Source Water Assessment

A Susceptibility and Vulnerability Assessment for Nikolaevsk, Alaska

PWSID # 241648

June 2003

Drinking Water Protection Program Report #987

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 Nikolaevsk, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Nikolaevsk water system is a Class A water system (community) that obtains water from four different streams. The overall protection area received a susceptibility rating of "**very high**". *A rating of high to very high is typical for all surface water catchment areas*. Identified potential and current sources of contaminants for the drinking water source include logging areas and roads. Potential and existing sources of the following contaminants were evaluated for this assessment: bacteria and viruses, nitrates and/or nitrites, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, volatile organic chemicals, and other organic chemicals. Combining the natural susceptibility of the surface water source with the contaminant risk, this water system has received a vulnerability rating of "**medium"** for heavy metals, cyanide, synthetic organic chemicals and other organic chemicals and "**high**" for nitrates and volatile organic chemicals and **"very high"** for bacteria and viruses.

INTRODUCTION

The Alaska Department of Environmental Conservation (ADEC) is completing source water assessments for all public drinking water sources in the State of Alaska. The purpose of this assessment is to provide owners and/or operators, communities, and local governments with information they can use to preserve the quality of Alaska's public drinking water supplies. The results of this source water assessment can be used to decide where voluntary protection efforts are needed and feasible, and also what efforts will be most effective in reducing contaminant risks to your water system.

DRINKING WATER SYSTEM AND AREA OVERVIEW

The Nikolaevsk water system is a Class A (community) water system that operates year round and serves approximately 265 residents through 53 service connections.

Nikolaevsk is located at the southern end of the Kenai Peninsula, near Anchor Point. It lies on a road leading from North Fork Road and the Sterling Highway. (Sec. 24, T004S, R014W, Seward Meridian.) Nikolaevsk is an unincorporated community. The area encompasses 33.6 sq. miles of land. Nikolaevsk's current population is 314. The majority of residents in Nikolaevsk are connected to the water system. The sewage collection system is through individual septic systems. Heating oil (stored in both above and below ground tanks) and wood are most commonly used for heating homes and buildings. Refuse is collected privately and delivered to the nearest transfer station is in Anchor Point. Winter temperatures range from 14 to 27; summer temperatures vary from 45 to 65. Average annual precipitation is 24 inches (ADCED, 2003).

According to the 2002 Sanitary Survey and 1997 SOC Waiver Application, the system is composed of four separate intakes on low flowing streams. The watershed contributing to the water supply is vegetated with fireweed alder and spruce. The catchments are fenced to keep animals and people away. However, the watershed contributing water to the catchments is accessible to foot, four-wheelers and snow machines.

NIKOLAEVSK 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 to a surface water source. 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 Nikolaevsk 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 Nikolaevsk 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 A public water system assessments, six categories of drinking water contaminants were inventoried. They include:

- Bacteria and viruses;
- Nitrates and/or nitrites;
- Volatile organic chemicals;
- Heavy metals, cyanide, and other inorganic chemicals;
- Synthetic Organic Chemicals; and
- Other Organic Chemicals.

Sources identified in the Nikolaevsk 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 Zones 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.

Tables 2 through 5 in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, metals, synthetic organic compounds, and other organic compounds.

VULNERABILITY OF NIKOLAEVSK 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 13 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, volatile organic chemicals, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, and other 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 Nikolaevsk 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. Nikolaevsk Contaminant Risks

Category	Score	Rating
Bacteria and Viruses	50	Very High
Nitrates and/or Nitrites	23	Medium
Volatile Organic Chemicals	25	Medium
Heavy Metals, Cyanide, and Other Inorganic Chemicals	12	Low
Synthetic Organic Chemicals	0	Low
Other 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. Overall Vulnerability

Category	Score	Rating
Bacteria and Viruses	95	Very High
Nitrates and Nitrites	23	Medium
Volatile Organic Chemicals	70	High
Heavy Metals, Cyanide, and Other Inorganic Chemicals	55	Medium
Synthetic Organic Chemicals	45	Medium
Other Organic Chemicals	55	Medium

Bacteria and Viruses

The contaminant risk for bacteria and viruses is "very high". The presence of roads present risk to this source. The sampling records indicate that bacteria an/or viruses were detected in 1997. (See Chart 2 – Contaminant Risks for Bacteria and Viruses in Appendix D).

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 is "very high".

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is "medium". The presence of logging activities, roads and existing contamination presents risk to this source. (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 Nikolaevsk water source indicates that nitrates were detected in 2002. The levels detected all below 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 (EPA, 2003).

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the source, the overall vulnerability of the well to contamination is "high".

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is "medium" (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D). The presence of logging activities and roads present contaminant risk to this source.

No regulated volatile organic chemicals have been detected recently in source waters. However, volatile organic chemicals commonly associated with the disinfection process have been detected at low concentrations. (less than 7% of the MCL).
Since it is likely that these chemicals are associated from the disinfection process, it is assumed that these chemicals do not derive from source waters.

After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the source, the overall vulnerability of the well to contamination is "high".

Heavy Metals, Cyanide, and Other Inorganic Chemicals

The contaminant risk for heavy metals is "low" The presence of logging activities, roads presents contaminant risk to this source. Low levels of lead and copper have been detected in the recent sampling. These chemicals are commonly associated with distributions systems and are not considered to derive from source waters. (See Chart 8 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

After combining the contaminant risk for heavy metals with the natural susceptibility of the source, the overall vulnerability of the well to contamination is "medium".

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is "low". No potential or existing sources of contamination have been identified in the protection area. After combining the contaminant risk with the natural susceptibility of the source, the overall vulnerability to synthetic organic chemicals of the well is "medium" (See Chart 11 – Contaminant Risks for Synthetic Organic Chemicals in Appendix D).

Review of the historical sampling data indicates that no synthetic organic chemicals have been detected in recent years.

Other Organic Chemicals

The contaminant risk for other organic chemicals is "low". The presence of roads presents risk to this source After combining the contaminant risk with the natural susceptibility of the source, the overall vulnerability to other organic chemicals of the source is "medium" (See Chart 13 – Contaminant Risks for Other Organic Chemicals in Appendix D).

Review of the historical sampling data indicates that no other organic chemicals have been detected.

Using the Source Water Assessment

This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of the community of Nikolaevsk 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 Nikolaevsk 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_BLOCK.cfm

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

APPENDIX A

Nikolaevsk
Drinking Water Protection Area Location Map
(Map 1)

Map 1- Nikolaevsk Village Public Water System

PWSID: 241648.001-004

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 375 750 1,500 2,250 3,000 Feet

1:7,370

Data Sources:
USGS- 1:24,000 Topog Map, Road
Kenai Borough-Parcels
ADEC-Intake and Protection Area

Legend

Nikolaevsk Public Water Systems

- 241648.001
- 241648.002
- 241648.003
- 241648.004

- Zone A Protection Area
- Watershed Boundary
- Lakes
- Rivers and Streams

APPENDIX B

Contaminant Source Inventory and Risk Rankings (Tables 1-6)

Table 1

Contaminant Source Inventory for
Nikolaevsk Village 1 and 2

PWSID 241648.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Logging (Inactive)	E02	E02	A	2	
Highways and roads, dirt/gravel	X24	X24-01	A	2	
Highways and roads, dirt/gravel	X24	X24-02	A	2	

Table 2

Contaminant Source Inventory and Risk Ranking for Nikolaevsk Village 1 and 2 Sources of Bacteria and Viruses

PWSID 241648.001

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	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-02	A	Low	2	

Table 3

Contaminant Source Inventory and Risk Ranking for Nikolaevsk Village 1 and 2 Sources of Nitrates/Nitrites

PWSID 241648.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Logging (Inactive)	E02	E02	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-02	A	Low	2	

Table 4

Contaminant Source Inventory and Risk Ranking for Nikolaevsk Village 1 and 2 Sources of Volatile Organic Chemicals

PWSID 241648.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Logging (Inactive)	E02	E02	A	Medium	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-02	A	Low	2	

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Logging (Inactive)	E02	E02	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-02	A	Low	2	

Table 6

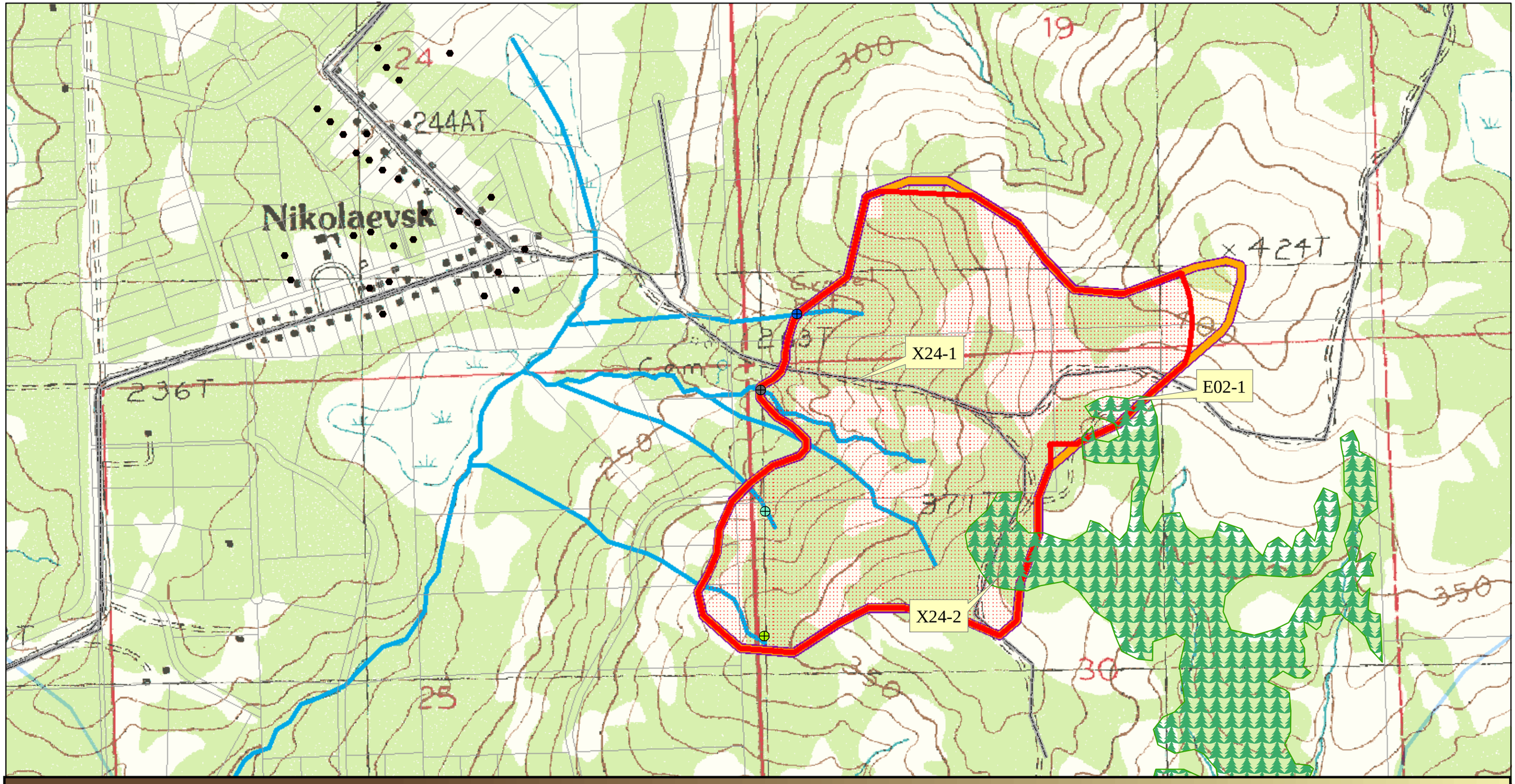
Contaminant Source Inventory and Risk Ranking for Nikolaevsk Village 1 and 2 Sources of Other Organic Chemicals

PWSID 241648.001

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	2	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	2	
Highways and roads, dirt/gravel	X24	X24-02	A	Low	2	

APPENDIX C

Nikolaevsk
Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map 2)



Map 2- Potential Sources of Contamination for Nikolaevsk Village Public Water System

PWSID 241648.001-004

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

Data Sources:
USGS- 1:25,000 Topo Map
DOT-Roads
Kenai Borough-Parcels
ADEC-Intake and Protection Area

0 450 900 1,800 Feet

1:8,906

Legend

Nikolaevsk Public Water Systems
- 241648.001
- 241648.002
- 241648.003
- 241648.004
- 241648.005

- Zone A Protection Area
- Watershed Boundary
- Parcels
- Lakes
- Roads
- Rivers
- Logging (E02)

N W E S

APPENDIX D

Vulnerability Analysis and Contaminant Risks
(Charts 1-13)

Chart 1. Susceptibility of the Surface Water Source - Nikolaevsk Village

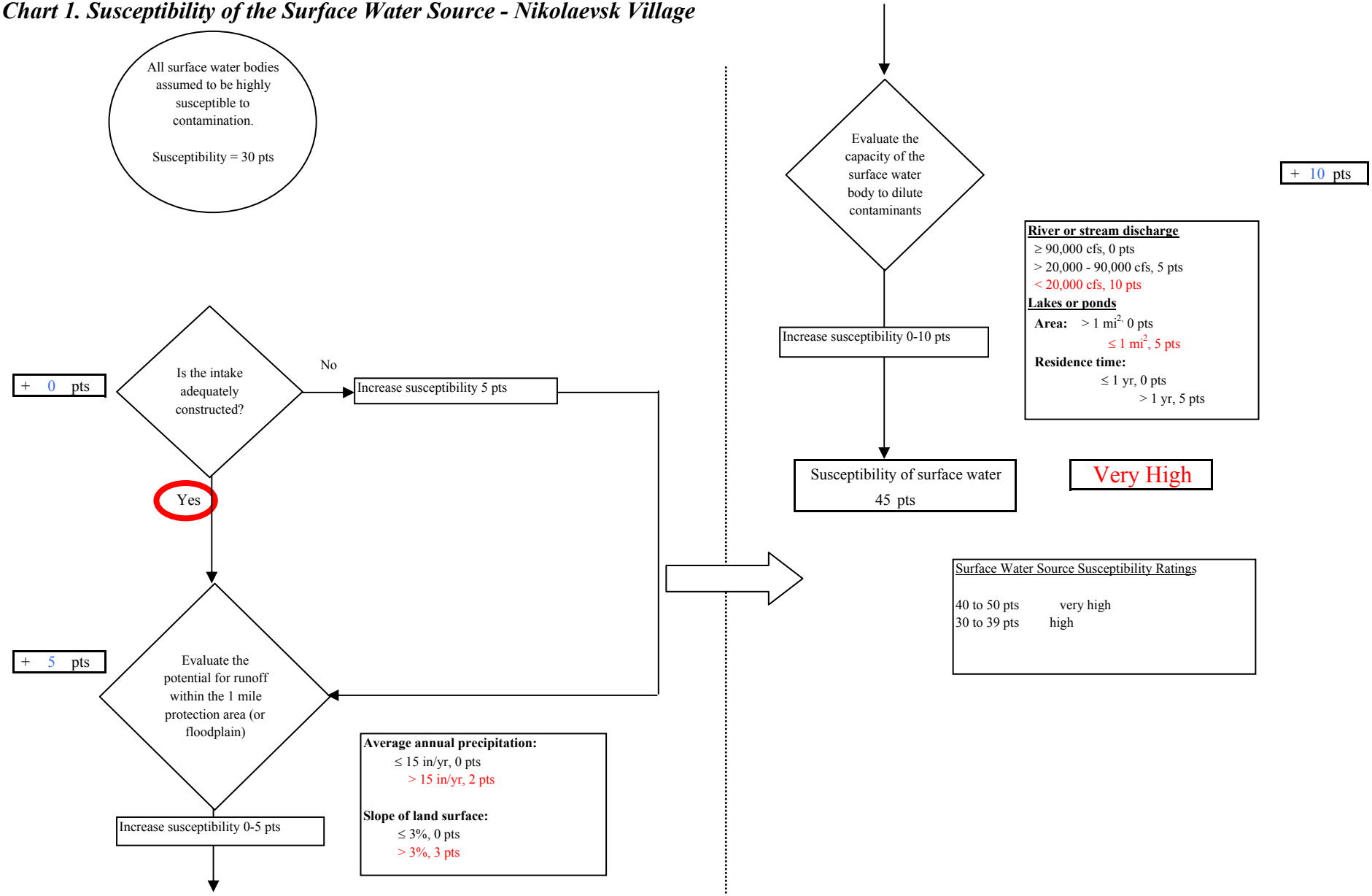
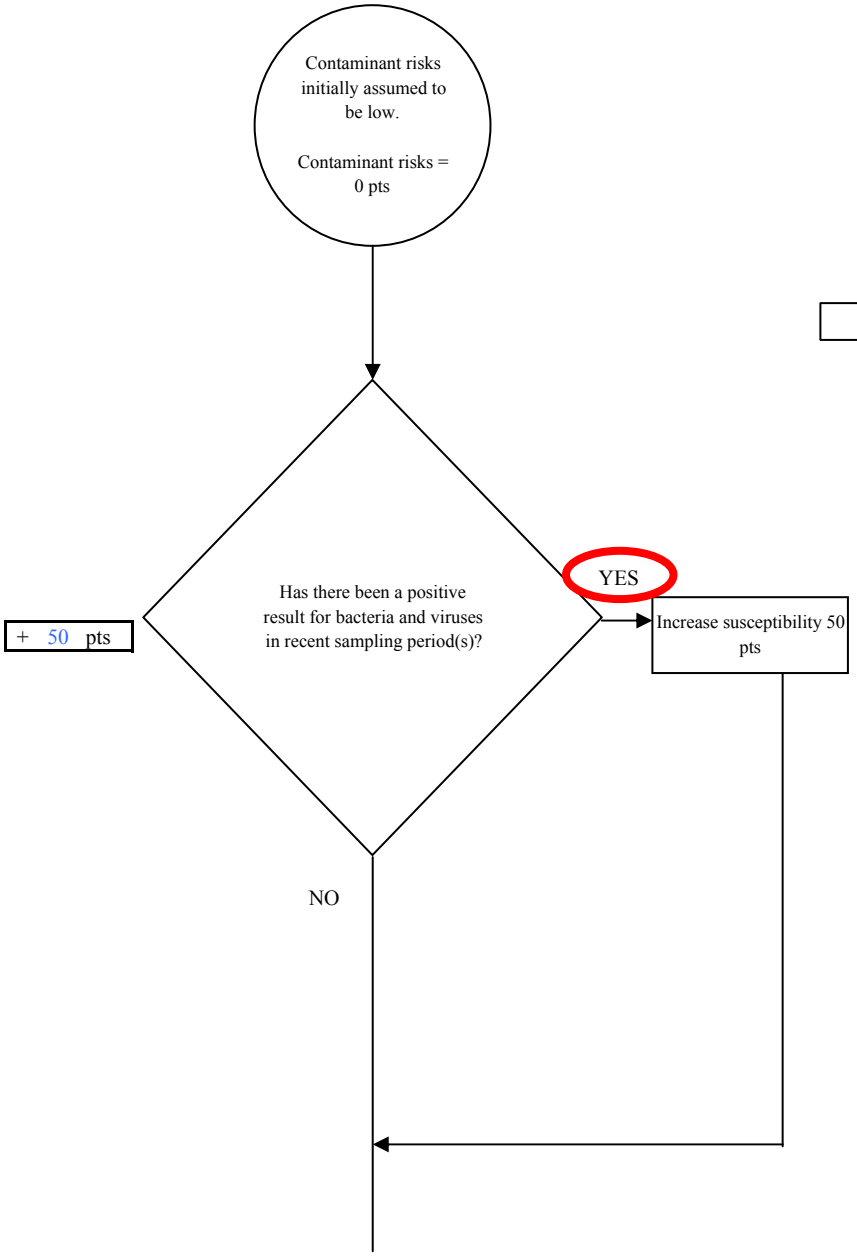
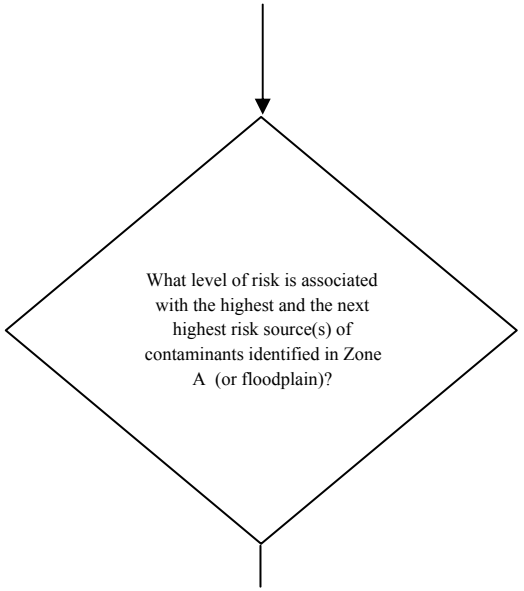


Chart 2. Contaminant risks for Nikolaevsk Village - Bacteria & Viruses





+ 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	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 Nikolaevsk Village - Bacteria & Viruses

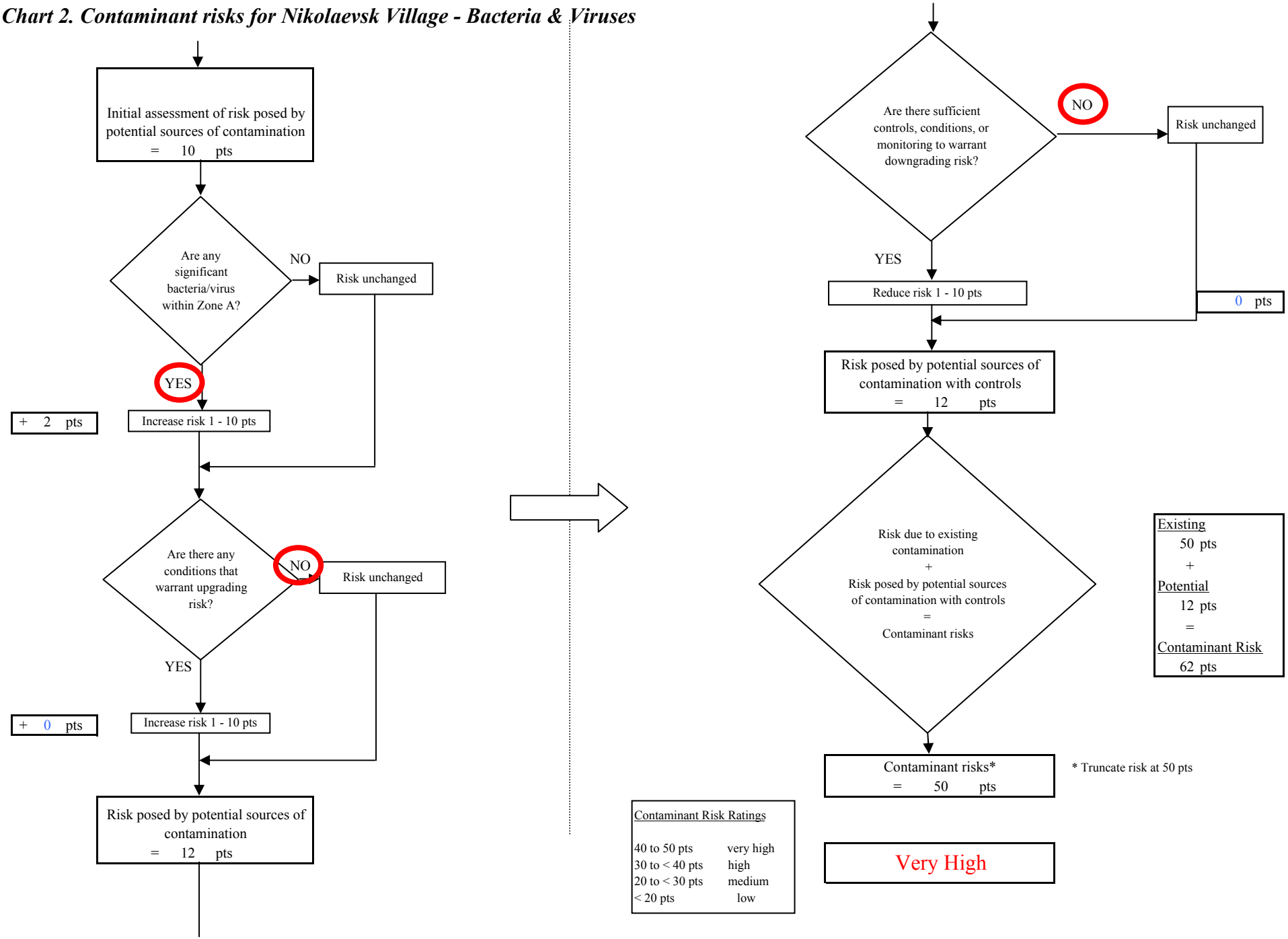


Chart 3. Vulnerability analysis for Nikolaevsk Village - Bacteria & Viruses

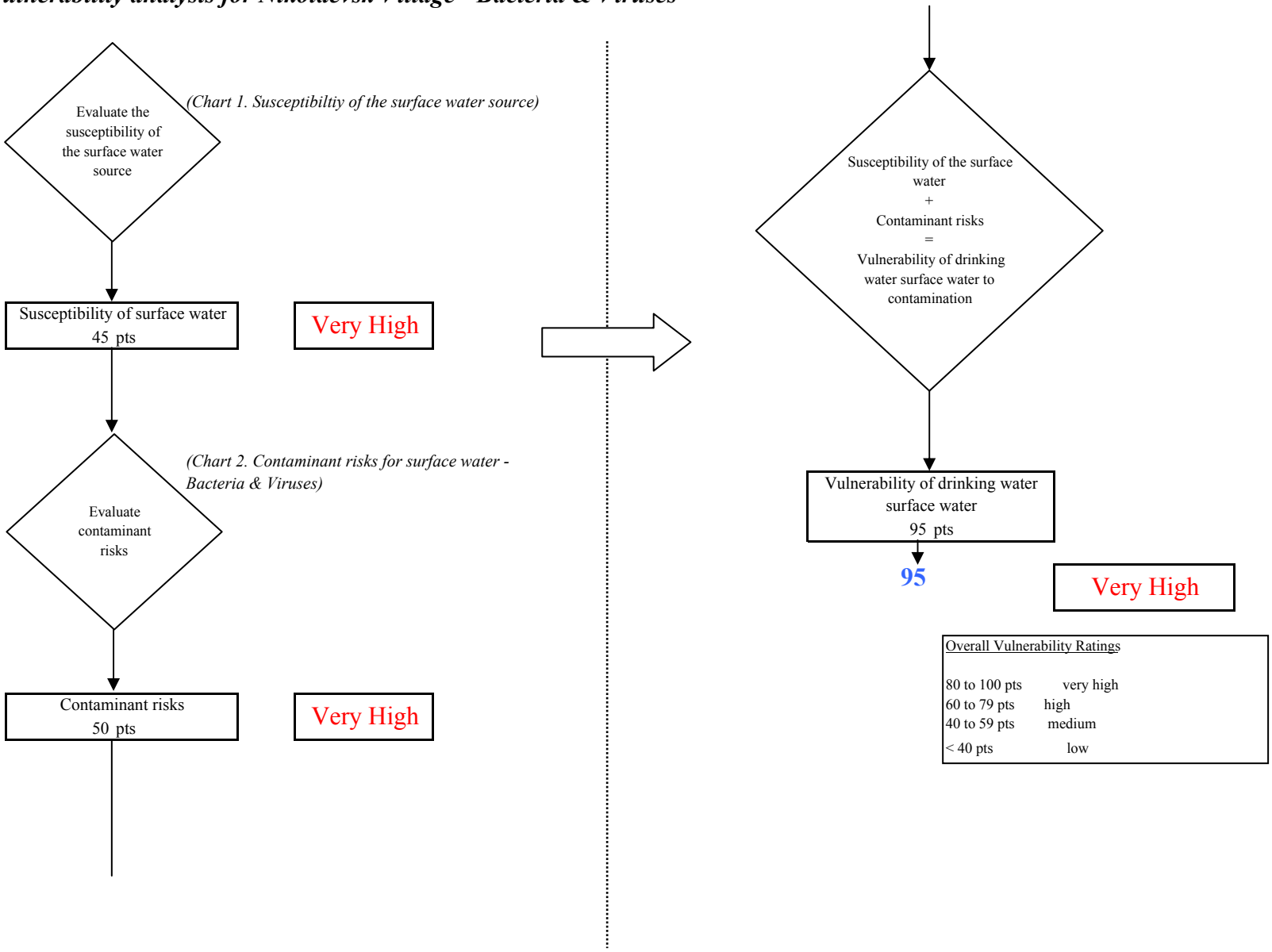


Chart 4. Contaminant risks for Nikolaevsk Village - Nitrates and Nitrites

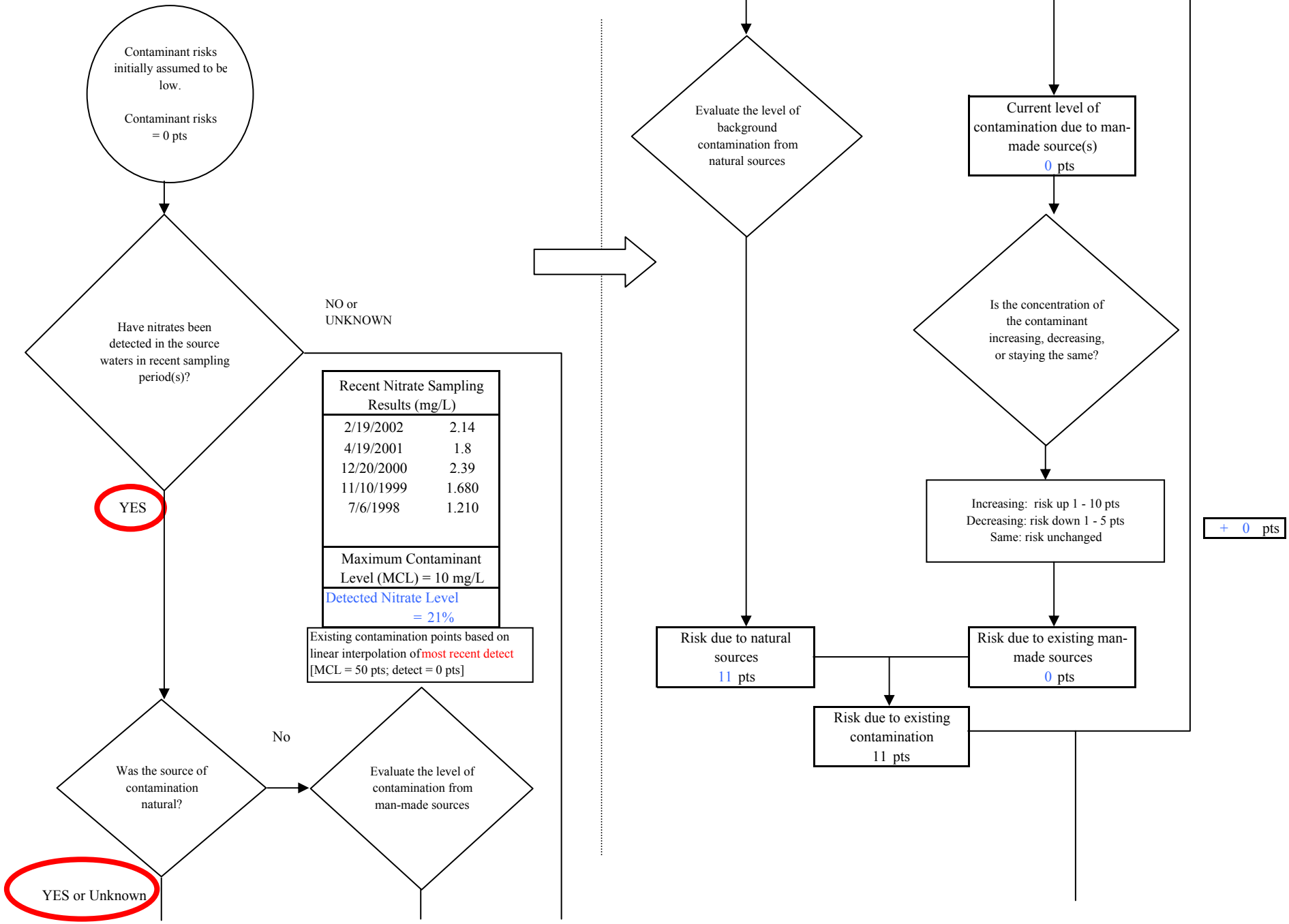
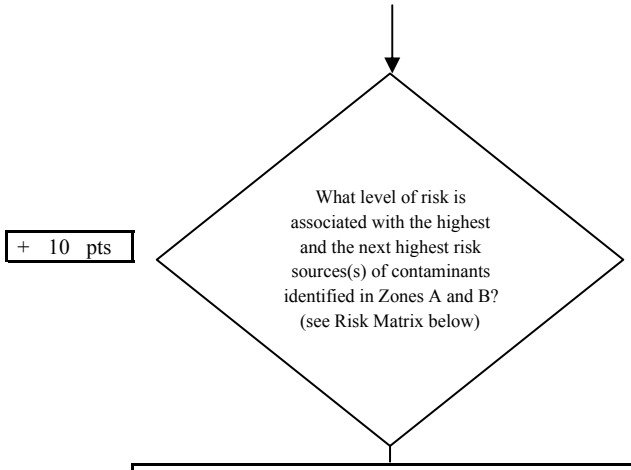


Chart 4. Contaminant risks for Nikolaevsk Village - Nitrates and Nitrites



+ 10 pts

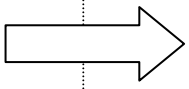
Risk Levels for Nitrate/Nitrite Sources identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0		0
Low(s)	2		2

	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.



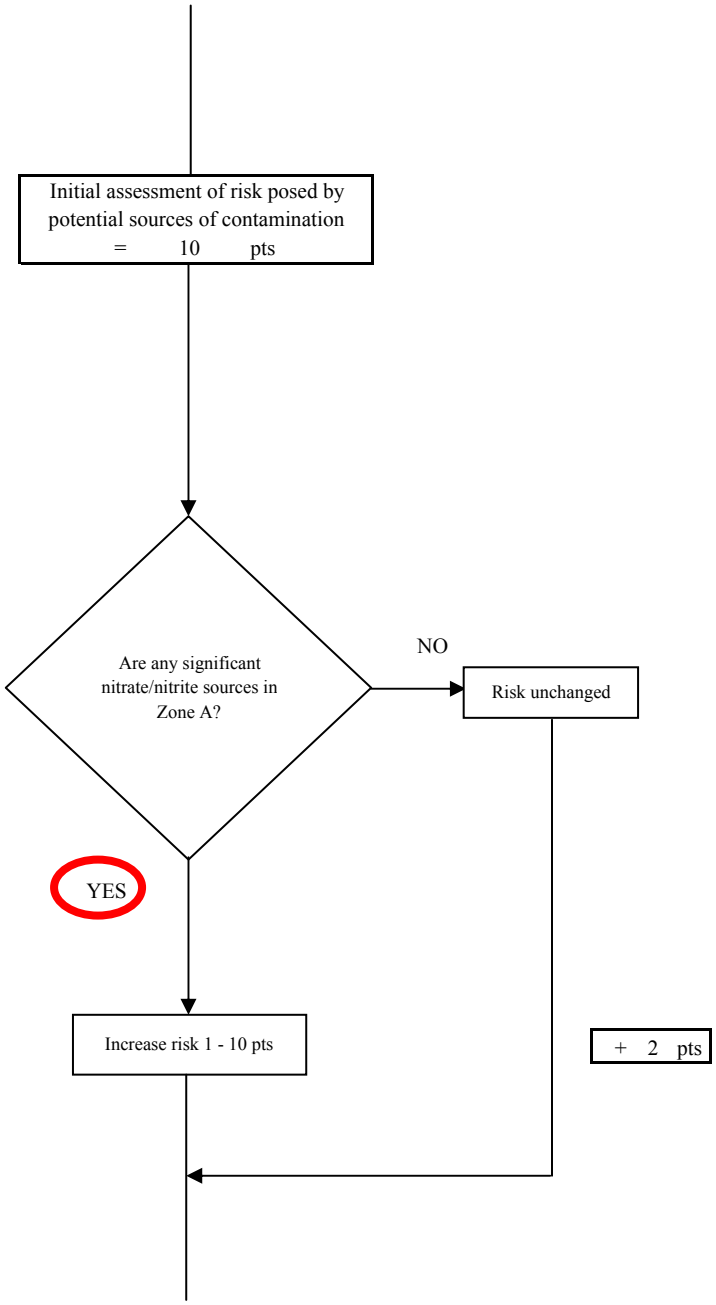


Chart 4. Contaminant risks for Nikolaevsk Village - Nitrates and Nitrites

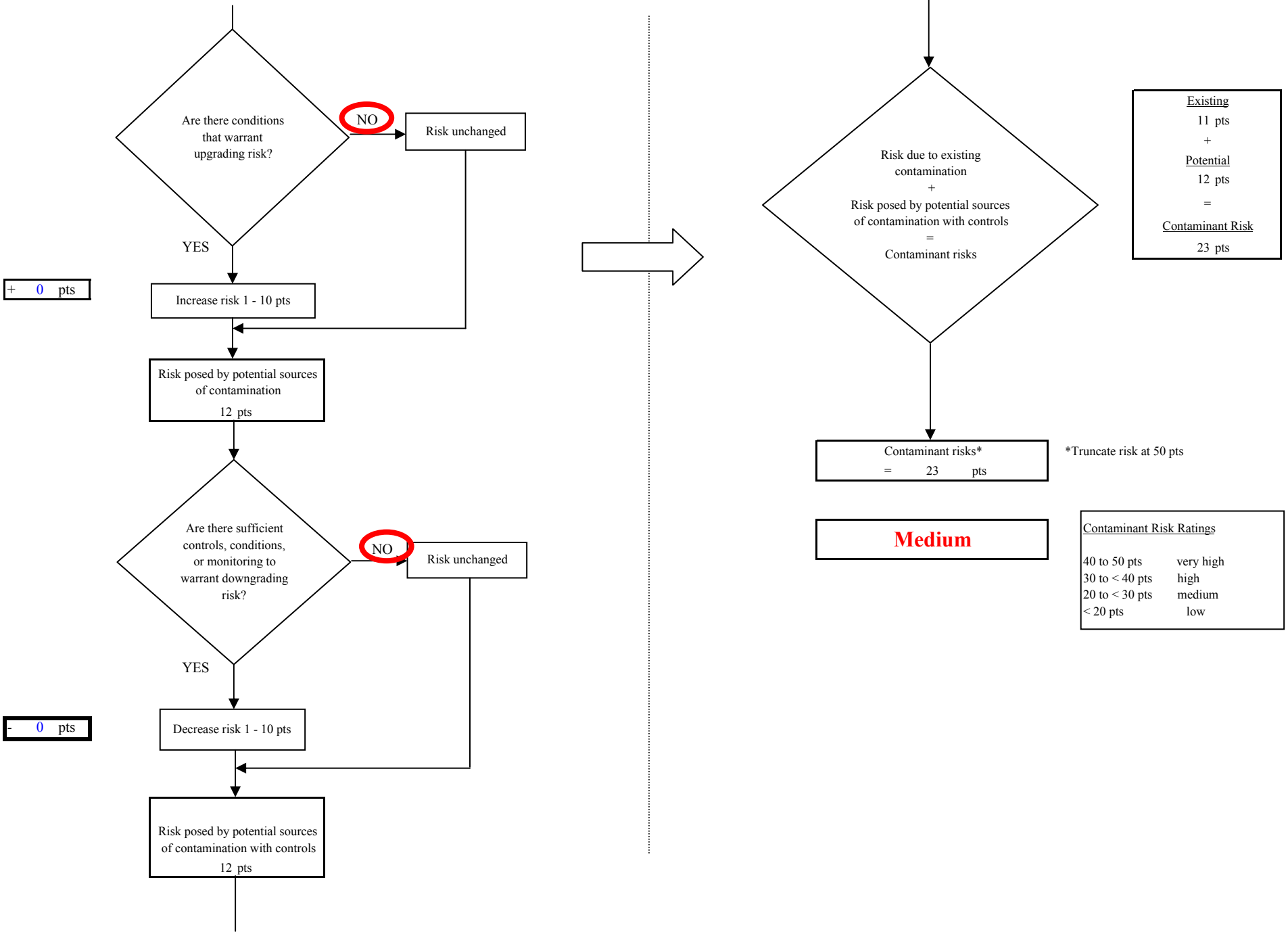


Chart 5. Vulnerability analysis for Nikolaevsk Village - Nitrates and Nitrites

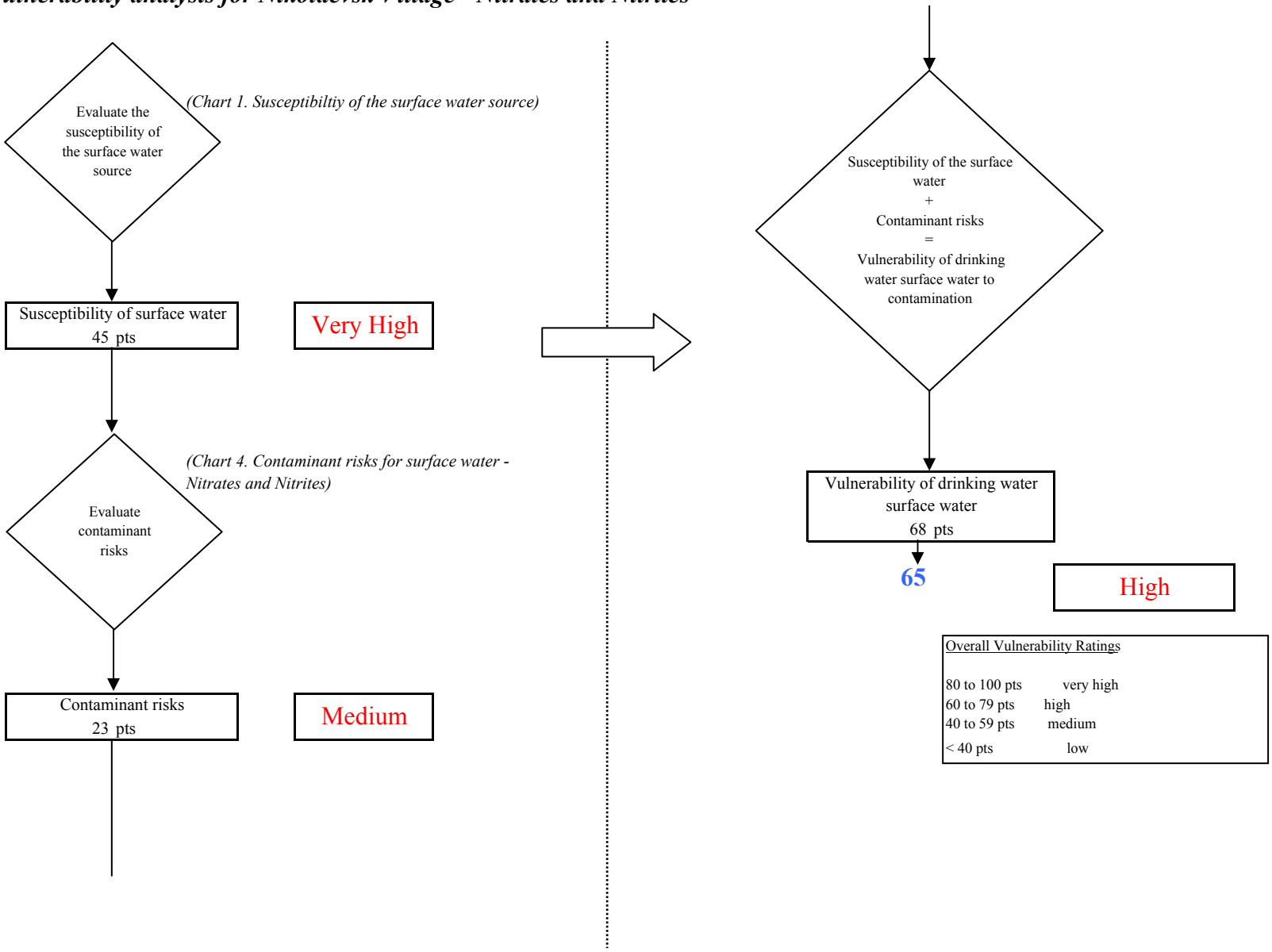


Chart 6. Contaminant risks for Nikolaevsk Village - Volatile Organic Chemicals

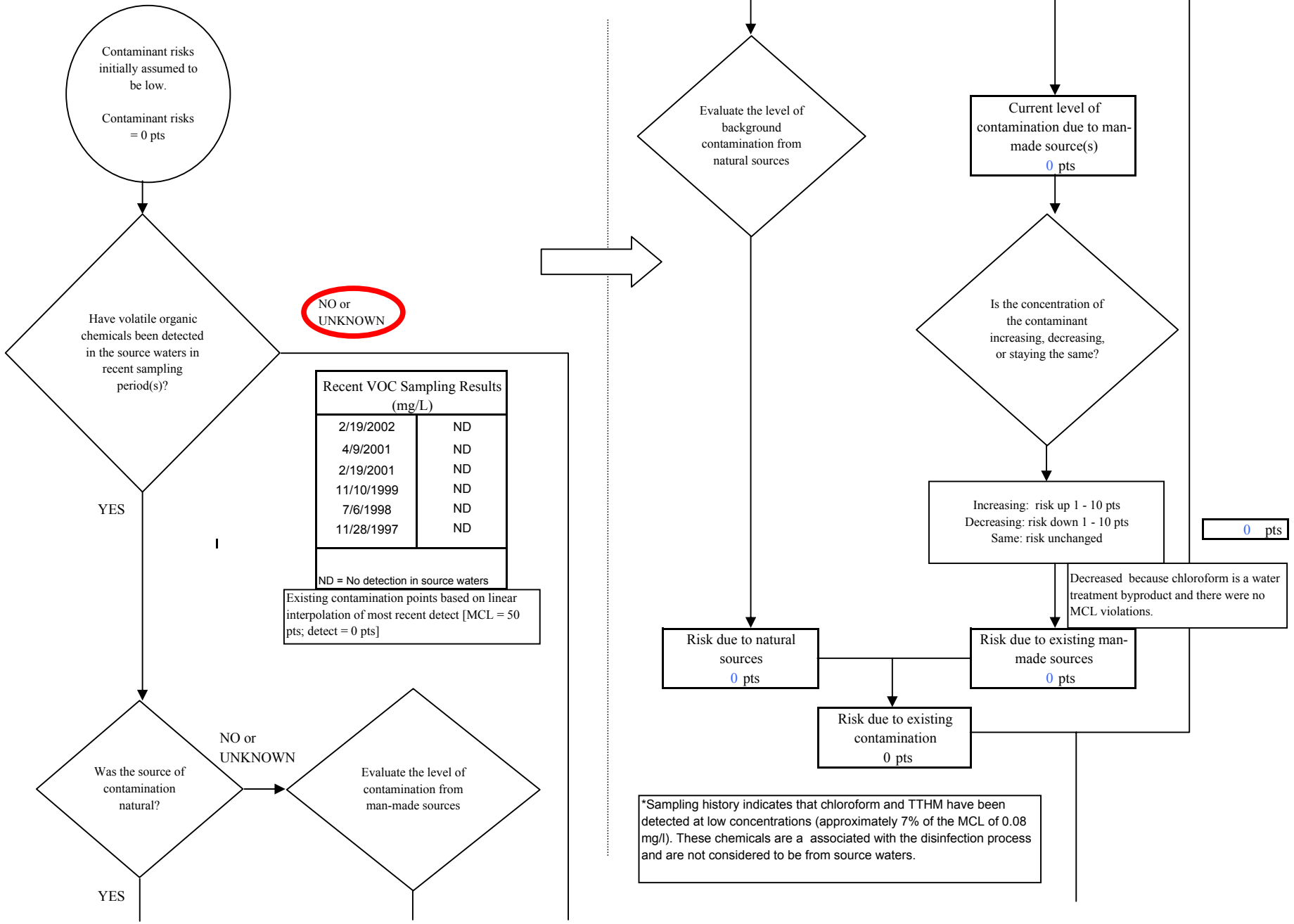
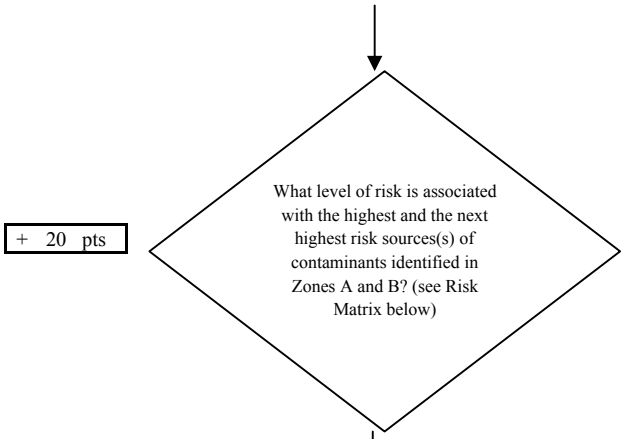


Chart 6. Contaminant risks for Nikolaevsk Village - Volatile Organic Chemicals



+ 20 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)	1		1
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 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.

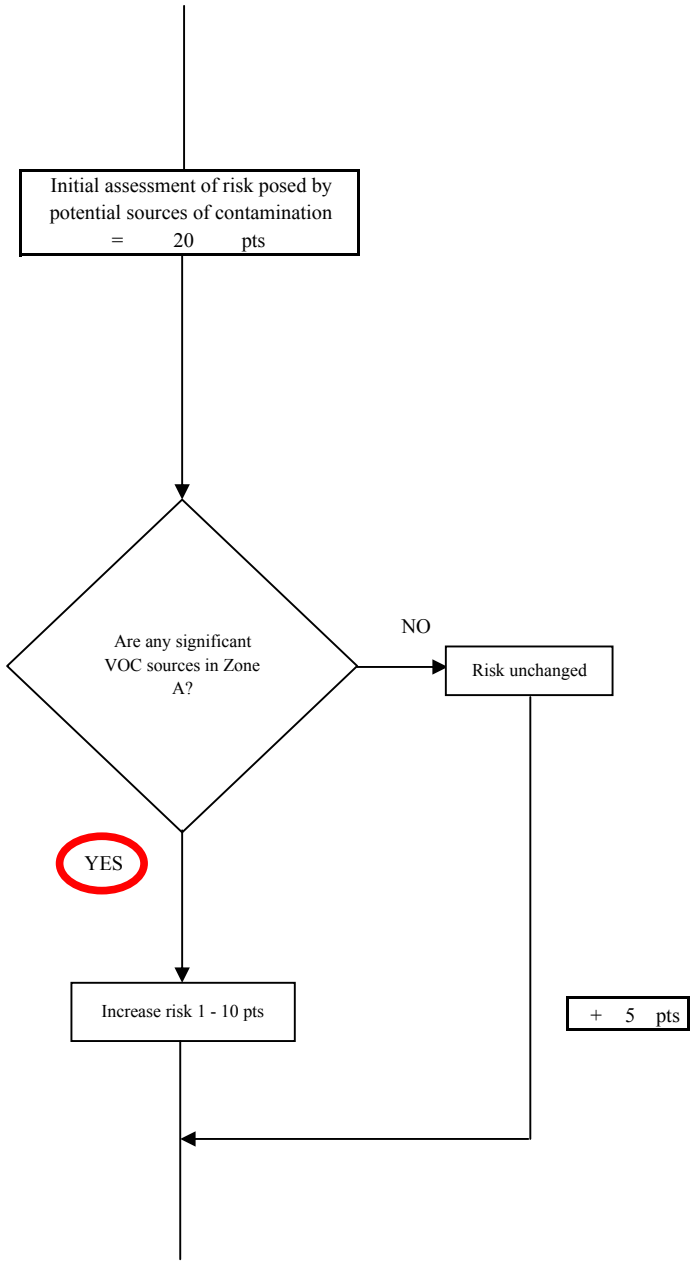


Chart 6. Contaminant risks for Nikolaevsk Village - Volatile Organic Chemicals

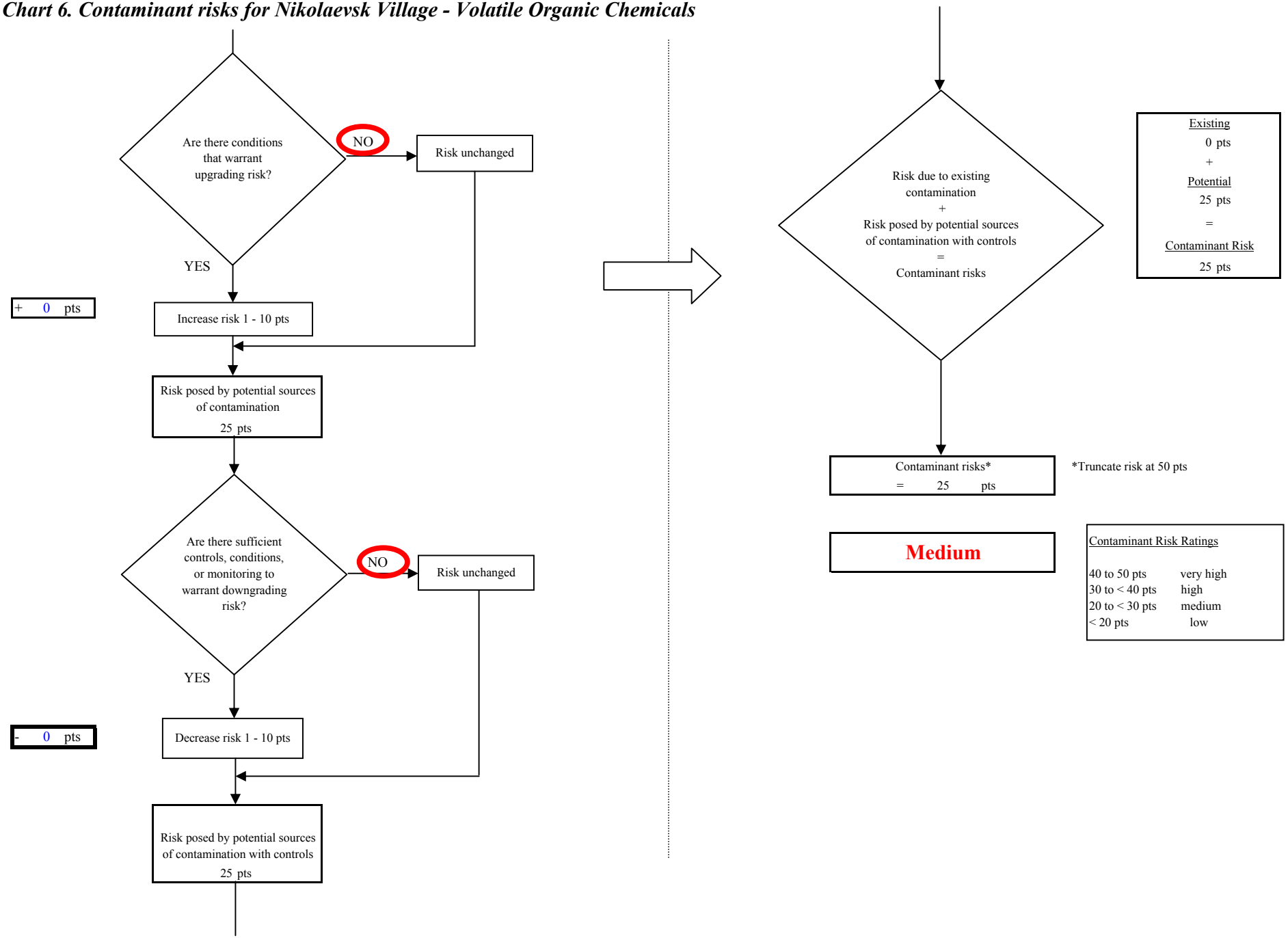


Chart 7. Vulnerability analysis for Nikolaevsk Village - Volatile Organic Chemicals

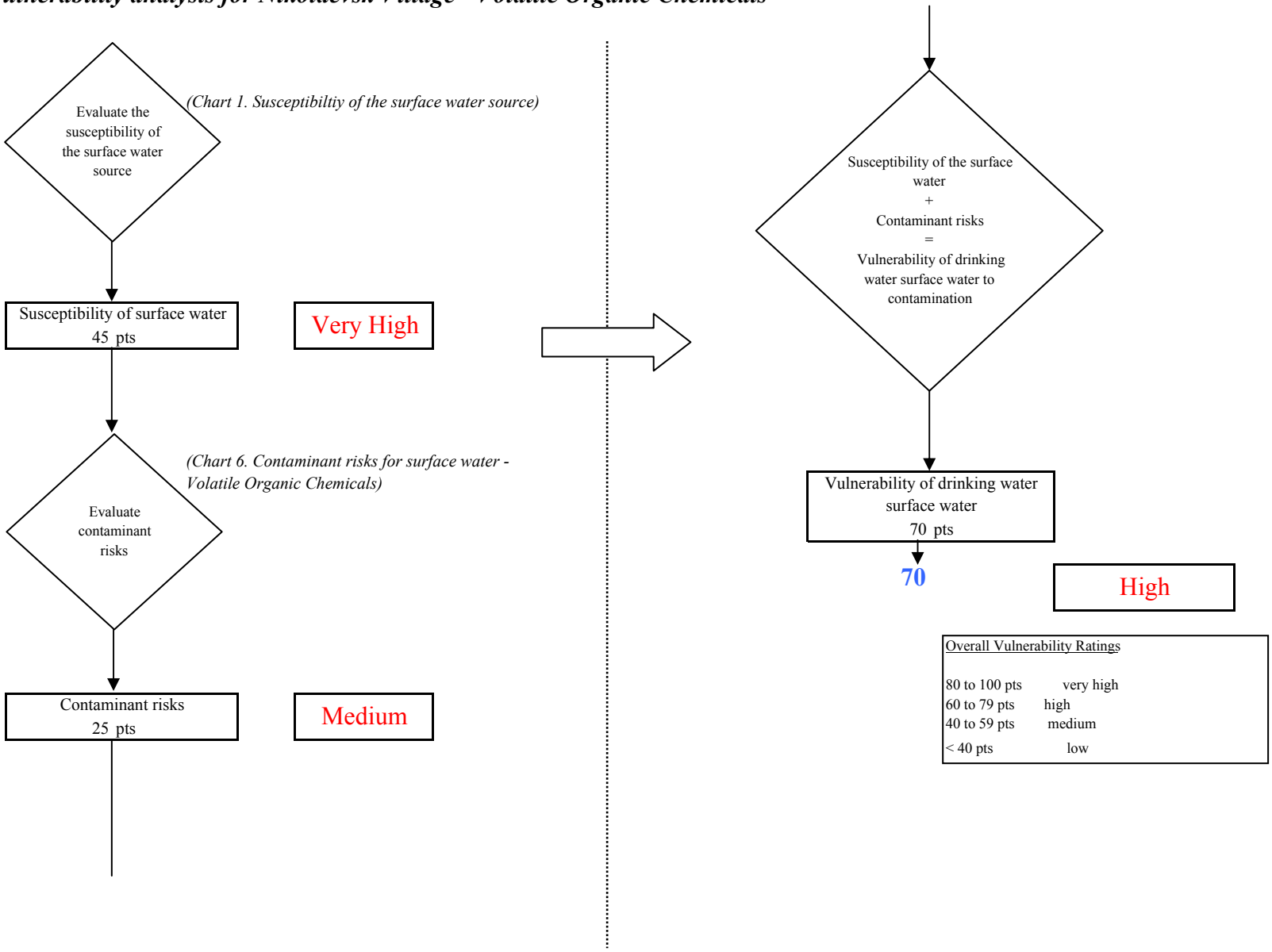


Chart 8. Contaminant risks for Nikolaevsk Village - Heavy Metals, Cyanide and Other Inorganic Chemicals

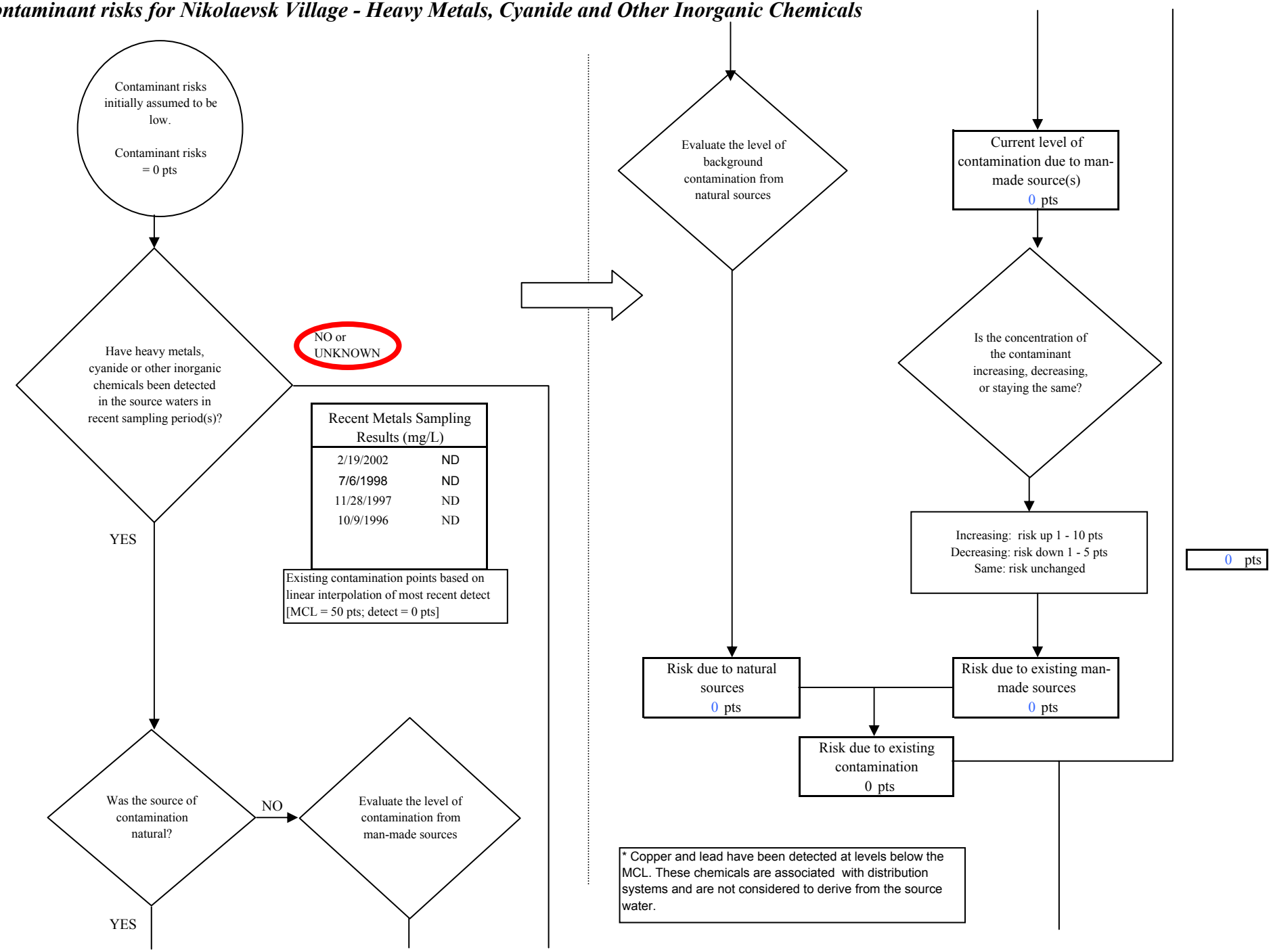
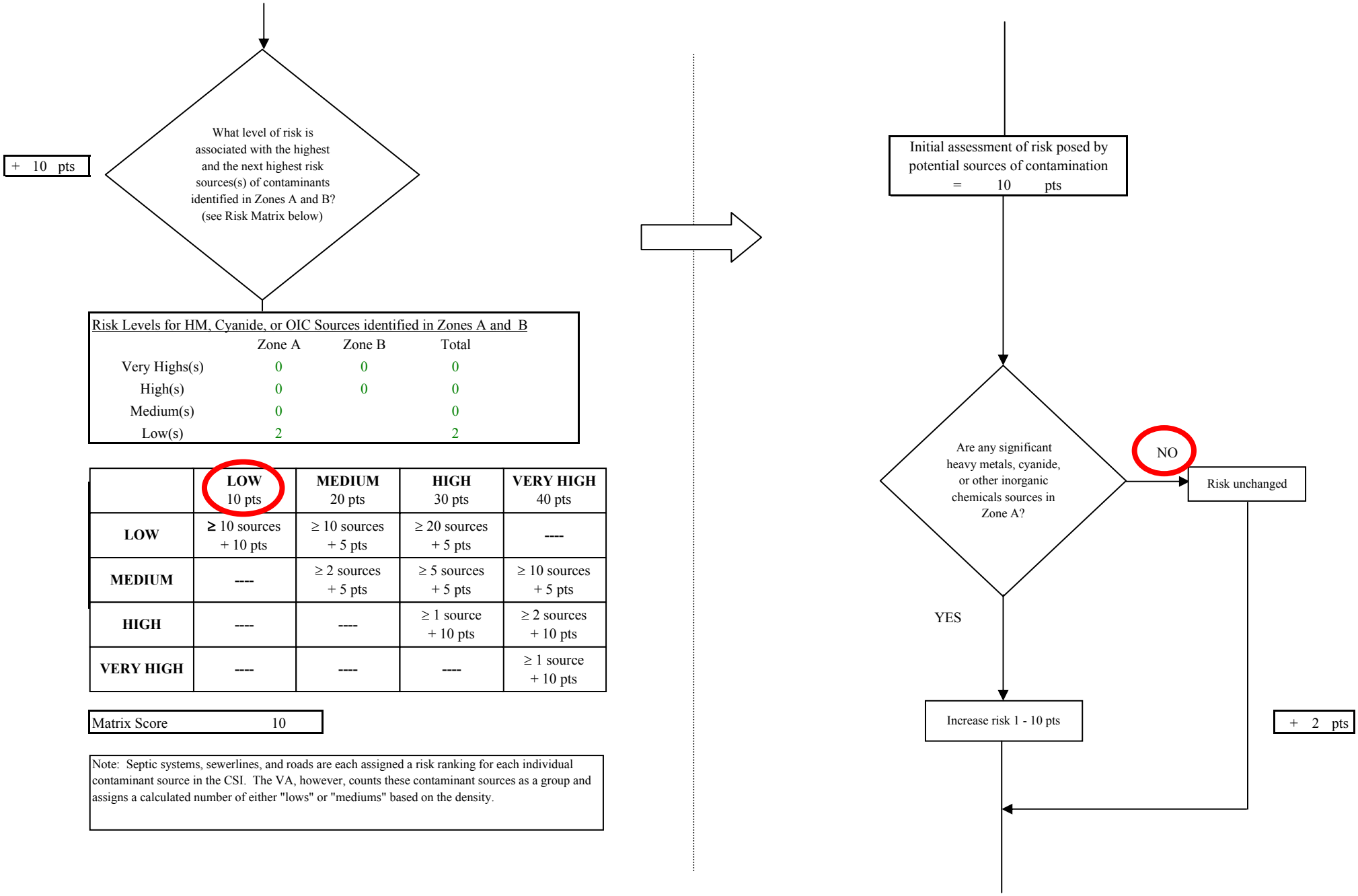


Chart 8. Contaminant risks for Nikolaevsk Village - Heavy Metals, Cyanide and Other Inorganic Chemicals



Risk Levels for HM, Cyanide, or OIC 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)	2		2

	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 8. Contaminant risks for Nikolaevsk Village - Heavy Metals, Cyanide and Other Inorganic Chemicals

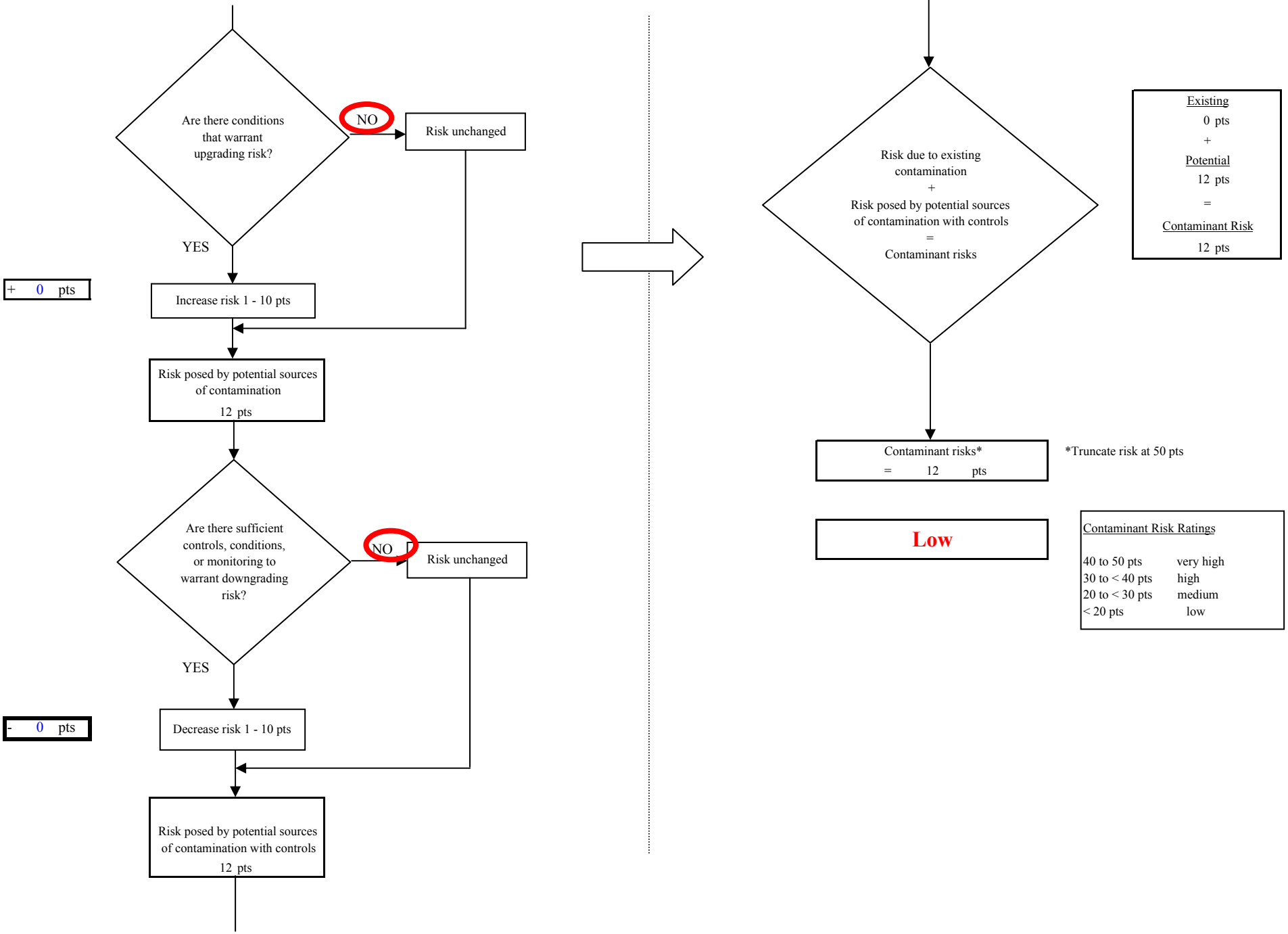


Chart 9. Vulnerability analysis for Nikolaevsk Village - Heavy Metals, Cyanide and Other Inorganic Chemicals

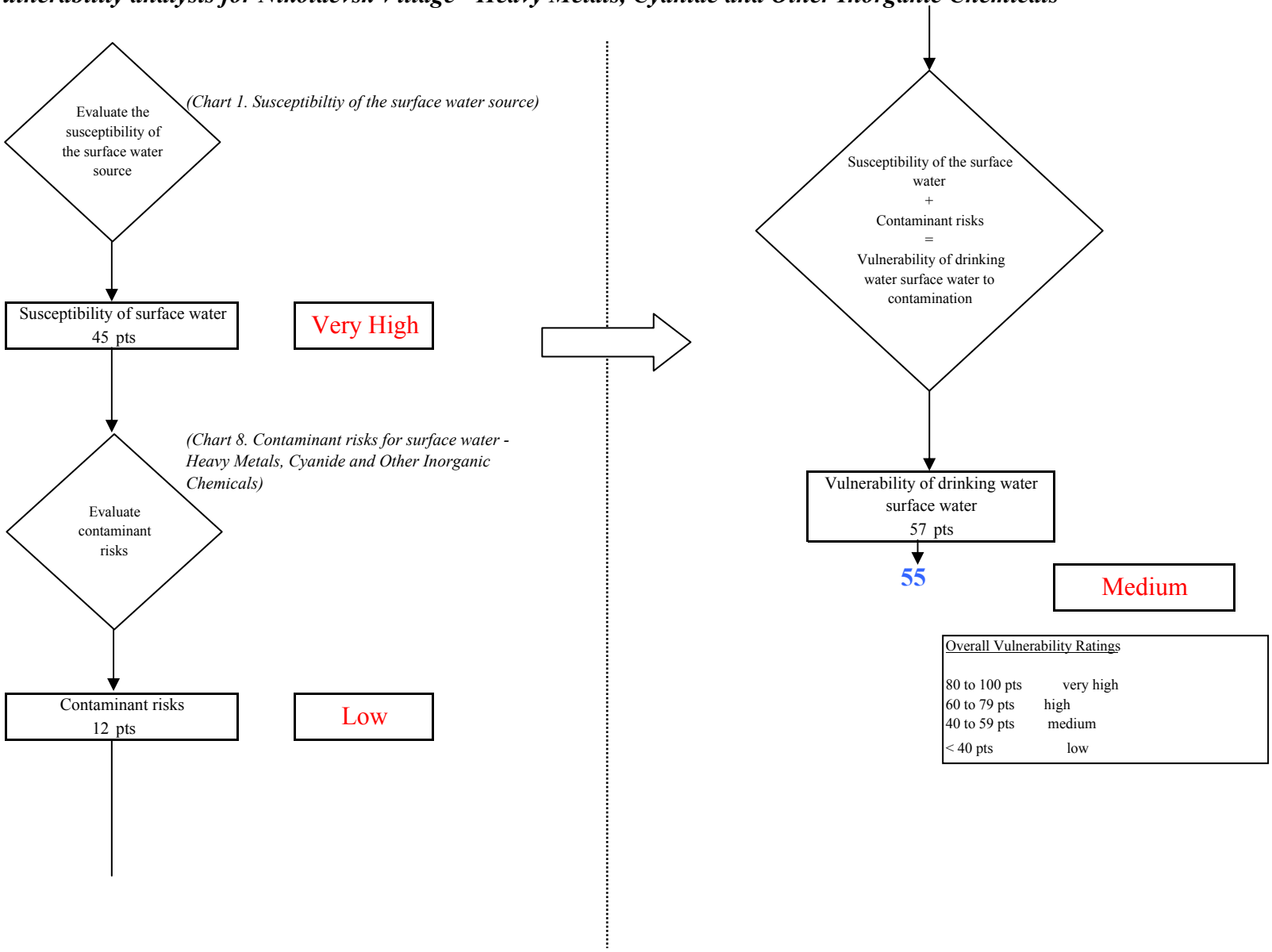


Chart 10. Contaminant risks for Nikolaevsk Village - Synthetic Organic Chemicals

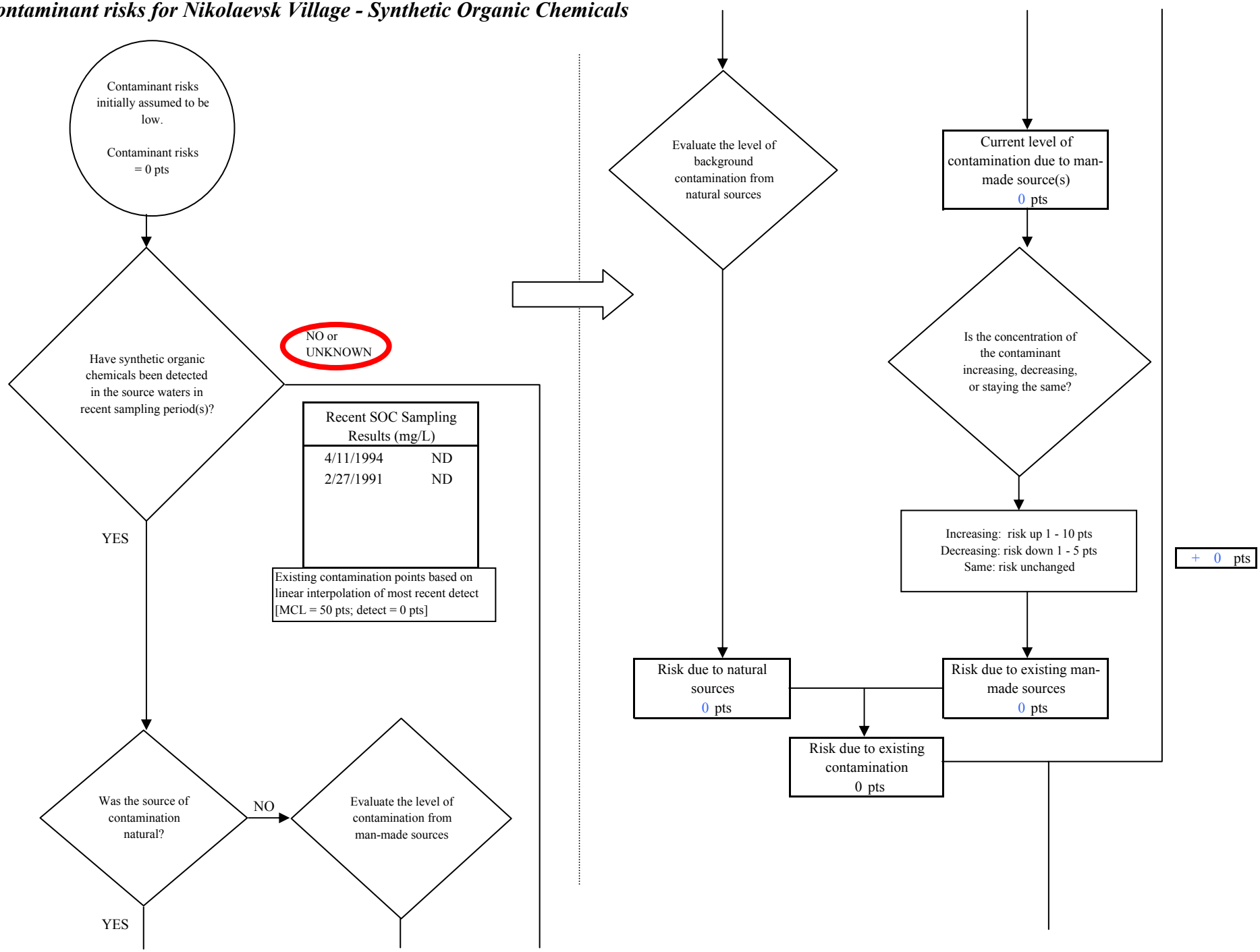
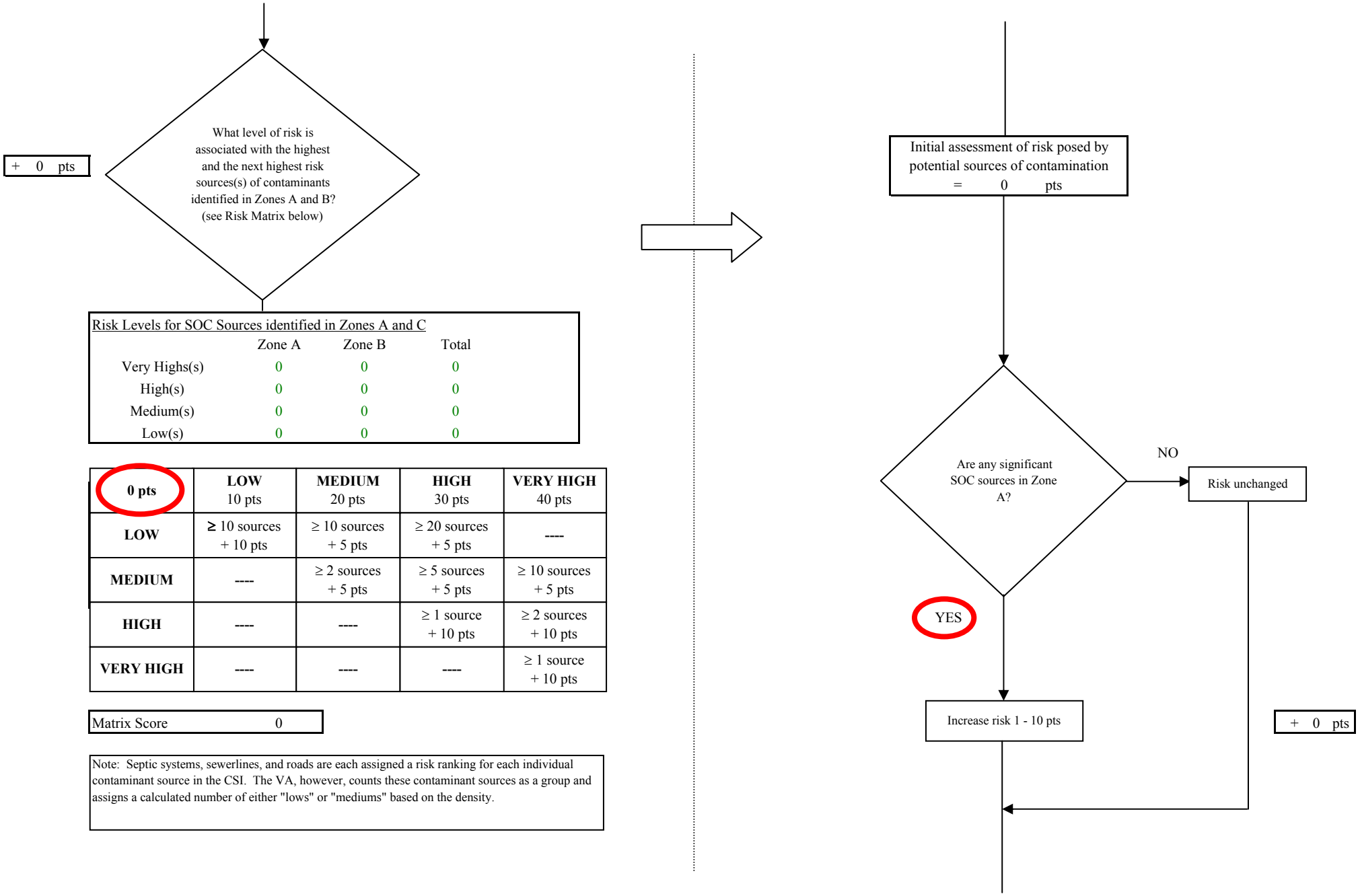


Chart 10. Contaminant risks for Nikolaevsk Village - Synthetic Organic Chemicals



Risk Levels for SOC Sources identified in Zones A and C

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

0 pts	**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 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 10. Contaminant risks for Nikolaevsk Village - Synthetic Organic Chemicals

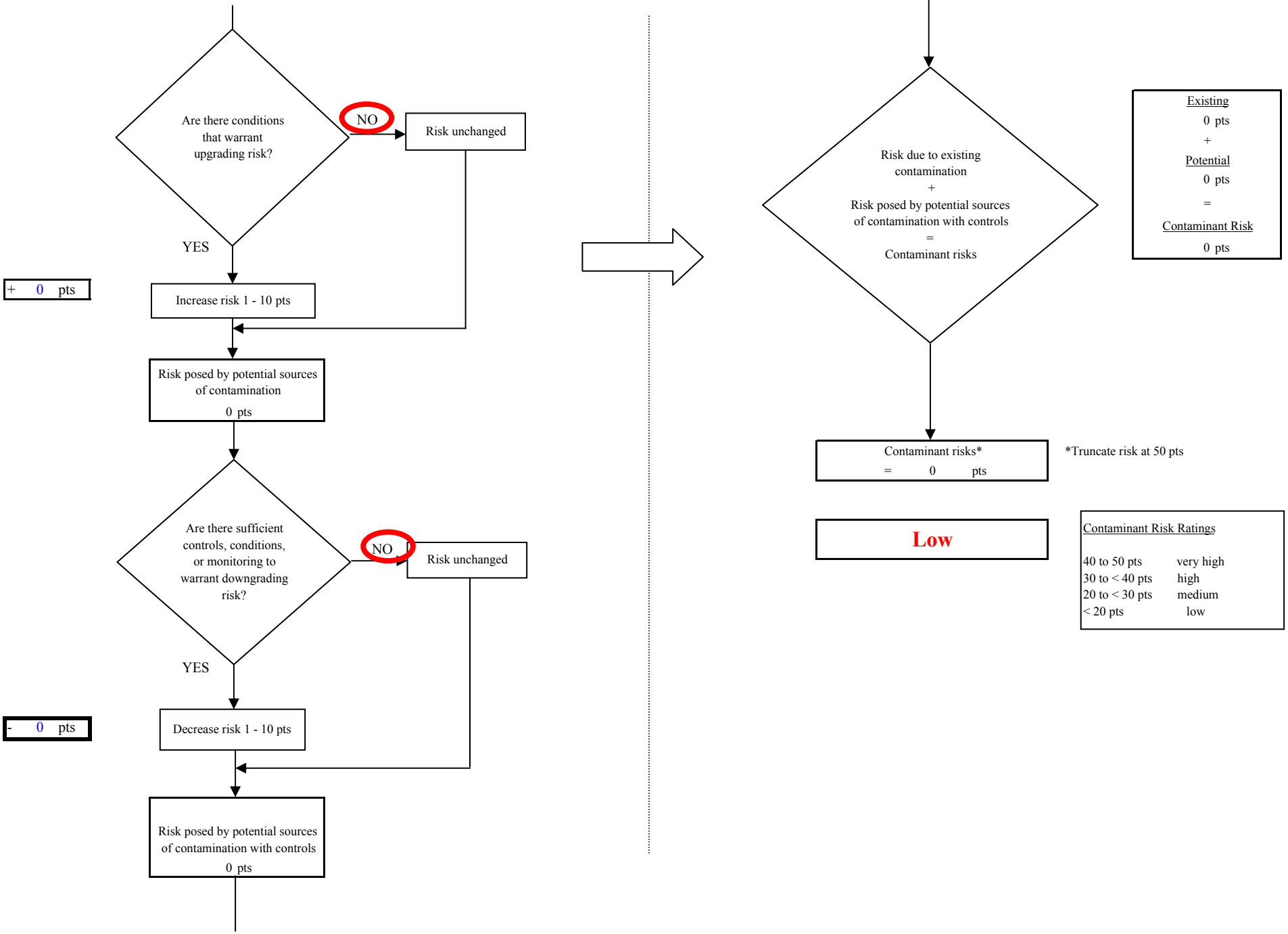


Chart 11. Vulnerability analysis for Nikolaevsk Village - Synthetic Organic Chemicals

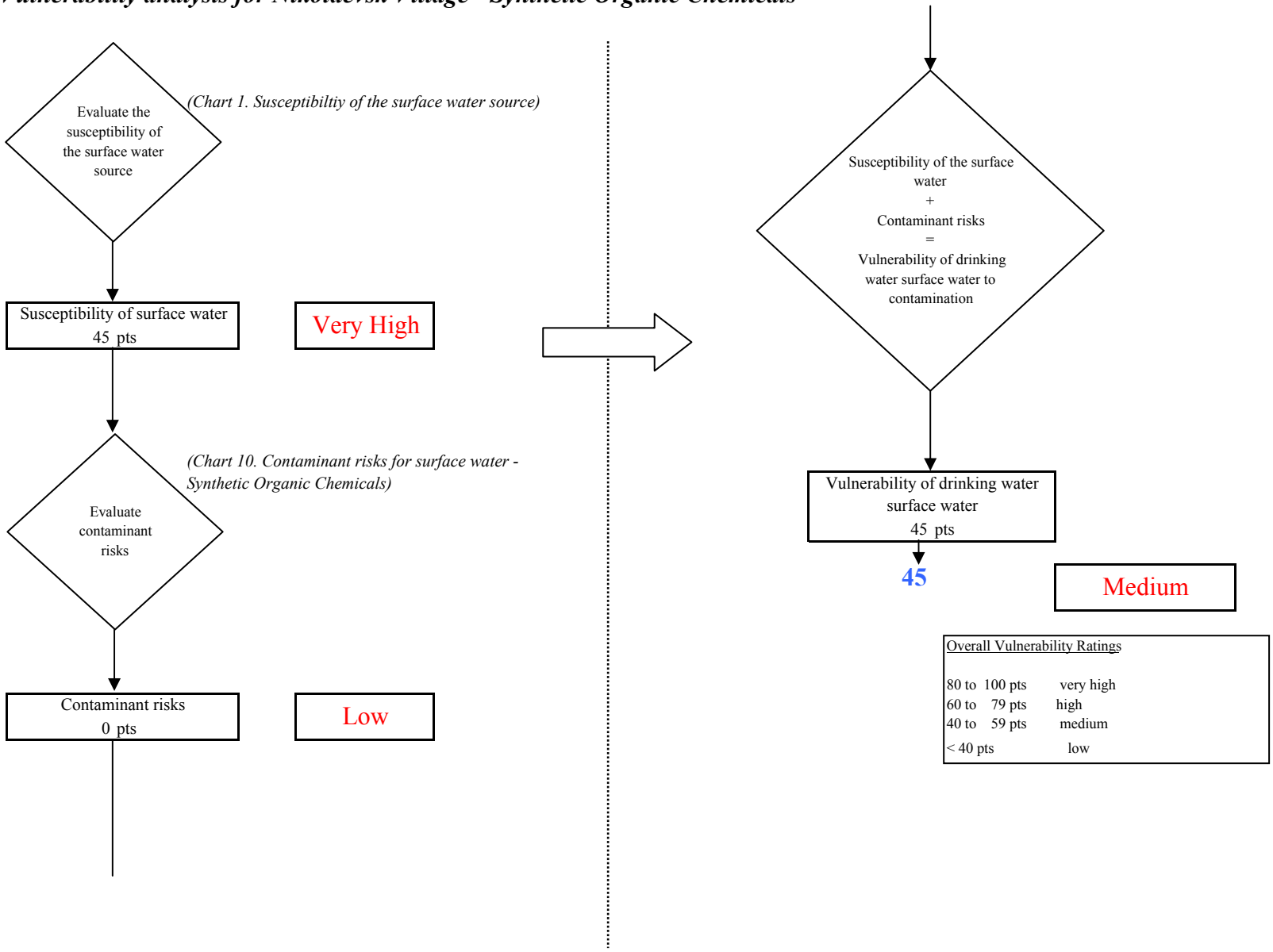


Chart 12. Contaminant risks for Nikolaevsk Village - Other Organic Chemicals

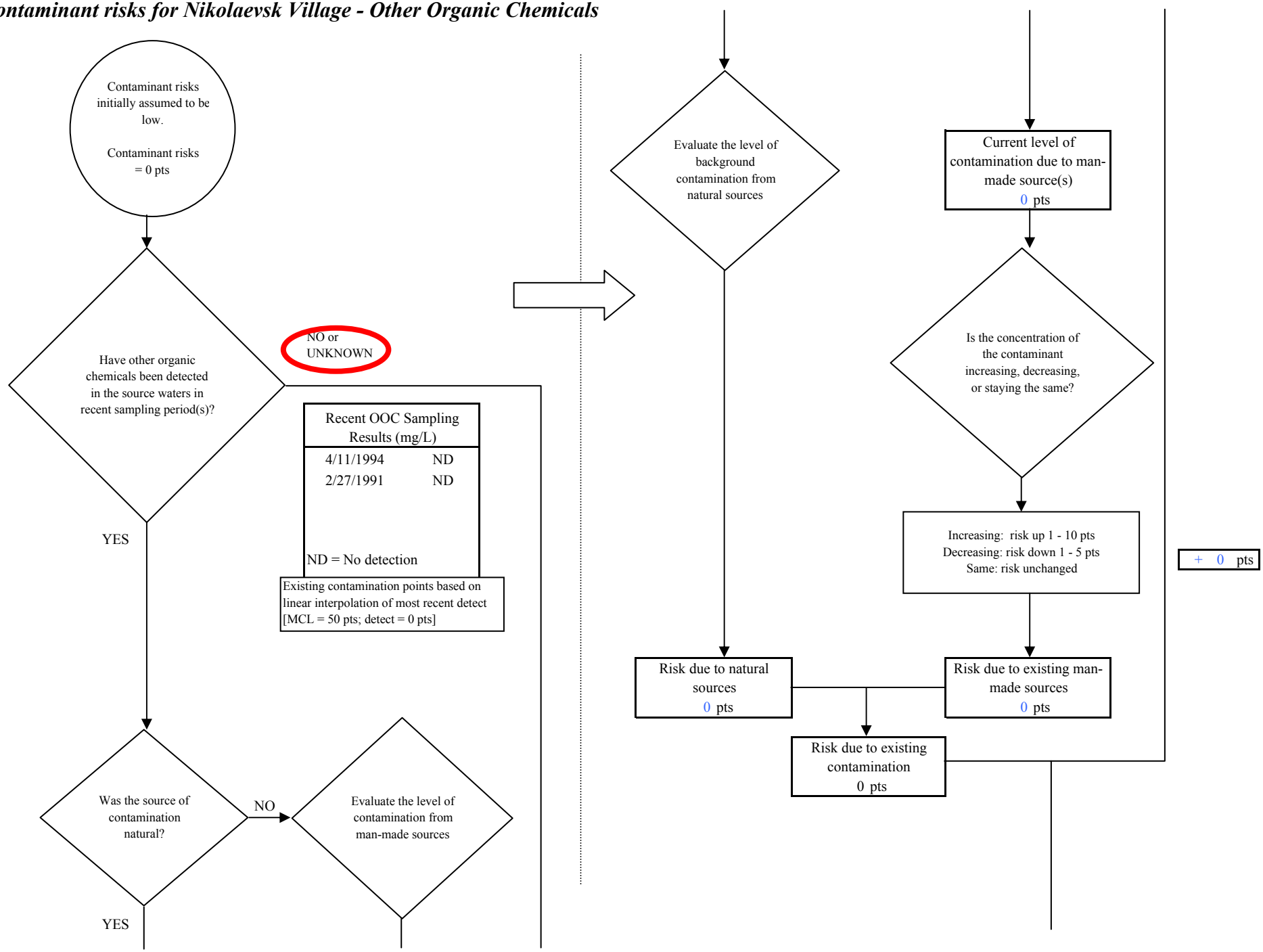
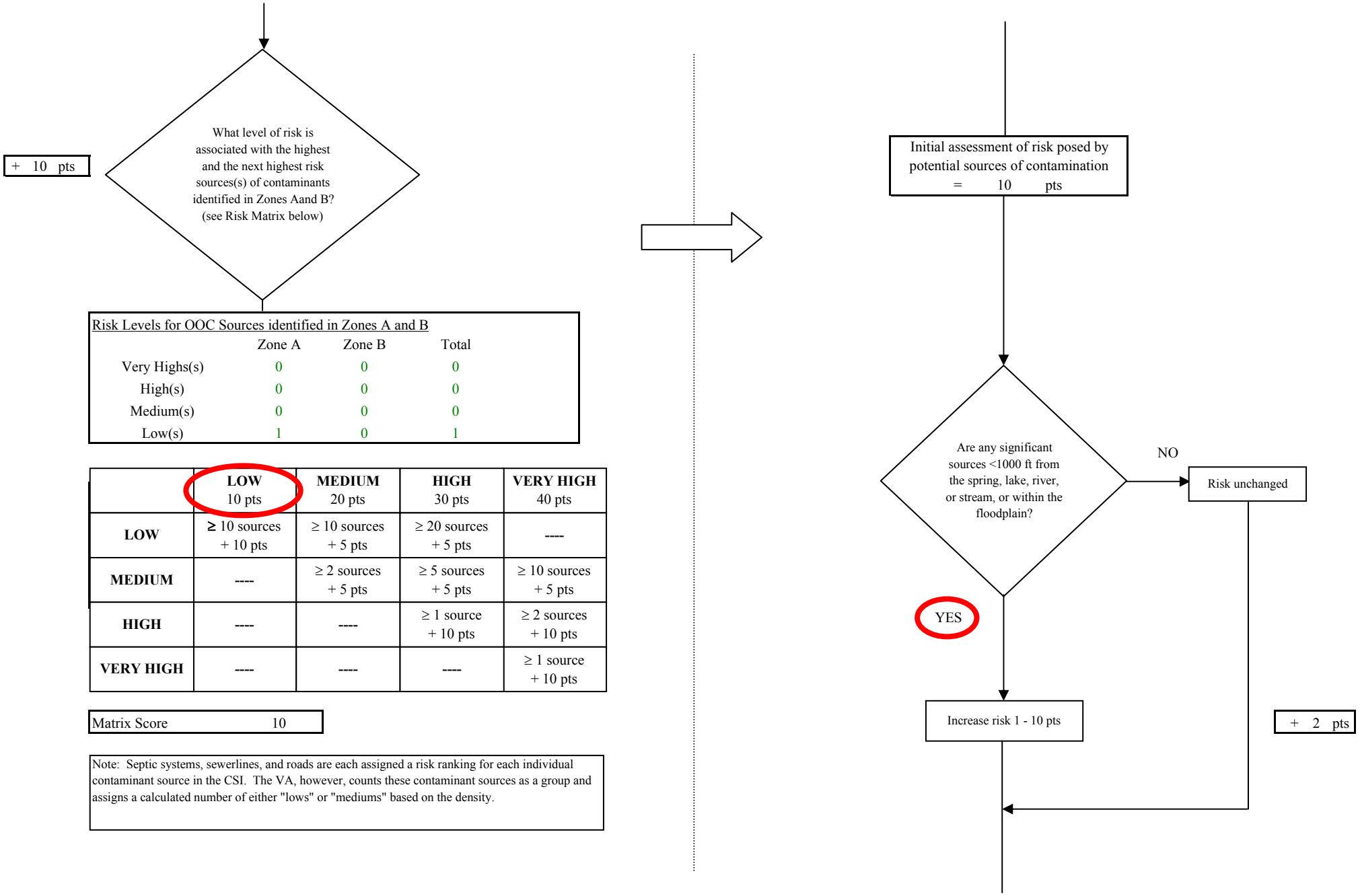


Chart 12. Contaminant risks for Nikolaevsk Village - Other Organic Chemicals



Risk Levels for OOC Sources identified in Zones A and B

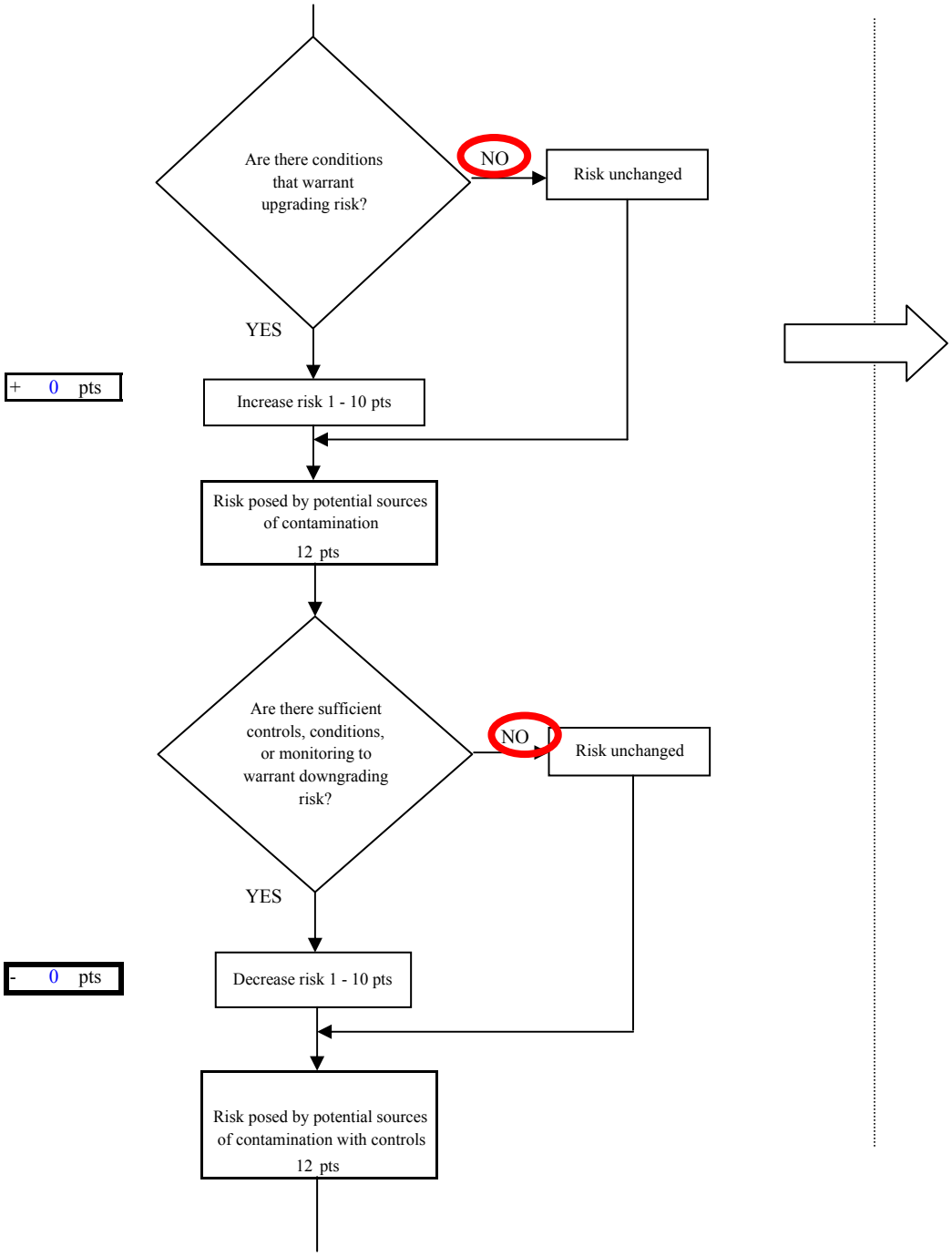
	Zone A	Zone B	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	1	0	1

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

Matrix Score 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 12. Contaminant risks for Nikolaevsk Village - Other Organic Chemicals



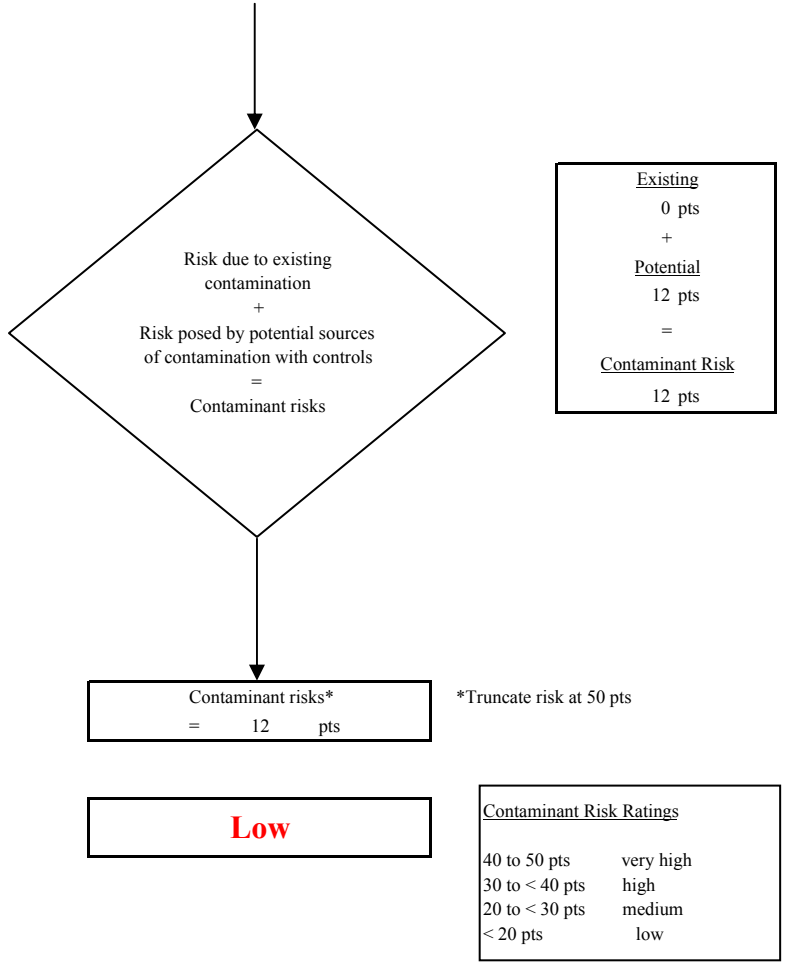


Chart 13. Vulnerability analysis for Nikolaevsk Village - Other Organic Chemicals