Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for

Peter Pan Seafoods

Port Moller, Alaska

PWSID #261216.001

June 2004

Drinking Water Protection Program Report #1462
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 (EPA), the 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 that 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 the Peter Pan Seafoods Water System, Port Moller, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The public water system (PWS) for Peter Pan Seafoods is a Class B surface water system that obtains water from a mountain pond. The 1999 sanitary survey indicates that the drinking water is piped to the pump house/water treatment building where it is treated with ozone and chlorine dioxide, and stored in a 40,000-gallon water storage tank. The Peter Pan Seafoods facility operates seasonally from approximately May to September and serves approximately 120 residents during the summer months, and 2 residents during the winter months, through fourteen service connections.

The Peter Pan Seafoods protection area is approximately 2-square miles in size and has 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.

Known potential contaminant sources are located within the surface water protection area and include landfills and roads. These sources may affect drinking water at the source and could potentially influence sampling results. Samples were collected from post-treated water. Contaminant sources identified within the surface water protection area for this public water system have been considered in order to provide the most conservative evaluation.

This evaluation included all available water sampling data submitted to the Alaska Department of Environmental Conservation (ADEC) by the system operator. As stated previously, the samples were collected from post-treated water. Vulnerability ratings for the water system have been determined by combining the susceptibility of the surface water source with the contaminant risks. The system received a vulnerability rating of **Medium** for the bacteria and viruses, and the volatile organic chemicals contaminant categories, and a vulnerability rating of **High** in the nitrates and nitrites contaminant category

DRINKING WATER SYSTEM AND AREA OVERVIEW

Peter Pan Seafoods is located in Port Moller, near the communities of Chignik and Port Heiden. The facility is located on a gravel spit at the northeast entrance of Port Moller Bay, on the Alaska Peninsula. Port Moller lies approximately 540 air miles southwest of Anchorage. The local population consists of the Peter Pan Seafoods cannery (BLM, 2004). Average annual precipitation in the Port Moller area is 127 inches, which includes 58 inches of snowfall. Temperatures range from 39 to 60°F during the summer, and winter temperatures average 20°F (ADCED, 2003). .

Information acquired from a September 1999 sanitary survey for the public water system indicated that the surface water intake is adequately constructed.

Port Moller is an embayment of Bristol Bay, on the Alaska Peninsula. Major geologic units include volcanic deposits, till, estuarine deposits, swamp deposits, alluvial deposits, outwash deposits, and marine terrace deposits. Soils in the area are generally poorly developed because of the frequent deposition of volcanic ash. Where soils are developed, they typically have buried surface horizons. The soil particles are mostly sand and gravel (Hogan, 1995).

PETER PAN SEAFOODS 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 pathways 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 10-11 of the "Guidance Manual for Class B Public Water Systems" for additional information.

The protection area established for surface water sources by the ADEC is usually separated into three zones. 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 Peter Pan Seafoods water intake includes Zones A and C (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 Peter Pan Seafoods surface water 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 public water system assessments, three categories of drinking water contaminants were inventoried. They include:

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

Several contaminant sources were identified in the Peter Pan Seafoods protection area as displayed on Map C of Appendix C and 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 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 7 repeat the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites and volatile organic chemicals.

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. Peter Pan Seafoods Contaminant Risks

Category	Score	Rating
Bacteria and Viruses	12	Low
Nitrates and/or Nitrites	15	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. Peter Pan Seafoods Water System Overall Vulnerability

Category	Score	Rating
Bacteria and Viruses	55	Medium
Nitrates and Nitrites	60	High
Volatile Organic Chemicals	55	Medium

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Low**. The contaminant risk for bacteria and viruses is primarily attributed to the presence of roads in Zone A.

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. 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).

No positive bacteria counts have been reported in recent (previous five years) sampling events.

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 remains **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). The contaminant risk is primarily attributed to the presence of roads in Zone A.

Nitrates are very mobile, moving at approximately the same rate as water. 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).

Although low concentrations of nitrates have been reported in recent sampling history, none of the concentrations exceed the MCL of 10 mg/L.

Nitrate levels are often derived from the decomposition of organic matter in soils. Although the nitrate source is 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 source, the overall vulnerability of the source to contamination is **High**.

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Low** (see Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D). The contaminant risk is primarily attributed to the presence of roads located in Zone A.

No recent volatile organic chemicals sampling data was available in ADEC records for this system.

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 Peter Pan Seafoods 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

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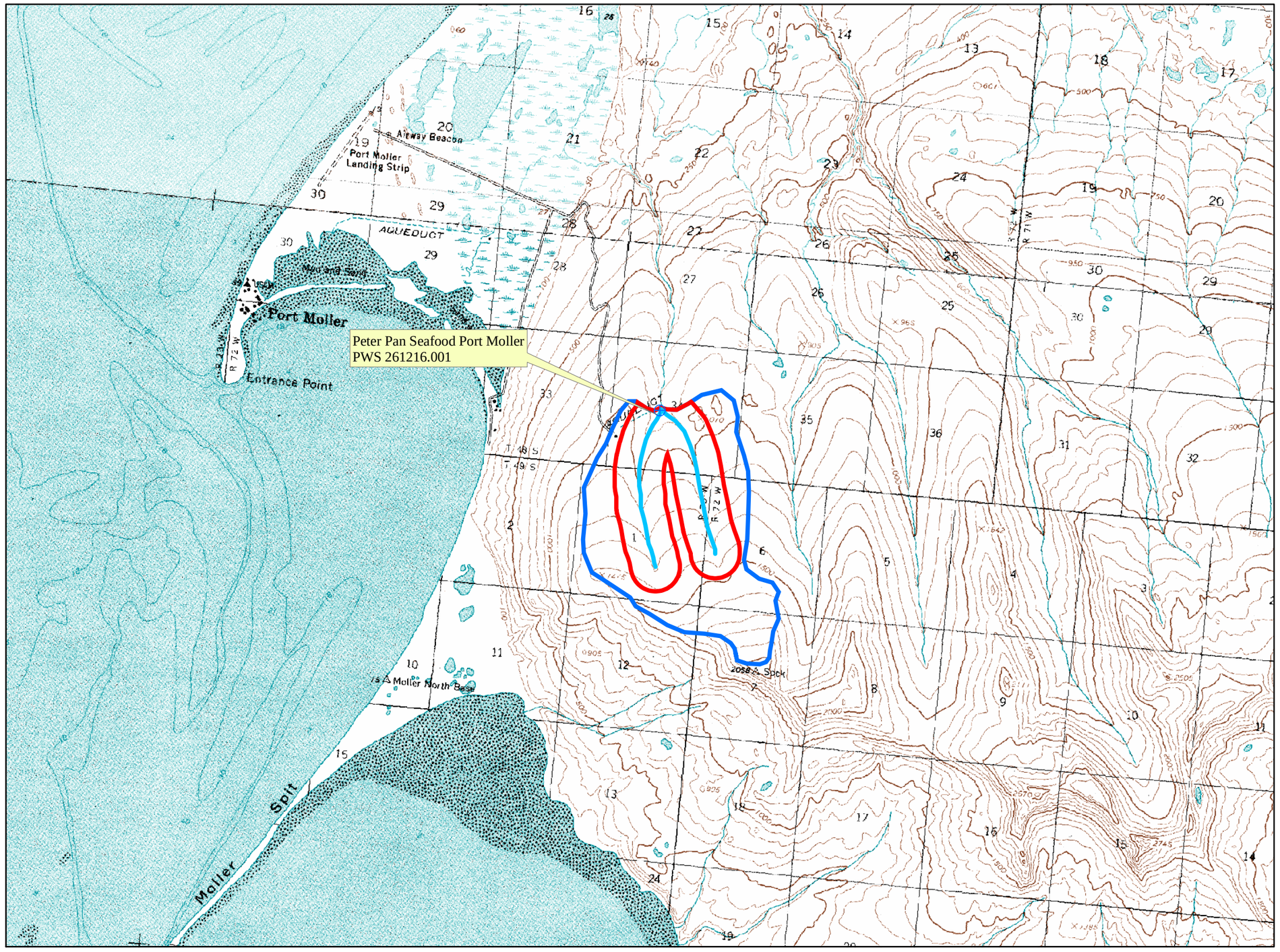
APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

Public Water Well System for PWSID 261216.001 Peter Pan Seafood Port Moller



LEGEND

- Public Water System Well

Surfacewater Protection Zones

- Zone A – 1000 feet from Surface Water
- Zone C – Watershed Boundary

Hydrography/Physical

- Parcels
- Stream
- Lake or Pond
- Contours

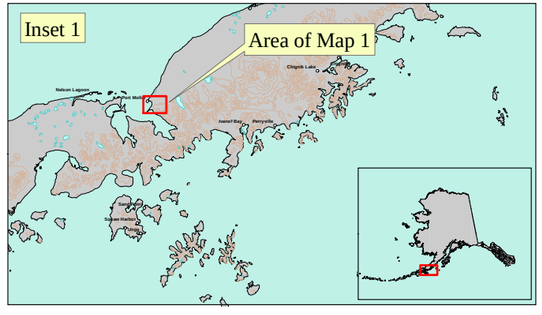
Transportation

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

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

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

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



0 0.35 0.7 1.4 2.1 2.8 Miles

Kodiak Salmon Packers, Inc.
PWS 250029.001
Appendix A Map A

APPENDIX B

Contaminant Source Inventory and Risk Ranking (Tables 1-4)

Table 1

Contaminant Source Inventory for

Peter Pan Seafood Port Moller

PWSID 261216.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Landfills (industrial; type of industrial waste?)	D52	D52-01	A	C	Port Moller - White Alice Site
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 1-20 roads in Zone A
Landfills (industrial; type of industrial waste?)	D52	D52-02	C	C	Port Moller - White Alice Site

Table 2

Contaminant Source Inventory and Risk Ranking for Peter Pan Seafood Port Moller Sources of Bacteria and Viruses

PWSID 261216.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A

Table 3

Contaminant Source Inventory and Risk Ranking for Peter Pan Seafood Port Moller Sources of Nitrates/Nitrites

PWSID 261216.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A

Table 4

Contaminant Source Inventory and Risk Ranking for Peter Pan Seafood Port Moller Sources of Volatile Organic Chemicals

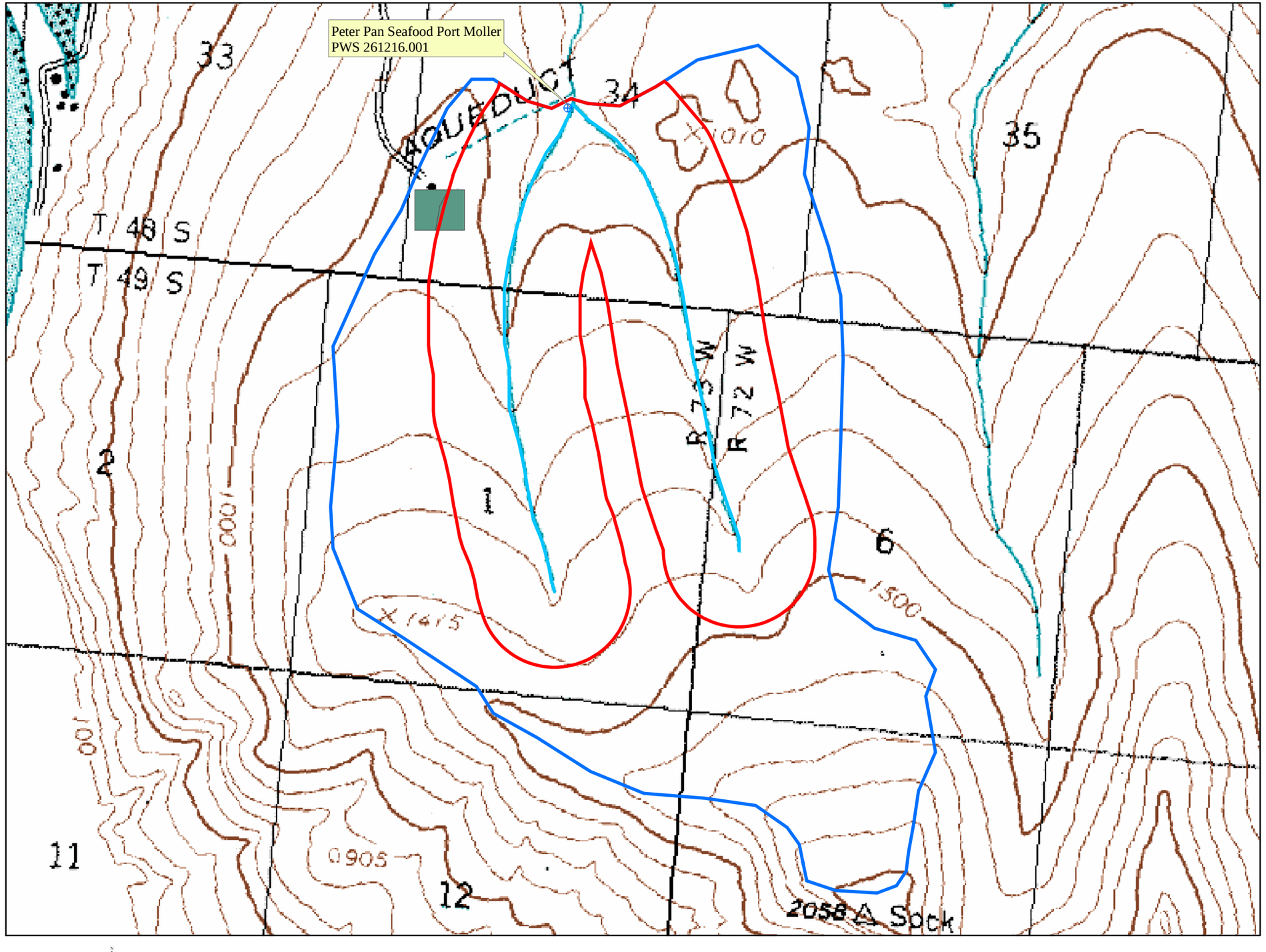
PWSID 261216.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A

APPENDIX C

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

Public Water Well System for PWSID 261216.001 Peter Pan Seafood Port Moller
Showing Potential and Existing Sources of Contamination



LEGEND

Public Water System Well

Surfacewater Protection Zones

- Zone A – 1000 feet from Surface Water
- Zone C – Watershed Boundary

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)
- Road Ferry Crossing

Existing or Potential Contaminant Sources

- Landfills, industrial (D52)

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

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

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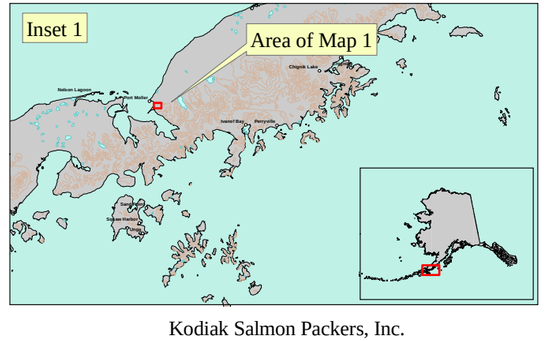


0 0.1 0.2 0.4 0.6 0.8 Miles

Kodiak Salmon Packers, Inc.
PWS 250029.001
Appendix C Map C

APPENDIX D

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

Chart 1. Susceptibility of the Surface Water Source - Peter Pan Seafood Port Moller (PWS No.261216.001)

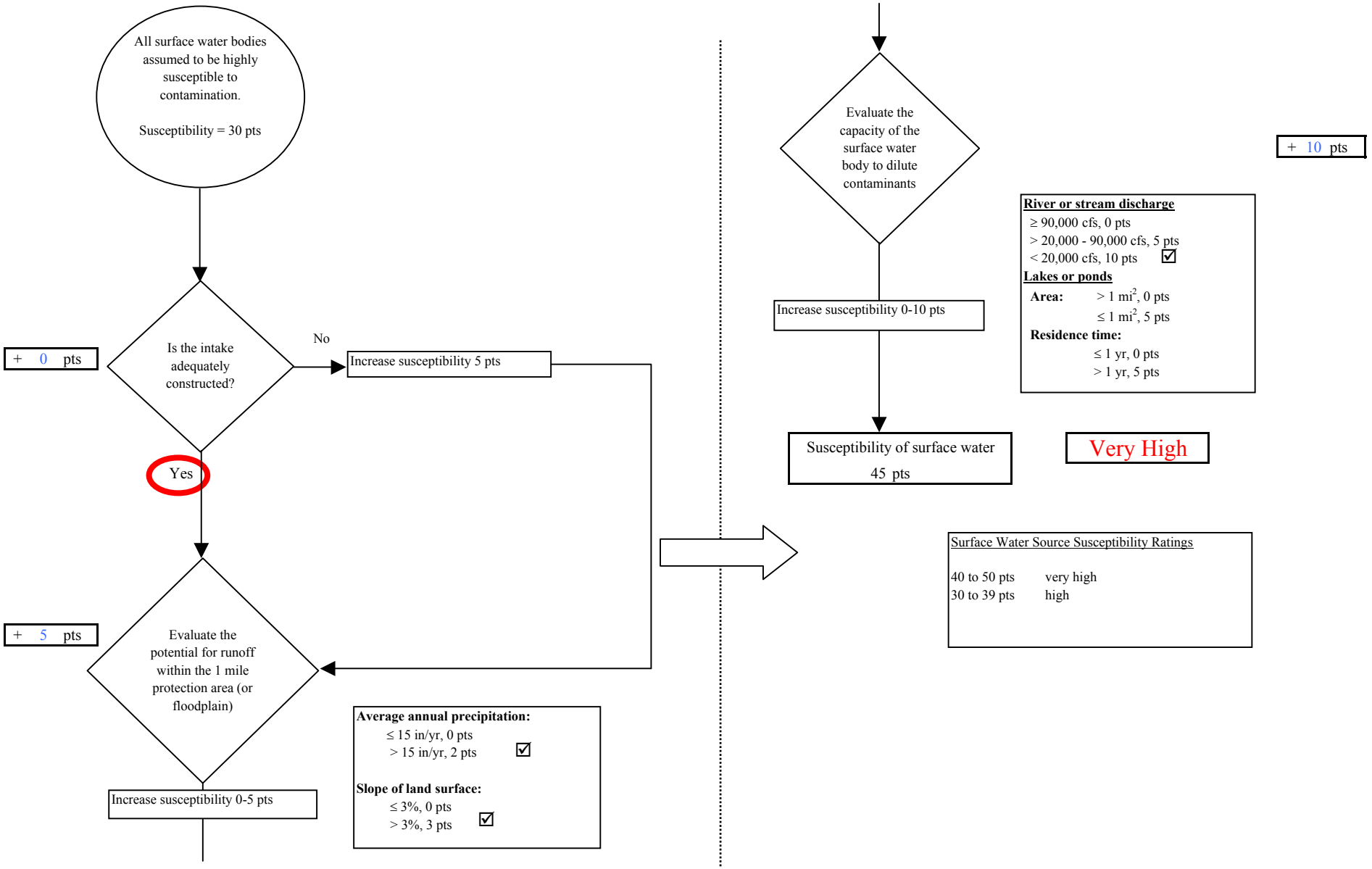
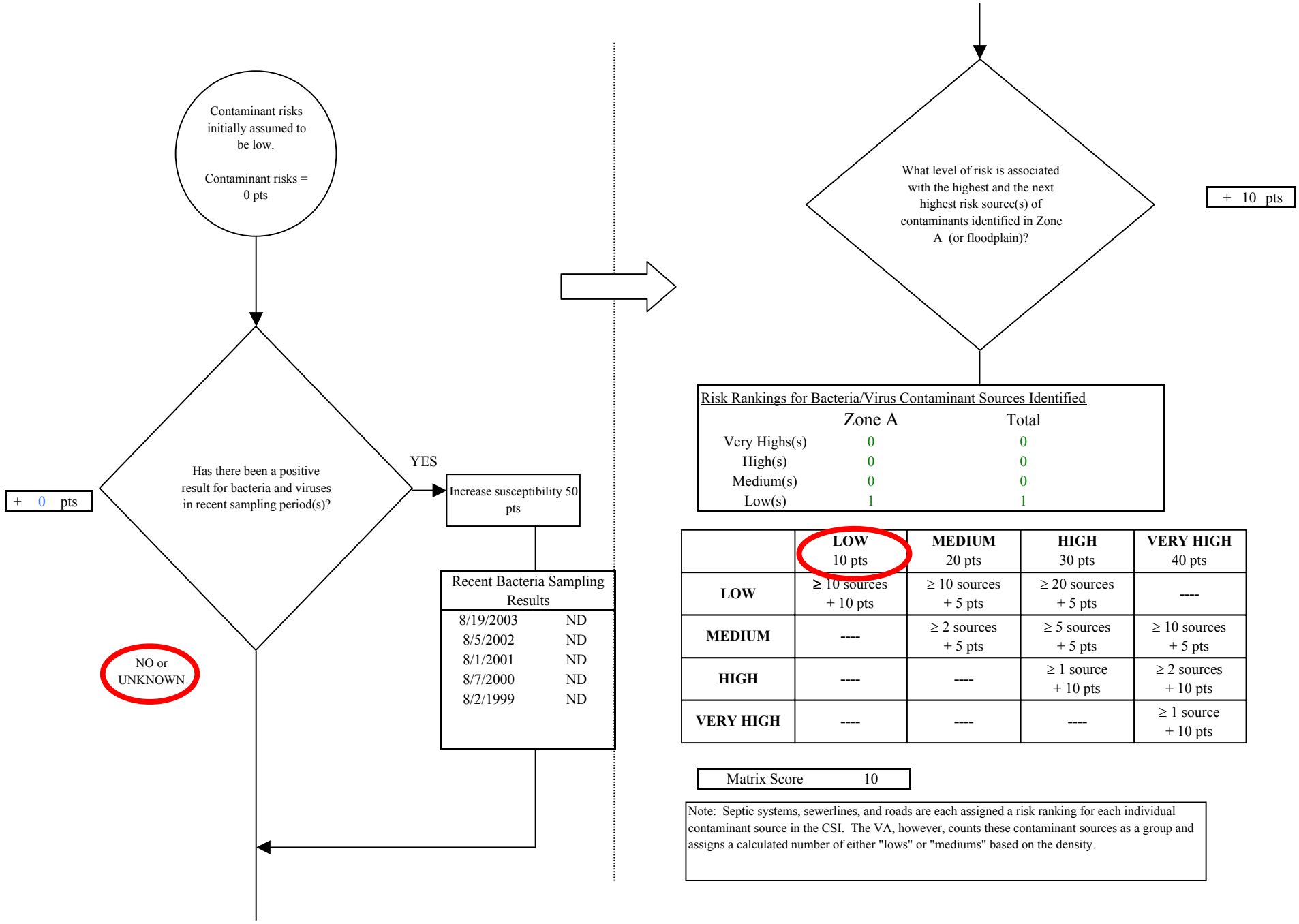


Chart 2. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Bacteria & Viruses



Risk Rankings for Bacteria/Virus Contaminant Sources Identified	Zone A	Total
Very Highs(s)	0	0
High(s)	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 2. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Bacteria & Viruses

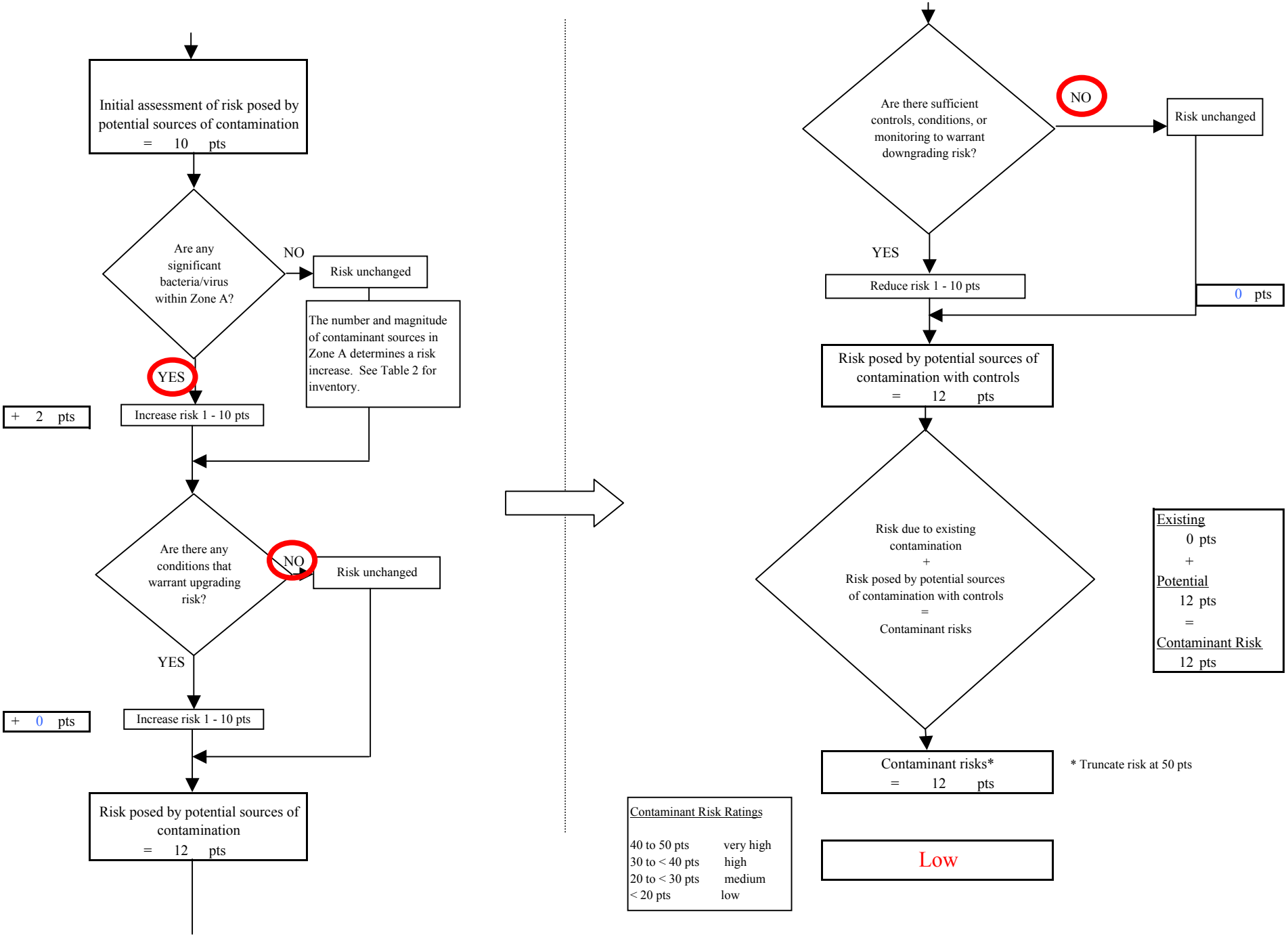


Chart 3. Vulnerability analysis for Peter Pan Seafood Port Moller (PWS No.261216.001) - Bacteria & Viruses

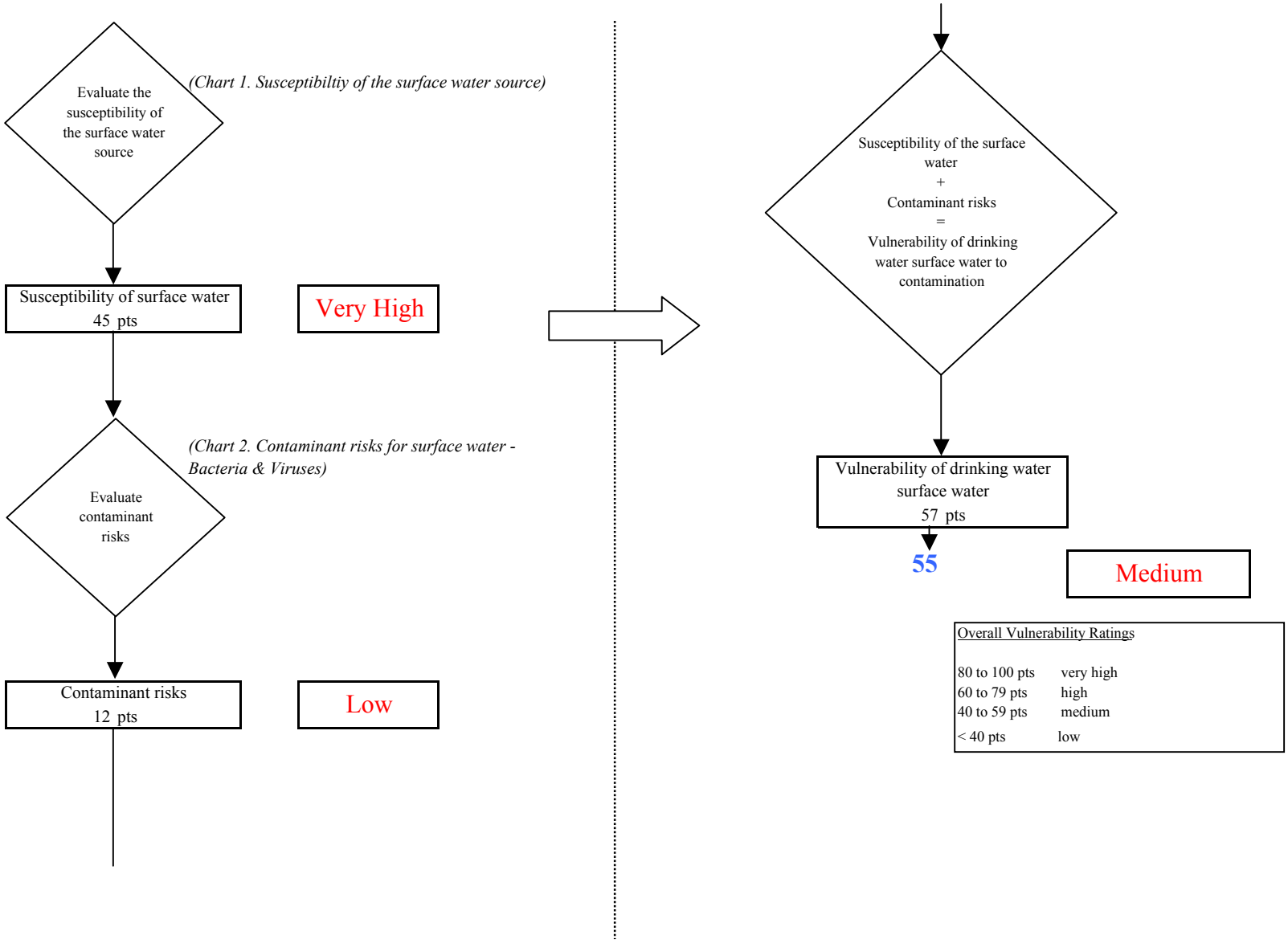
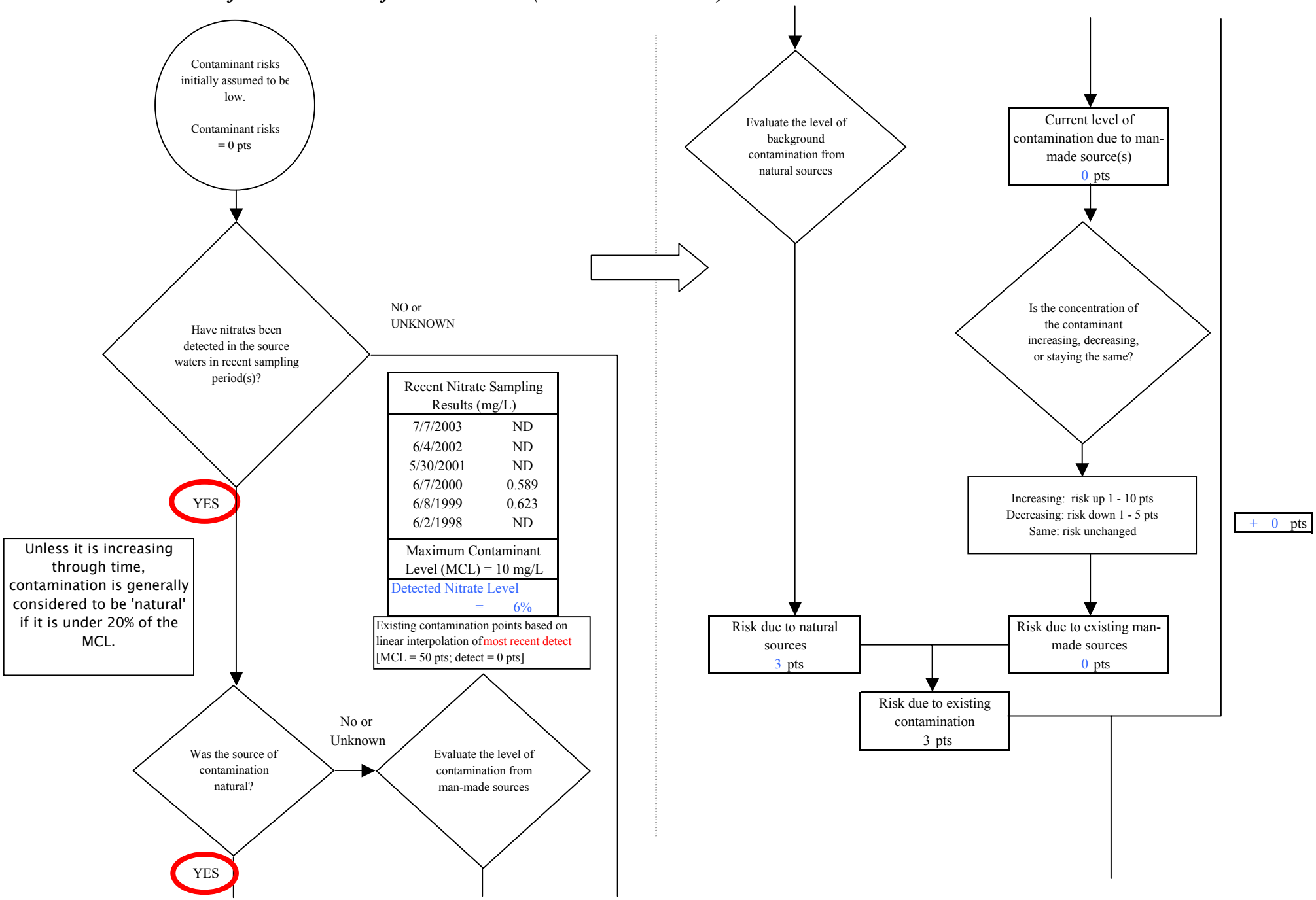


Chart 4. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Nitrates and Nitrites



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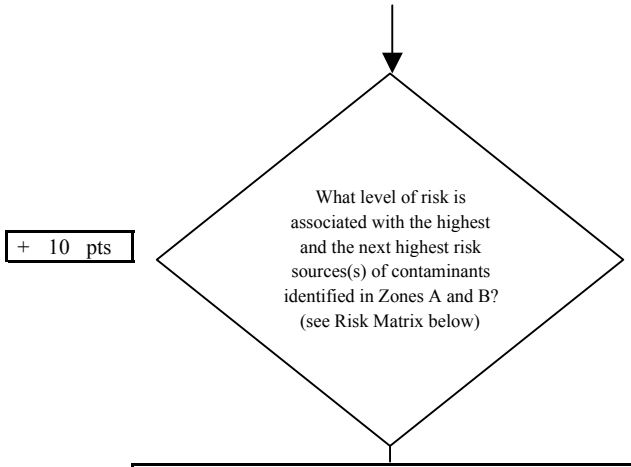


+ 10 pts

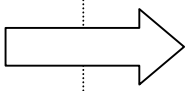
Risk Levels for Nitrate/Nitrite Sources identified in Zones A and B

	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.



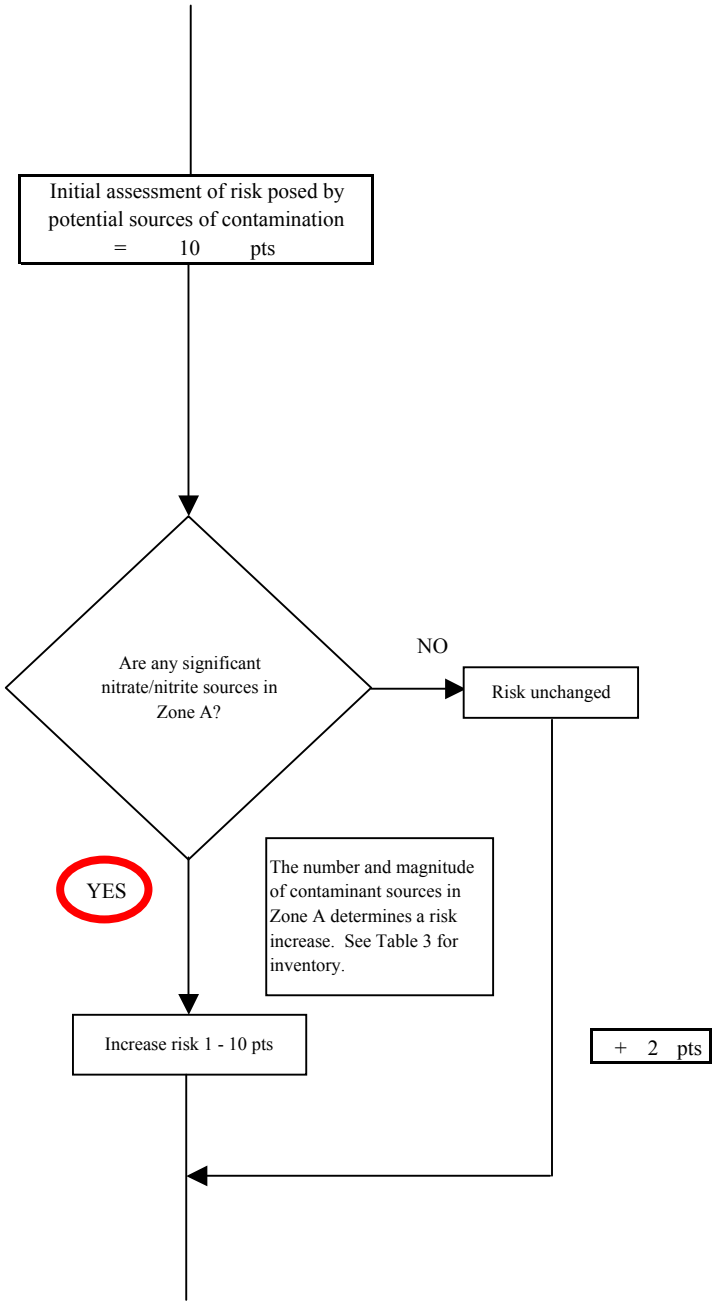


Chart 4. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Nitrates and Nitrites

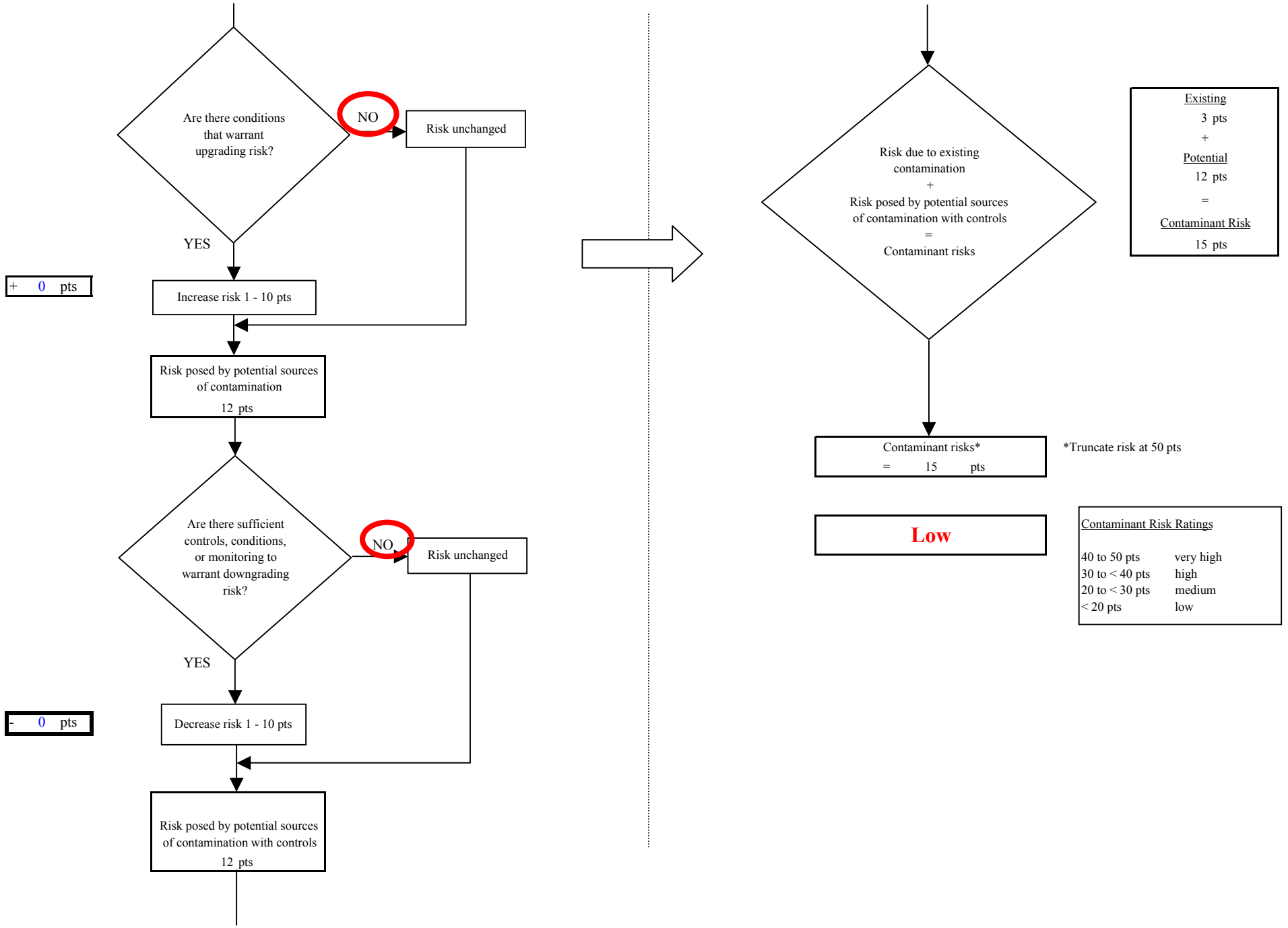


Chart 5. Vulnerability analysis for Peter Pan Seafood Port Moller (PWS No.261216.001) - Nitrates and Nitrites

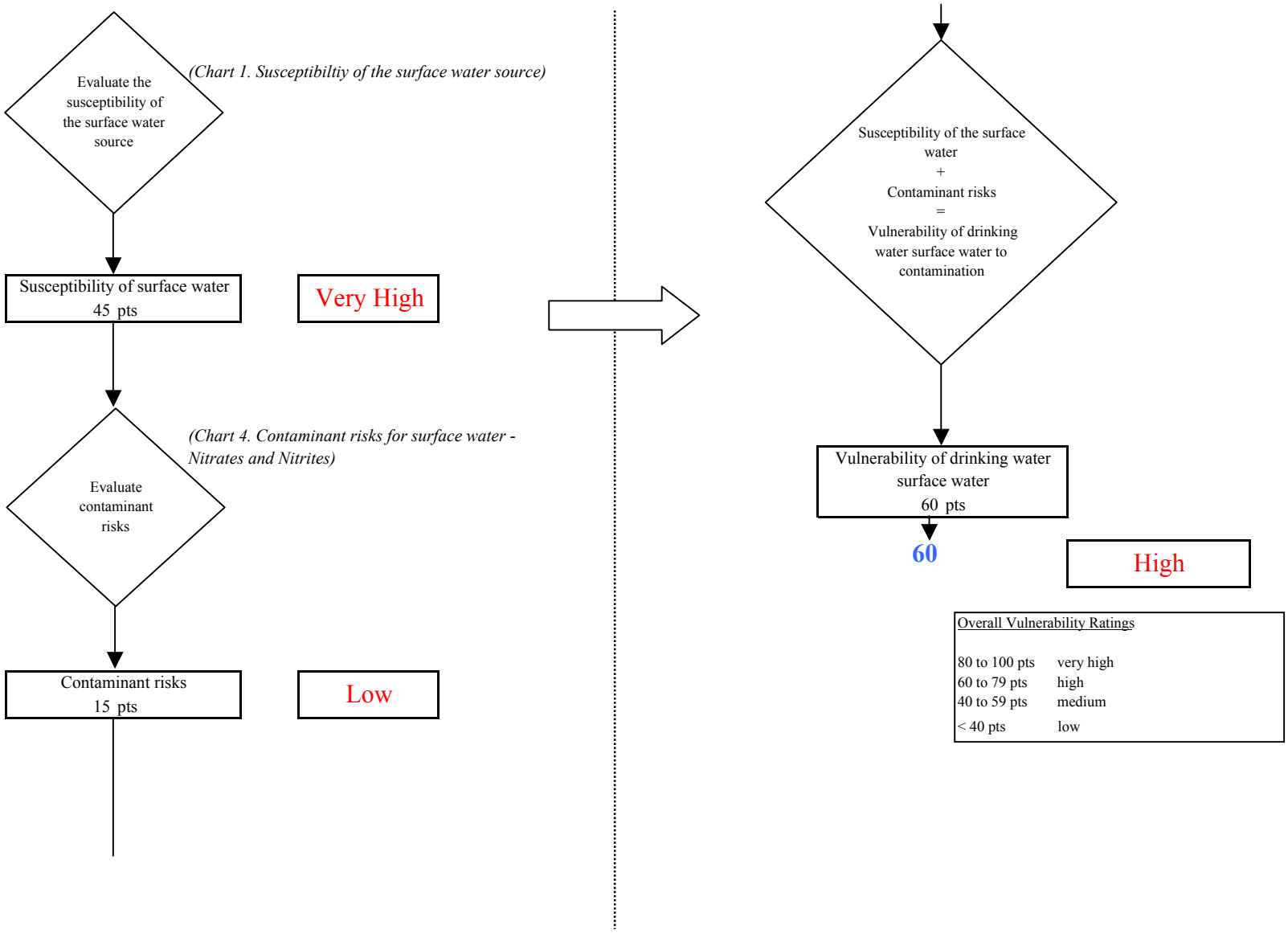


Chart 6. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Volatile Organic Chemicals

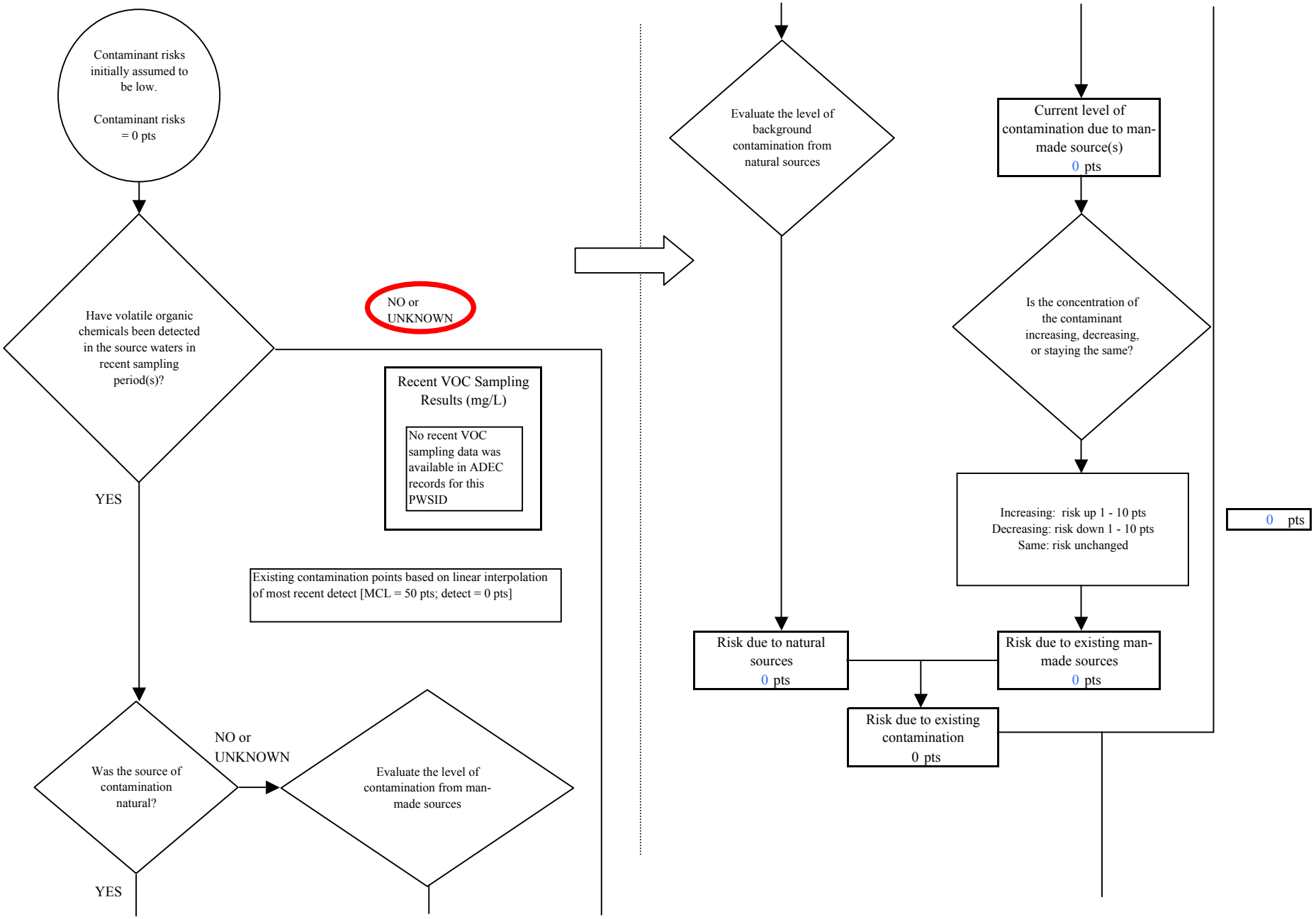


Chart 6. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Volatile Organic Chemicals

+ 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)

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.

Initial assessment of risk posed by potential sources of contamination = 10 pts

Are any significant VOC sources in Zone A?

NO → Risk unchanged

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 4 for inventory.

YES

Increase risk 1 - 10 pts

+ 2 pts

Chart 6. Contaminant risks for Peter Pan Seafood Port Moller (PWS No.261216.001) - Volatile Organic Chemicals

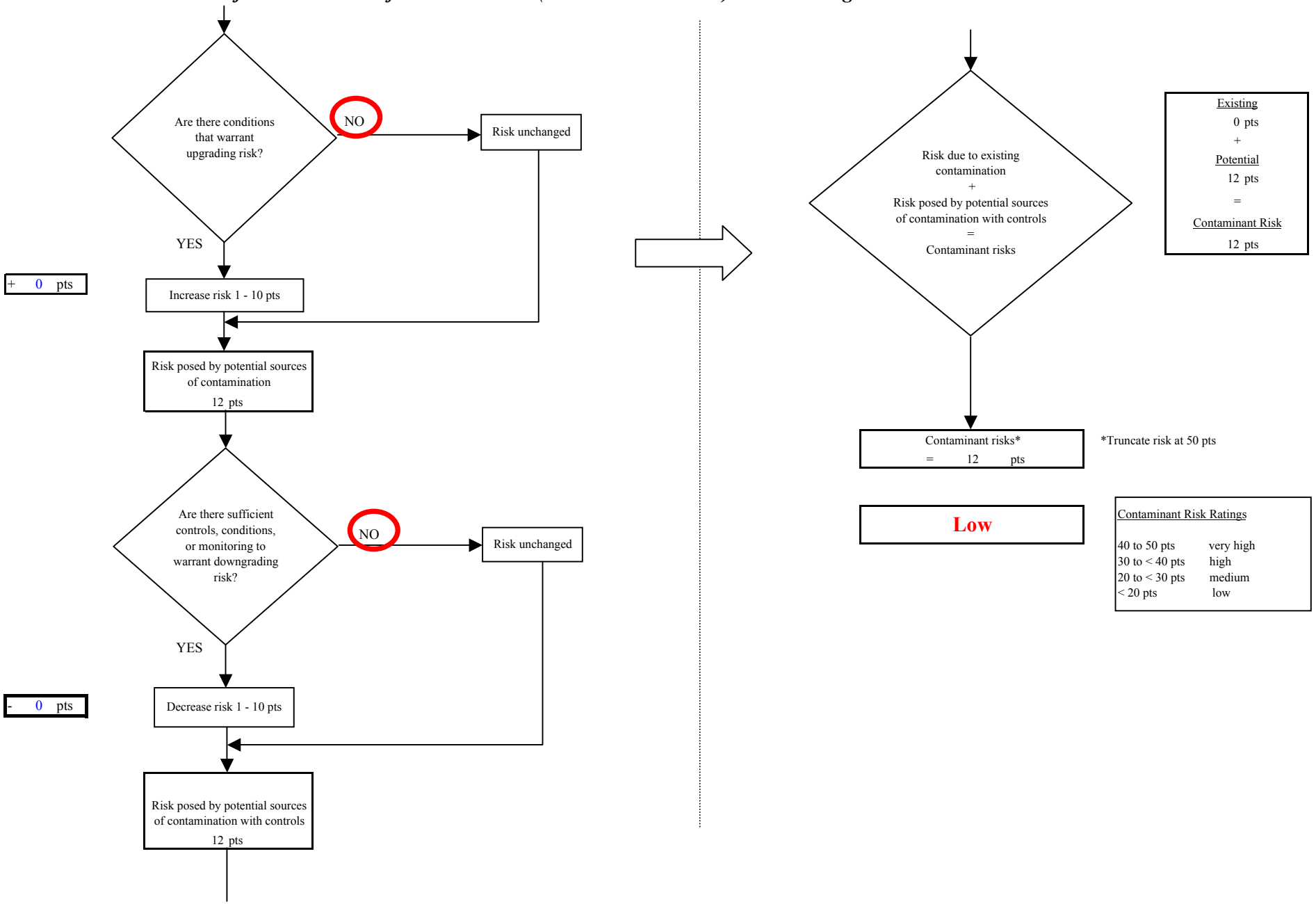


Chart 7. Vulnerability analysis for Peter Pan Seafood Port Moller (PWS No.261216.001) - Volatile Organic Chemicals