Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Bartlett Cove Water System, Gustavus, Alaska PWSID #130198

DRINKING WATER PROTECTION PROGRAM REPORT NO. 705

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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Source Water Assessment for Bartlett Cove Water System, Gustavus, Alaska

Drinking Water Protection Program
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EXECUTIVE SUMMARY

The public water system for Bartlett Cove Water System is a Class B (transient/non-community) water system consisting of one surface water intake from Alder Creek in Bartlett Cove, Alaska. The system's intake is located approximately 500 feet from the shoreline and is accessible via gravel road. The surface water intake received a susceptibility rating of **Very High**. A rating of High to Very High is typical for all surface water systems. There are no identified potential and current sources of contaminants for Bartlett Cove Water System public drinking water source. Identified potential and existing source of contamination include sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Contaminant sources could potentially contribute bacteria and viruses; nitrates and nitrites; and volatile chemical compounds into the source waters. Overall, the public water sources for Bartlett Cove Water System received a vulnerability rating of **Medium** for bacteria and viruses, and nitrates and nitrites; and **High** for volatile organic chemicals.

BARTLETT COVE WATER SYSTEM PUBLIC DRINKING WATER SYSTEM

Bartlett Cove Water System public water system is a Class B (transient/non-community) water system. The system consists of one surface water intake from Alder Creek in Gustavus, Alaska (please see the inset of Map 1 in Appendix A for location). The population of Gustavus is approximately 380.

Gustavus averages about 75 inches of precipitation per year; and approximately 103 inches of snow. The groundwater sources underlying the area are recharged through the infiltration of precipitation and surface water. Groundwater sources in the region generally occur in the fractured bedrock and unconsolidated sediments deposited by glaciers and/or rivers.

The Gustavus area topography varies from near sea level along Icy Strait on one side to 4,300 feet to the Chilkat Range and Fairweather Mountains surrounding Gustavus.

The most recent Site Plan (September 29, 1998) indicates that the surface water intake is screened. The capacity of the systems is estimated at 40,000 gallons per day (gpd); the average daily production during the summer months is 25-30,000 gpd, and 5-10,000 gpd during the winter. The survey indicates that the intake was adequately constructed. An adequately constructed intake may provide protection against debris and contaminants from entering the system. The raw water is treated by filtration and chlorination. There is a potential for runoff within the area surrounding the surface water.

This system operates year-round and serves 14 residents and more than 1,000 on-residents through one service connection.

BARTLETT COVE WATER SYSTEM 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 creek. These areas are determined by looking at the characteristics of the creek, surrounding contaminant sources, and the intake.

The most probable area for contamination to reach the drinking water system is the area that contributes water to the surface water body that water is being drawn from. This area is designated as the Drinking Water Protection Area (DWPA). Because releases of contaminants within the DWPA are most likely to impact the drinking water system, this area will serve as the focus for voluntary protection efforts.

The size and shape of the DWPAs were established based on aerial distances from the surface water body, and the watershed that recharges the surface water body. Please refer to the Guidance Manual for Class B Public Water Systems for additional information.

The DWPAs established for surface water systems by the ADEC are separated into three zones. These zones correspond to different distances from the surface water body, and the entire watershed that recharges the surface water body. The following is a summary of the three DWPA zones and their definitions.

Table 1. Definition of Zones

Zone	Definition
A	1,000 feet from the Surface Water Body
B	1 mile from the Surface Water Body
C	Entire Watershed

The DWPA for Bartlett Cove Water System extends over the entire watershed. Development in the vicinity of the surface water intake is limited to Zone A (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 Bartlett Cove Water System DWPA. This inventory was completed through a search of agency records and other publicly-available information. Potential sources of contamination to the drinking water source 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 BARTLETT COVE WATER SYSTEM 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 surface water source.

Natural Susceptibility
(Susceptibility of the Surface Water Source)
(30 – 50 Points)

The surface water intake for Bartlett Cove Water System is from Alder Creek. Because the creek is recharged by surface water runoff and precipitation, contaminants at or near the creek have the potential to adversely impact this drinking water source. Table 2 shows the Overall Susceptibility score and rating for Bartlett Cove Water System.

Table 2. Natural Susceptibility

	Score	Rating
Natural Susceptibility	42	Very High

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	0	Low
Nitrates and/or Nitrites	0	Low
Volatile Organic Chemicals	49	Very High

Appendix D contains seven 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 Surface Water Source' 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 '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 intake. Chart 3 contains the 'Vulnerability Analysis for Bacteria and Viruses.' Charts 4 through 7 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	40	Medium
Nitrates and Nitrites	40	Medium
Volatile Organic Chemicals	90	Very High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Low** with no unnatural sources of contamination identified (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 Bartlett Cove Water System and filtration and disinfection of the raw water occurs. Combining the contaminant risks with the overall natural susceptibility of the surface water source, the vulnerability of the surface water source to contamination by bacteria and viruses is **Medium**.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is **Low** with no unnatural sources of contamination identified (See Chart 4 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D).

Sampling history for Bartlett Cove Water System indicates that nitrates have not been detected in the water. 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 surface water source, the overall vulnerability of the surface water source to contamination by nitrates and nitrites is **Medium**.

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Very High** and is primarily associated with the identification of volatile organic chemicals in the treated water. The chemicals reported were chemicals that are formed as byproducts of chlorination (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Recent analytical data (after August 2000) for the drinking water at Bartlett Cove is not available. However, after combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the surface water source, the overall vulnerability of the surface water source to contamination by volatile organic chemicals is **Very High**.

REFERENCES

Alaska Department of Community and Economic Development (ADCED), 2002 [WWW document]. URL http://www.dced.state.ak.us/mra/CF_BLOCK.cfm.

Alaska Geospatial Data Clearinghouse, 2003. URL: http://agdc.usgs.gov/data/datasets.html.

Gehrels, G.E., Berg, H.C., Geologic Map of Southeastern Alaska: U.S. Geological Survey Map (scale 1:600,000), Map I-1867, 1sheet.

King, P.B., compiler, 1969, Tectonic map of North America: US Geological Survey Map, (scale 1:5,000,000) 2 sheets.

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

APPENDIX A

Bartlett Cove Water System
Drinking Water Protection Area Location Map
(Map 1)

Glacier Bay Lodge

32

33

31

100

Location of Map

Map 1: Bartlett Cove Drinking Water Protection Areas

PWSID: 130198.001

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 550 1,100 2,200 3,300 4,400 Feet

1:9,678

Data Sources:

Background image - USGS 1:63,000 mapping

For this PWS, Zone C (the entire watershed) covers the same area as Zone B (1 Mile from surface waterbody)

Legend

- Public Drinking Water Systems
- Glacier Bay National Park

Zone A Protection Area
1000 Feet from Surface Water Body

Zone B Protection Area
1 Mile from Surface Water Body

Zone C Protection Area
Entire Watershed

N W E S

0 2 4 8 Miles

April 4, 2003

APPENDIX B

Vulnerability Analysis for Bartlett Cove Water System
Public Drinking Water Source
(Charts 1-7)

Chart 1. Susceptibility of the surface water source - Bartlett Cove

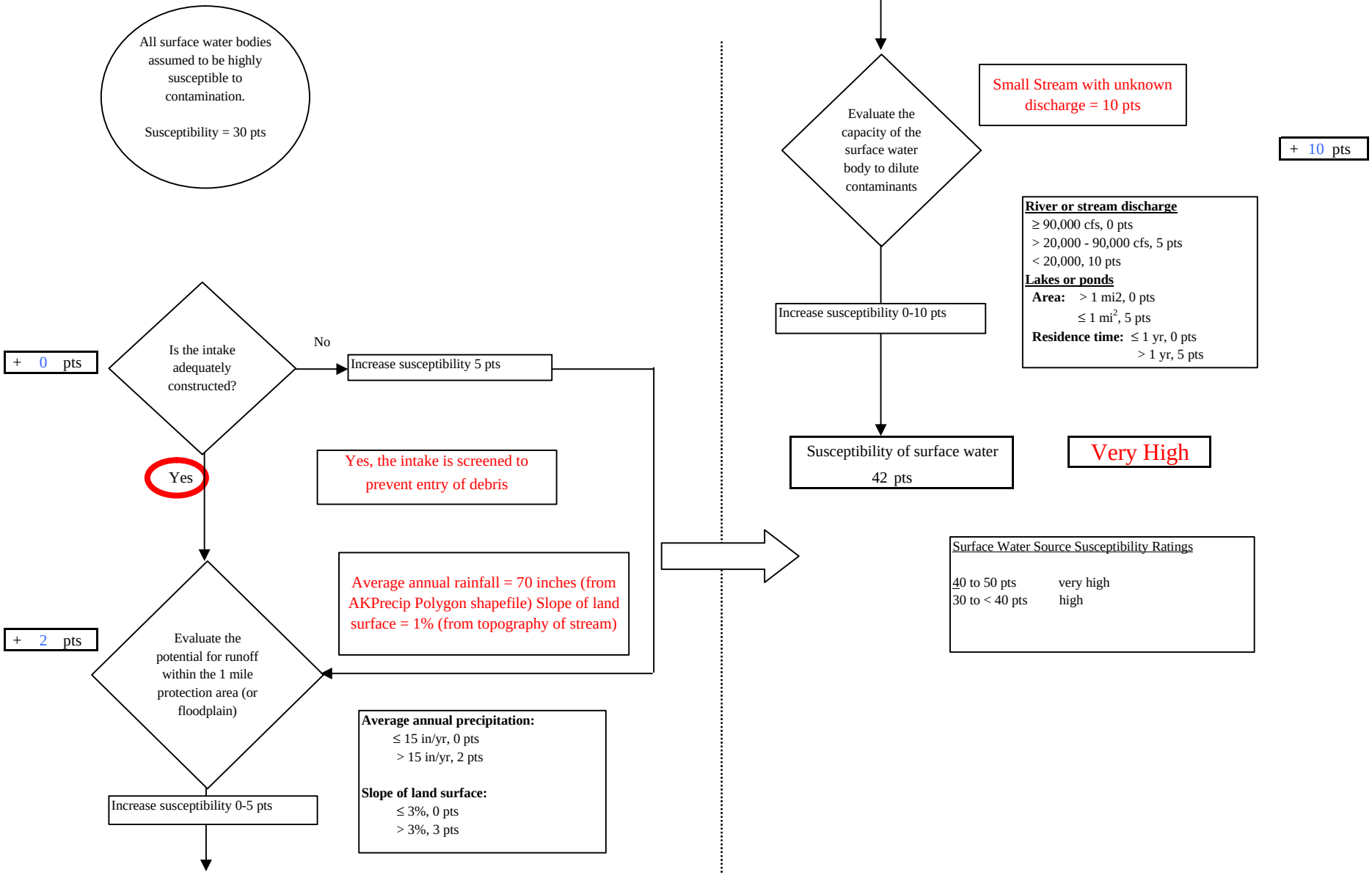
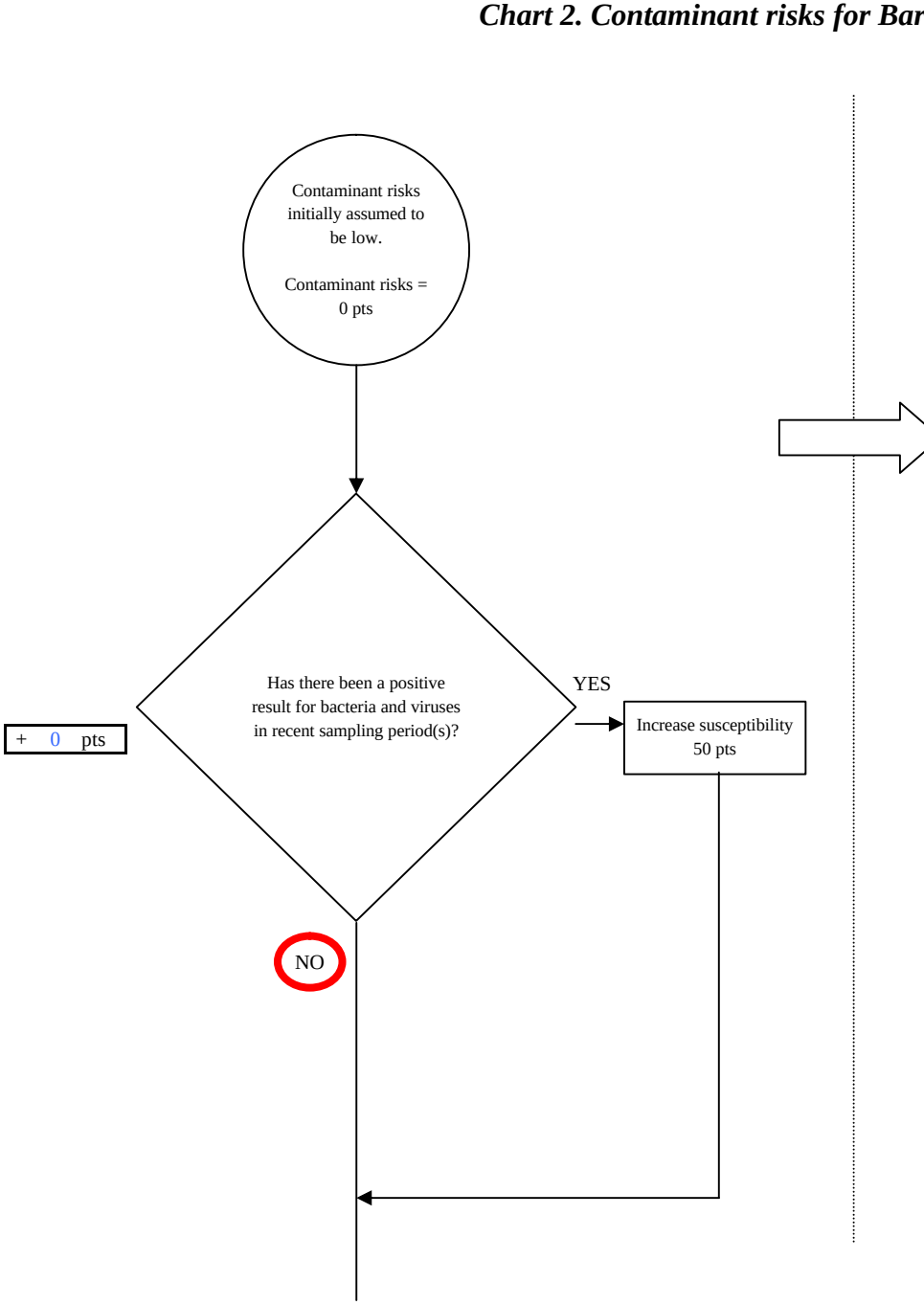
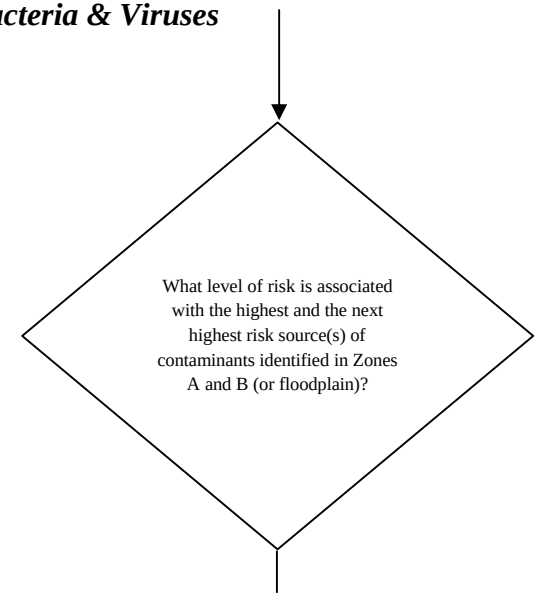


Chart 2. Contaminant risks for Bartlett Cove - Bacteria & Viruses





+ 0 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		0
Low(s)	0		0

	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 0

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 2. Contaminant risks for Bartlett Cove - Bacteria & Viruses

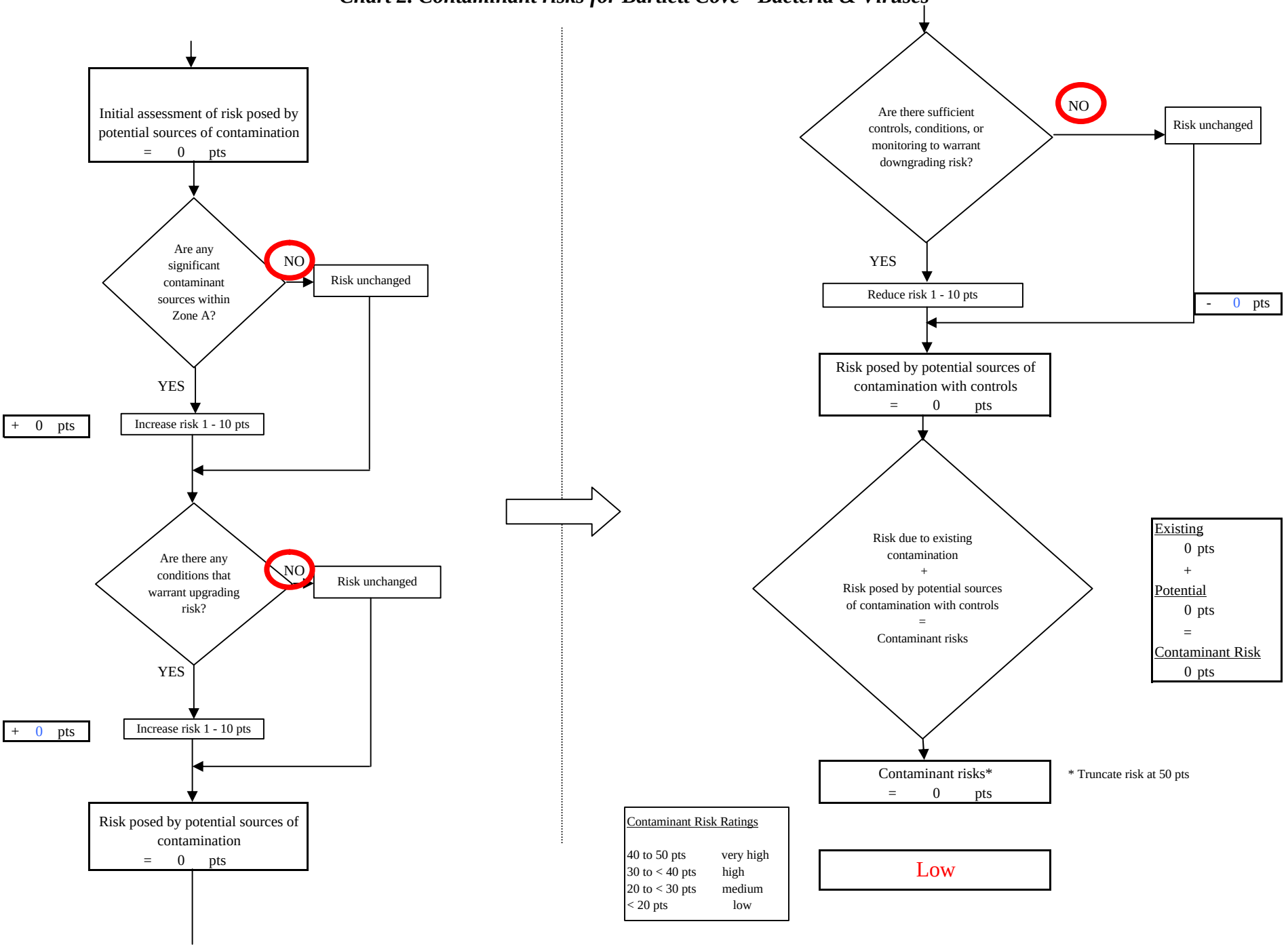


Chart 3. Vulnerability analysis for Bartlett Cove - Bacteria & Viruses

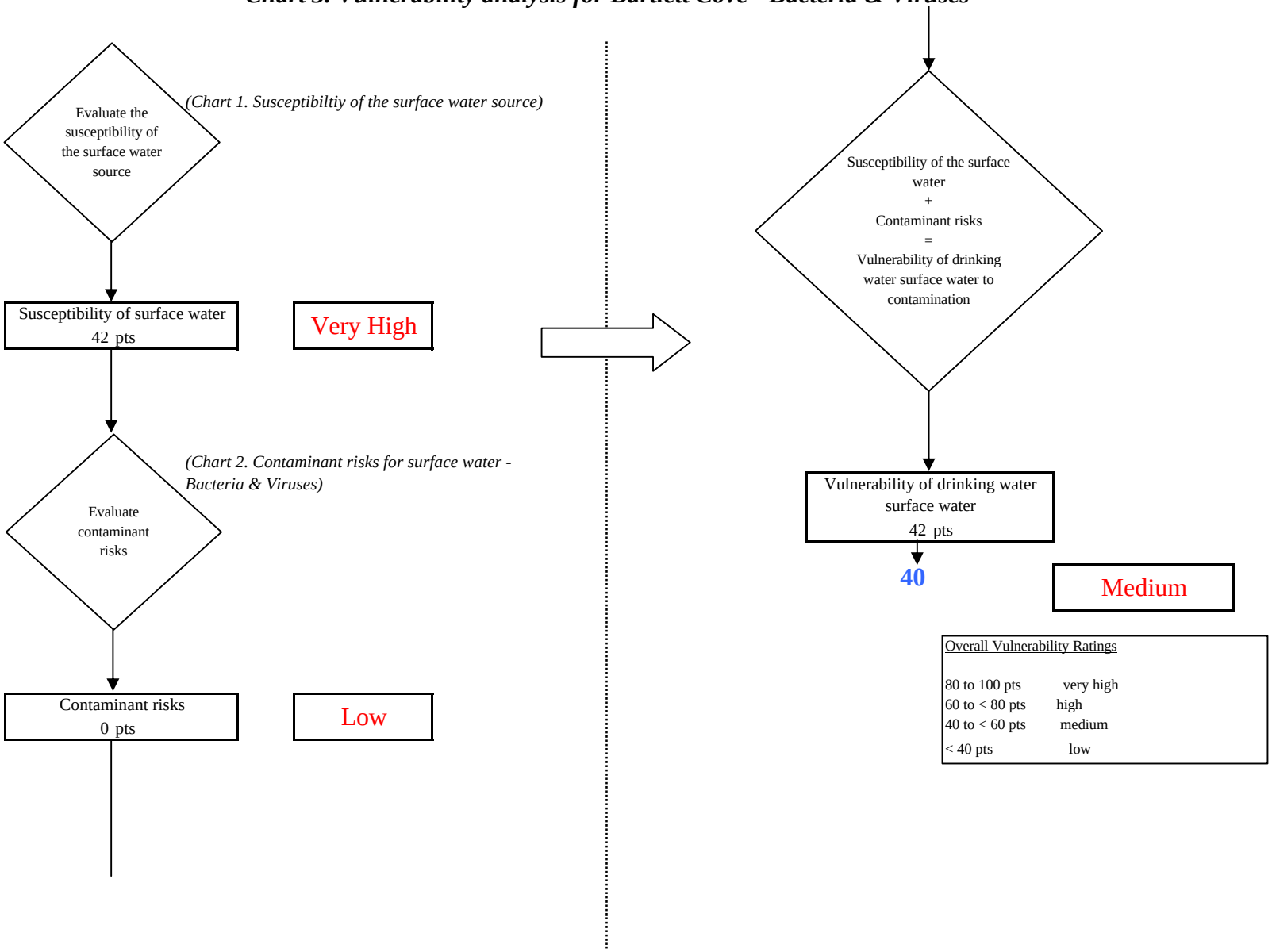


Chart 4. Contaminant risks for Bartlett Cove - Nitrates and Nitrites

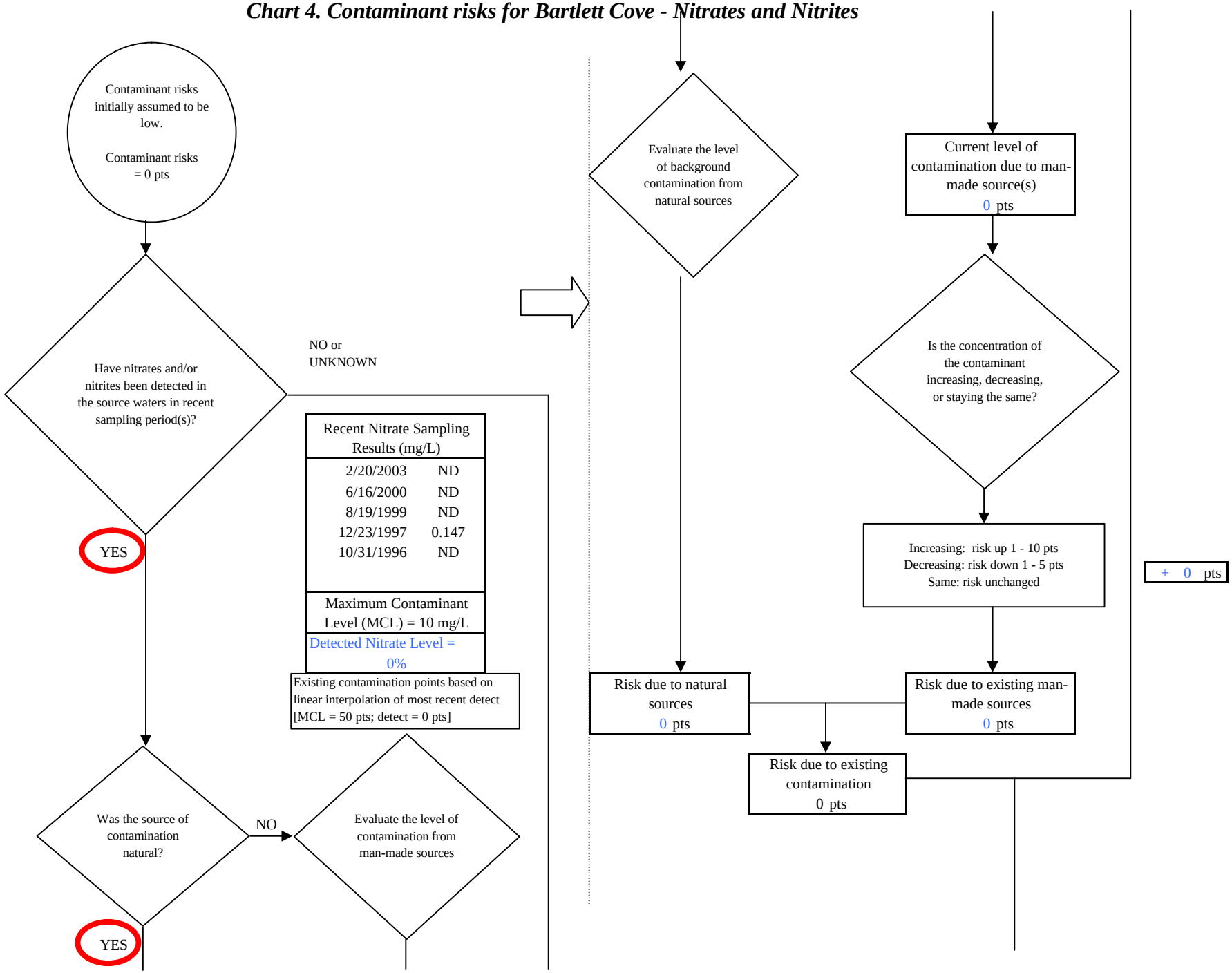


Chart 4. Contaminant risks for Bartlett Cove - Nitrates and Nitrites

+ 0 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 = 0 pts

Are any significant sources in Zone A?

NO → Risk unchanged

YES → Increase risk 1 - 10 pts

+ 0 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		0
Low(s)	0		0

	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 0

Note: Septic systems, sewerline, 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 4. Contaminant risks for Bartlett Cove - Nitrates and Nitrites

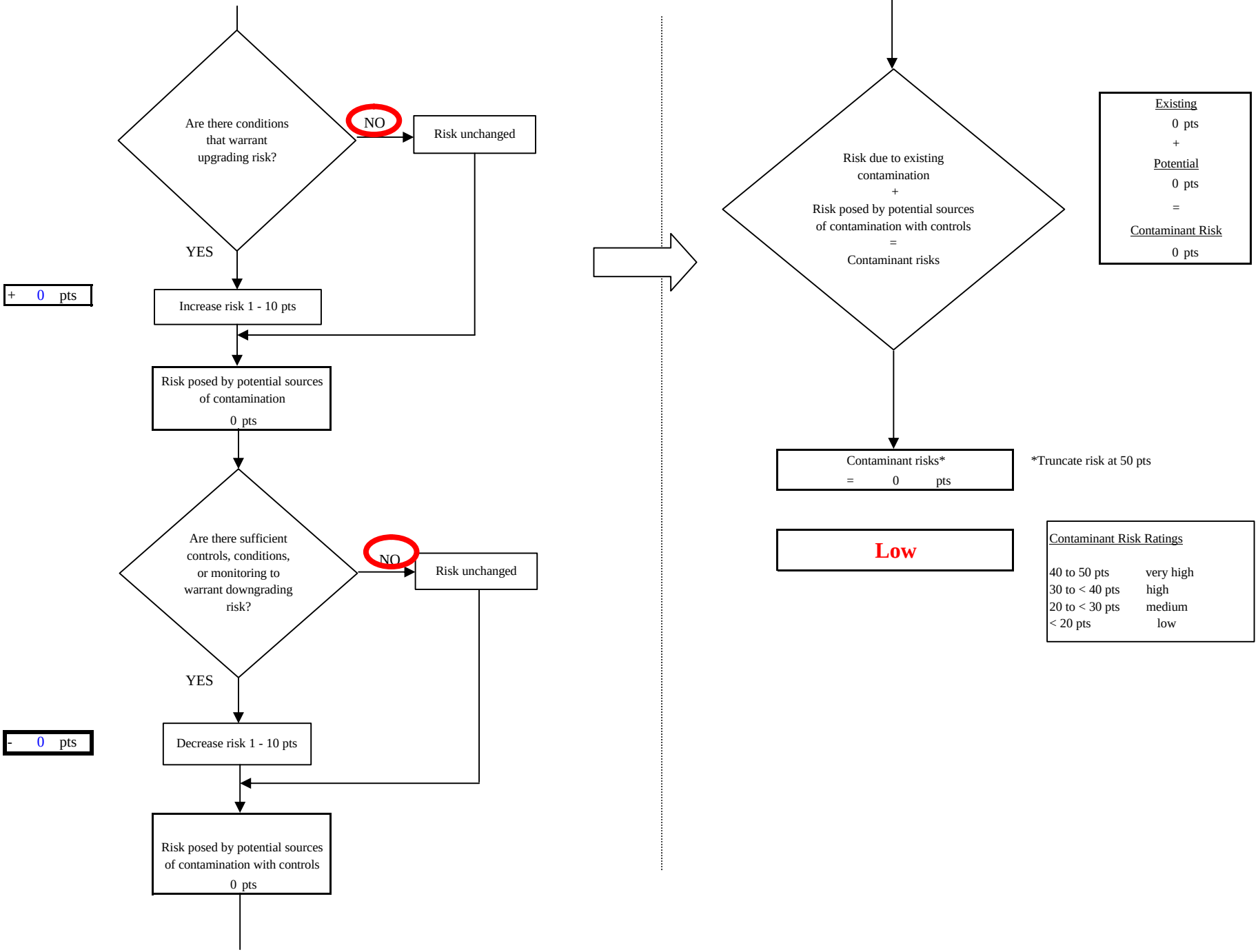


Chart 5. Vulnerability analysis for Bartlett Cove - Nitrates and Nitrites

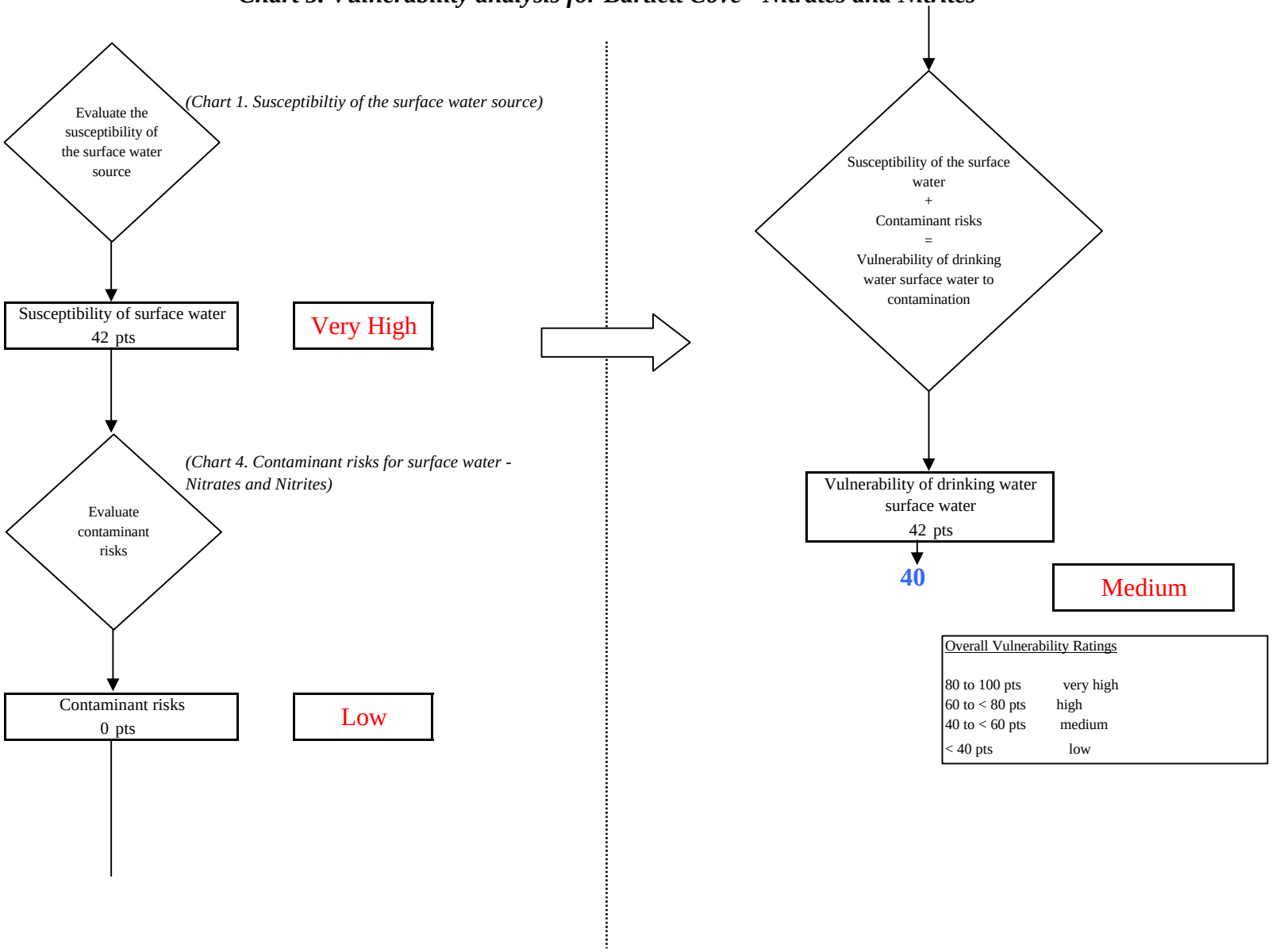


Chart 6. Contaminant risks for Bartlett Cove - Volatile Organic Chemicals

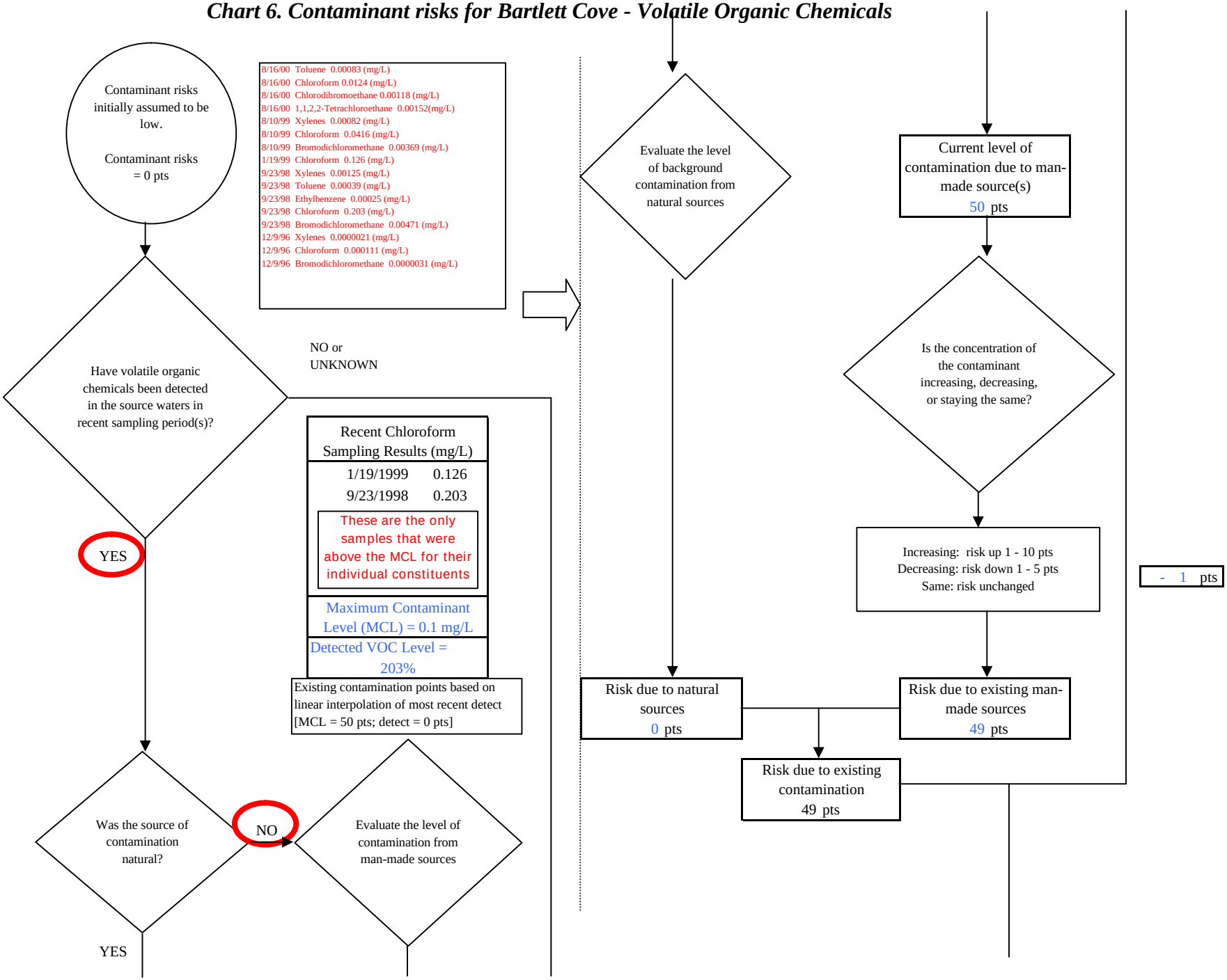


Chart 6. Contaminant risks for Bartlett Cove - Volatile Organic Chemicals

+ 0 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 = 0 pts

Are any significant sources in Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 0 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		0
Low(s)	0		0

	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
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Matrix Score 0

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Chart 6. Contaminant risks for Bartlett Cove - Volatile Organic Chemicals

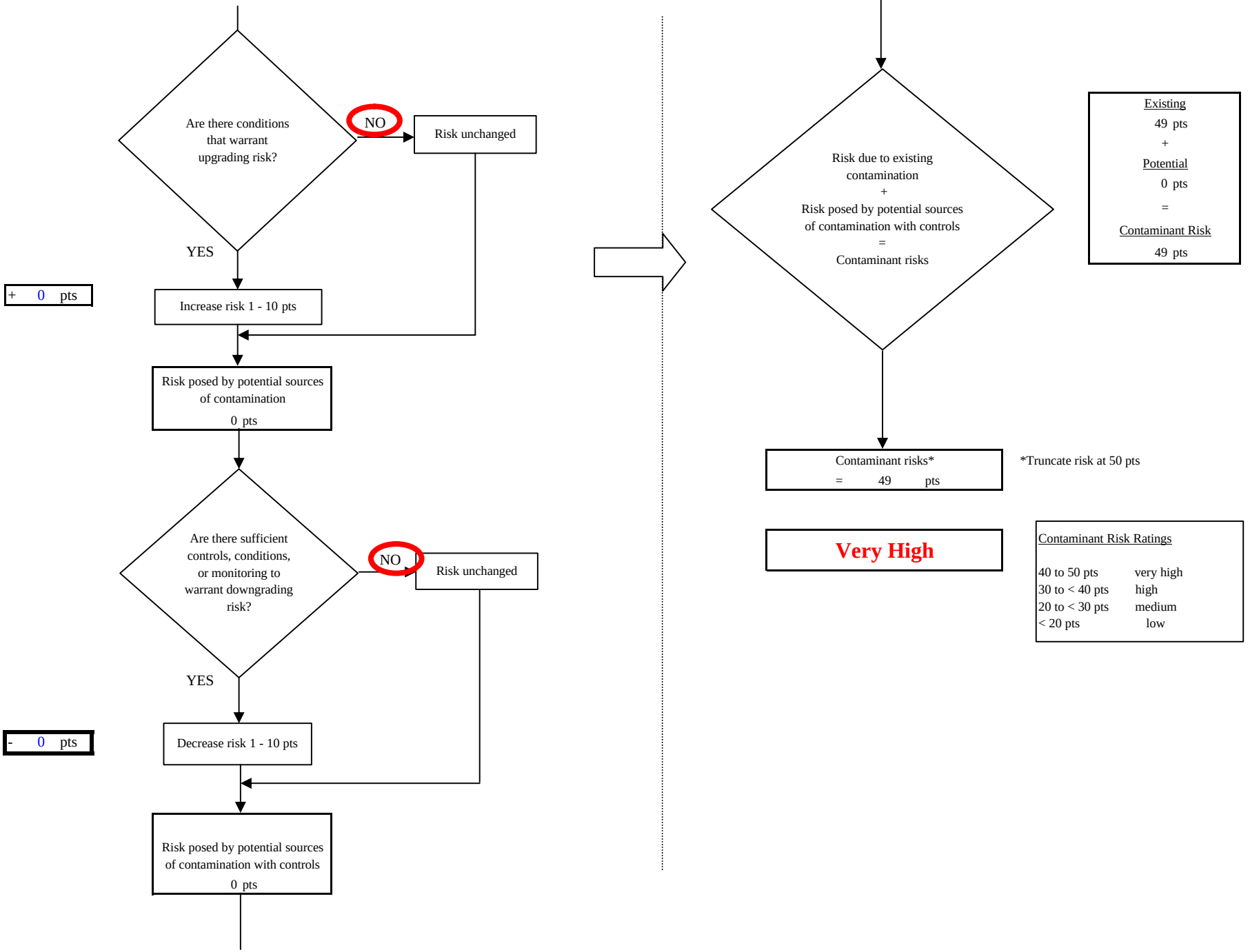

Chart 7. Vulnerability analysis for Bartlett Cove - Volatile Organic Chemicals