Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Alaska Pure Mountain Spring Water, Juneau, Alaska PWSID #111241

DRINKING WATER PROTECTION PROGRAM REPORT NO. 702

Alaska Department of Environmental Conservation

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Alaska Pure Mountain Spring Water
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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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Source Water Assessment for Alaska Pure Mountain Spring Water, Juneau, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system for Alaska Pure Mountain Spring Water is a Class B (transient/non-community) water system consisting of one spring from an unnamed spring located at the headwaters of Switzer Creek, northwest of Juneau, Alaska. The spring received a susceptibility rating of **Medium**, and the aquifer a susceptibility rating of **High**. Combining these two ratings produces a **Medium** rating for the natural susceptibility of the spring. Identified potential and current sources of contaminants for Alaska Pure Mountain Spring Water public drinking water source includes construction trade areas and materials; dry cleaners; lawn and garden supplies/services; landfills; metals mining; sand, gravel, rock quarries; underground closed diesel tanks; open leaking underground fuel storage tanks; paved highways and roads; and dirt/gravel highways and roads. These identified potential and existing sources of contamination include sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Overall, the public water sources for Alaska Pure Mountain Spring Water received a vulnerability rating of **Low** for bacteria and viruses; **Medium** for nitrates and nitrites; and **High** for volatile organic chemicals.

ALASKA PURE MOUNTAIN SPRING WATER PUBLIC DRINKING WATER SYSTEM

Alaska Pure Mountain Spring Water public water system is a Class B (transient/non-community) water system. The system consists of one spring, referred to as Switzer Spring, located at the base of Heinztleman Ridge, Thunder Mountain, near Juneau, across from Juneau, Alaska (See Map 1 of Appendix A).

Downtown Juneau averages about 92 inches of precipitation per year, while near the airport averages approximately 54 inches annually; snowfall is approximately 101 inches of snow. The groundwater aquifers underlying the area are recharged through the infiltration of precipitation and surface water. Groundwater aquifers in the region generally occur in the fractured bedrock and unconsolidated sediments deposited by glaciers and/or rivers. Topography for this area varies from near sea level along the Gastineau Channel to approximately 3,500 feet at Heinztleman Ridge northeast of Alaska Pure Mountain Spring Water.

According to a Sanitary Survey from April 30, 1990, the spring is enclosed by a permanent structure, was not susceptible to flooding, and the intake was adequately constructed. An adequately constructed intake may provide protection against debris and contaminants from entering the system. The spring was determined to not be under the direct influence of surface water in 1997. The raw water is filtered and disinfected. There is a potential for runoff within the area surrounding the spring.

This system operates year round and serves customers through one connection.

ALASKA PURE MOUNTAIN SPRING WATER 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 spring. Some areas are more likely to allow contamination to reach the spring than others. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and intake.

The most probable area for contamination to reach the spring intake is the area that contributes water to the perched aquifer area. This area is designated as the Drinking Water Protection Area (DWPA). Because a release of contaminants within the DWPA are most likely to impact the drinking water, this area will serve as the focus for voluntary protection efforts.

The DWPAs established for springs by ADEC are separated into three zones. These zones correspond to differences in the aerial distances from the spring intake and the entire watershed boundary. Little is known about the time of travel for contaminants, thus conservative distances have been established to provide protection for the spring. The following is a summary of the three DWPA zones and the calculations for each.

Table 1. Definition of Zones

Zone	Definition
A	1,000 feet from the Spring
B	1 mile from the Spring
C	Entire Watershed

The DWPA for Alaska Pure Mountain Spring Water encompasses the entire drainage of Lemon Creek. Development in the vicinity of the spring intake is limited to Zone B (See Map 1 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 Alaska Pure Mountain Spring Water 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 B public water system assessments, three categories of drinking water contaminants were inventoried. They include:

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

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 TOT 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.

VULNERABILITY OF ALASKA PURE MOUNTAIN SPRING WATER DRINKING WATER SYSTEM

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

- Natural susceptibility; and
- Contaminant risks.

Each of the three categories of drinking water contaminants has been analyzed and an overall vulnerability score of 30 to 100 is ultimately assigned:

Natural Susceptibility (30 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

Vulnerability of the
Drinking Water Source to Contamination (30 – 100).

A score for the Natural Susceptibility is achieved by analyzing the properties of the Spring water source.

Natural Susceptibility
(Susceptibility of the Spring Water Source)
(30 – 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 spring intake for Alaska Pure Mountain Spring Water spring is located at the headwaters of Switzer Creek, northwest of Juneau, Alaska. Because the spring is recharged by groundwater, surface water runoff and precipitation, contaminants at or near the spring have the potential to adversely impact this drinking water source. Table 2 shows the Susceptibility scores and ratings for Alaska Pure Mountain Spring Water.

Table 2. Susceptibility

	Score	Rating
Susceptibility of the Spring	10	Medium
Susceptibility of the Aquifer	16	High
Natural Susceptibility	26	Medium

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. This data has been derived from an examination of existing or historical contamination

that has been detected at the drinking water source through routine sampling. It also evaluates potential sources of contamination. Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 3. Contaminant Risks

Category	Score	Rating
Bacteria and Viruses	10	Low
Nitrates and/or Nitrites	23	Medium
Volatile Organic Chemicals	35	High

Appendix D contains eight 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 Spring Outlet/Intake' to contamination by looking at the construction of the intake and its surrounding area and naturally-occurring attributes of the water source and influences on the groundwater system that might lead to contamination. Chart 2 analyzes the 'Susceptibility of the Aquifer.' 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 spring. Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses.' Charts 5 through 8 contain the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites and volatile organic chemicals, respectively.

Table 4 contains the overall vulnerability scores (30 - 100) and ratings for each of the three categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

Table 4. Overall Vulnerability

Category	Score	Rating
Bacteria and Viruses	35	Low
Nitrates and Nitrites	50	Medium
Volatile Organic Chemicals	60	High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Low** with the dry cleaners; landfills; paved highways and roads representing the risk to this source of public drinking water (See Chart 2 – Contaminant Risks for Bacteria and Viruses in Appendix D).

Only a small amount of bacteria and viruses are required to endanger public health. Bacteria and viruses have not been detected during recent water sampling of the system at the Alaska Pure Mountain Spring Water. Combining the contaminant risks with the overall natural susceptibility of the spring, the vulnerability of the spring to contamination by bacteria and viruses is **Low**.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is **Medium** with the with the dry cleaners; lawn and garden supplies/services; metals mining; sand, gravel and rock quarries; and paved highways and roads representing the risk to this source of public drinking water (See Chart 4 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D).

Sampling history for Alaska Pure Mountain Spring Water indicates that nitrates have been detected in the water, but only in very low concentrations (most recently at 0.620 mg/L on 8/31/1999) or 6% of the Maximum Contaminant Level (MCL). The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects. Due to the high solubility and weak retention by soil, nitrates are very mobile, moving at approximately the same rate as water.

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

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **High** with the construction trade areas and materials; dry cleaners; landfills; metals mining; sand, gravel and roc quarries; closed underground diesel tanks; and paved highways and roads creating the only known risk for Volatile Organic Chemicals (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Sampling history indicates that volatile organic chemicals have not been detected in the water. Combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the spring, the overall vulnerability of the spring to contamination by volatile organic chemicals is **High**.

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APPENDIX A

Alaska Pure Mountain Spring Water
Drinking Water Protection Area Location Map
(Map 1)

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Alaska Pure Mountain Spring Water (Tables 1-4)

Table 1 *Contaminant Source Inventory for* ***PWSID 111241.001***

Alaska Pure Mountain Spring Water

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Construction trade areas and materials	C09	C09-1	B	2	Juneau Home Repair (5980 Lemon St.)
Dry cleaners	C10	C10-1	B	2	Alaska Sterile Laundry Service (2000 Lemon Creek Rd.)
Lawn and garden supplies/services	C23	C23-1	B	2	Lockhart's Tree Service (1845 Alaska Ave.)
Incinerators (municipal wastes)	D21	D21-1	B	2	Juneau Incinerator
Metals mining, open pit (active or inactive?)	E03	E03-1	B	2	Ace Lode Surface Pit
Metals mining, placer (active or inactive?)	E04	E04-1	B	2	Lucky Lou Placer
Metals mining, placer (active or inactive?)	E04	E04-2	B	2	Lemon Creek Placer
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	2	Hildre Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-2	B	2	Horns Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-3	B	2	Knapp Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-4	B	2	Lemon Creek Gravel Pit
Tanks, heating oil, residential (above ground)	R08	R08-1	B	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-2	B	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-3	B	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-4	B	2	Residence South of Alaska Pure Mountain Spring Water
Closed tanks, diesel (underground)	T09	T09-1	B	2	Lemon Creek Correctional Center (2000 Davis Dr.)
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-1	B	2	Lemon Creek Correctional Center (2000 Davis Dr.)
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	2	Road in Lemon Creek Area

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-15	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-16	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-17	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	2	Road in Lemon Creek Area
Metals mining, open pit (active or inactive?)	E03	E03-2	C	2	Clark Pit
Metals mining, open pit (active or inactive?)	E03	E03-3	C	2	Lemon Creek Surface Pit

Contaminant Source Inventory and Risk Ranking for

Table 2 ***PWSID 111241.001***

Alaska Pure Mountain Spring Water

Sources of Bacteria and Viruses

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Dry cleaners	C10	C10-1	B	Low	2	Alaska Sterile Laundry Service (2000 Lemon Creek Rd.)
Incinerators (municipal wastes)	D21	D21-1	B	Medium	2	Juneau Incinerator
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-15	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-16	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-17	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	Road in Lemon Creek Area

Contaminant Source Inventory and Risk Ranking for

Table 3 ***PWSID 111241.001***

Alaska Pure Mountain Spring Water

Sources of Nitrates/Nitrites

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Dry cleaners	C10	C10-1	B	Low	2	Alaska Sterile Laundry Service (2000 Lemon Creek Rd.)
Lawn and garden supplies/services	C23	C23-1	B	Medium	2	Lockhart's Tree Service (1845 Alaska Ave.)
Incinerators (municipal wastes)	D21	D21-1	B	Low	2	Juneau Incinerator
Metals mining, open pit (active or inactive?)	E03	E03-1	B	Low	2	Ace Lode Surface Pit
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	Low	2	Hildre Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-2	B	Low	2	Horns Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-3	B	Low	2	Knapp Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-4	B	Low	2	Lemon Creek Gravel Pit
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-15	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-16	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-17	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Road in Lemon Creek Area

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	Road in Lemon Creek Area
Metals mining, open pit (active or inactive?)	E03	E03-2	C	Low	2	Clark Pit
Metals mining, open pit (active or inactive?)	E03	E03-3	C	Low	2	Lemon Creek Surface Pit

Contaminant Source Inventory and Risk Ranking for

Table 4 ***PWSID 111241.001***

Alaska Pure Mountain Spring Water

Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Construction trade areas and materials	C09	C09-1	B	Low	2	Juneau Home Repair (5980 Lemon St.)
Dry cleaners	C10	C10-1	B	High	2	Alaska Sterile Laundry Service (2000 Lemon Creek Rd.)
Incinerators (municipal wastes)	D21	D21-1	B	Low	2	Juneau Incinerator
Metals mining, open pit (active or inactive?)	E03	E03-1	B	Medium	2	Ace Lode Surface Pit
Quarries (sand, gravel, rock, other?)	E10	E10-1	B	Low	2	Hildre Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-2	B	Low	2	Horns Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-3	B	Low	2	Knapp Gravel Pit
Quarries (sand, gravel, rock, other?)	E10	E10-4	B	Low	2	Lemon Creek Gravel Pit
Tanks, heating oil, residential (above ground)	R08	R08-1	B	Medium	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-2	B	Medium	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-3	B	Medium	2	Residence South of Alaska Pure Mountain Spring Water
Tanks, heating oil, residential (above ground)	R08	R08-4	B	Medium	2	Residence South of Alaska Pure Mountain Spring Water
Closed tanks, diesel (underground)	T09	T09-1	B	Medium	2	Lemon Creek Correctional Center (2000 Davis Dr.)
Highways and roads, paved (cement or asphalt)	X20	X20-1	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-10	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-11	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-12	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low	2	Road in Lemon Creek Area

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-15	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-16	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-17	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-2	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-3	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-4	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-5	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-6	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-7	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-8	B	Low	2	Road in Lemon Creek Area
Highways and roads, paved (cement or asphalt)	X20	X20-9	B	Low	2	Road in Lemon Creek Area
Metals mining, open pit (active or inactive?)	E03	E03-2	C	Medium	2	Clark Pit
Metals mining, open pit (active or inactive?)	E03	E03-3	C	Medium	2	Lemon Creek Surface Pit

APPENDIX C

Alaska Pure Mountain Spring Water Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map 2)

APPENDIX D

Vulnerability Analysis for Alaska Pure Mountain Spring Water Public Drinking Water Source

(Charts 1-8)

Chart 1. Susceptibility of the spring outlet/intake - AK Pure Mountain Spring Water

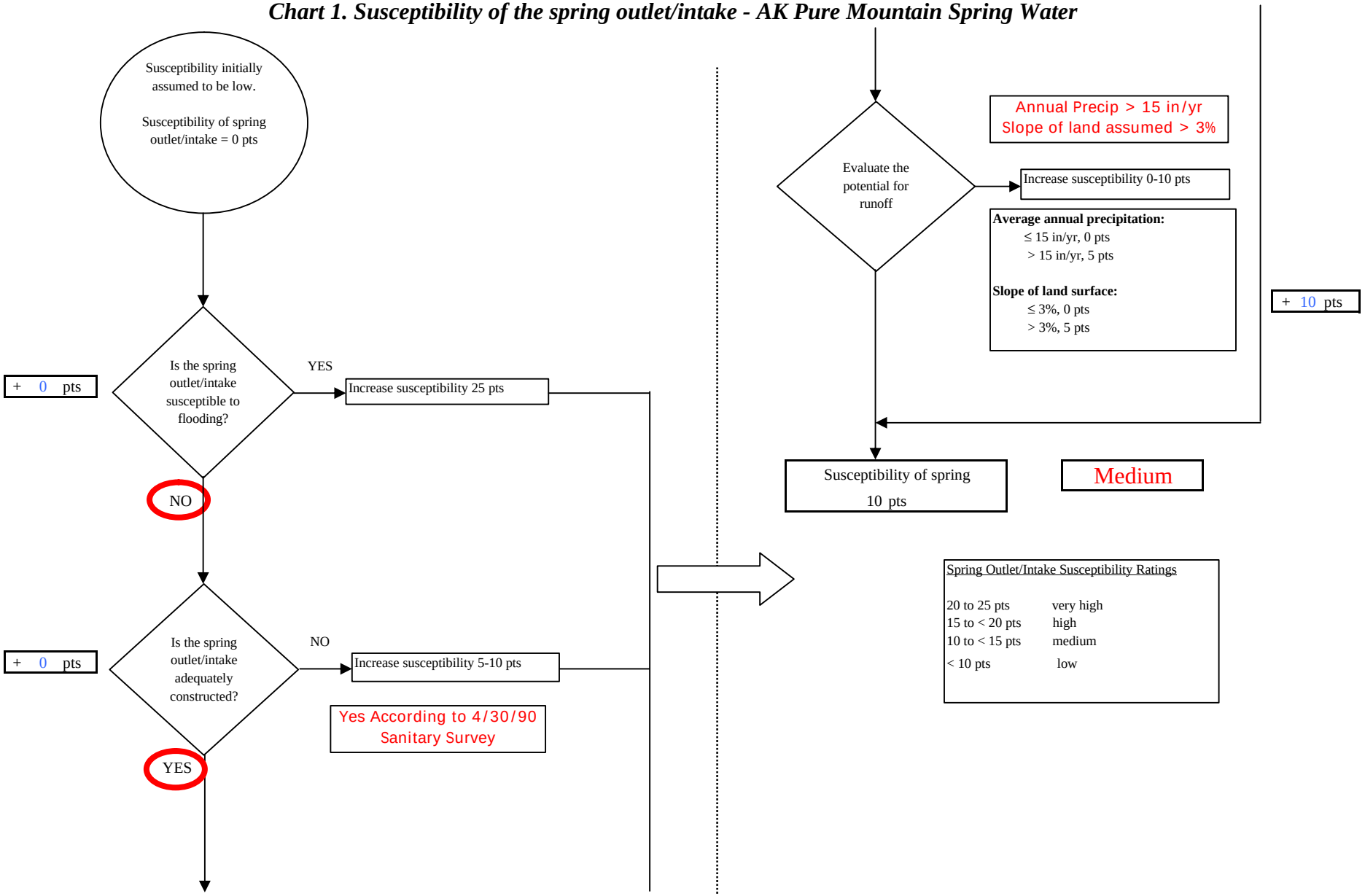


Chart 2. Susceptibility of the aquifer - AK Pure Mountain Spring Water

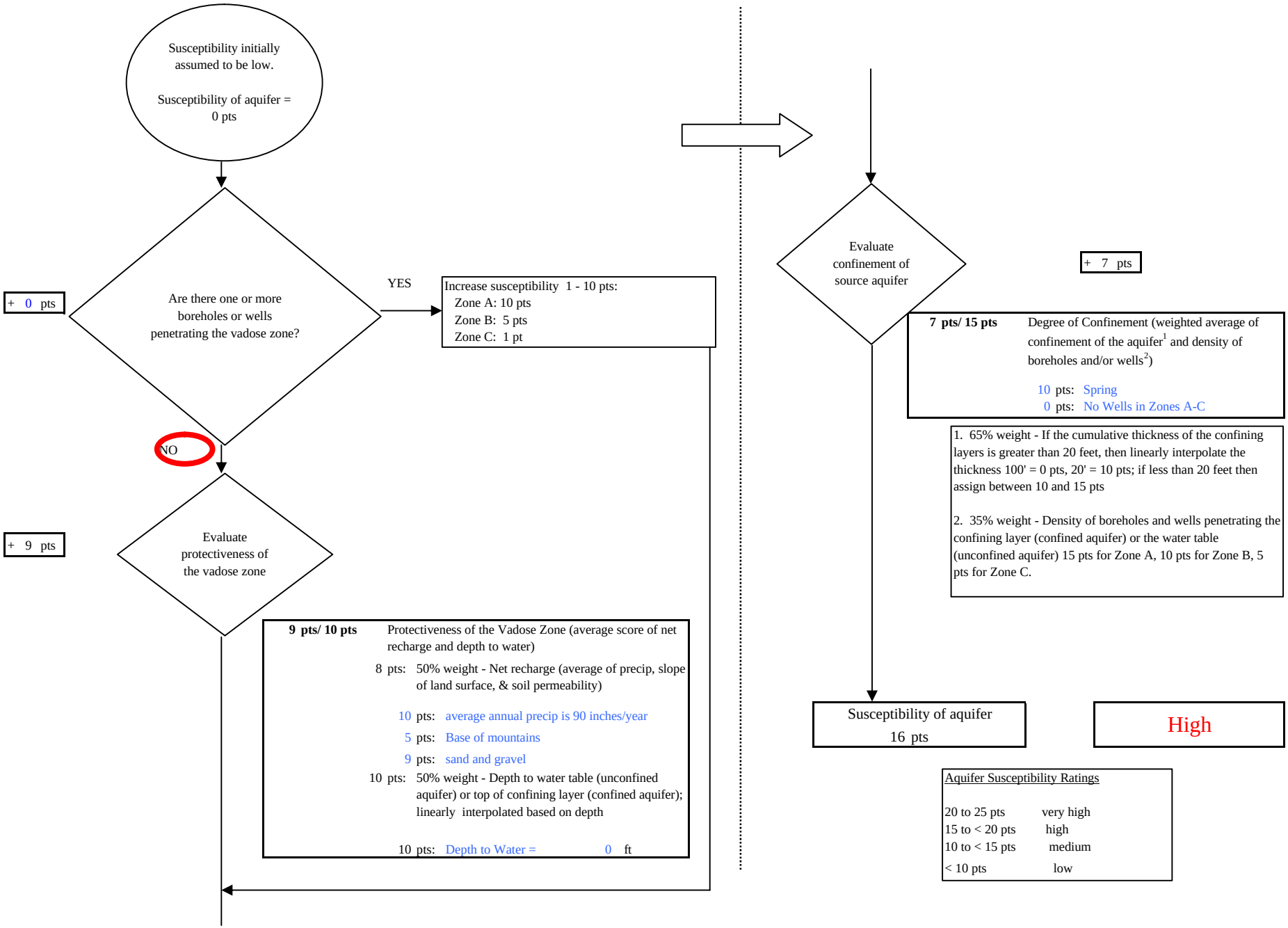
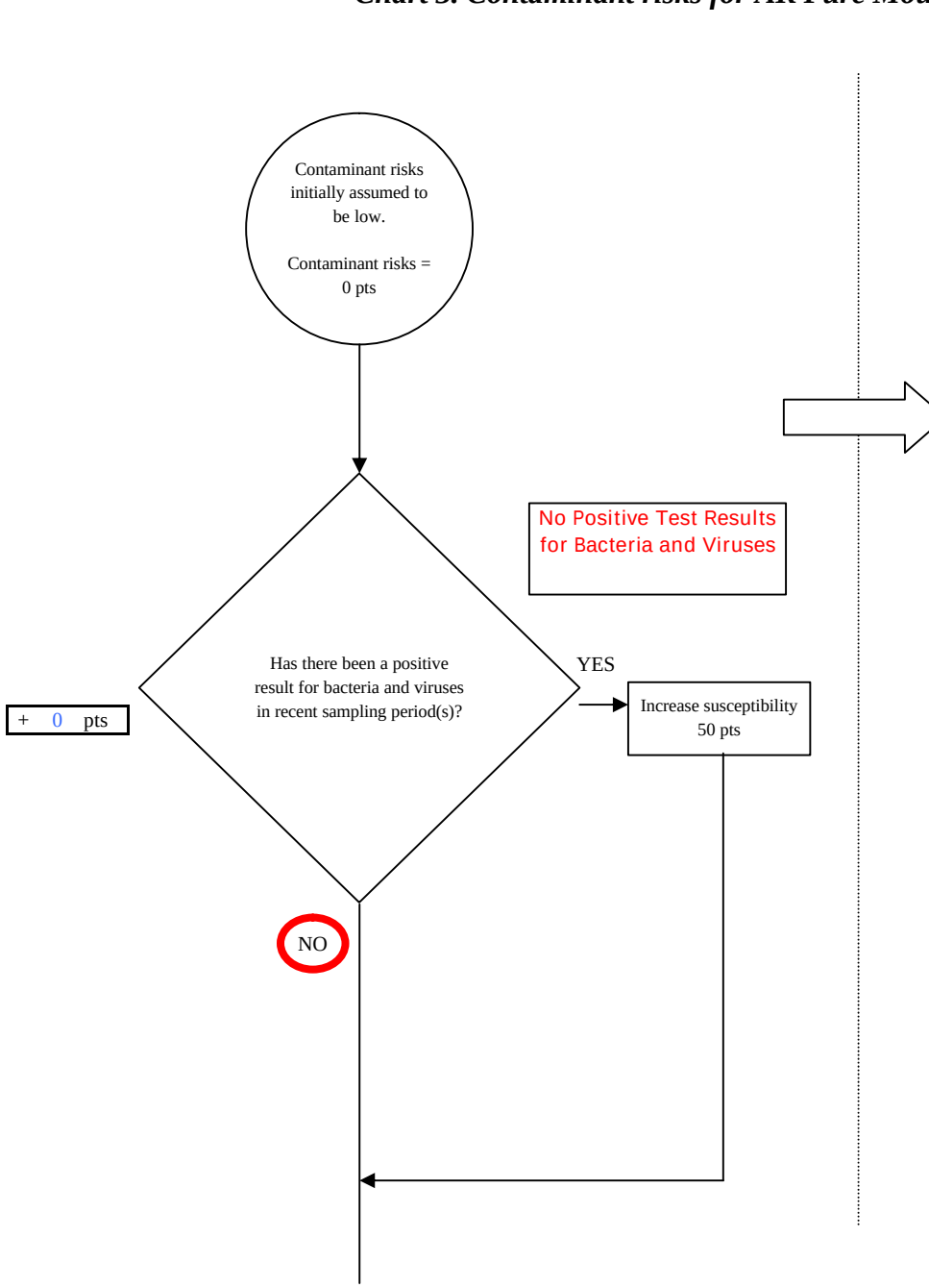
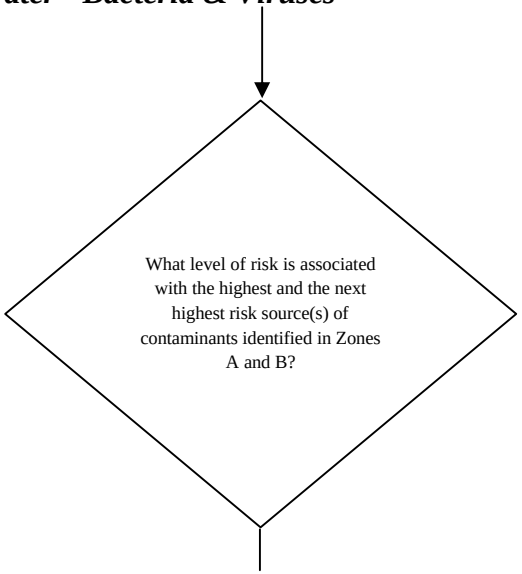


Chart 3. Contaminant risks for AK Pure Mountain Spring Water - Bacteria & Viruses





+ 20 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)	0	0	0
Medium(s)	0	1	1
Low(s)	0	2	2

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	[3] 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 20

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 AK Pure Mountain Spring Water - Bacteria & Viruses

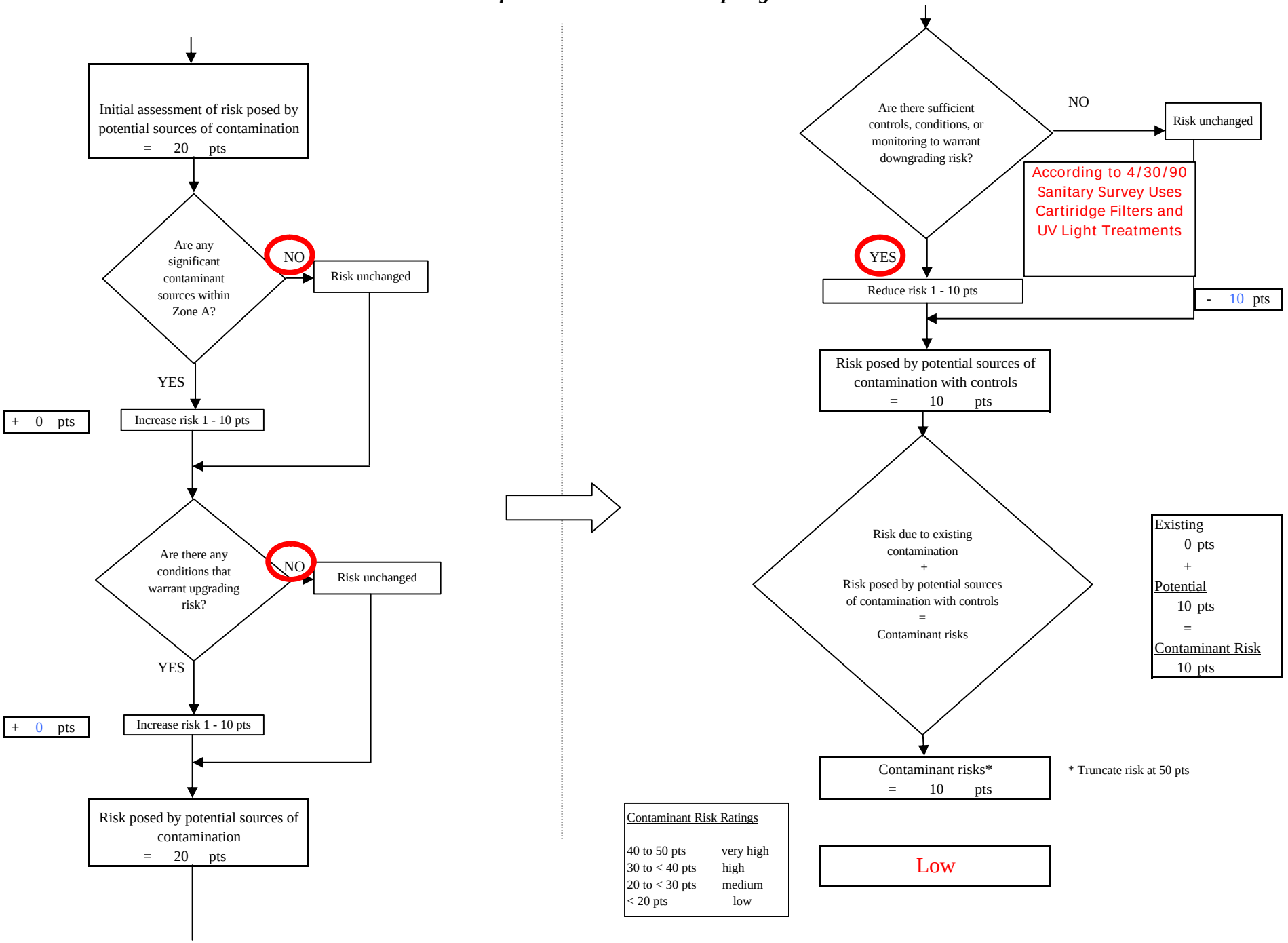


Chart 4. Vulnerability analysis for AK Pure Mountain Spring Water - Bacteria & Viruses

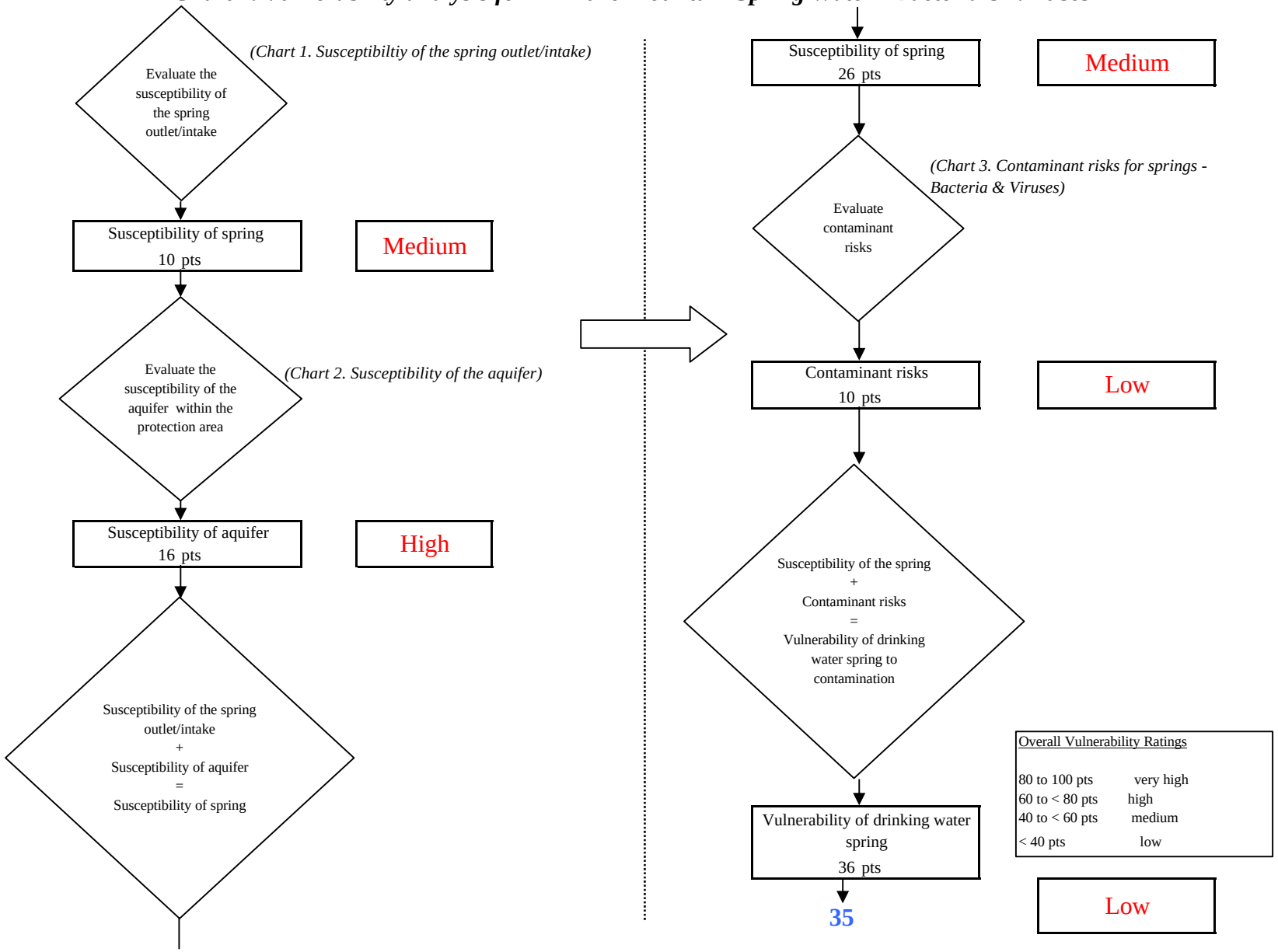


Chart 5. Contaminant risks for AK Pure Mountain Spring Water - Nitrates and Nitrites

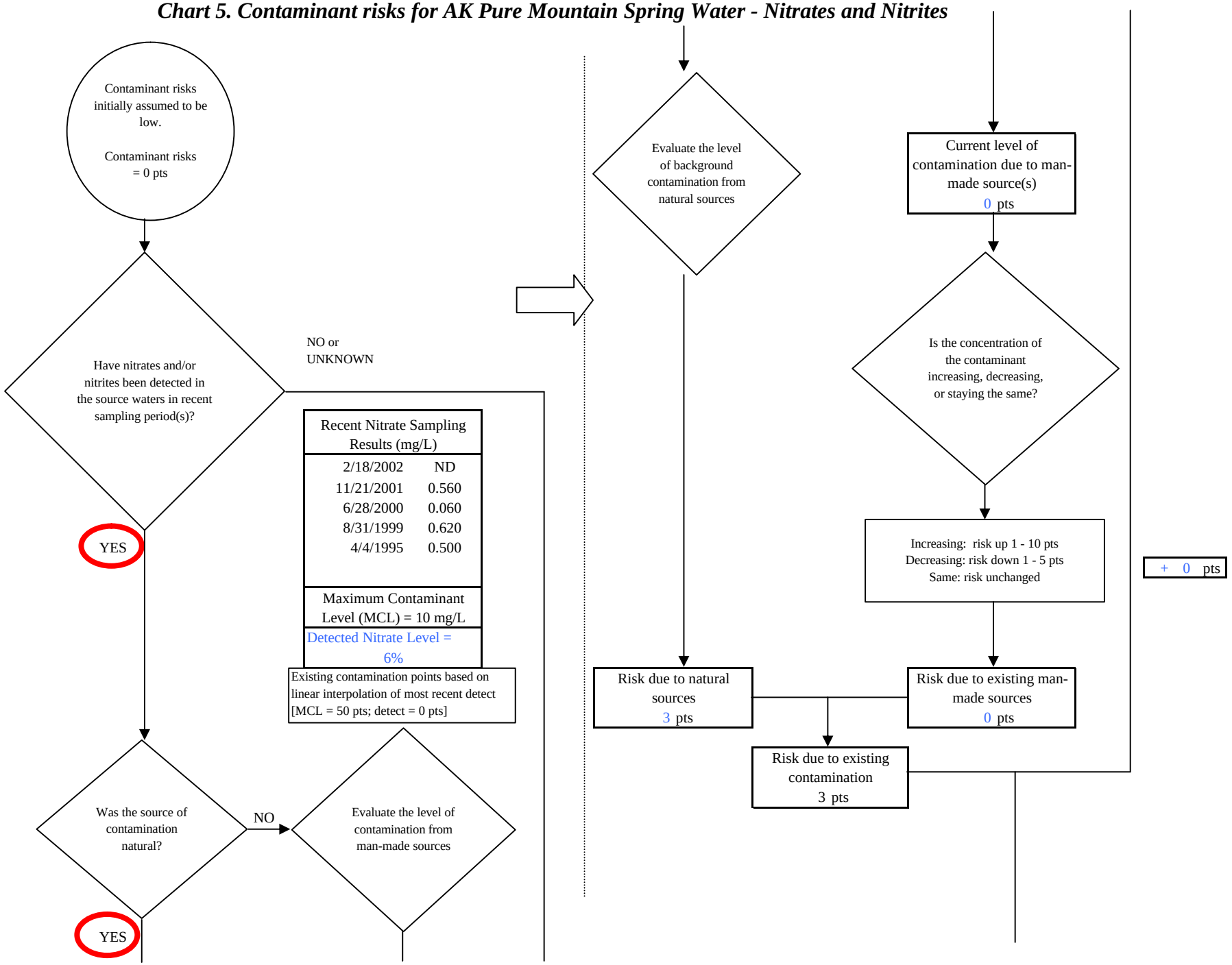


Chart 5. Contaminant risks for AK Pure Mountain Spring Water - Nitrates and Nitrites

+ 20 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A and B? (see Risk Matrix below)

Initial assessment of risk posed by potential sources of contamination = 20 pts

Are any significant sources in Zone A?

NO → Risk unchanged → + 0 pts

YES → Increase risk 1 - 10 pts

Risk Levels for Contaminant Sources identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	1	1
Low(s)	0	8	8

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	[3] 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 20

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 5. Contaminant risks for AK Pure Mountain Spring Water - Nitrates and Nitrites

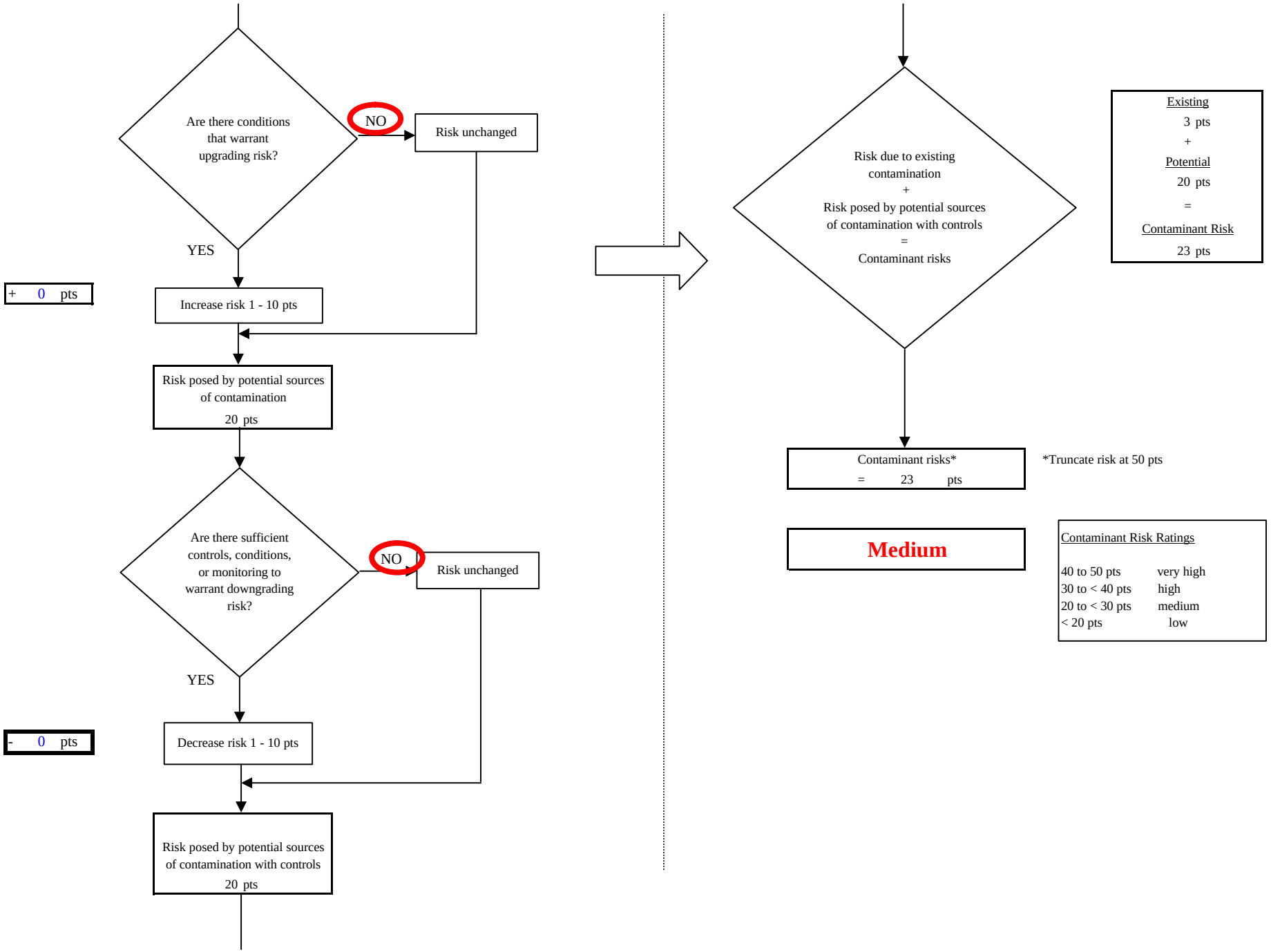


Chart 6. Vulnerability analysis for AK Pure Mountain Spring Water - Nitrates and Nitrites

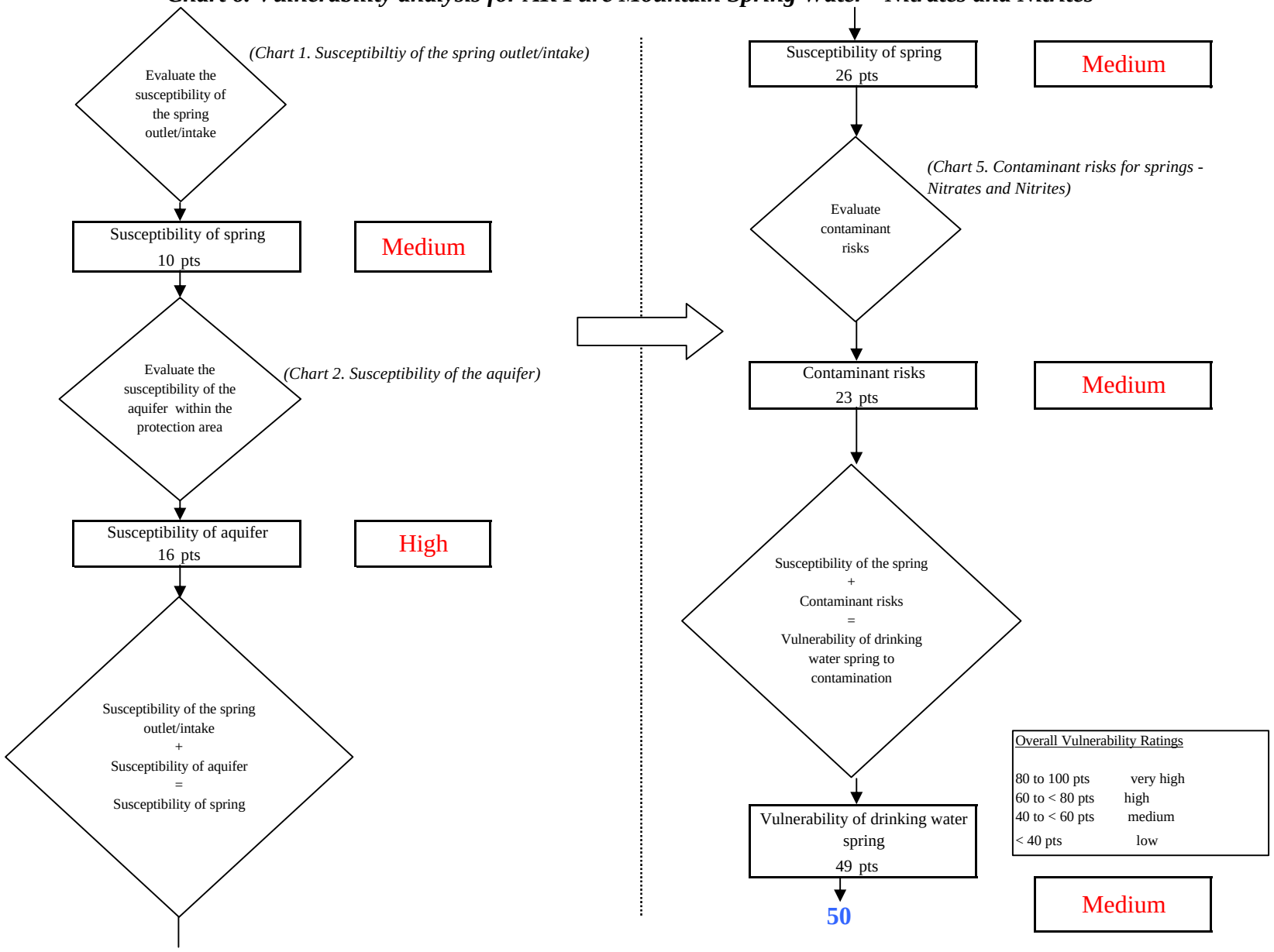


Chart 7. Contaminant risks for AK Pure Mountain Spring Water - Volatile Organic Chemicals

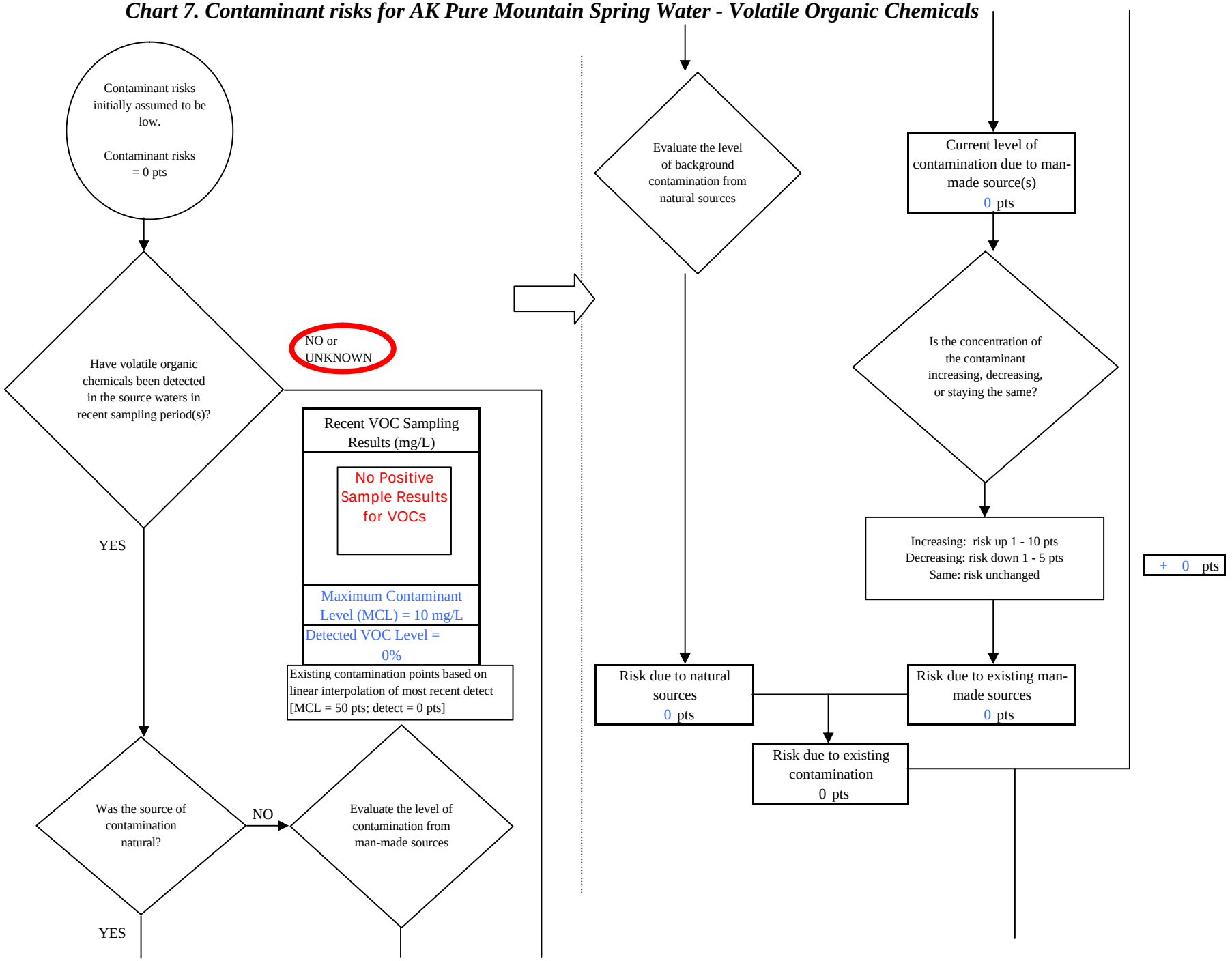


Chart 7. Contaminant risks for AK Pure Mountain Spring Water - Volatile Organic Chemicals

+ 35 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zone A and B? (see Risk Matrix below)

Initial assessment of risk posed by potential sources of contamination = 35 pts

Are any significant sources in Zone A?

NO → Risk unchanged → + 0 pts

YES → Increase risk 1 - 10 pts

Risk Levels for Contaminant Sources identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	1	1
Medium(s)	0	6	6
Low(s)	0	7	7

	LOW 10 pts	**MEDIUM** 20 pts	**HIGH** 30 pts	**VERY HIGH** 40 pts
LOW	[3] 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 35

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 7. Contaminant risks for AK Pure Mountain Spring Water - Volatile Organic Chemicals

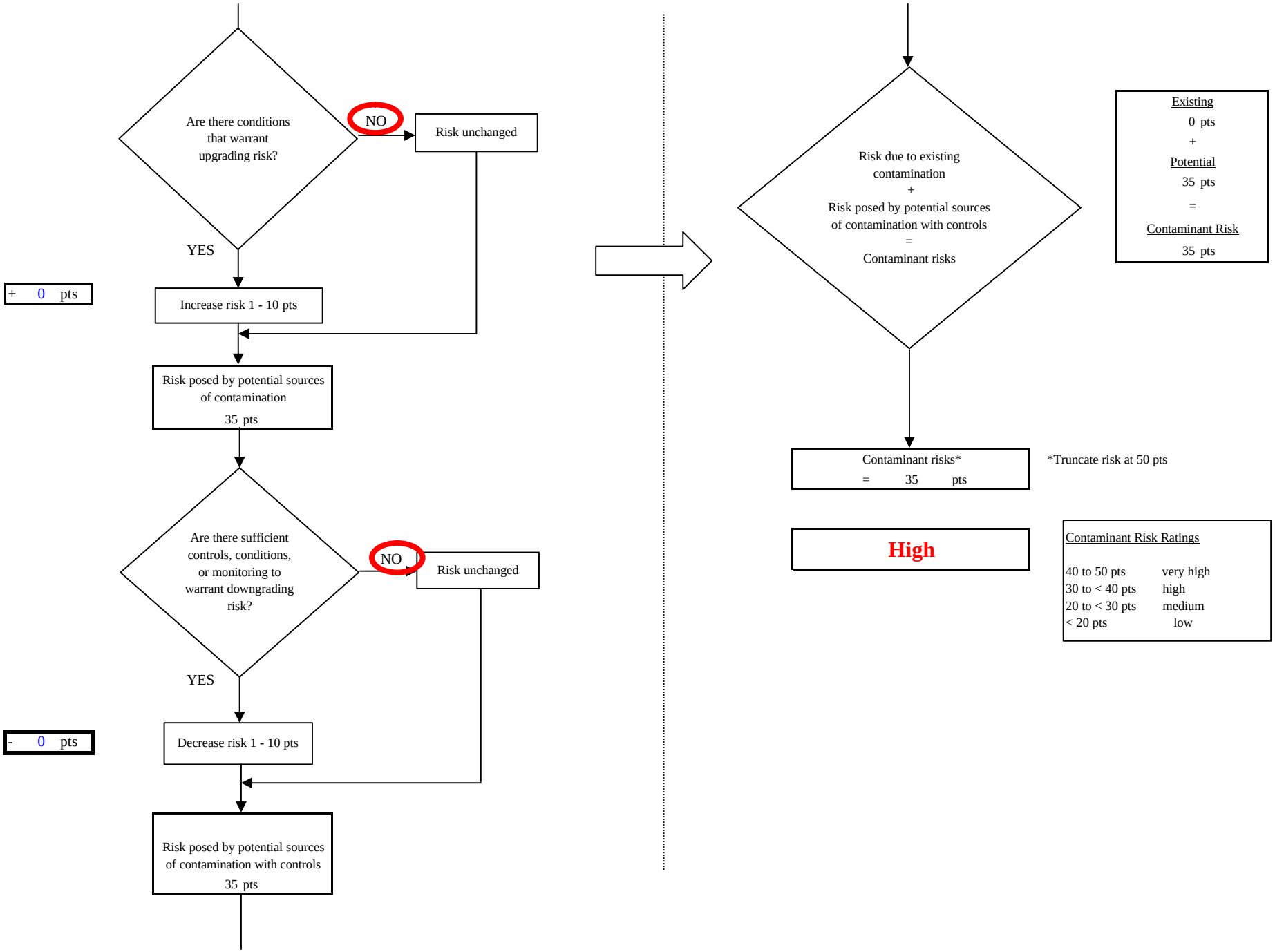


Chart 8. Vulnerability analysis for AK Pure Mountain Spring Water - Volatile Organic Chemicals