# Source Water Assessment

## A Hydrogeologic Susceptibility and Vulnerability Assessment for Doc Warner's Fish Camp, Excursion Inlet, Alaska PWSID #111513

DRINKING WATER PROTECTION PROGRAM REPORT NO. 713

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 Doc Warner's Fish Camp, Excursion Inlet, Alaska

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

## EXECUTIVE SUMMARY

The public water system for Doc Warner's Fish Camp is a Class B (transient/non-community) water system consisting of one surface water intake from Duncan Creek, Excursion Inlet, Alaska. 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. Identified potential and current sources of contaminants for Doc Warner's Fish Camp public drinking water includes septic systems. Identified potential and existing sources 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/or nitrites, and volatile organic chemicals into the source waters. Overall, the public water sources for Doc Warner's Fish Camp received a vulnerability rating of **High** for bacteria and viruses; **Very High** for nitrates and nitrites; and **Medium** for volatile organic chemicals.

## DOC WARNER'S FISH CAMP PUBLIC DRINKING WATER SYSTEM

Doc Warner's Fish Camp public water system is a Class B (transient/non-community) water system. The system consists of one surface water intake from Duncan Creek, on the eastern side of Excursion Inlet, Alaska (See Map 1 of Appendix A). Excursion Inlet is located in Glacier Bay National Park; north of Icy Straight and south of the Chilkat Range. The population of Excursion Inlet is approximately 475.

Excursion Inlet averages about 70 inches of precipitation per year; and approximately 120 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. Excursion Inlet topography varies from near sea level along Excursion Inlet to 3,900 feet at the Chilkat Range north of Doc Warner's Fish Camp.

Based on a limited As-Built Survey Plat dated December 16, 1998, and a State of Alaska Division of Governmental Coordination Final Consistency Determination, dated March 8, 1999, the intake is adequately constructed. An adequately constructed intake may provide protection against debris and contaminants from entering the system. It is assumed the raw water is filtered and disinfected in accordance with the Environmental Protection Agency's Surface Water Treatment Rule. It is also assumed there is a potential for runoff within the area surrounding the surface water.

Water is apparently withdrawn from Duncan Creek between June and August. The intake is approximately 340 feet from the mouth of the stream. We understand the Lodge uses about 2,500 gallons per day.

## DOC WARNER'S FISH CAMP 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 Doc Warner's Fish Camp extends over the entire watershed. Development in the vicinity of the surface water intake is limited to only 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 Doc Warner's Fish Camp 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

The sources are displayed on Map 2 of Appendix C and summarized in Table 1 of Appendix B.

## 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.

Tables 2 through 4 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 DOC WARNER'S FISH CAMP 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 Doc Warner's Fish Camp is in Duncan Creek. Because Duncan 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 Doc Warner's Fish Camp.

**Table 2. Natural Susceptibility**

| | Score | Rating |
|---|---|---|
| Natural Susceptibility | 45 | 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 | 30 | High |
| Nitrates and/or Nitrites | 43 | Very High |
| Volatile Organic Chemicals | 12 | Low |

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 . 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 | 75 | High |
| Nitrates and Nitrites | 90 | Very High |
| Volatile Organic Chemicals | 55 | Medium |

Tables 2 through 4 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.

**Bacteria and Viruses**

The contaminant risk for bacteria and viruses is **High** with the septic systems representing the risk to the source of public drinking water (See Chart 2 – Contaminant Risks for Bacteria and Viruses in Appendix D).

Only a small amount of bacteria and viruses are required to endanger public health. Bacteria and viruses were detected during sampling of the system in 1999, but have not been detected since. 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 **High**.

**Nitrates and Nitrites**

The contaminant risk for nitrates and nitrites is **Very High** with the septic systems representing the risk to this source of public drinking water (See Chart 4 – Contaminant Risk for Nitrates and/or Nitrites in Appendix D).

Sampling history for Doc Warner's Fish Camp indicates that nitrates have been detected in the water, but only in very low concentrations (most recently at 0.590 mg/L on 5/28/2002) or 6% of the Maximum Contaminant Level (MCL). The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects. Due to the high solubility and weak retention by soil, nitrates are very mobile, moving at approximately the same rate as water.

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the surface water source, the overall vulnerability of the surface water source to contamination by nitrates and nitrites is **Very High**.

**Volatile Organic Chemicals**

The contaminant risk for volatile organic chemicals is **Low** with no sources of contamination identified (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Sampling history for volatile organic chemicals is not available. 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 **Medium**.

# 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

## Doc Warner's Fish Camp
## Drinking Water Protection Area Location Map
## (Map 1)

# APPENDIX B

## Contaminant Source Inventory and Risk Ranking for Doc Warner's Fish Camp (Tables 1-4)

***Table 1*** *Contaminant Source Inventory for* ***PWSID 111513.001***

***Doc Warner's Fish Camp***

| *Contaminant Source Type* | *Contaminant Source ID* | *CS ID tag* | *Zone* | *Map Number* | *Comments* |
|---|---|---|---|---|---|
| Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) | D10 | D10-1 | A | 2 | Northwest of Doc Warner's Fish Camp |
| Water supply wells | W09 | W09-1 | A | 2 | Northwest of Doc Warner's Fish Camp |

*Contaminant Source Inventory and Risk Ranking for*

***Table 2*** ***PWSID 111513.001***

*Doc Warner's Fish Camp*

*Sources of Bacteria and Viruses*

| *Contaminant Source Type* | *Contaminant Source ID* | *CS ID tag* | *Zone* | *Risk Ranking for Analysis* | *Map Number* | *Comments* |
|---|---|---|---|---|---|---|
| Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) | D10 | D10-1 | A | High | 2 | Northwest of Doc Warner's Fish Camp |

*Contaminant Source Inventory and Risk Ranking for*

***Table 3*** ***PWSID 111513.001***

*Doc Warner's Fish Camp*

*Sources of Nitrates/Nitrites*

| *Contaminant Source Type* | *Contaminant Source ID* | *CS ID tag* | *Zone* | *Risk Ranking for Analysis* | *Map Number* | *Comments* |
|---|---|---|---|---|---|---|
| Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) | D10 | D10-1 | A | High | 2 | Northwest of Doc Warner's Fish Camp |

*Contaminant Source Inventory and Risk Ranking for*

***Table 4*** ***PWSID 111513.001***

*Doc Warner's Fish Camp*

*Sources of Volatile Organic Chemicals*

| *Contaminant Source Type* | *Contaminant Source ID* | *CS ID tag* | *Zone* | *Risk Ranking for Analysis* | *Map Number* | *Comments* |
|---|---|---|---|---|---|---|
| Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) | D10 | D10-1 | A | Low | 2 | Northwest of Doc Warner's Fish Camp |

# APPENDIX C

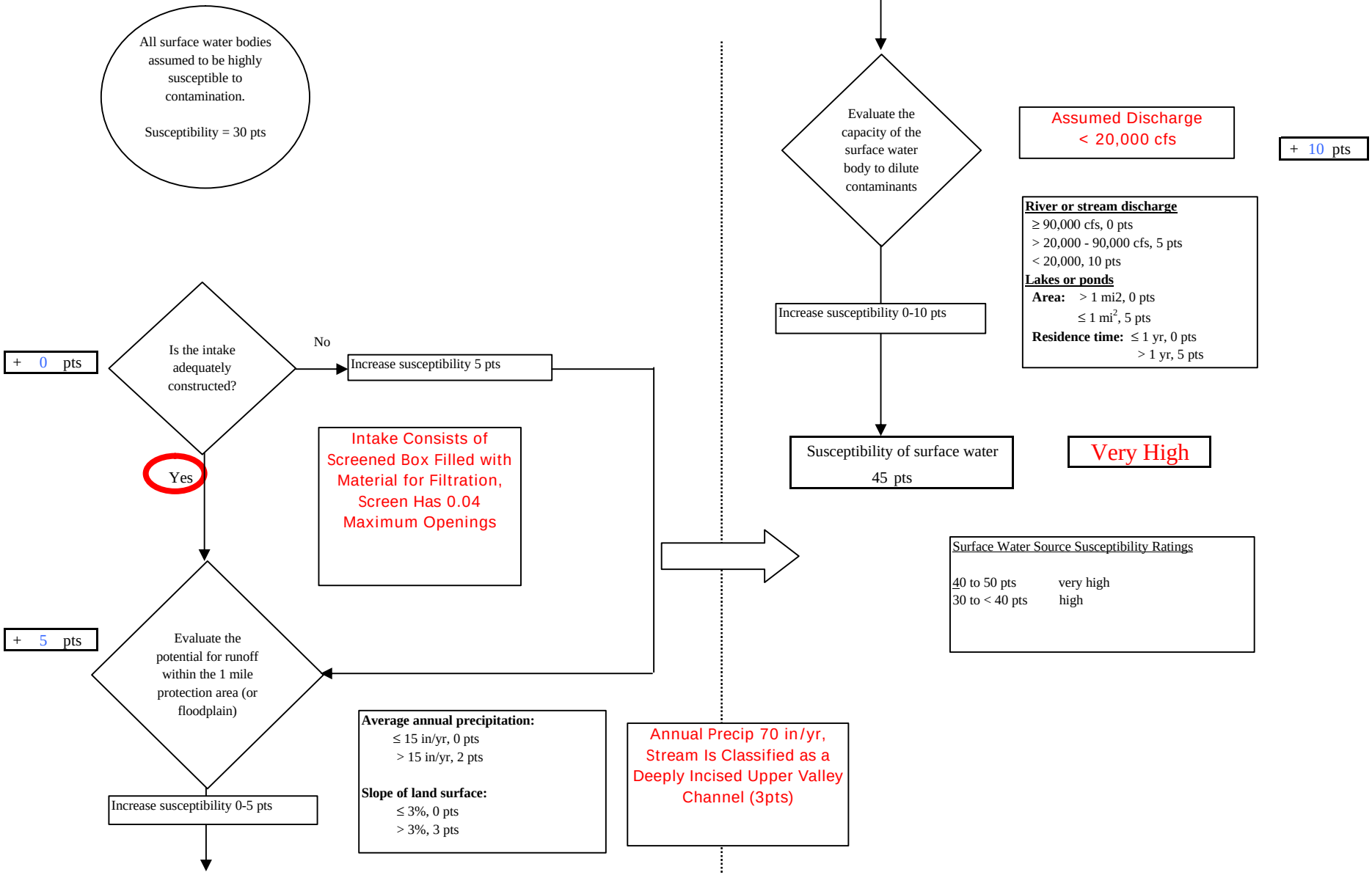
## Doc Warner's Fish Camp
## Drinking Water Protection Area
## and Potential and Existing Contaminant Sources
## (Map 2)

# APPENDIX D

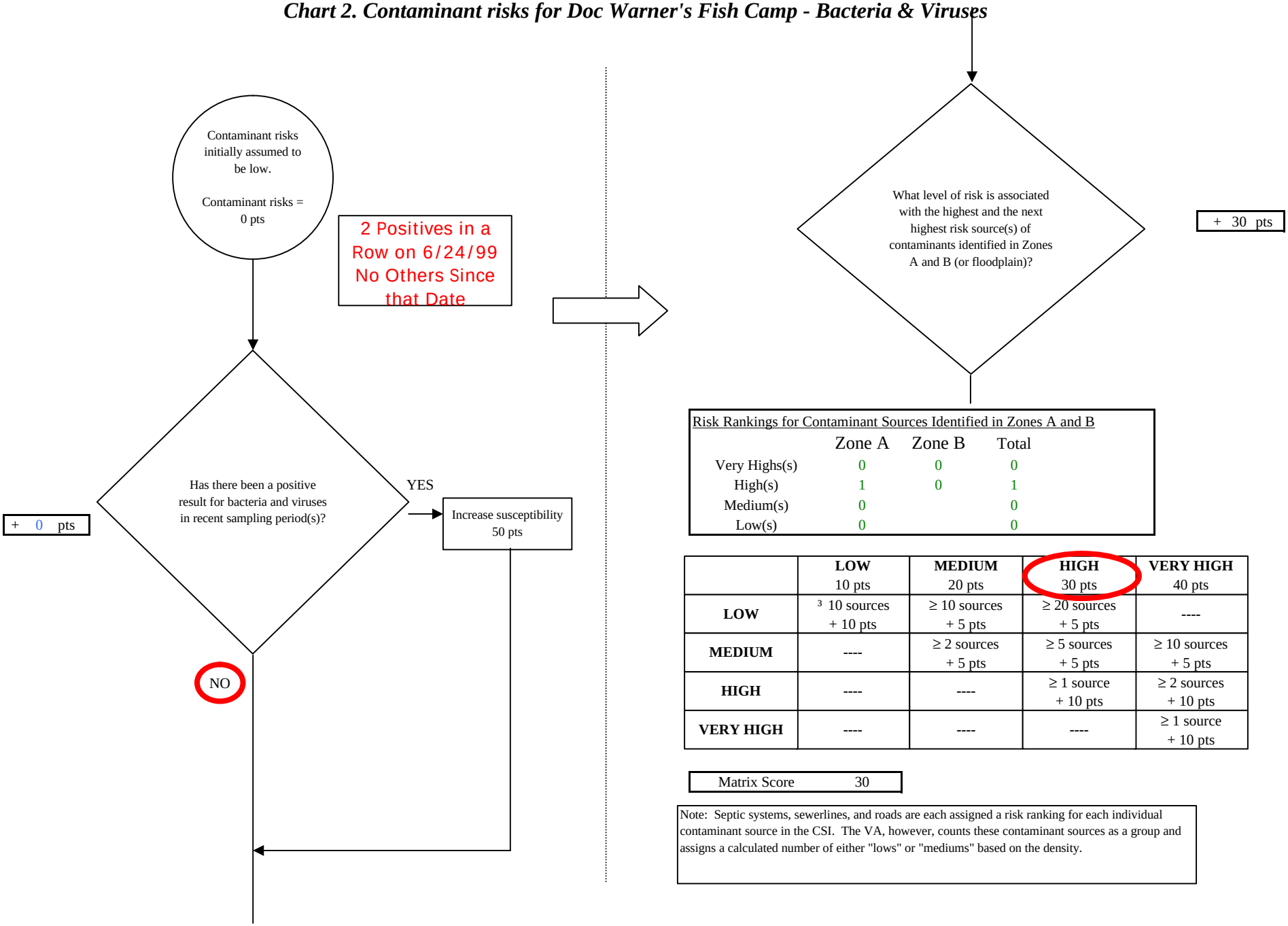
## Vulnerability Analysis for Doc Warner's Fish Camp Public Drinking Water Source

**(Charts 1-7)**

# *Chart 1. Susceptibility of the surface water source - Doc Warner's Fish Camp*



## *Chart 2. Contaminant risks for Doc Warner's Fish Camp - Bacteria & Viruses*




Risk Rankings for Contaminant Sources Identified in Zones A and B

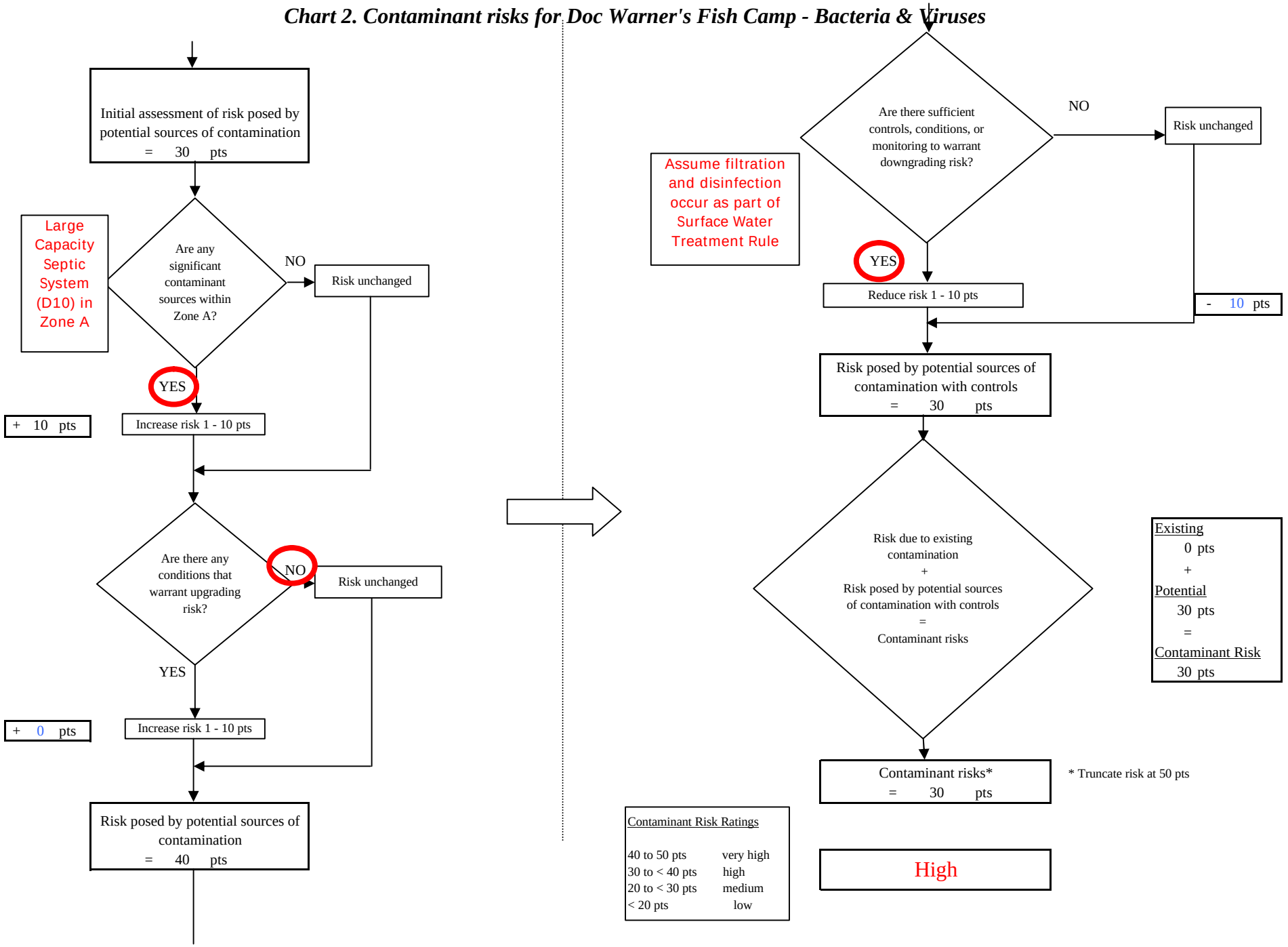
| | Zone A | Zone B | Total |
|---|---|---|---|
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 1 | 0 | 1 |
| Medium(s) | 0 | | 0 |
| Low(s) | 0 | | 0 |

| | **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 |

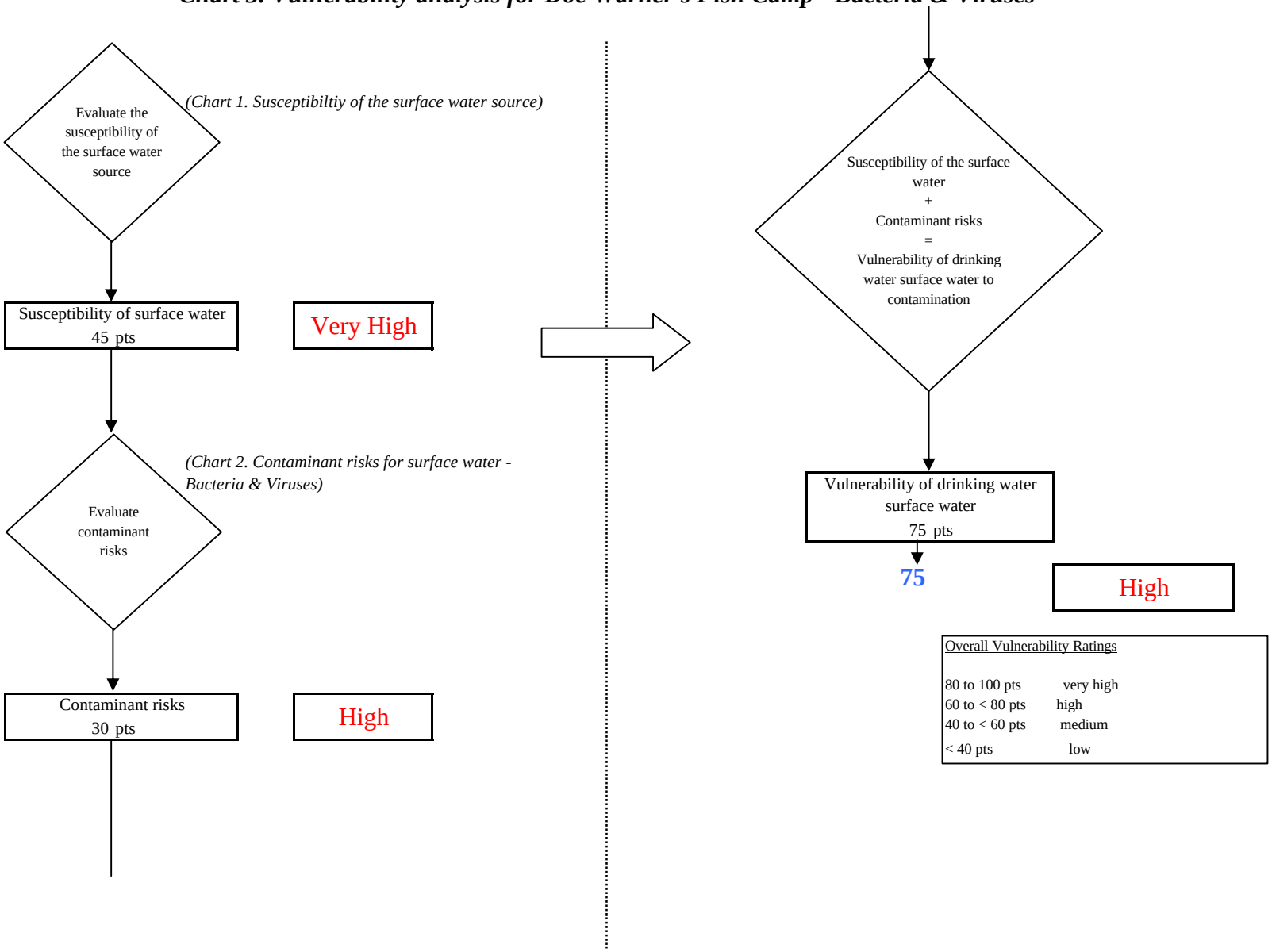
Matrix Score 30

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.

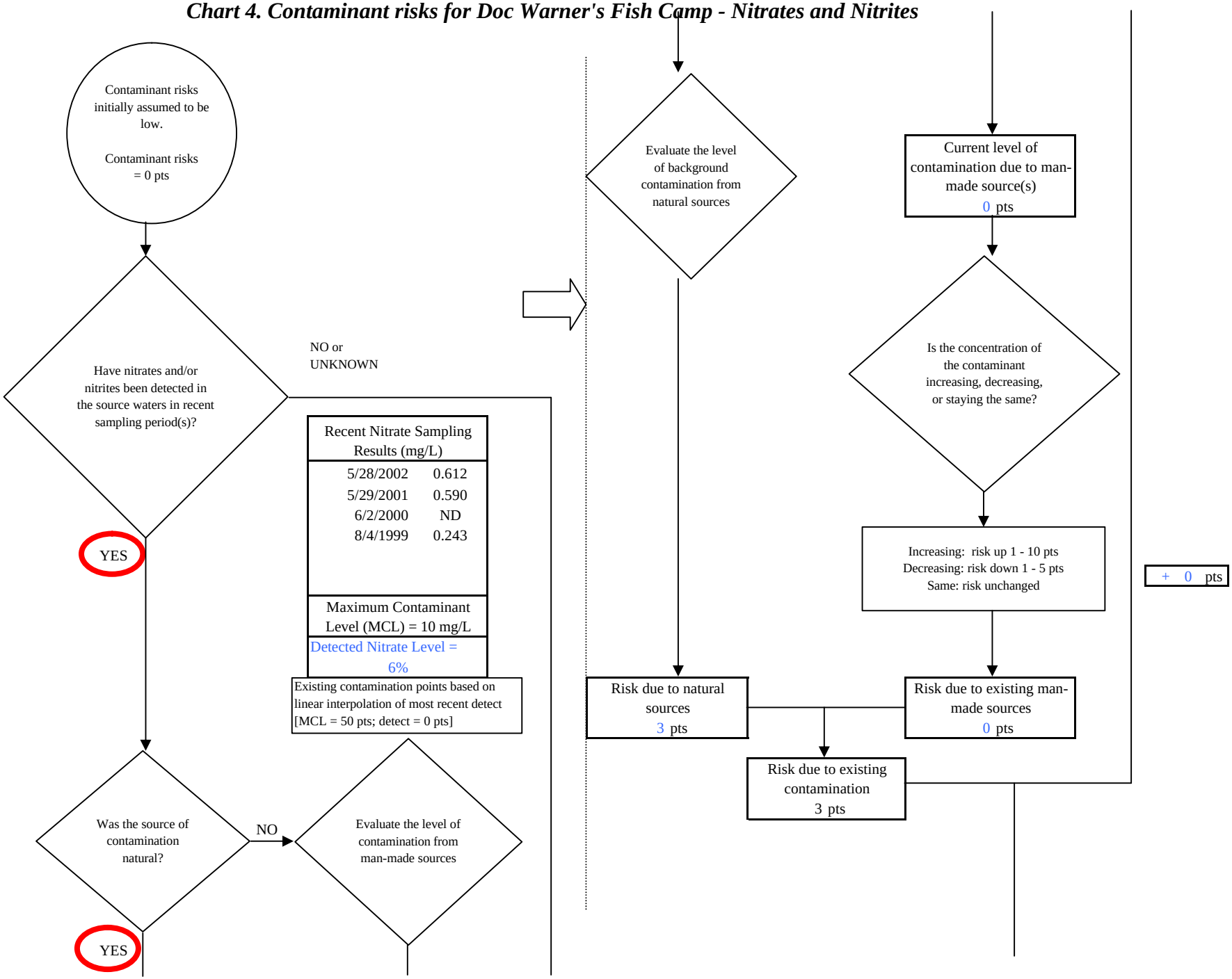
## *Chart 2. Contaminant risks for Doc Warner's Fish Camp - Bacteria & Viruses*



## *Chart 3. Vulnerability analysis for Doc Warner's Fish Camp - Bacteria & Viruses*



## *Chart 4. Contaminant risks for Doc Warner's Fish Camp - Nitrates and Nitrites*



# *Chart 4. Contaminant risks for Doc Warner's Fish Camp - Nitrates and Nitrites*

+ 30 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 = 30 pts

Are any significant sources in Zone A?

NO → Risk unchanged

YES → Increase risk 1 - 10 pts

Large Capacity Septic System (D10) in Zone A

+ 10 pts

Risk Levels for Contaminant Sources identified in Zones A and B

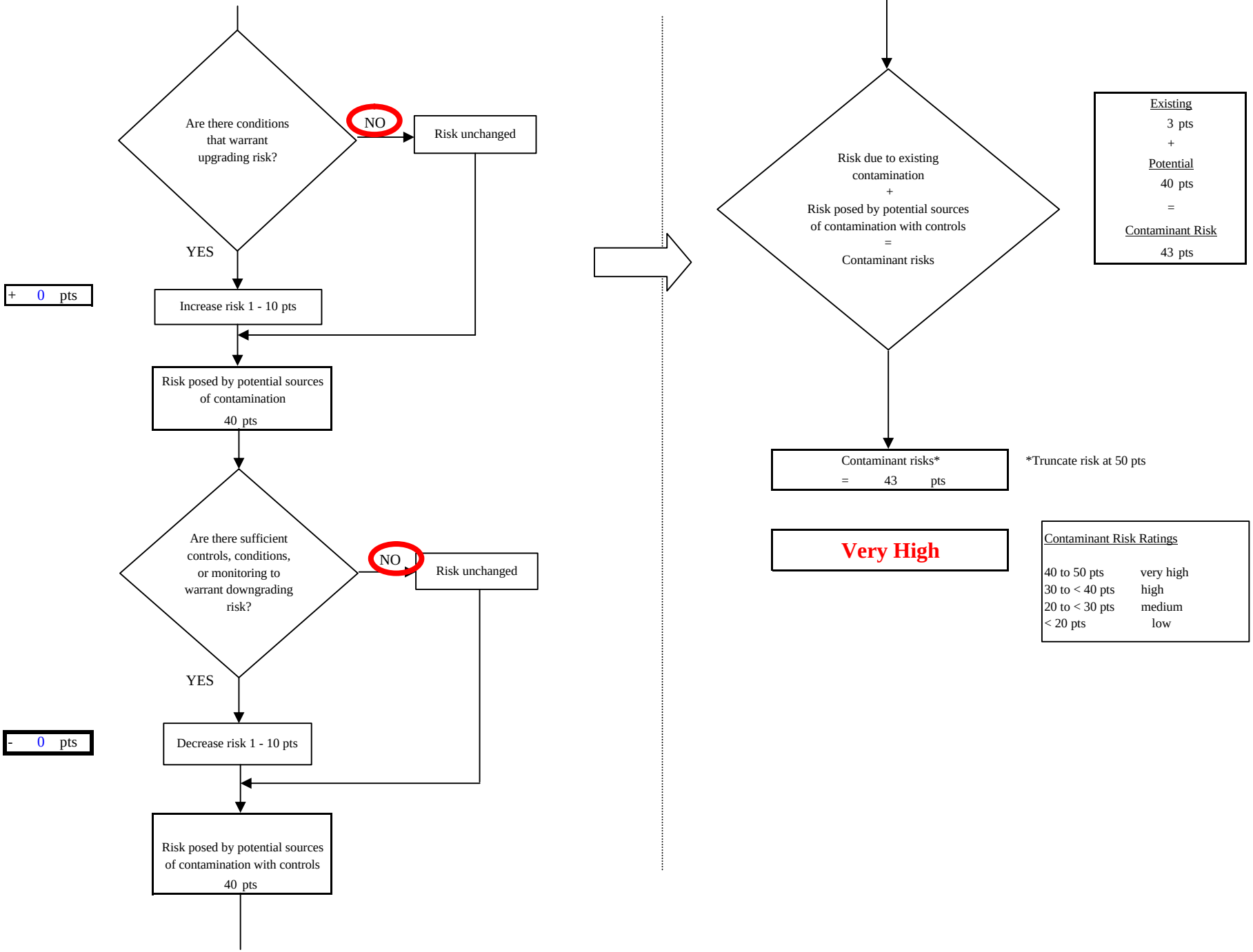
| | Zone A | Zone B | Total |
|---|---|---|---|
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 1 | 0 | 1 |
| Medium(s) | 0 | | 0 |
| Low(s) | 0 | | 0 |

| | **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 |

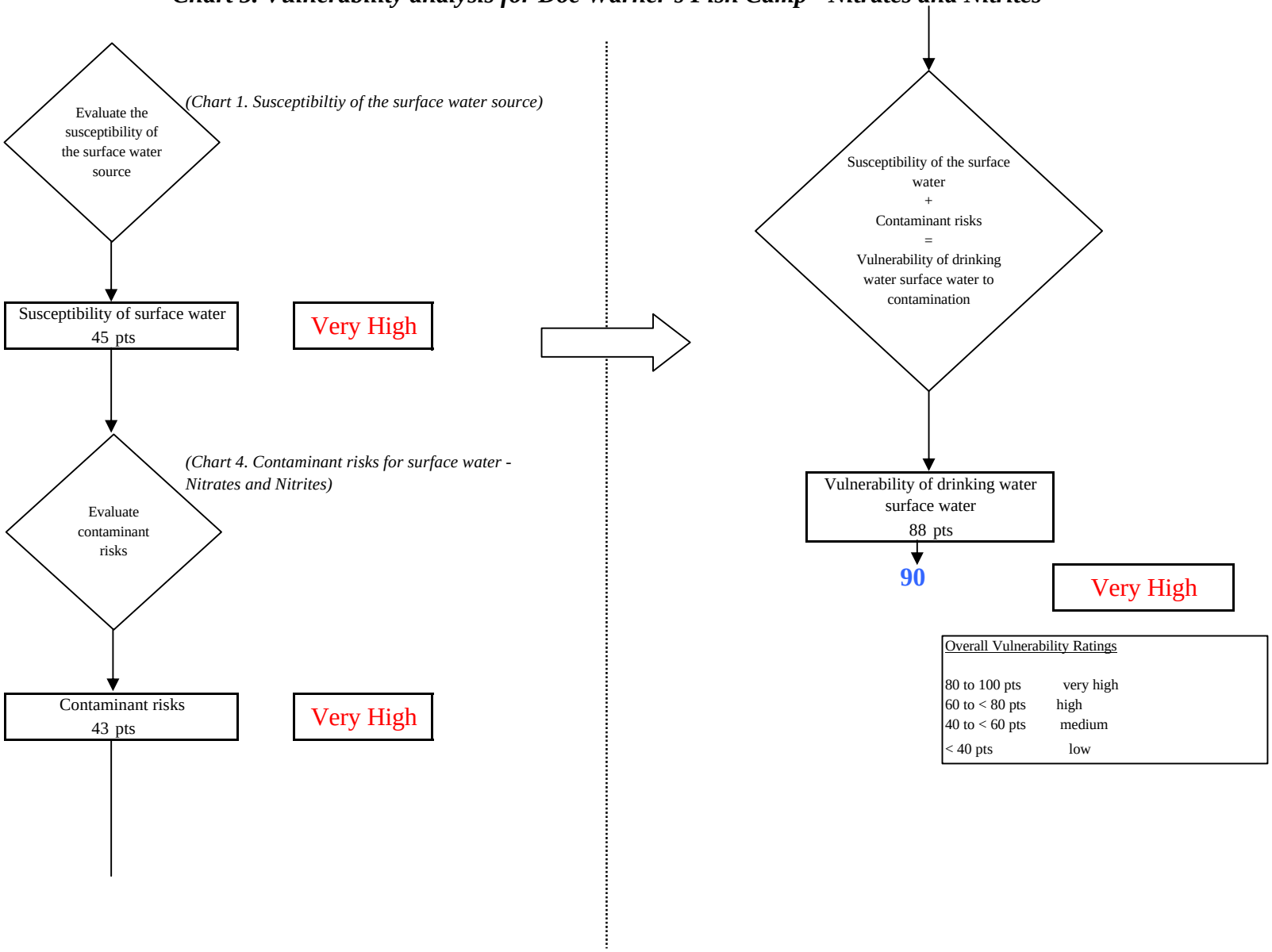
Matrix Score 30

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.

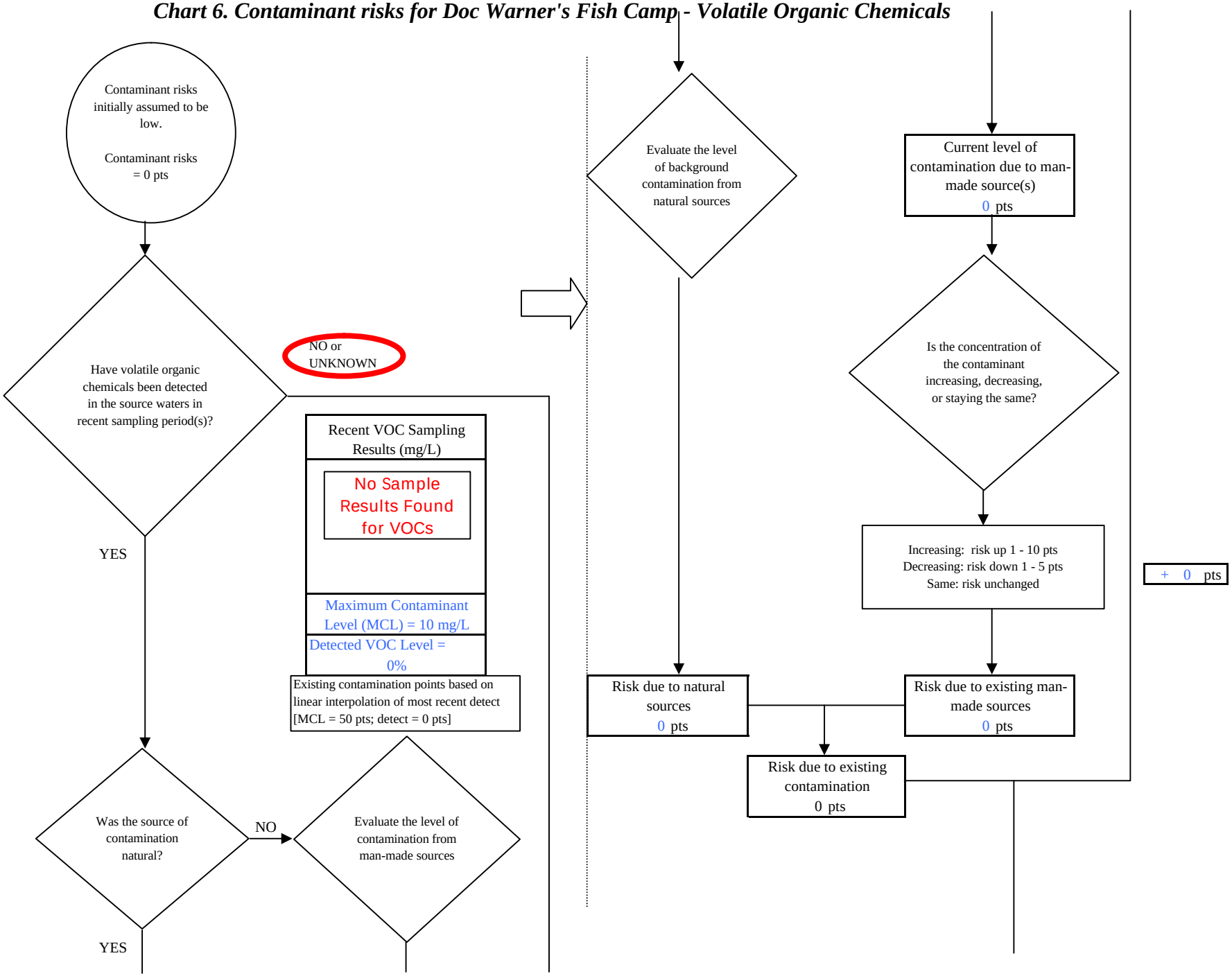
# *Chart 4. Contaminant risks for Doc Warner's Fish Camp - Nitrates and Nitrites*



## *Chart 5. Vulnerability analysis for Doc Warner's Fish Camp - Nitrates and Nitrites*



# *Chart 6. Contaminant risks for Doc Warner's Fish Camp - Volatile Organic Chemicals*



# *Chart 6. Contaminant risks for Doc Warner's Fish Camp - 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)

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

Are any significant sources in Zone A?

NO → Risk unchanged

YES → Increase risk 1 - 10 pts

Large Capacity Septic System (D10) in Zone A

+ 2 pts

Risk Levels for Contaminant Sources identified in Zones A and B

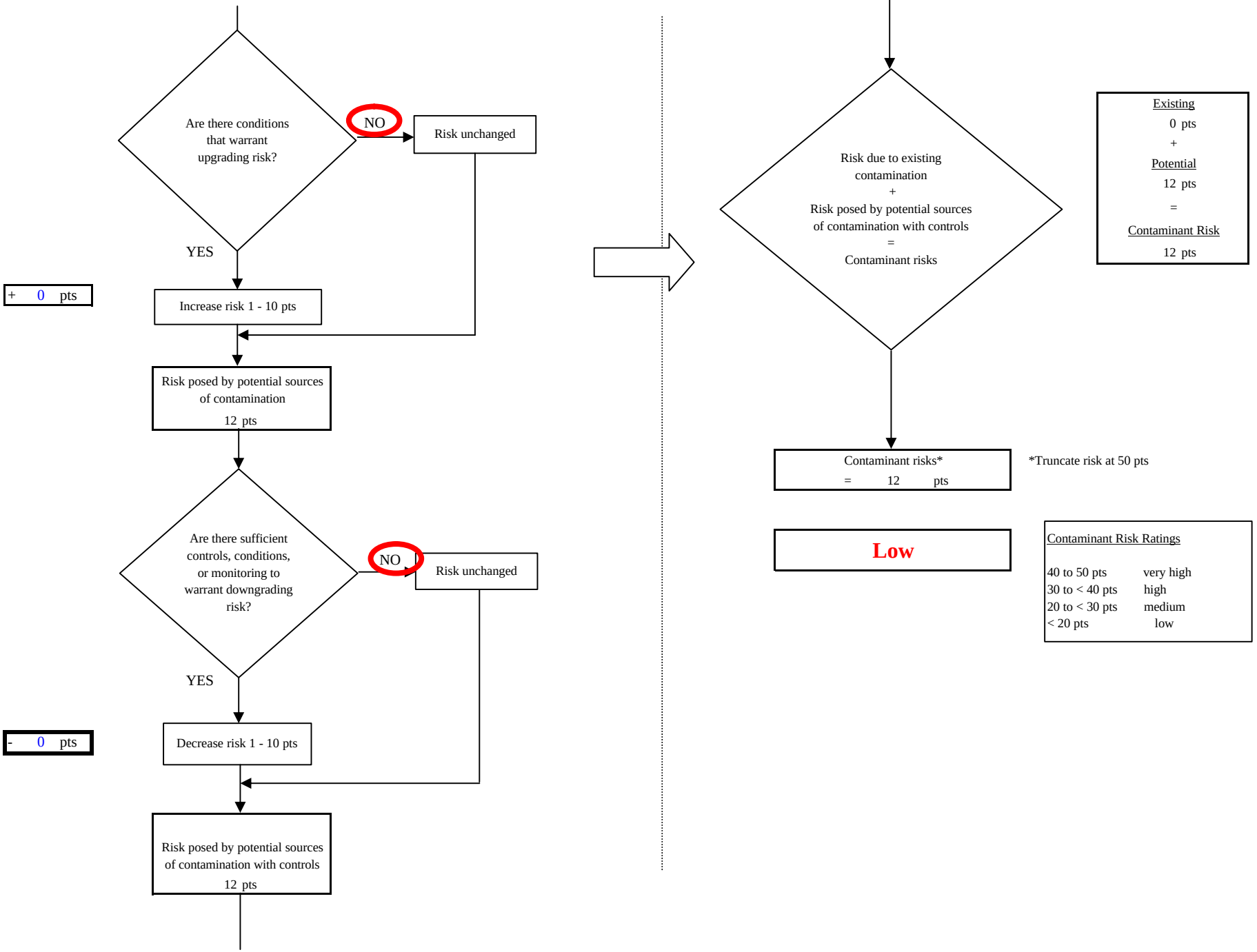
| | Zone A | Zone B | Total |
|---|---|---|---|
| Very Highs(s) | 0 | 0 | 0 |
| High(s) | 0 | 0 | 0 |
| Medium(s) | 0 | | 0 |
| Low(s) | 1 | | 1 |

| | **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 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 Doc Warner's Fish Camp - Volatile Organic Chemicals*



## *Chart 7. Vulnerability analysis for Doc Warner's Fish Camp - Volatile Organic Chemicals*