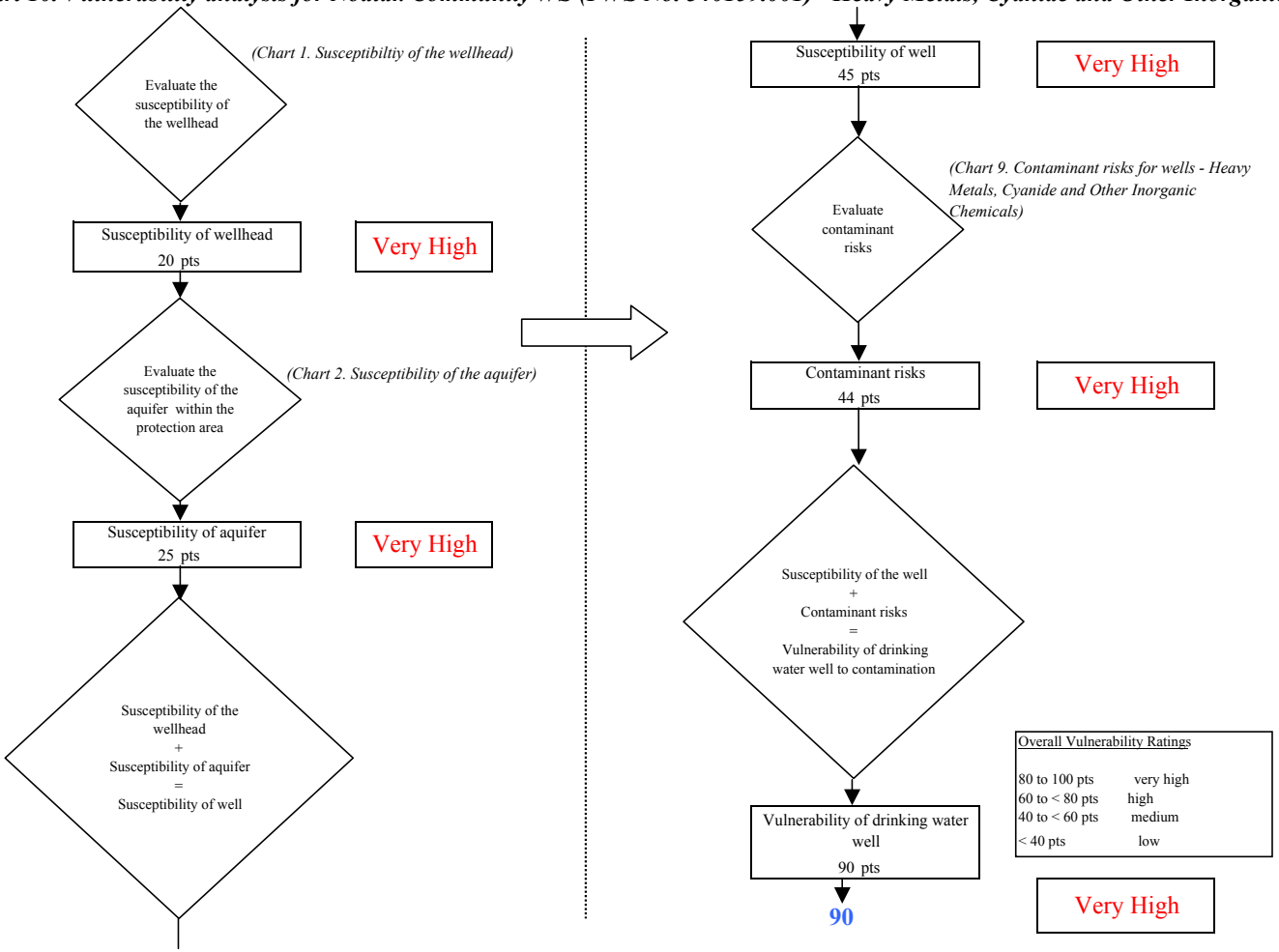


Chart 11. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Synthetic Organic Chemicals

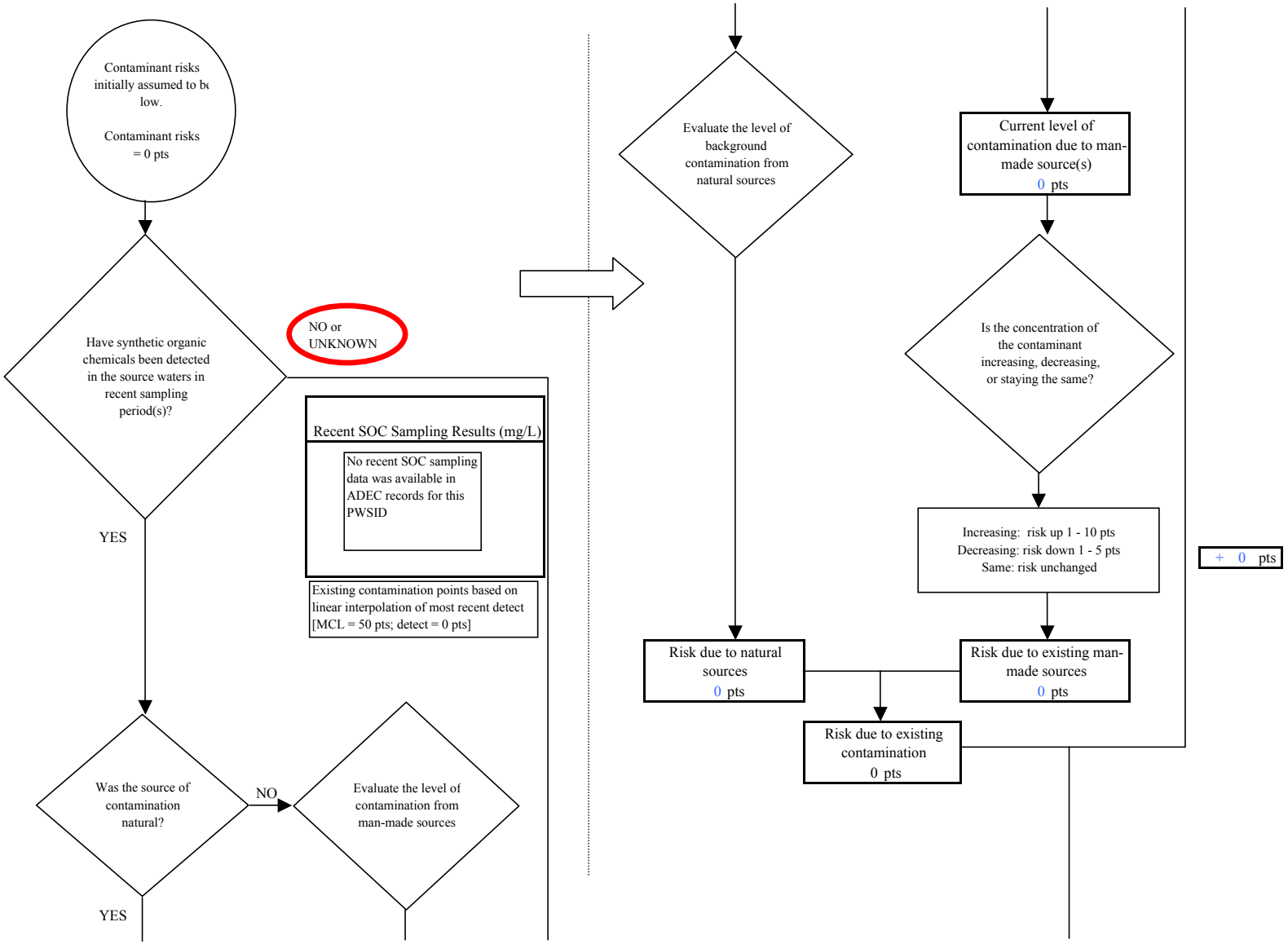
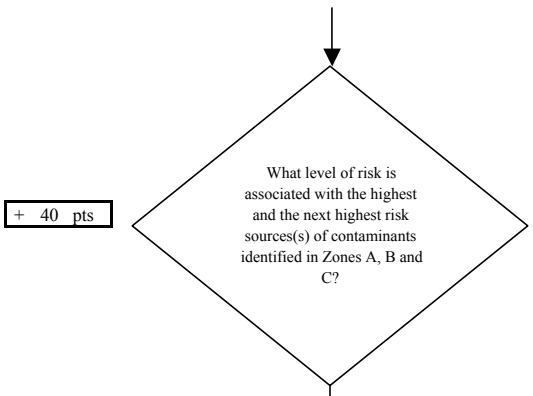


Chart 11. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Synthetic Organic Chemicals



+ 40 pts

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

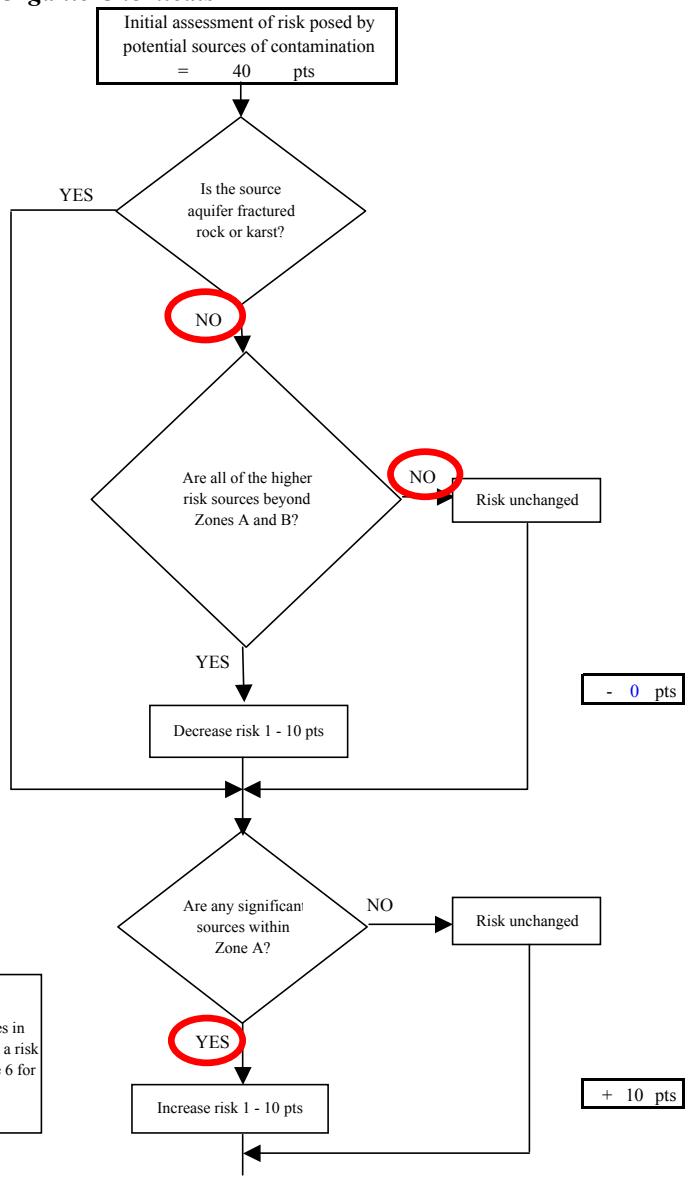
	Zone A	Zones B&C	Total
Very Highs(s)	1	0	1
High(s)	0	0	0
Medium(s)	3	0	3
Low(s)	10	2	12

	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.



- 0 pts

+ 10 pts

Chart 11. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Synthetic Organic Chemicals

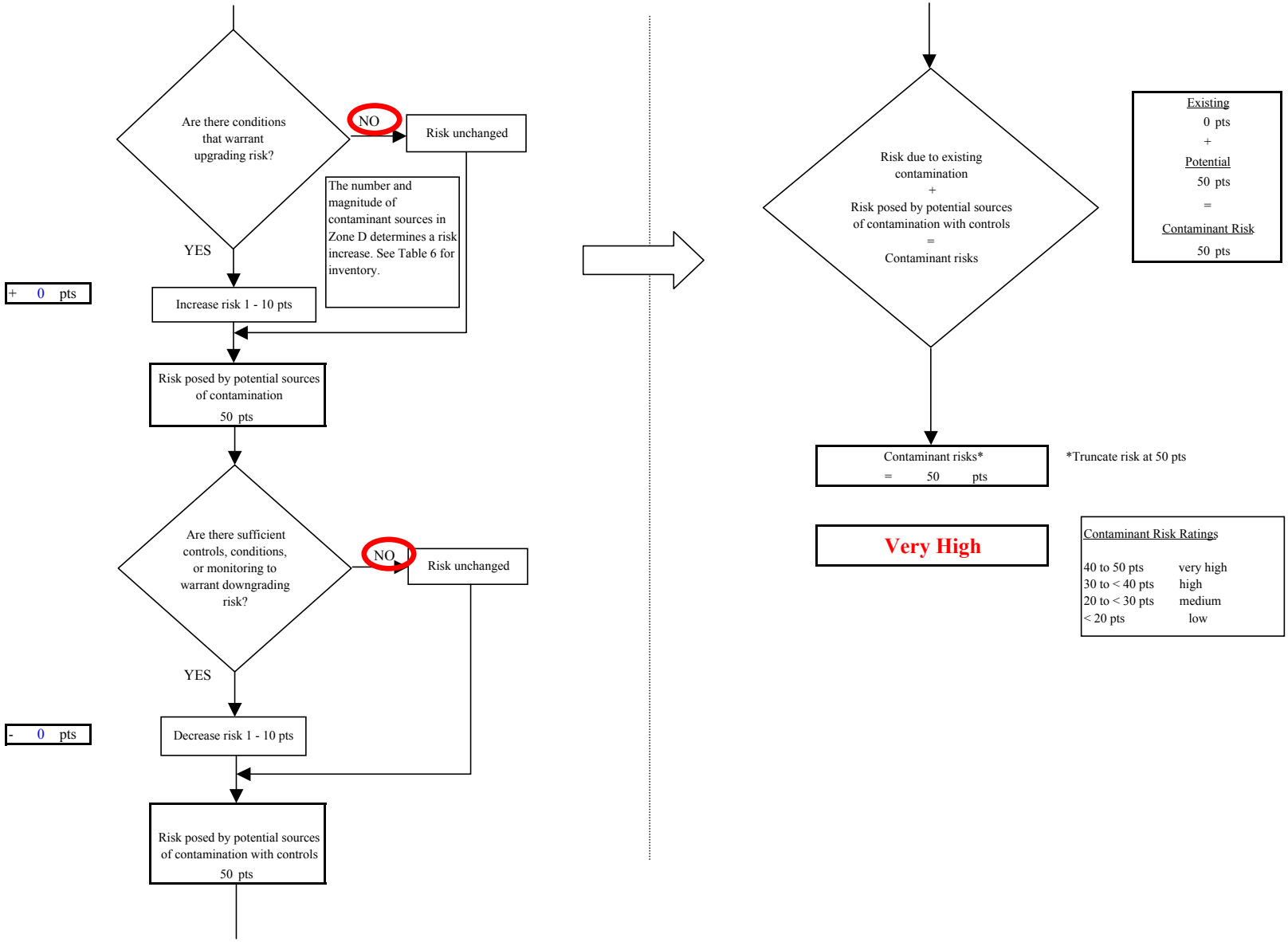


Chart 12. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Synthetic Organic Chemicals

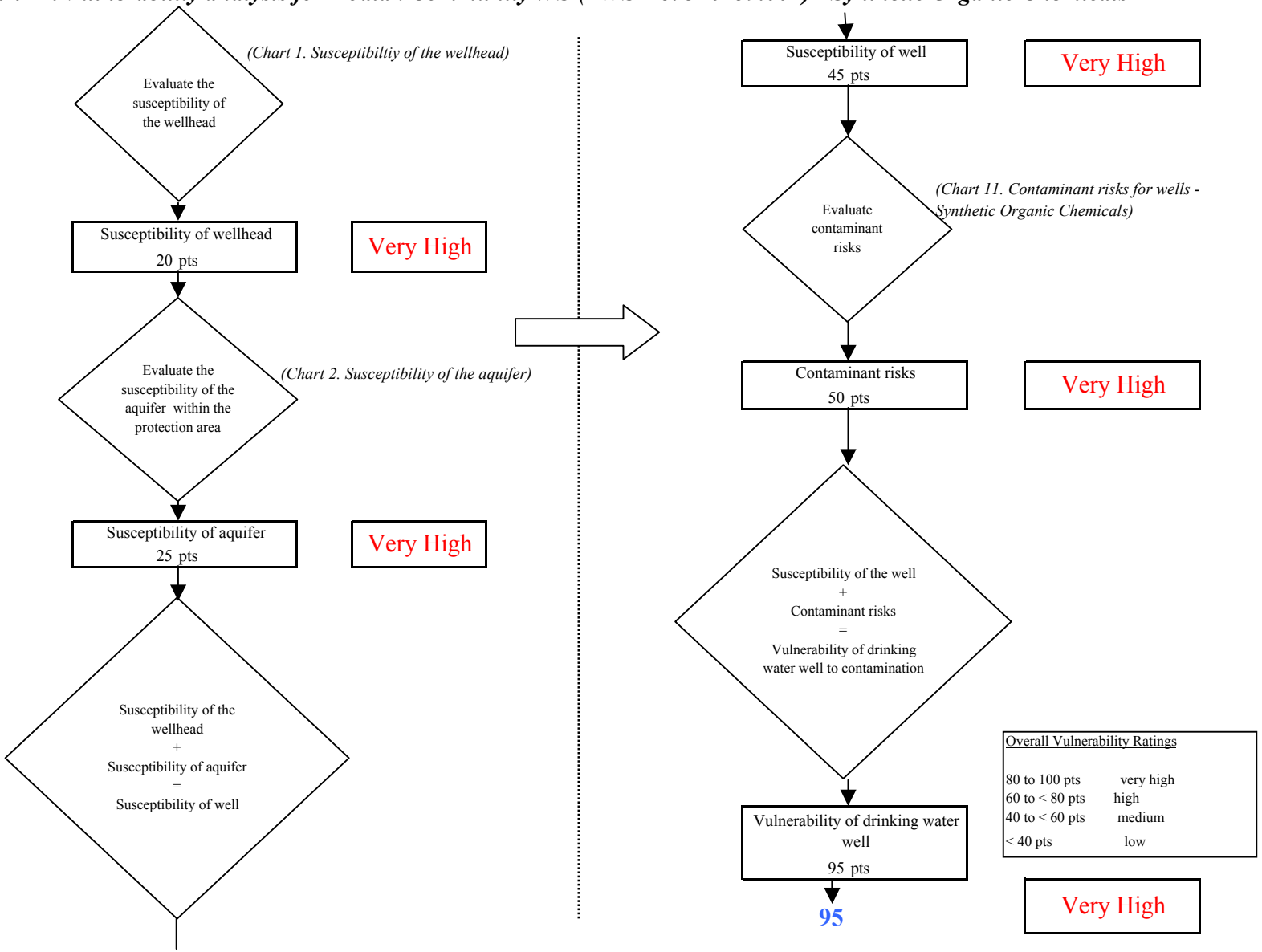


Chart 13. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Other Organic Chemicals

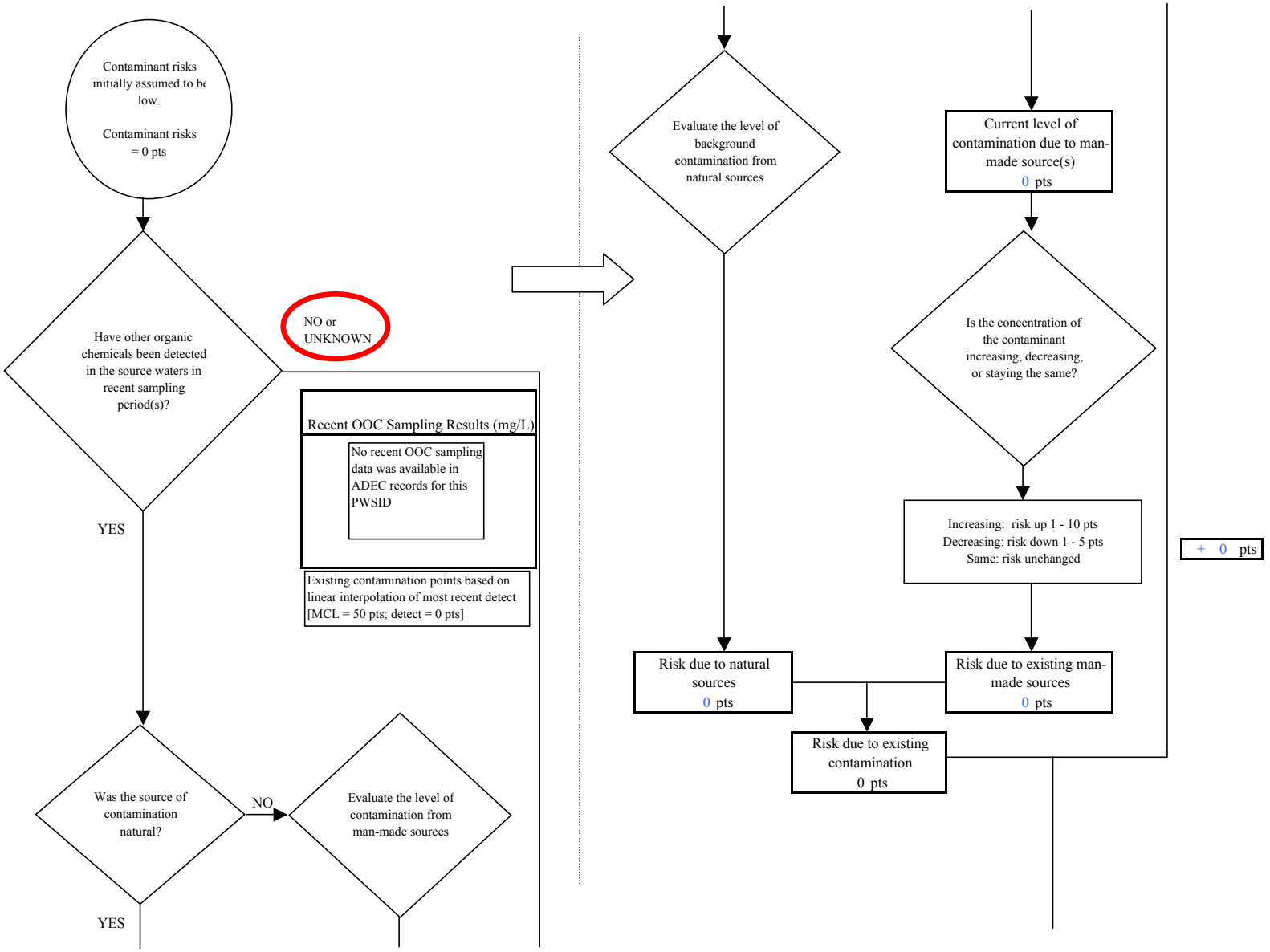
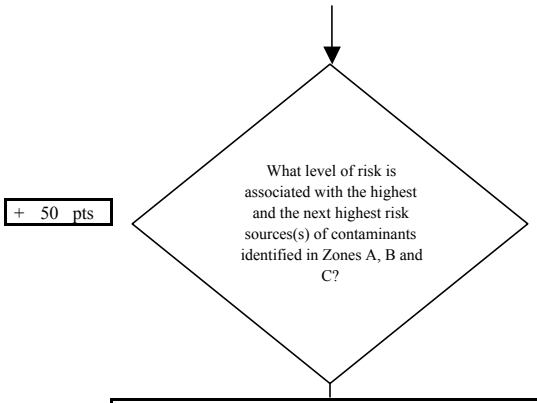


Chart 13. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Other Organic Chemicals



+ 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)	4	0	4
Low(s)	6	0	6

	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.

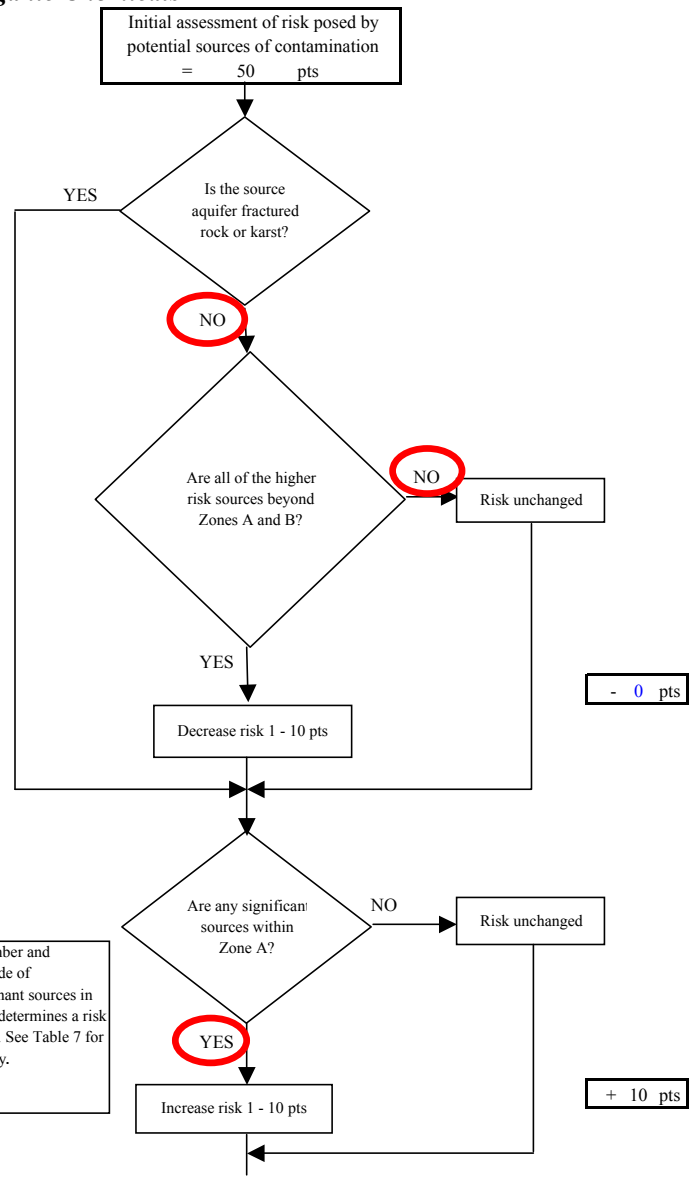


Chart 13. Contaminant risks for Noatak Community WS (PWS No. 340159.001) - Other Organic Chemicals

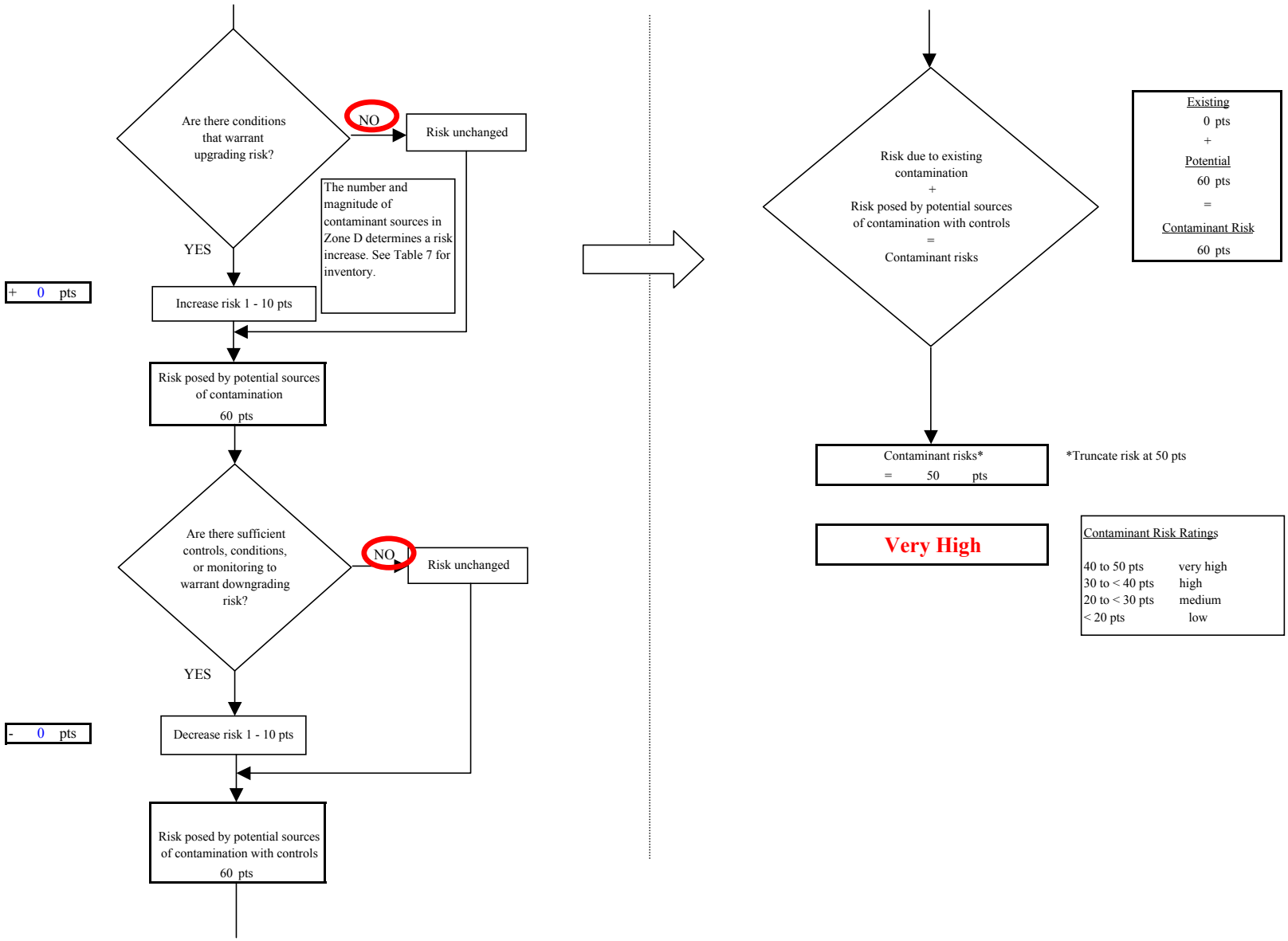


Chart 14. Vulnerability analysis for Noatak Community WS (PWS No. 340159.001) - Other Organic Chemicals