# Source Water Assessment

## A Hydrogeologic Susceptibility and Vulnerability Assessment for the True Alaska Bottling Company

Sitka, Alaska

PWSID # 111533.001

August 2004

Drinking Water Protection Program Report #1417

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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# APPENDICES

# Source Water Assessment for the True Alaska Bottling Company Water System

**Drinking Water Protection Program**
**Alaska Department of Environmental Conservation**

## EXECUTIVE SUMMARY

The True Alaska Bottling Company water system is a Class B (non-community) water system that obtains water from Blue Lake. The intake is located approximately 2-miles upstream of where Sawmill Creek drains into Silver Bay and is accessible via gravel road. The overall protection area is approximately 36.7 square miles in size and received a susceptibility rating of "**very high**". *A rating of high to very high is typical for all systems with surface water intakes*. Potential and existing sources of the following contaminants were evaluated for the Source Water Assessment: bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. A gravel road, an inactive placer mine, glacial flour, inundation from spring break-up, lake turnover, stream erosion, and possible landslides were identified as potential sources of contaminants for the drinking water source. This evaluation included all available water sampling data submitted to ADEC by the system operator. The samples may have been collected from either raw water or post-treated water. Combining the susceptibility of the surface water source with the contaminant risks, this water system has received a vulnerability rating of **"medium"** for all three contaminant categories. This assessment 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 True Alaska Bottling Company to protect public health.

## DRINKING WATER SYSTEM AND AREA OVERVIEW

The True Alaska Bottling Company is located in Sitka (Sec. 36, T055S, R063E, Copper River Meridian), which is located on the west coast of Baranof Island fronting the Pacific Ocean, on Sitka Sound. An extinct volcano, Mount Edgecumbe, rises 3,200 feet above the community. It is 95 air miles southwest of Juneau, and 185 miles northwest of Ketchikan. Seattle, Washington lies 862 air miles to the south. (Please see the inset of Map 1 in Appendix A for location).

The True Alaska Bottling Company water system is a Class B (non-community) water system that operates year round. The system receives its water from the same intake facility on Blue Lake as the City of Sitka. The water is diverted to the bottling company before the water reaches the Sitka treatment facility. The intake is located approximately 2-miles upstream of where Sawmill Creek drains into Silver Bay and is accessible via gravel road (See Map 1 of Appendix A).

The geology of the watershed area is heavily composed volcanic ash and cinders. Landslides are common on the ash-coated surfaces. Hemlock-spruce and hemlock forests dominate the shorelines and lower elevations. Forested wetlands of lodgepole pine and mixed conifers are also present (USDA, 2001).

January temperatures range from 23 to 35; summers vary from 48 to 61. Average annual precipitation is 96 inches, including 39 inches of snowfall. (ADCED, 2003).

The "Watershed Control Program" report of 1992 states that the Blue Lake reservoir has an average depth of 170-feet and a typical surface area of 1,330 acres.

## TRUE ALASKA BOTTLING COMPANY DRINKING WATER PROTECTION AREA

Identifying the pathways most likely for surface contamination to reach water intake areas is the first step in determining the water system's risk. These are initially determined by looking at the drainage area contributing overland water flow to a surface water source intake. The entire drainage area is also known as the "drinking water protection area". Please refer to pages 10-11of the "Guidance Manual for Class A Public Water Systems" for additional information.

The protection area established for surface water sources by the ADEC is usually separated into three zones, limited by the watershed boundary. These zones correspond to the overland-flow distance that water travels to get to the source. The ADEC Drinking Water Protection Program's Technical Advisory Committee developed guidelines for derivation of these zones in 1998. The following is a summary of the three protection area zones:

**Table 1. Definition of Zones**

| Zone | Definition |
|---|---|
| A | Areas within 1000-ft of lakes or streams |
| B | Areas within 1-mile of lakes or streams |
| C | The watershed boundary |

The protection area for the True Alaska Bottling Company includes each of these Zones (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 True Alaska Bottling Company protection area. This inventory was completed through a search of agency records and other publicly available information. There is a wide array of potential contamination sources to surface water. These contaminants are found within agricultural, residential, commercial, and industrial areas, but *can also occur within areas that have little or no development*.

For Class B water system assessments, three categories of drinking water contaminants were inventoried. They include:

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

Sources identified in the True Alaska Bottling Company protection area are displayed on Map 2 of Appendix C and summarized in Table 1 of Appendix B.

## RANKING OF CONTAMINANT RISKS

Once potential and existing sources of contamination have been identified, they are assigned a ranking according to what category and level of risk they represent. Ranking of contaminant risks for "potential" or "existing" sources of contamination is a function of the toxicity and the volume of specific contaminants associated with that source. Rankings include:

- Low;
- Medium;
- High; and
- Very High.

The time-of-travel for contaminants within the water is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zone A because of their short life span. Only "Very High" and "High" rankings are inventoried within Zones B and C due to the probability of contaminant dilution by the time the contaminants reach the water intake.

The remaining tables in Appendix B (if necessary) contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

## VULNERABILITY OF THE DRINKING WATER SYSTEM

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

- Surface Water Susceptibility; and
- Contaminant risks.

Appendix D contains 7 charts, which together form the 'Vulnerability Analysis' for the public drinking water Source Water Assessment. Chart 1 analyzes the 'Susceptibility of the Surface Water Source' to contamination by looking at the climate, terrain, and intake location. 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 area. Chart 3 contains the 'Vulnerability Analysis for Bacteria and Viruses', which is a composite score of the Vulnerability Analysis and the overall Susceptibility. Charts 4 through 13 repeat the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, and volatile organic chemicals, respectively.

A score for the Surface Water Susceptibility of the source is reached by considering the properties of the water intake and the surrounding area. The derivation of this information is presented below and the data for this source is shown in Chart 1 of Appendix D.

Susceptibility of the Surface Water Source – always considered to be "high" (30 points)

+

Adequate Construction of the Intake (0 – 5 Points)

+

Runoff Potential Within Zone B (0 – 5 Points)

+

Dilution Capacity of the Surface Water (0 – 10 Points)

=

Natural Susceptibility
(0 – 50 Points)

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

| Surface Water Source Susceptibility Ratings | |
|---|---|
| 40 to 50 pts | Very High |
| 30 to < 40 pts | High |

**Table 2. Susceptibility of the Water Source**

| | Score | Rating |
|---|---|---|
| Minimum Allowable Susceptibility | 30 | |
| Intake Construction Adequate | 0 | |
| Runoff Potential | 5 | |
| Dilution Capacity | 10 | |
| Overall Susceptibility | 45 | Very High |

For contaminants, risks to a drinking water source depend on the type, number or density, and distribution of the contaminant sources. The Contaminant Risk score has been derived from an examination of existing, and historical contamination sources that have been detected in the protection area 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 the 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. True Alaska Bottling Company Contaminant Risks**

| Category | Score | Rating |
|---|---|---|
| Bacteria and Viruses | 12 | Low |
| Nitrates and/or Nitrites | 12 | Low |
| Volatile Organic Chemicals | 12 | Low |

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

Susceptibility of the Surface Water Source

(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 and ratings for each of the six categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

**Table 4. True Alaska Bottling Company Overall Vulnerability**

| Category | Score | Rating |
|---|---|---|
| Bacteria and Viruses | 55 | Medium |
| Nitrates and Nitrites | 55 | Medium |
| Volatile Organic Chemicals | 55 | Medium |

**Bacteria and Viruses**

The contaminant risk for bacteria and viruses is "low". Typically, coliform detection in raw water samples collected from surface water sources is normal. (See Chart 2 – Contaminant Risks for Bacteria and Viruses in Appendix D).

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, 2003). Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination.

No two consecutive positive bacteria counts have been detected in sampling collected since November 2001. A

possible source of bacteria could be from the activity generated by gravel roads.

After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the source, the overall vulnerability of the source to bacteria and virus contamination becomes “medium”.

**Nitrates and Nitrites**

The contaminant risk for nitrates and nitrites is “low” (See Chart 4 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D). Nitrates are very mobile, moving at approximately the same rate as water.

Sampling history for the water source indicates that nitrates were not detected in a sample collected in July 2001. The Maximum Contaminant Level (MCL) for nitrates is 10 milligrams per liter (mg/L). 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 (EPA, 2003).

A possible source of nitrate/nitrites is the presence of gravel roadways.

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the source, the overall vulnerability of the source to contamination is “medium”.

**Volatile Organic Chemicals**

The contaminant risk for volatile organic chemicals is “low” (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

No recent samples of volatile organic chemicals were available for review. These chemicals (including chloroform and trihalomethanes) typically originate during the process of water treatment and not from the source waters. The MCL for chloroform is 0.2 milligrams per liter (mg/L) and the MCL for total trihalomethanes is 0.1 mg/L.

After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the source, the overall vulnerability of the source to contamination is “medium”.

**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 True Alaska Bottling Co. to protect public health. It is anticipated that Source Water Assessments will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of the drinking water source.

# REFERENCES

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

United States Forest Service – Alaska Region (USDA), 2001. Technical Publication No. R10-TP-75. Ecological Subsections of Southeast Alaska and Neighboring Areas of Canada.

United States Environmental Protection Agency (EPA), 2003 [WWW document]. URL http://www.epa.gov/safewater/mcl.html.

# APPENDIX A

## True Alaska Bottling Company
## Drinking Water Protection Area Location Map
## (Map 1)

Sitka Beverage Corporation - Drinking Water Protection Area

Blue Lake

Area enlarged at left

Elfin Cove
Hoonah
Cube Cove
Hobart Bay
Pelican
Tenakee Springs
Angoon
Kake
Petersburg
Sitka
Rowan Bay
Wrangell
Port Protection
Whale Pass
Port Alexander
Thorne Bay
Craig
Hollis
Hydaburg

Alexander Archipelago

February 11, 2004

# Map 1: True Alaska Bottling Company

**PWSID: 111533.001**

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 0.5 1 2 3 4 Miles

1:120,000

***Data Sources:***
***Background image***
***- USGS 1:63,000 mapping***
***Lakes, streams, & roads***
***- U.S. Forest Service, Tongass***

*Protection zones were delineated based upon streams noted on USGS 1:63,000 mapping.*

## Legend

- True Alaska Bottling Company Intake
- Zone A Protection Area
- Zone B Protection Area
- Zone C Protection Area
- Roads
- Stream
- Lake

# APPENDIX B

## Contaminant Source Inventory and Risk Rankings (Tables 1 - 4)

***Table 1***

# *Contaminant Source Inventory for* ***True Alaska Bottling Co.***

***PWSID 111533.001***

| ***Contaminant Source Type*** | ***Contaminant Source ID*** | ***CS ID tag*** | ***Zone*** | ***Map Number*** | ***Comments*** |
|---|---|---|---|---|---|
| Glacial flour (rivers/streams) | B03 | B03-1 | A | 2 | From operator information |
| Inundation (break-up or other seasonal events) | B04 | B04-1 | A | 2 | From operator information |
| Lake 'turnover' | B05 | B05-1 | A | 2 | From operator information |
| Landslides or other hillside areas subject to significant erosion | B06 | B06-1 | A | 2 | From operator information |
| River/stream bank erosion | B09 | B09-1 | A | 2 | From operator information |
| Metals mining, placer (active or inactive?) | E04 | E04-1 | A | 2 | From ADNR placer mine data. Verified with BLM study from: http://wwwndo.ak.blm.gov/juneau/LIBRARY/pdf_docs/chchgf_brnf_eeas.pdf |
| Highways and roads, dirt/gravel | X24 | X24-1 | A | 2 | From U.S. Forest Service, Tongass GIS data. |

***Table 2***

# *Contaminant Source Inventory and Risk Ranking for True Alaska Bottling Co. Sources of Bacteria and Viruses*

***PWSID 111533.001***

| *Contaminant Source Type* | *Contaminant Source ID* | *CS ID tag* | *Zone* | *Risk Ranking for Analysis* | *Map Number* | *Comments* |
|---|---|---|---|---|---|---|
| Highways and roads, dirt/gravel | X24 | X24-1 | A | Low | 2 | From U.S. Forest Service, Tongass GIS data. |

***Table 3***

# *Contaminant Source Inventory and Risk Ranking for True Alaska Bottling Co. Sources of Nitrates/Nitrites*

***PWSID 111533.001***

| ***Contaminant Source Type*** | ***Contaminant Source ID*** | ***CS ID tag*** | ***Zone*** | ***Risk Ranking for Analysis*** | ***Map Number*** | ***Comments*** |
|---|---|---|---|---|---|---|
| Highways and roads, dirt/gravel | X24 | X24-1 | A | Low | 2 | From U.S. Forest Service, Tongass GIS data. |

***Table 4***

# *Contaminant Source Inventory and Risk Ranking for True Alaska Bottling Co. Sources of Volatile Organic Chemicals*

***PWSID 111533.001***

| ***Contaminant Source Type*** | ***Contaminant Source ID*** | ***CS ID tag*** | ***Zone*** | ***Risk Ranking for Analysis*** | ***Map Number*** | ***Comments*** |
|---|---|---|---|---|---|---|
| Highways and roads, dirt/gravel | X24 | X24-1 | A | Low | 2 | From U.S. Forest Service, Tongass GIS data. |

# APPENDIX C

## True Alaska Bottling Company
## Drinking Water Protection Area
## and Potential and Existing Contaminant Sources
## (Map 2)

E04 - 1 (Inactive Placer Mine)
Pande Basin Gold Mining Company
Patented claim on private property.

B06 - 1
(Landslides)

B09 - 1
(River/Stream Bank Erosion)

B05 - 1
(Lake Turnover)

B03 - 1
(Glacial Flour)

B04 - 1
(Inundation from break-up or other events)

X24 - 1
(Gravel road)

Water System Intake

Blue Lake

Area enlarged at left

# Map 2: Potential and Existing Contaminant Sources

**PWSID: 111533.001**

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 2,250 4,500 9,000 13,500 Feet

1:54,000

***Data Sources:***

***Background image - USGS 1:63,000 mapping***
***Lakes, streams, & roads - U.S. Forest Service***
***Roads, contours - Shannon & Wilson, Inc.***

*Protection zones were delineated based upon streams noted on USGS 1:63,000 mapping.*

**Legend**

- PWS Intake
- Zone A Protection Area
- Zone B Protection Area
- Zone C Protection Area
- Lake
- Potential Logging Area
- Roads
- Stream

N W E S

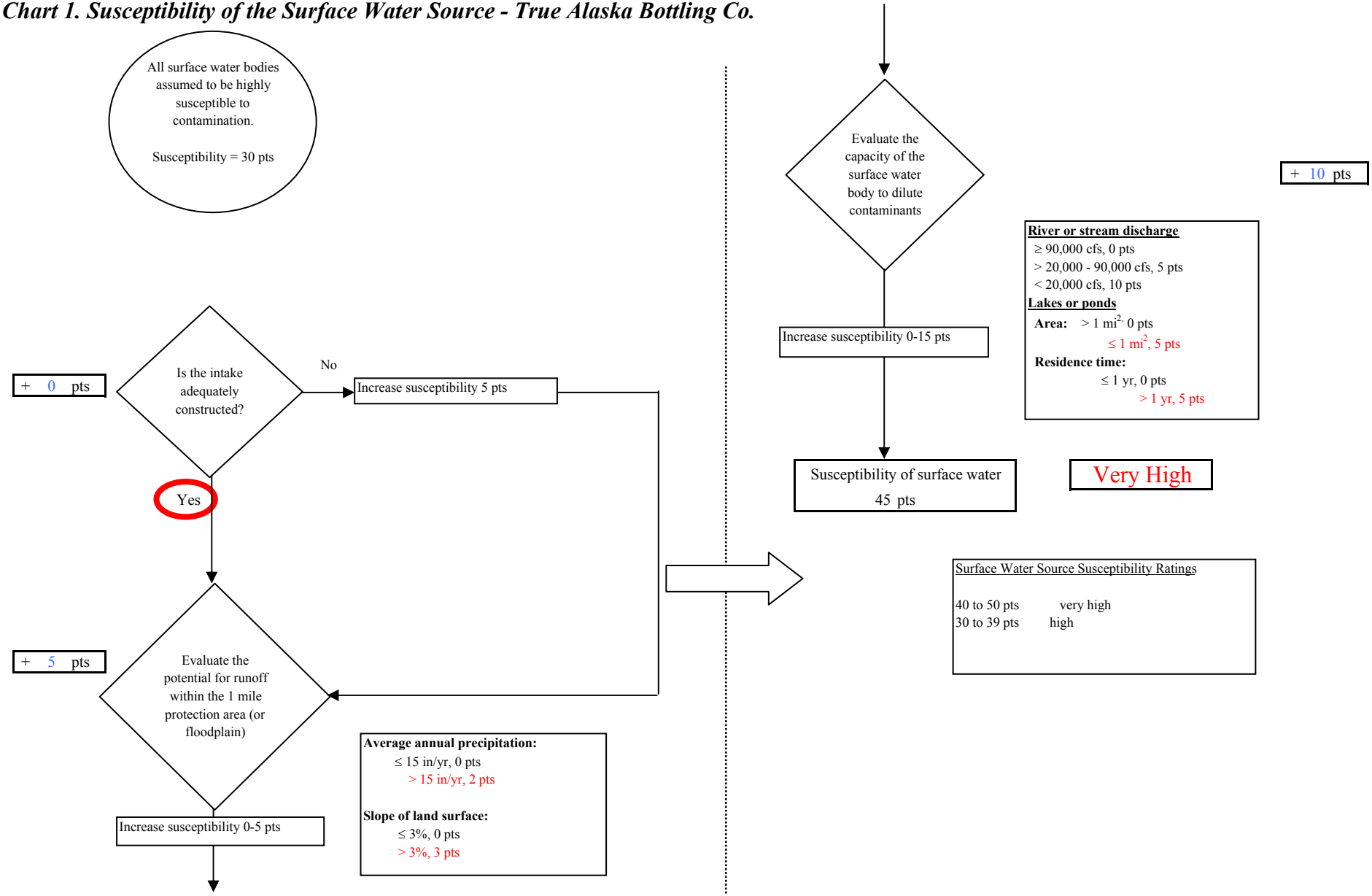
0 1.5 3 6 9 Miles

February 11, 2004

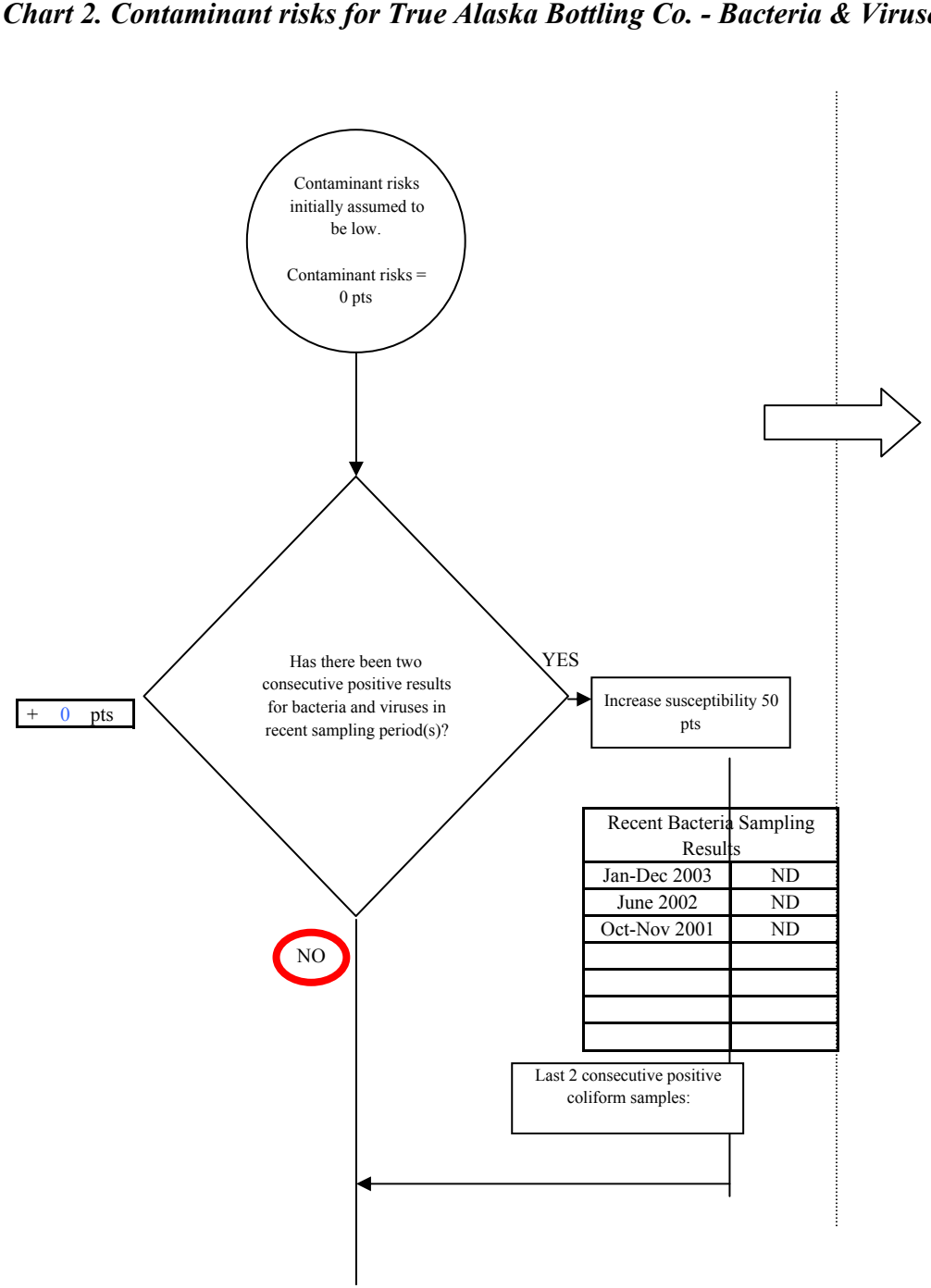
# APPENDIX D

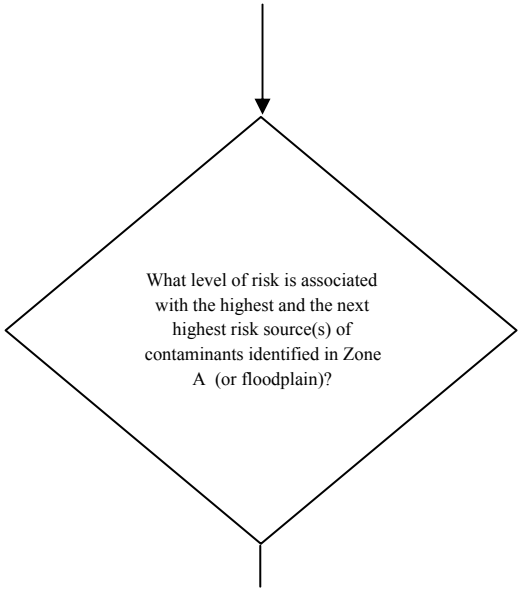
## Vulnerability Analysis and Contaminant Risks
**(Charts 1-7)**

## *Chart 1. Susceptibility of the Surface Water Source - True Alaska Bottling Co.*



## *Chart 2. Contaminant risks for True Alaska Bottling Co. - Bacteria & Viruses*




+ 10 pts

Risk Rankings for Bacteria/Virus Contaminant Sources Identified

| | Zone A | Total |
|---|---|---|
| Very Highs(s) | 0 | 0 |
| High(s) | 0 | 0 |
| Medium(s) | | 0 |
| Low(s) | 1 | 1 |

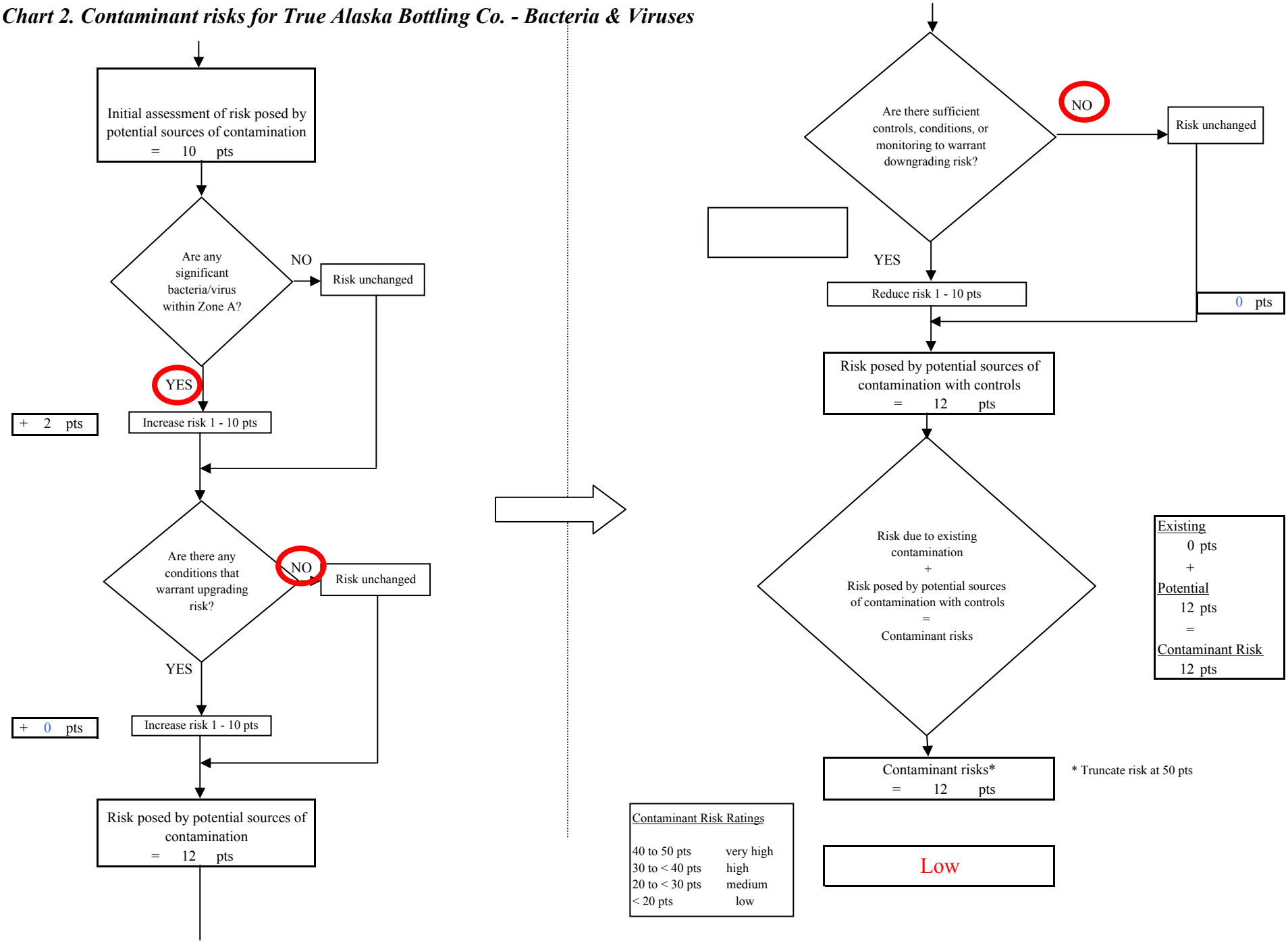
0

| | **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 |

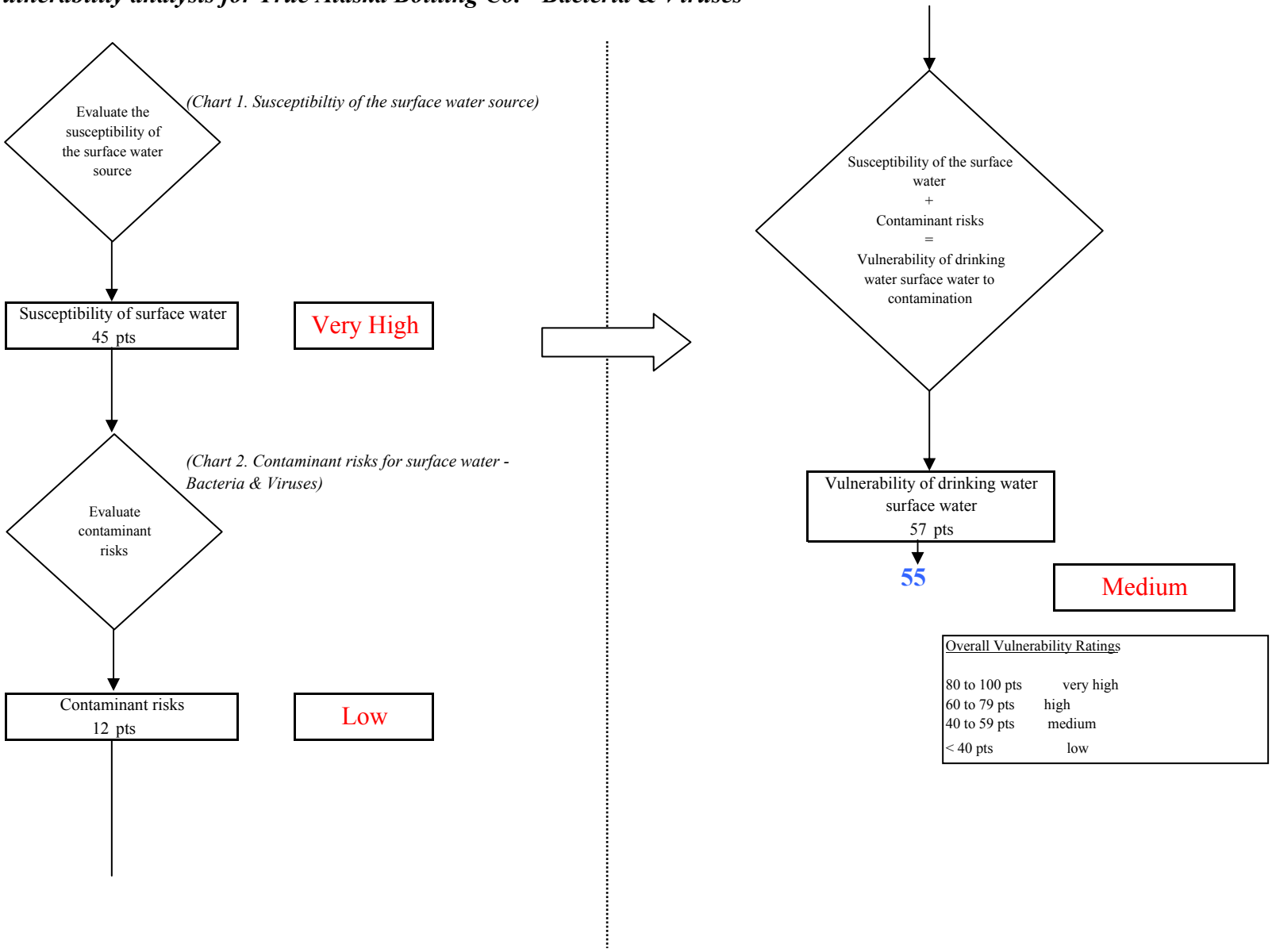
Matrix Score 10

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.

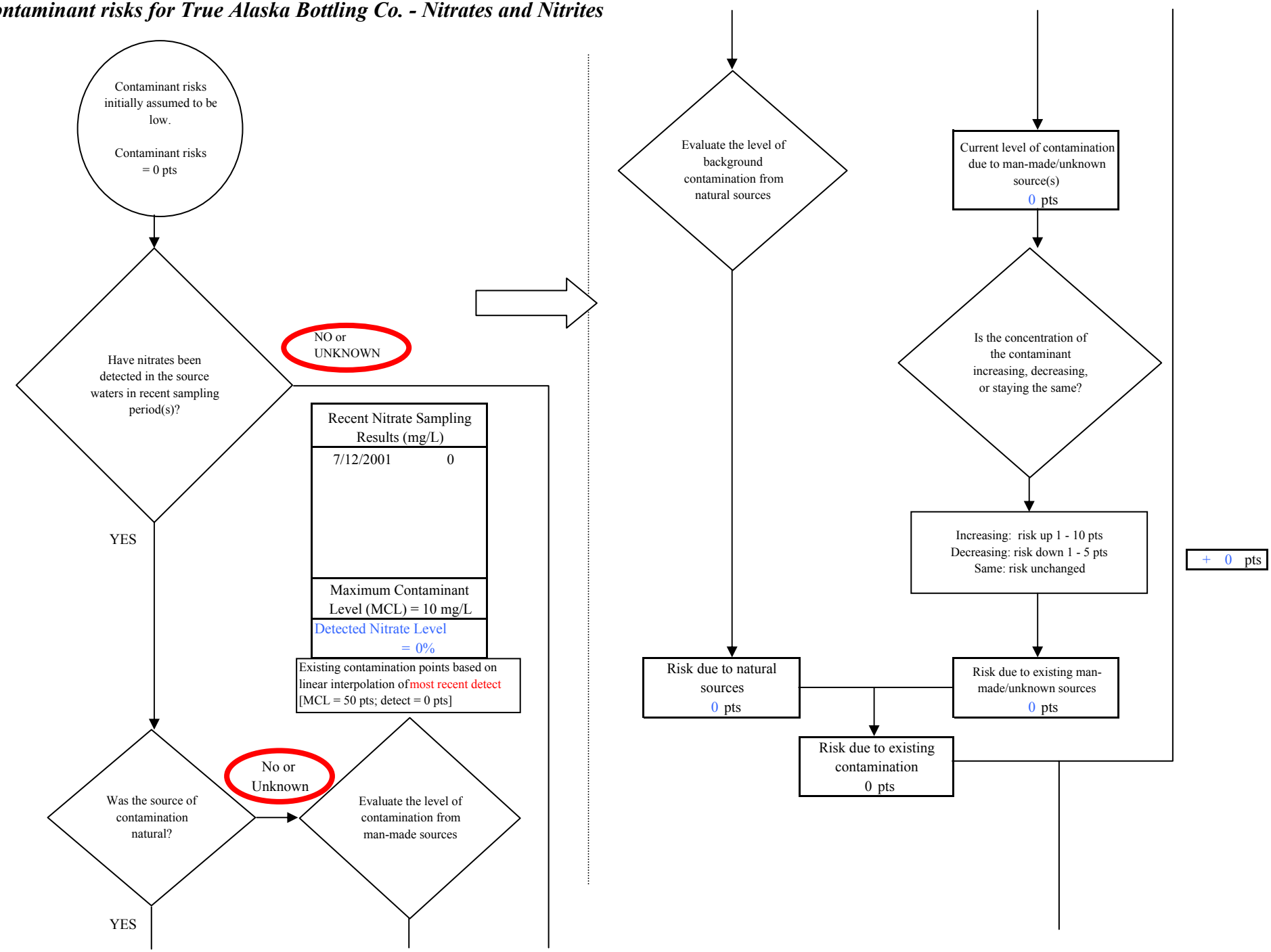
## *Chart 2. Contaminant risks for True Alaska Bottling Co. - Bacteria & Viruses*



## *Chart 3. Vulnerability analysis for True Alaska Bottling Co. - Bacteria & Viruses*



## *Chart 4. Contaminant risks for True Alaska Bottling Co. - Nitrates and Nitrites*



## *Chart 4. Contaminant risks for True Alaska Bottling Co. - Nitrates and Nitrites*

+ 10 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 = 10 pts

Are any significant nitrate/nitrite sources in Zone A?

NO → Risk unchanged

YES → Increase risk 1 - 10 pts

+ 2 pts

Risk Levels for Nitrate/Nitrite Sources identified in Zones A and B

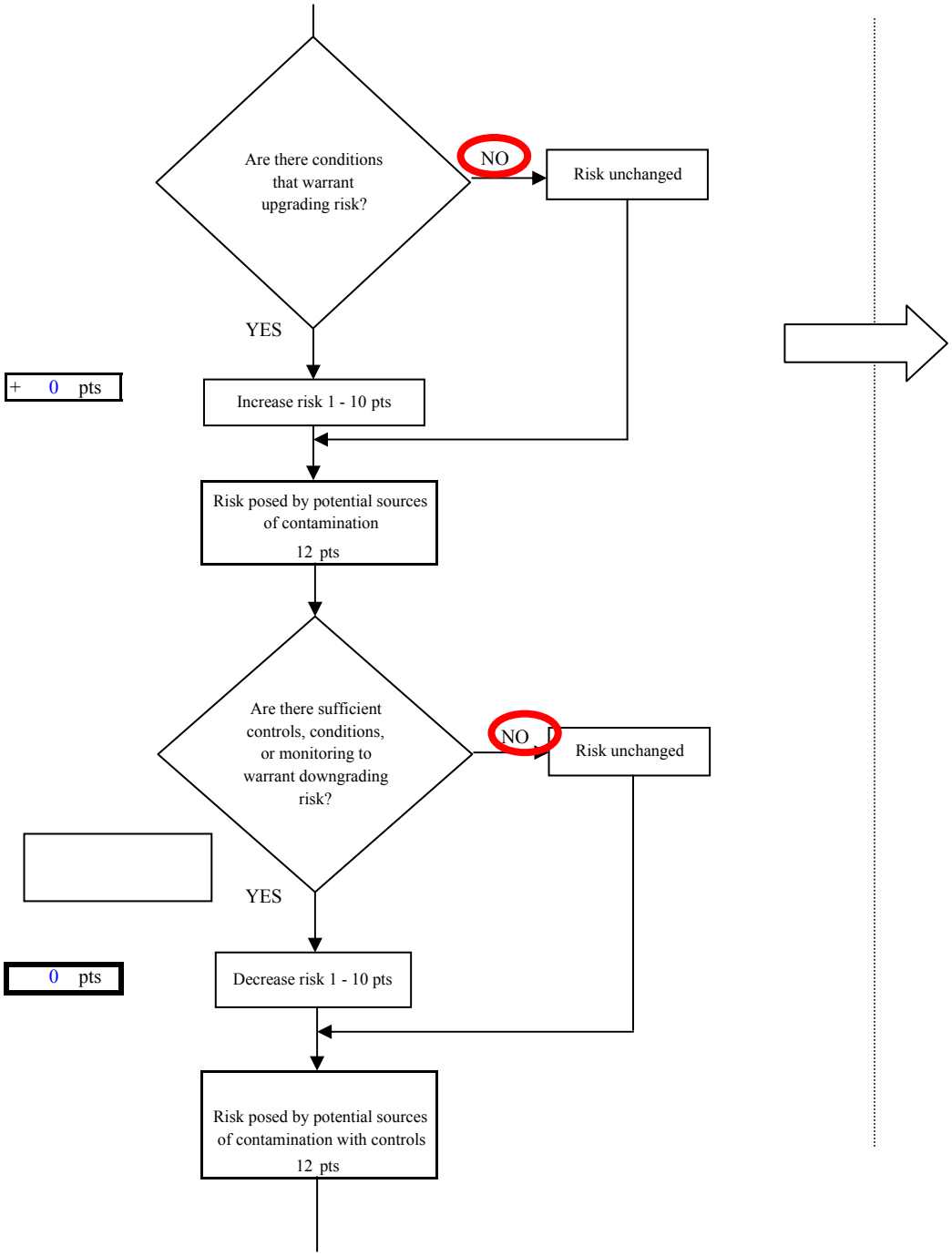
| | Zone A | Zone B | Total |
|---|---|---|---|
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 0 | | 0 |
| Low(s) | 1 | | 1 |

| | **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 10

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 4. Contaminant risks for True Alaska Bottling Co. - Nitrates and Nitrites*



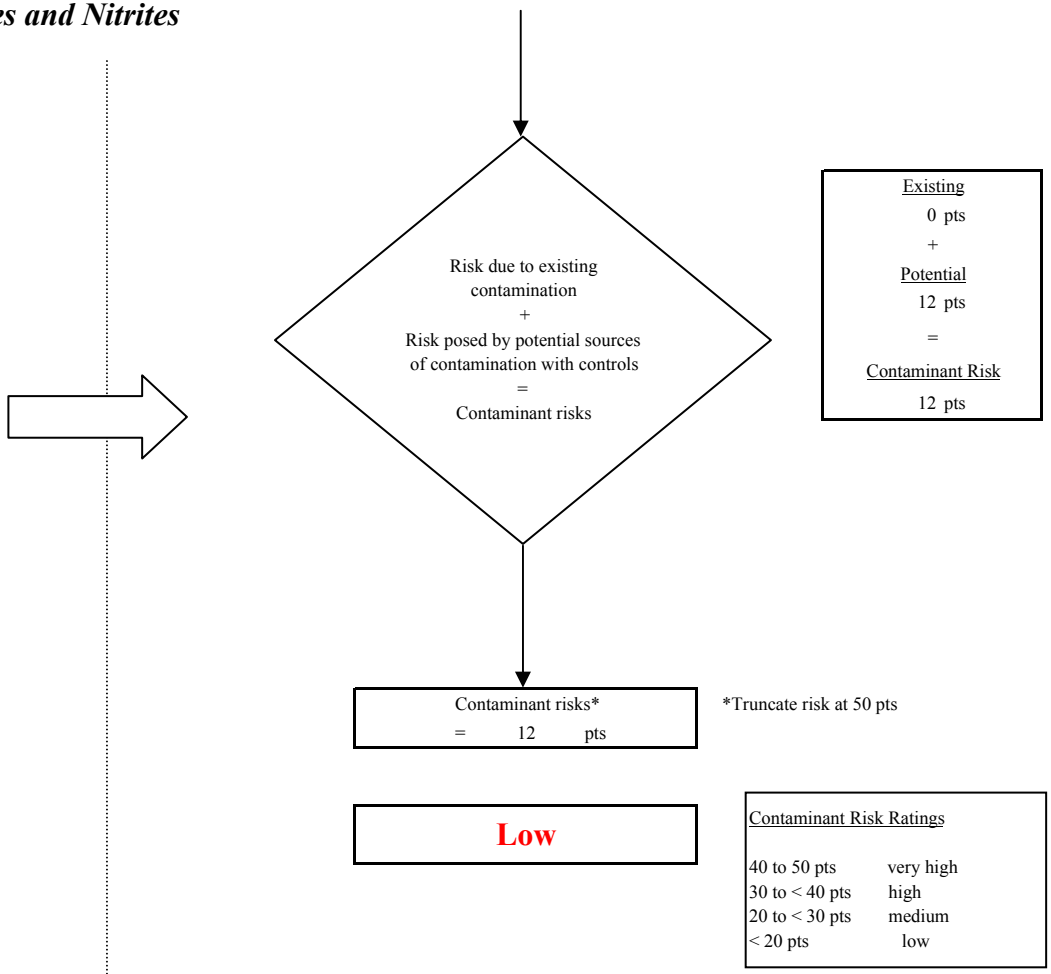
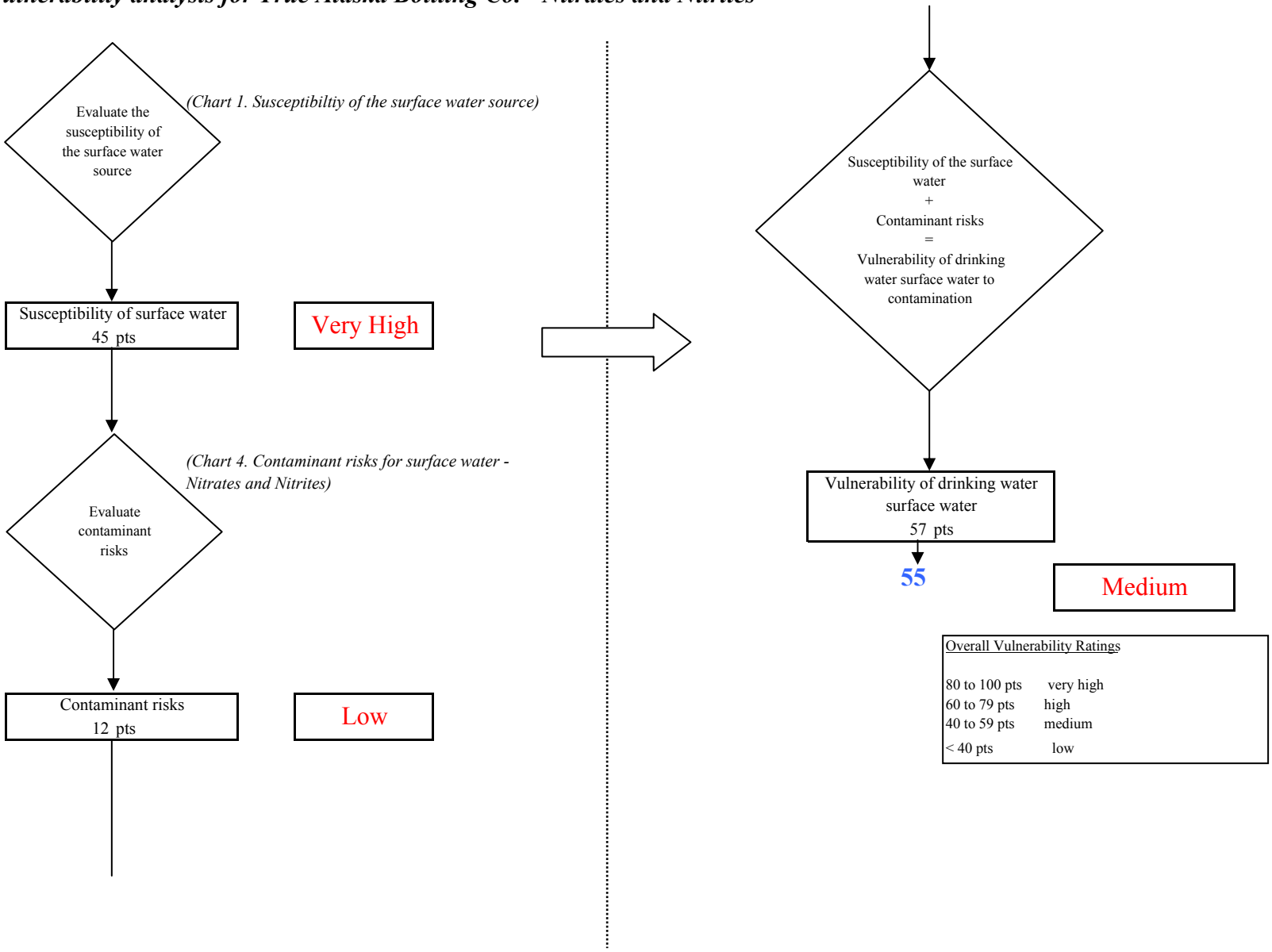
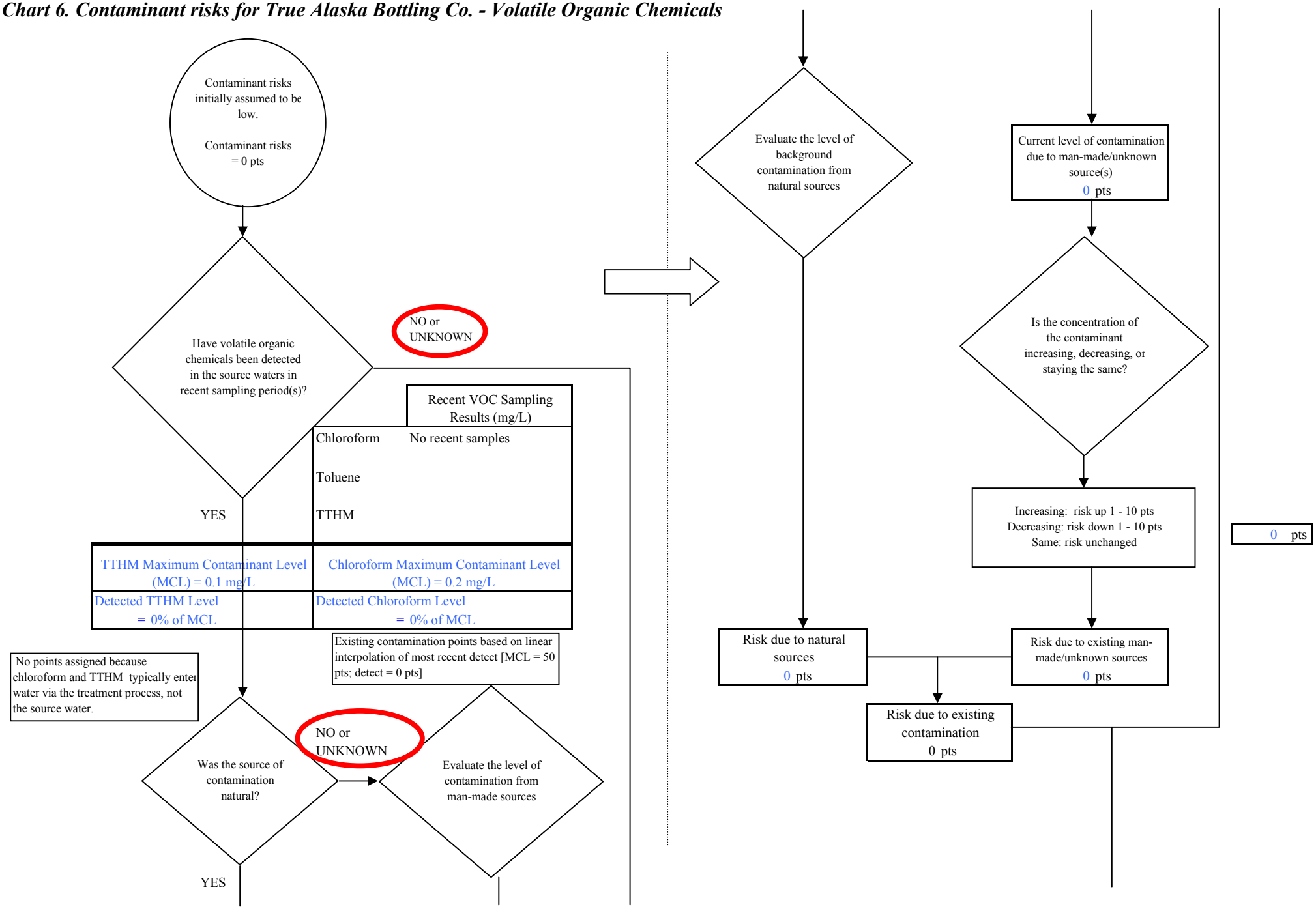



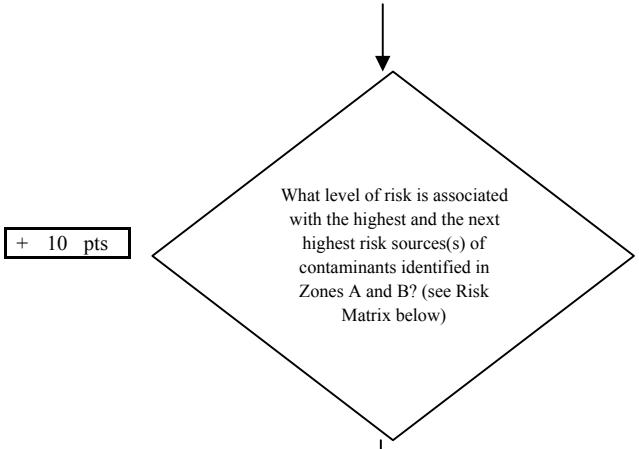
***Chart 5. Vulnerability analysis for True Alaska Bottling Co. - Nitrates and Nitrites***



## *Chart 6. Contaminant risks for True Alaska Bottling Co. - Volatile Organic Chemicals*



## *Chart 6. Contaminant risks for True Alaska Bottling Co. - Volatile Organic Chemicals*




+ 10 pts

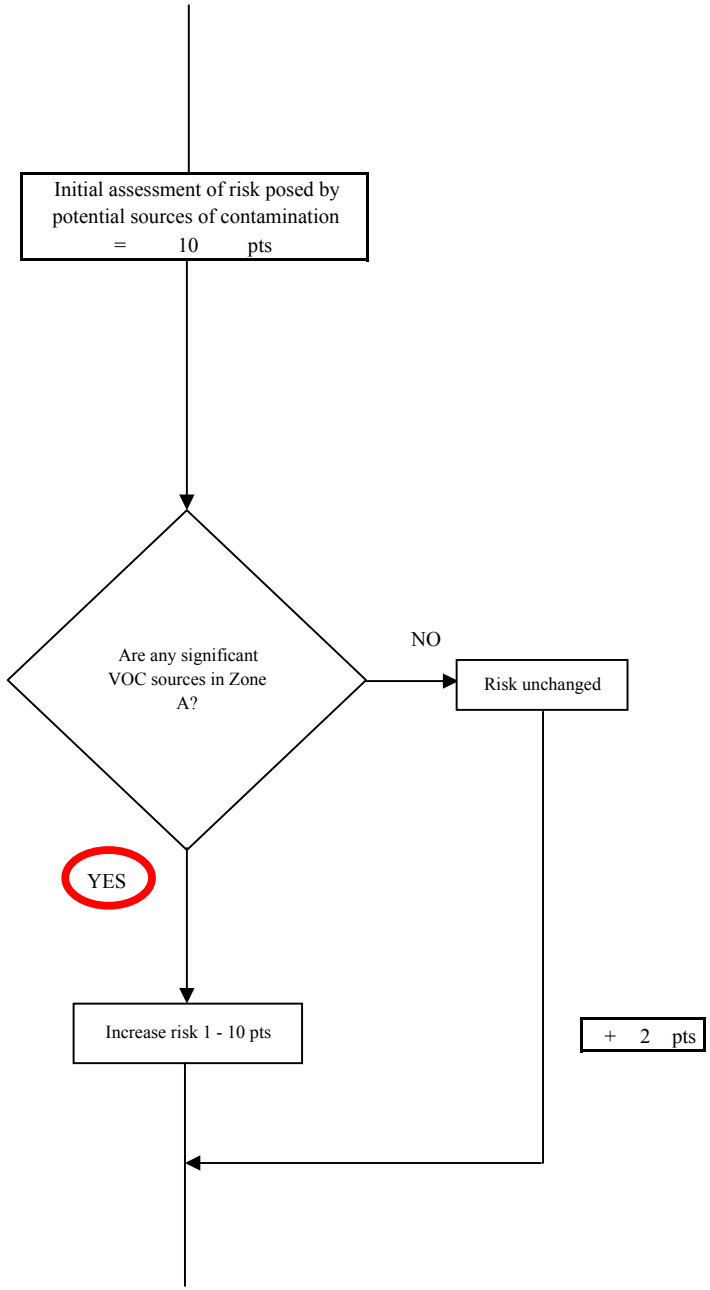
Risk Levels for VOC Sources identified in Zones A and B

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

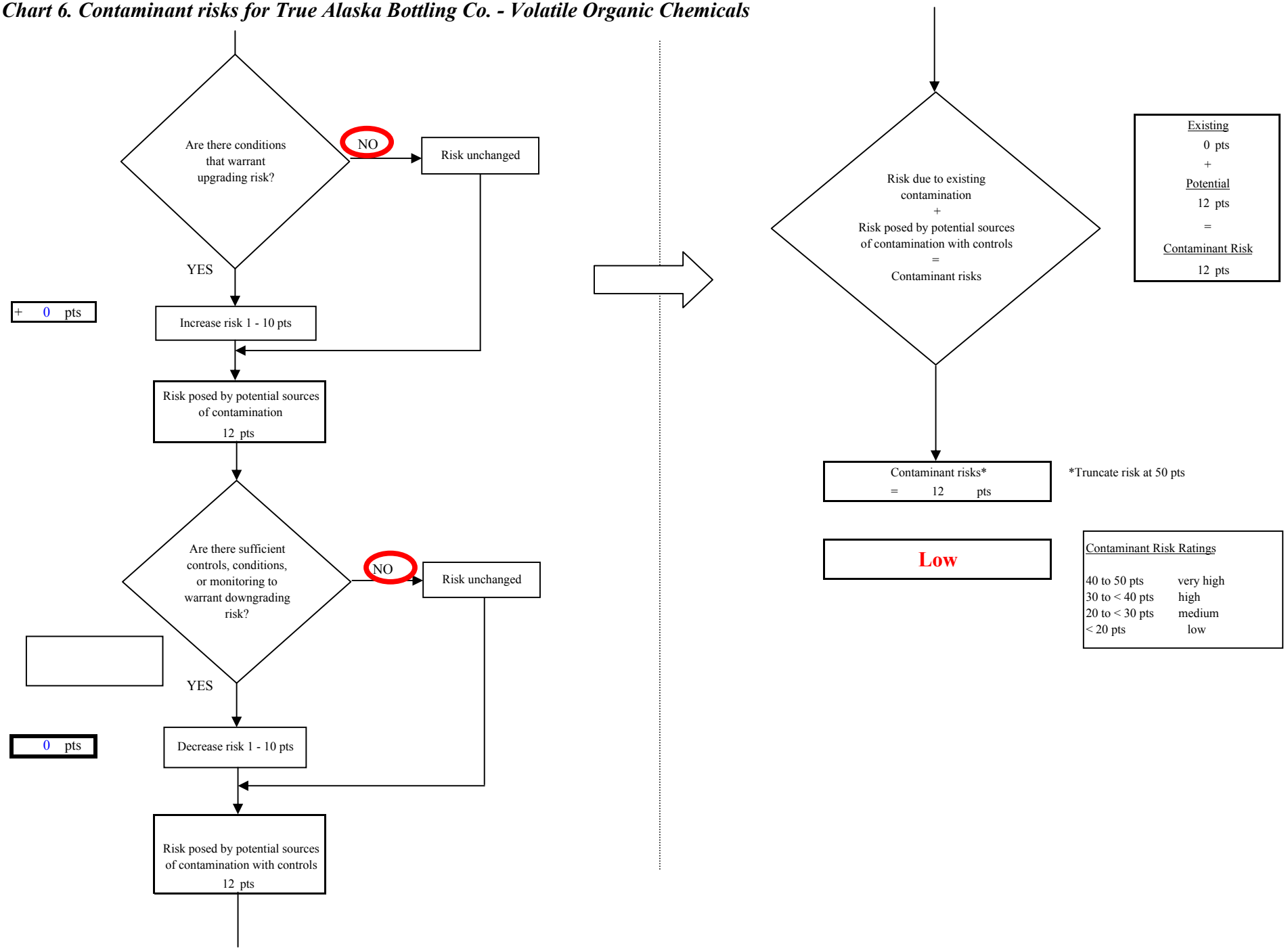
| | **LOW** 10 pts | **MEDIUM** 20 pts | **HIGH** 30 pts | **VERY HIGH** 40 pts |
|---|---|---|---|---|
| **LOW** | ≥ 10 sources + 10 pts | ≥ 10 sources + 5 pts | ≥ 20 sources + 5 pts | ---- |
| **MEDIUM** | ---- | ≥ 2 sources + 5 pts | ≥ 5 sources + 5 pts | ≥ 10 sources + 5 pts |
| **HIGH** | ---- |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

Matrix Score 10

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 6. Contaminant risks for True Alaska Bottling Co. - Volatile Organic Chemicals*



## *Chart 7. Vulnerability analysis for True Alaska Bottling Co. - Volatile Organic Chemicals*