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# Source Water Assessment

A Hydrogeologic Susceptibility and  
Vulnerability Assessment for the  
Anderson School  
Anderson, Alaska  
PWSID 390015

April 2004

DRINKING WATER PROTECTION PROGRAM REPORT Report 1501  
Alaska Department of Environmental Conservation

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DRINKING WATER PROTECTION PROGRAM REPORT Report 1501

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 the Anderson School Anderson, Alaska

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## Drinking Water Protection Program Alaska Department of Environmental Conservation

### EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability to potential contamination of the public water system serving Anderson School. This Class A (non-community non-transient) water system consists of one well on Anderson Road in the town of Anderson, Alaska. The well received a natural susceptibility rating of **Medium**. This rating is a combination of a susceptibility rating of **Low** for the actual wellhead and a **High** rating for the aquifer in which the well is drawing water from. Identified potential and current sources of contamination for the Anderson School public water system include: Anderson Road. It is evaluated as a source of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals. Combining the natural susceptibility of the well with the contaminant risk, the public water system for Anderson School received an overall vulnerability rating of **Low** for all six contaminant categories.

### ANDERSON SCHOOL PUBLIC DRINKING WATER SYSTEM

The Anderson School public water system is a Class A (non-community non-transient) water system. The well is located on Anderson Road in the town of Anderson, Alaska (T7S, R8W, Section 5) (See Map 1 of Appendix A). Anderson is located on a spur road off of the George Parks Highway 76 miles southwest of Fairbanks.

Residents in the area of Anderson primarily use individual water wells and septic systems (ADCED, 2002). Electricity is provided by Golden Valley Electric Association. Residents primarily use heating oil (typically stored in both above and below ground 275 to 500-gallon tanks) to heat homes and buildings (ADCED, 2002). Refuse is hauled to the new Denali Borough regional landfill, located 2 miles south of Anderson.

The Anderson School lies in the alluvial plain of the Nenana River at an elevation of approximately 600 feet above sea level.

According to the 8/7/01 Sanitary Survey for this water

system, the depth of the well is 38 feet below the ground surface. Most of the wells in this area are screened in sand and gravel, and it is assumed this one is also. The coarse, alluvial, sandy gravel in the floodplains of the areas streams and rivers provides a large aquifer even in the winter when infiltration is low. Discontinuous permafrost (perennially frozen areas) may also be present in the alluvial plain. Areas with discontinuous permafrost may locally affect the ground water flow directions. Both the Nenana River as well as surface infiltration contribute water to this alluvial aquifer.

The Anderson School public drinking water system serves approximately 100 non-residents through one service connection.

### ANDERSON SCHOOL DRINKING WATER PROTECTION AREA

The pathways most likely for surface contamination to reach the groundwater are identified as the first step in determining a drinking water system's risk. These areas are determined by looking at the characteristics of the soil, groundwater, aquifer, and well.

The most probable area for contamination to reach the drinking water wells is the area that contributes water to the well, the groundwater capture zone. The groundwater capture zone is located in the area circling the well (the area influenced by pumping) and also the area of the water table upgradient of the well, usually forming a parabola shape.

There are many different ways of calculating the size of capture zones. This assessment uses a combination of two simple groundwater flow equations, the Thiem and uniform flow equations for all groundwater wells screened in unconsolidated material. The orientation of the capture zone is then drawn using a water table elevation map (if available) or a land surface elevation map of the area. The capture zone calculated in this assessment is only a best guess using the information and resources available to us, and may differ slightly from the actual capture zone.

The parameters used to calculate the shape of this capture zone are general for the whole alluvial plain and were obtained from area well logs in the area and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

Only limited information is available for the aquifer Anderson School’s public water system well draws its water from. The orientation of the capture zone was drawn based on the assumption that groundwater flow direction is generally the same direction as the topography.

Because of uncertainties and changing site conditions, a factor of safety is added to the groundwater capture zone to form the drinking water protection area for the well.

The protection areas established for wells are usually separated into four zones, limited by the watershed. These zones correspond to times-of-travel (TOT) of the water moving through the aquifer to the well (plus the factor of safety).

The following is a summary of the four zones for wells and the calculated time-of-travel for each:

**Table 1. Definition of Zones**

<b>Zone</b>	<b>Definition</b>
A	¼ the distance for the 2-yr. time-of-travel
B	Less than 2 years time-of-travel
C	Less than 5 years time-of-travel
D	Less than 10 years time-of-travel

The time of travel for *contaminants* within the water varies with their unique physical and chemical characteristics.

The drinking water protection area outlined for the Anderson School on Map 1 of Appendix A will serve as the focus for voluntary protection efforts.

**INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES**

The Drinking Water Protection Program (DWPP) has completed an inventory of potential and existing sources of contamination within the Anderson School protection area. This inventory was completed through a search of agency records and other publicly available information. 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 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 inorganic 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 each 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 combination of toxicity and volume associated with that source. Rankings include:

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

Bacteria and Viruses are only inventoried in Zones A and B because of their short life span. Only “Very High” and “High” rankings are inventoried within the outer Zone D due to the probability of contaminant dilution by the time the contaminants get to the well.

Tables 2 through 7 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to the six contaminant categories.

**VULNERABILITY OF ANDERSON SCHOOL DRINKING WATER SYSTEM**

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

- Natural susceptibility; and
- Contaminant risks.

Appendix D contains fourteen 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 Wellhead’ to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the ‘Susceptibility of the Aquifer’ to contamination by looking at the properties of the aquifer and the presence of other wells or boreholes in the area. Chart 3 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 the water system’s contaminant sample results. Lastly, Chart 4 combines the results of the first three charts to produce the ‘Vulnerability Analysis for Bacteria and Viruses’. Charts 5 through 14 contain 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 Natural Susceptibility is reached by considering the properties of the well and the aquifer.

$$\begin{aligned}
 & \text{Susceptibility of the Wellhead (0 – 25 Points)} \\
 & \quad \text{(Chart 1 of Appendix D)} \\
 & \quad + \\
 & \text{Susceptibility of the Aquifer (0 – 25 Points)} \\
 & \quad \text{(Chart 2 of Appendix D)} \\
 & \quad = \\
 & \text{Natural Susceptibility (Susceptibility of the Well)} \\
 & \quad \text{(0 – 50 Points)}
 \end{aligned}$$

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

Natural Susceptibility Ratings	
40 to 50 pts	Very High
30 to < 40 pts	High
20 to < 30 pts	Medium
< 20 pts	Low

The wellhead for the Anderson School received a Low Susceptibility rating. Although the well is probably located within the floodplain for Nenana River and Lost Slough, the town of Anderson is protected from flooding by a dike surrounding the town. The 8/7/01 Sanitary Survey indicates the well is capped with a sanitary seal and the land surface is sloped away from each of the wells; however, the well is not grouted. A sanitary seal prevents potential contaminants from entering the well from the inside while sloping the land surface away from the well and grouting help to prevent potential contaminants from traveling down the outside of the well casing.

The aquifer the Anderson School well is completed in received a High Susceptibility rating. The highly transmissive aquifer material (sand and gravel) in the area allows contaminants to travel quickly through it. The shallow depth of the water table also allows contaminants to come into contact with the ground water with little natural filtering. Most contaminants disperse much quicker in water than in soils. Table 2 summarizes the Susceptibility scores and ratings for Anderson School.

**Table 2. Susceptibility**

	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	17	High
Natural Susceptibility	22	Medium

The Contaminant Risk has been derived from an evaluation of the routine sampling results of the water system and the presence of potential sources of contamination. Contaminant risks to a drinking water source depend on the type and distribution of contaminant sources. Flow charts are used to assign a point score, and ratings are assigned in the same way as for the natural 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. Contaminant Risks**

Category	Score	Rating
Bacteria and Viruses	10	Low
Nitrates and/or Nitrites	11	Low
Volatile Organic Chemicals	10	Low
Heavy Metals, Cyanide, and Other Inorganic Chemicals	10	Low
Synthetic Organic Chemicals	0	Low
Other Organic Chemicals	10	Low

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

$$\begin{aligned}
 & \text{Natural Susceptibility (0 – 50 points)} \\
 & \quad + \\
 & \text{Contaminant Risks (0 – 50 points)} \\
 & \quad = \\
 & \text{Vulnerability of the} \\
 & \text{Drinking Water Source to Contamination (0 – 100).}
 \end{aligned}$$

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 (0 – 100) 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	30	Low
Nitrates and/or Nitrites	35	Low
Volatile Organic Chemicals	30	Low
Heavy Metals, Cyanide, and Other Inorganic Chemicals	30	Low
Synthetic Organic Chemicals	20	Low
Other Organic Chemicals	30	Low

**Bacteria and Viruses**

The Anderson Road represents the only identified risk of Bacteria and Viruses to this water system.

Only a small amount of bacteria and viruses are required to endanger public health. Coliforms (a bacteria) are found naturally in the environment and although they aren't necessarily a health threat, it is 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 (EPA, 2002). Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2002). Routine sampling has not recently detected coliforms in the water.

After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

**Nitrates and Nitrites**

The Anderson Road also represents the only identified risk of nitrates and nitrites for this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have not been detected in significant concentrations in recent sampling history for the Anderson School School well.

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

**Volatile Organic Chemicals**

The Anderson School heating oil tank and the Anderson Road represents the only identified risks for volatile organic chemical contamination to the well.

Volatile Organic Chemicals have not been detected during routine sampling of this water system. After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

**Heavy Metals, Cyanide, and Other Inorganic Chemicals**

Again, the Anderson School heating oil tank and the Anderson Road also represents the only identified risk for heavy metals, cyanide, and other inorganic chemicals.

Heavy metals have not been detected in significant concentrations during routine sampling.

After combining the contaminant risk for heavy metals, cyanide and other inorganic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

**Synthetic Organic Chemicals**

No potential sources of risk of synthetic organic chemicals were identified for this source of public drinking water.

Synthetic Organic Chemicals have not recently been sampled for in this water system.

After combining the contaminant risk for synthetic organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

**Other Organic Chemicals**

Again, the Anderson Road represents the only identified risk of other organic chemicals for this source of public drinking water.

Other Organic Chemicals have not recently been sampled for in this water system.

After combining the contaminant risk for other organic chemicals with the natural susceptibility of the well, the overall vulnerability of the well to contamination is low.

## REFERENCES

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

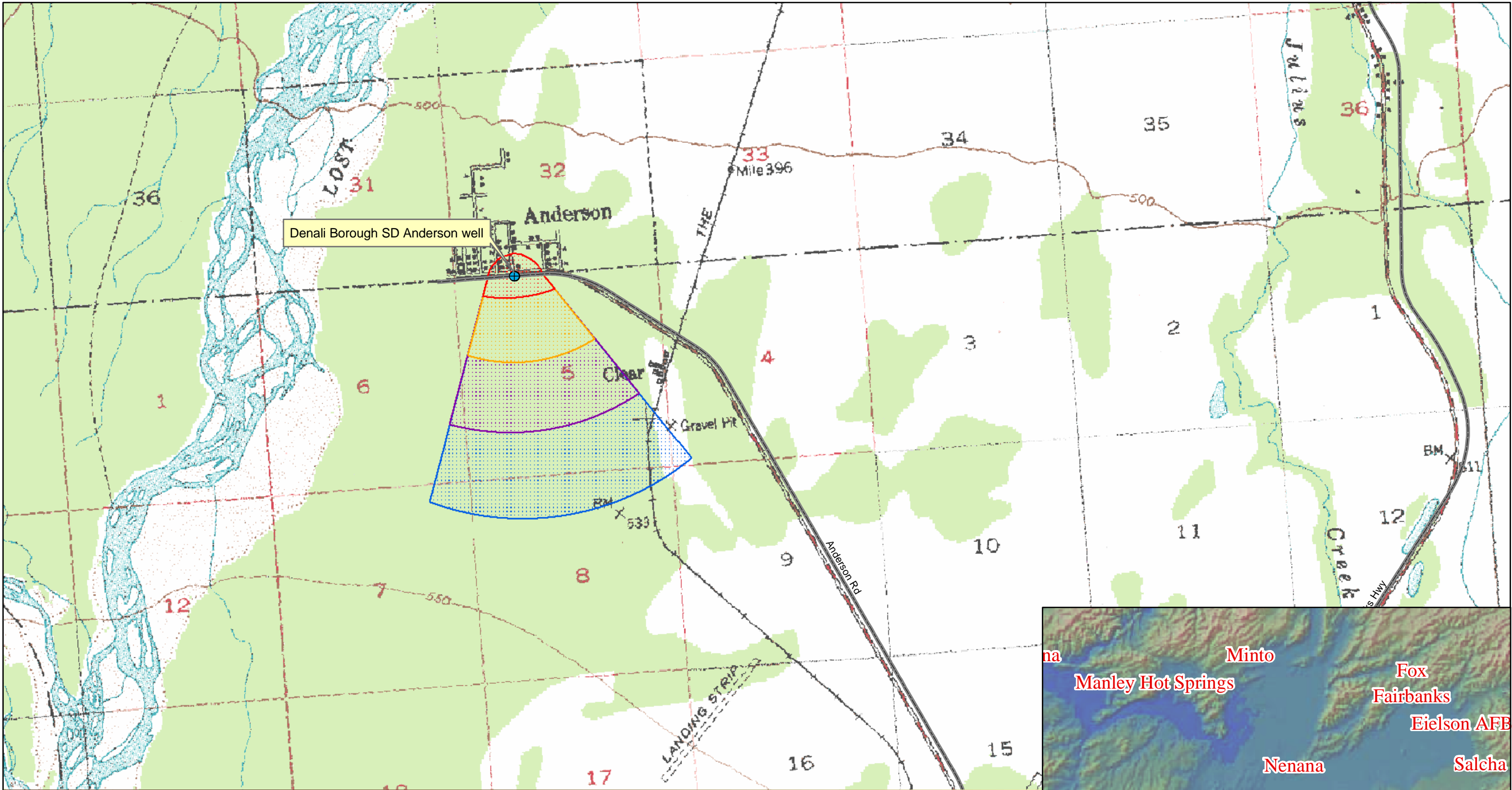
Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice-Hall, Englewood Cliffs, NJ.

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

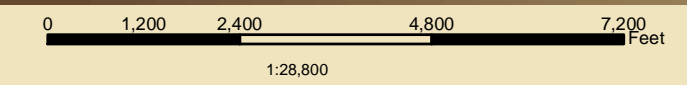


## **APPENDIX A**

### **Anderson School Drinking Water Protection Area Location Map (Map 1)**

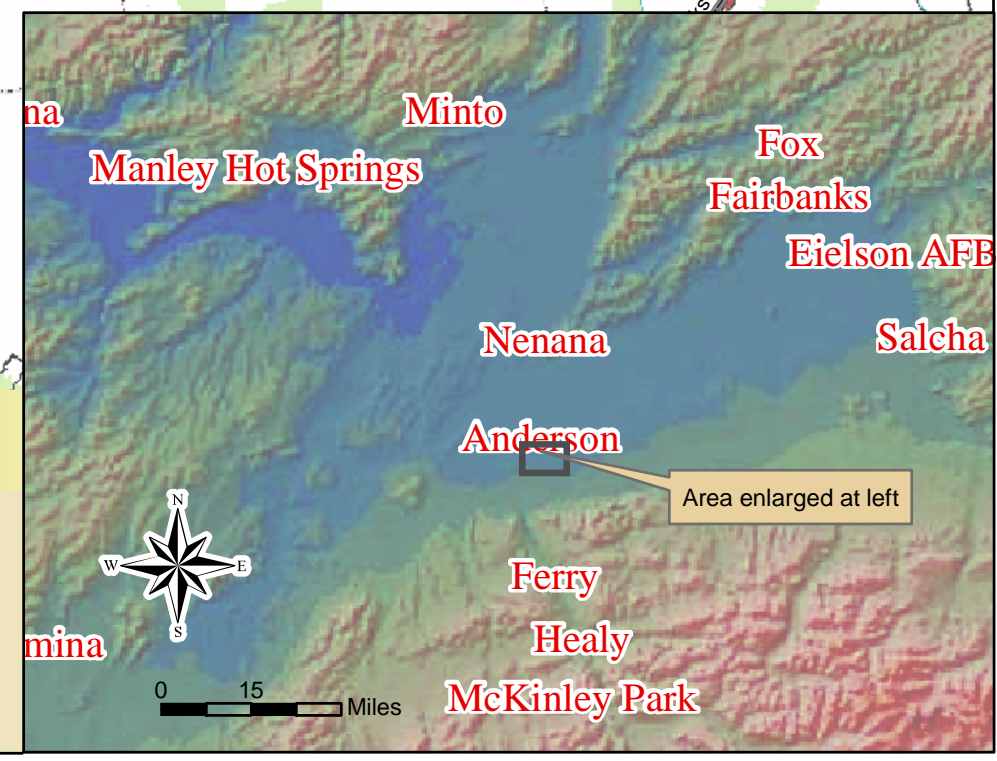


**Map 1: Denali Borough SD Anderson Drinking Water Protection Area** PWSID: 390015.001



**Data Sources:**  
 Background image  
 - USGS 1:63,000 mapping

- Legend**
- Denali Borough SD\* Anderson
  - Zone A
  - Zone B
  - Zone C
  - Zone D



Area enlarged at left

## **APPENDIX B**

### **Contaminant Source Inventory and Risk Ranking for Anderson School (Tables 1-7)**

**Table 1**

**Contaminant Source Inventory for  
Denali Borough SD\* Anderson**

**PWSID 390015.001**

<b>Contaminant Source Type</b>	<b>Contaminant Source ID</b>	<b>CS ID tag</b>	<b>Zone</b>	<b>Map Number</b>	<b>Comments</b>
Tanks, heating oil, nonresidential (aboveground)	T14	T14-1	A	2	Anderson School heating oil tank
Highways and roads, dirt/gravel	X24		A	2	Anderson Road
Landfills (municipal; Class III)	D51	D51-1	C	2	Inactive Clear Air Station landfill; identification provided by the water system operator

**Table 2**

*Contaminant Source Inventory and Risk Ranking for  
Denali Borough SD\* Anderson  
Sources of Bacteria and Viruses*

**PWSID 390015.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Anderson Road

**Table 3**

*Contaminant Source Inventory and Risk Ranking for  
Denali Borough SD\* Anderson  
Sources of Nitrates/Nitrites*

**PWSID 390015.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Anderson Road

**Table 4**

*Contaminant Source Inventory and Risk Ranking for  
Denali Borough SD\* Anderson  
Sources of Volatile Organic Chemicals*

**PWSID 390015.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Anderson Road
Tanks, heating oil, nonresidential (aboveground)	T14	T14-1	A	Low	2	Anderson School heating oil tank

**Table 5**

*Contaminant Source Inventory and Risk Ranking for  
Denali Borough SD\* Anderson  
Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals*

**PWSID 390015.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Anderson Road
Tanks, heating oil, nonresidential (aboveground)	T14	T14-1	A	Low	2	Anderson School heating oil tank



**Table 6**

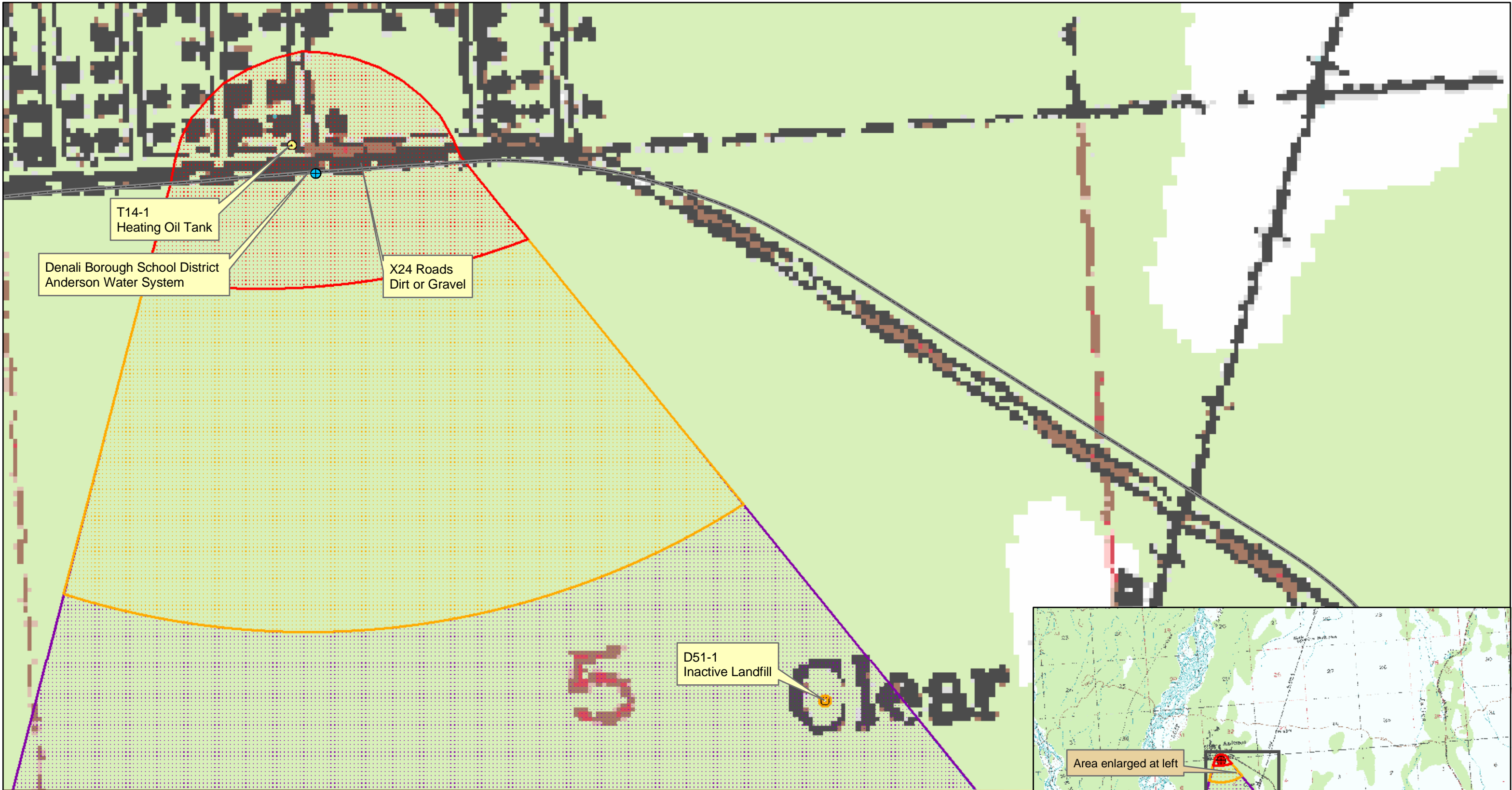
*Contaminant Source Inventory and Risk Ranking for  
Denali Borough SD\* Anderson  
Sources of Other Organic Chemicals*

**PWSID 390015.001**

<i>Contaminant Source Type</i>	<i>Contaminant Source ID</i>	<i>CS ID tag</i>	<i>Zone</i>	<i>Risk Ranking for Analysis</i>	<i>Map Number</i>	<i>Comments</i>
Highways and roads, dirt/gravel	X24		A	Low	2	Anderson Road

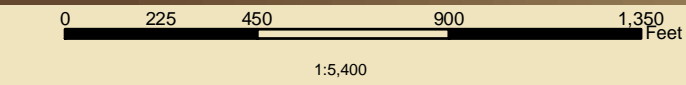
## **APPENDIX C**

### **Anderson School Potential Contaminant Sources (Map 2)**



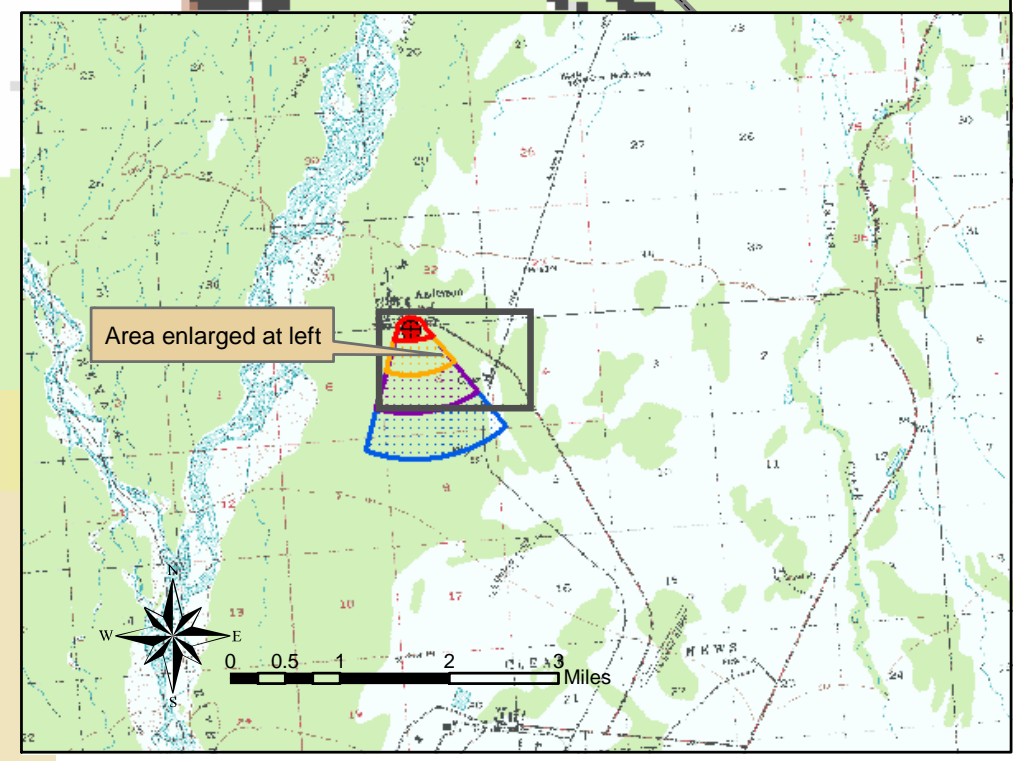
**Map 2: Anderson School Potential Contaminant Sources**

**PWSID: 390015**



**Data Sources:**  
**Background image**  
 - USGS 1:63,000 mapping

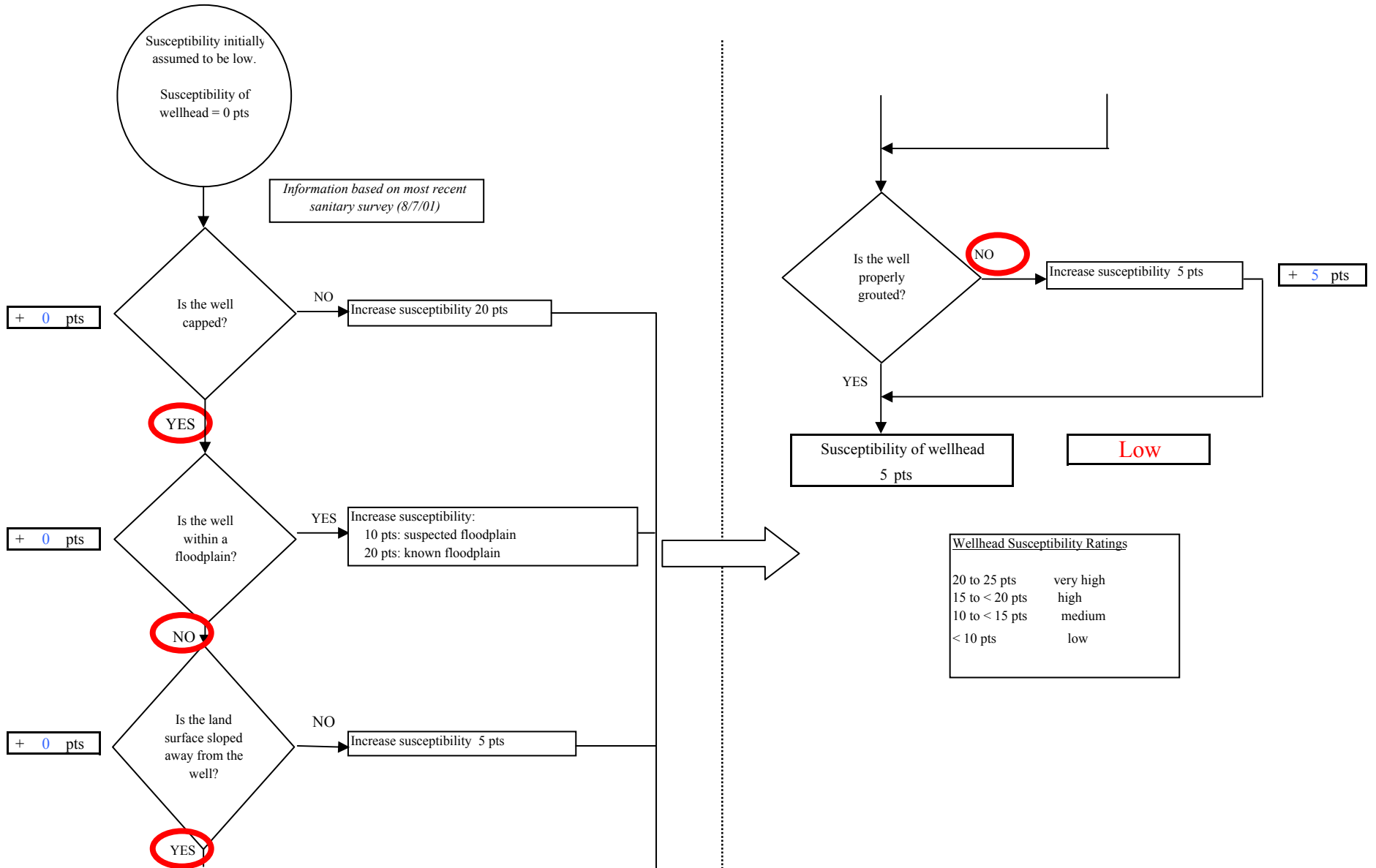
- Legend**
- Denali Borough SD Anderson well
  - Zone A
  - Zone B
  - Zone C
  - Zone D
  - Roads



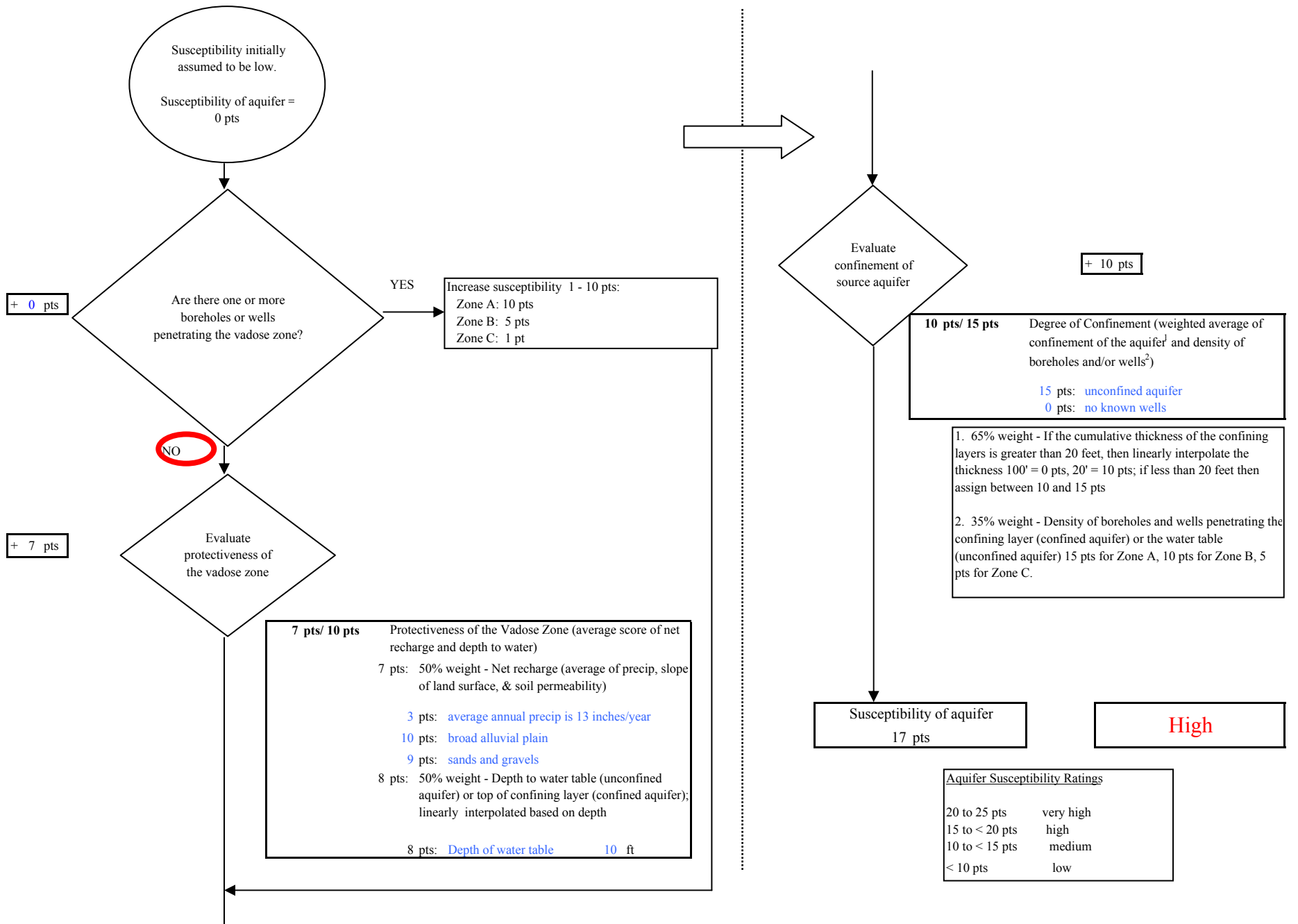
## **APPENDIX D**

### **Vulnerability Analysis for Anderson School Public Drinking Water Source (Charts 1-14)**

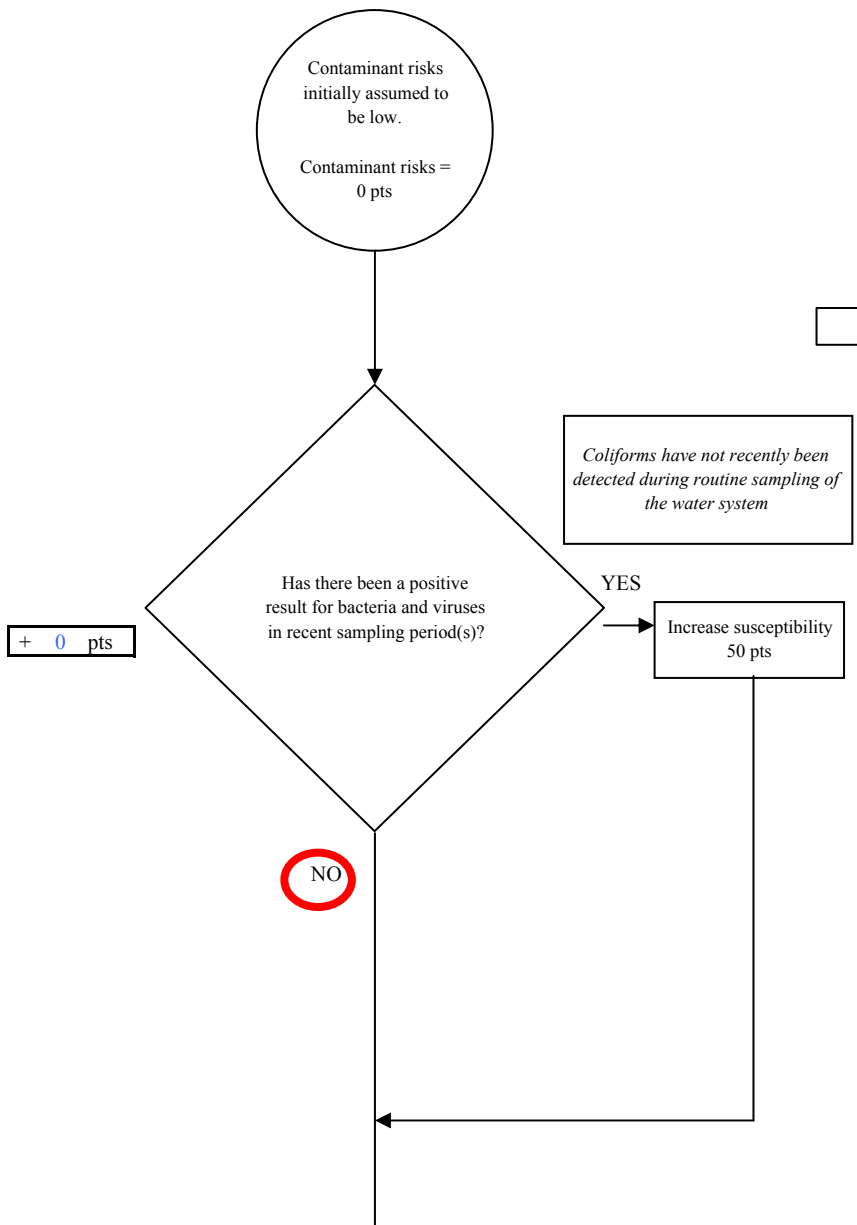
**Chart 1. Susceptibility of the wellhead - Denali Borough Anderson School**



**Chart 2. Susceptibility of the aquifer - Denali Borough Anderson School**



**Chart 3. Contaminant risks for Denali Borough Anderson School - Bacteria & Viruses**

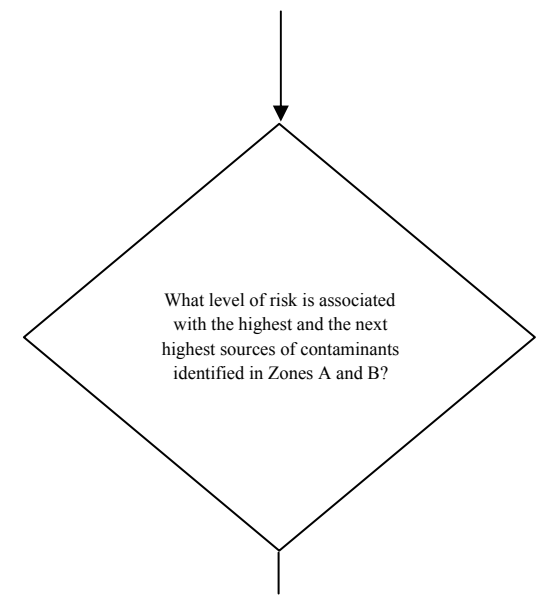
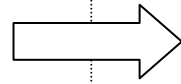


+ 0 pts

Coliforms have not recently been detected during routine sampling of the water system

Increase susceptibility 50 pts

NO



+ 10 pts

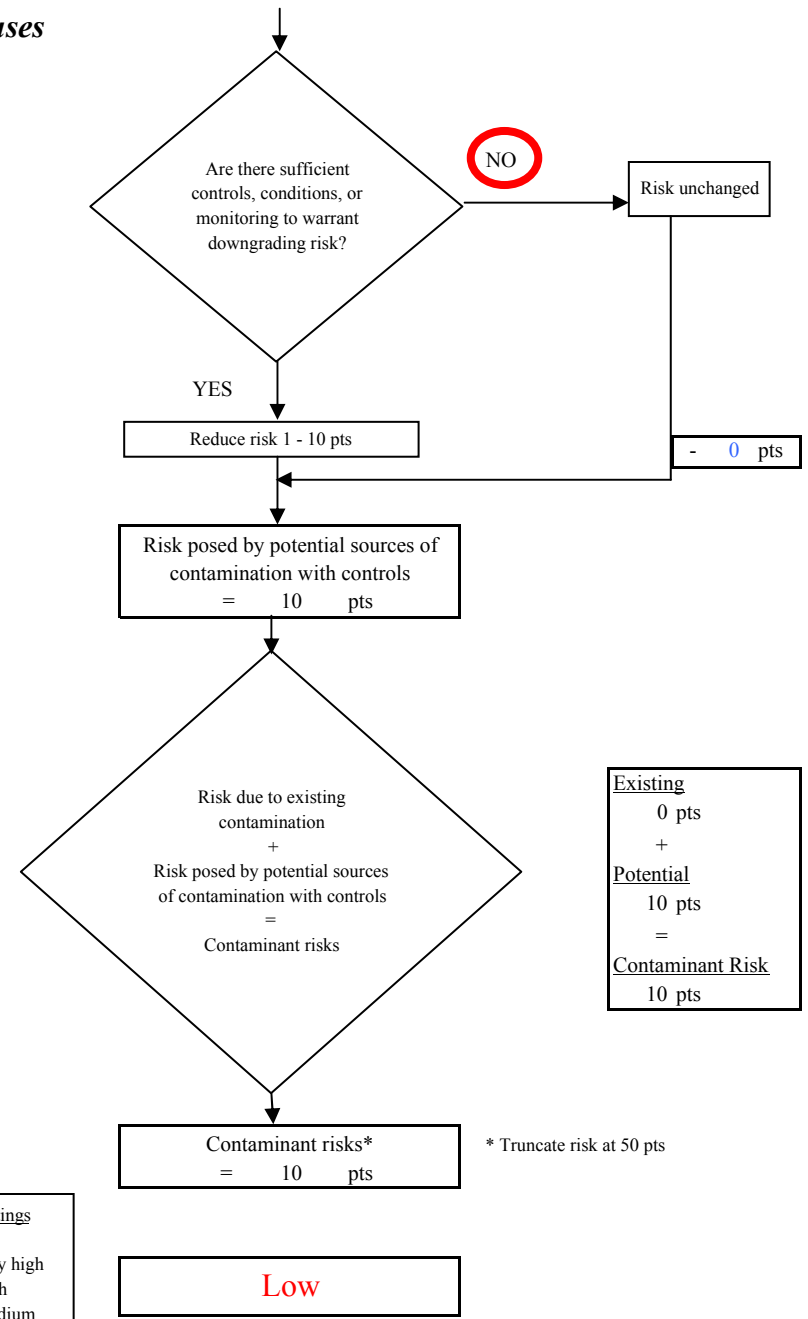
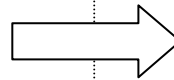
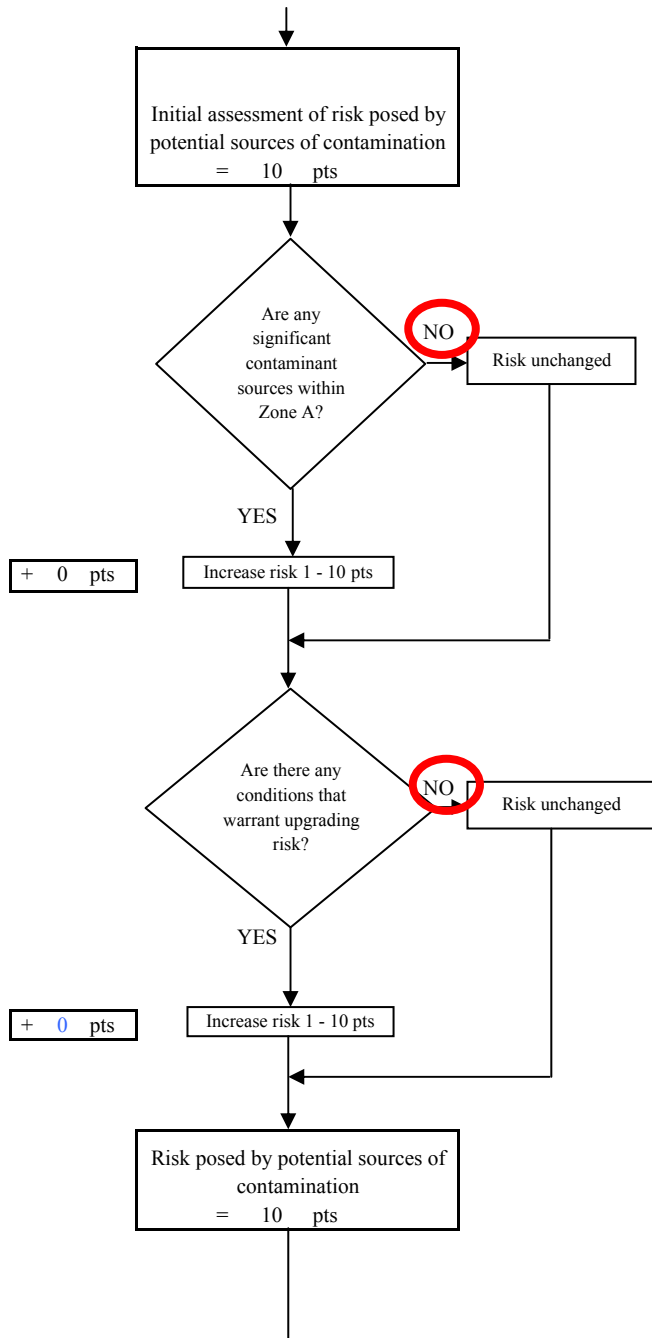
Risk Rankings for Contaminant Sources Identified in Zones A and B			
	Zone A	Zone B	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	1	0	1

	<b>LOW</b> 10 pts	<b>MEDIUM</b> 20 pts	<b>HIGH</b> 30 pts	<b>VERY HIGH</b> 40 pts
<b>LOW</b>	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
<b>MEDIUM</b>	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
<b>HIGH</b>	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
<b>VERY HIGH</b>	----	----	----	≥ 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 3. Contaminant risks for Denali Borough Anderson School - Bacteria & Viruses**

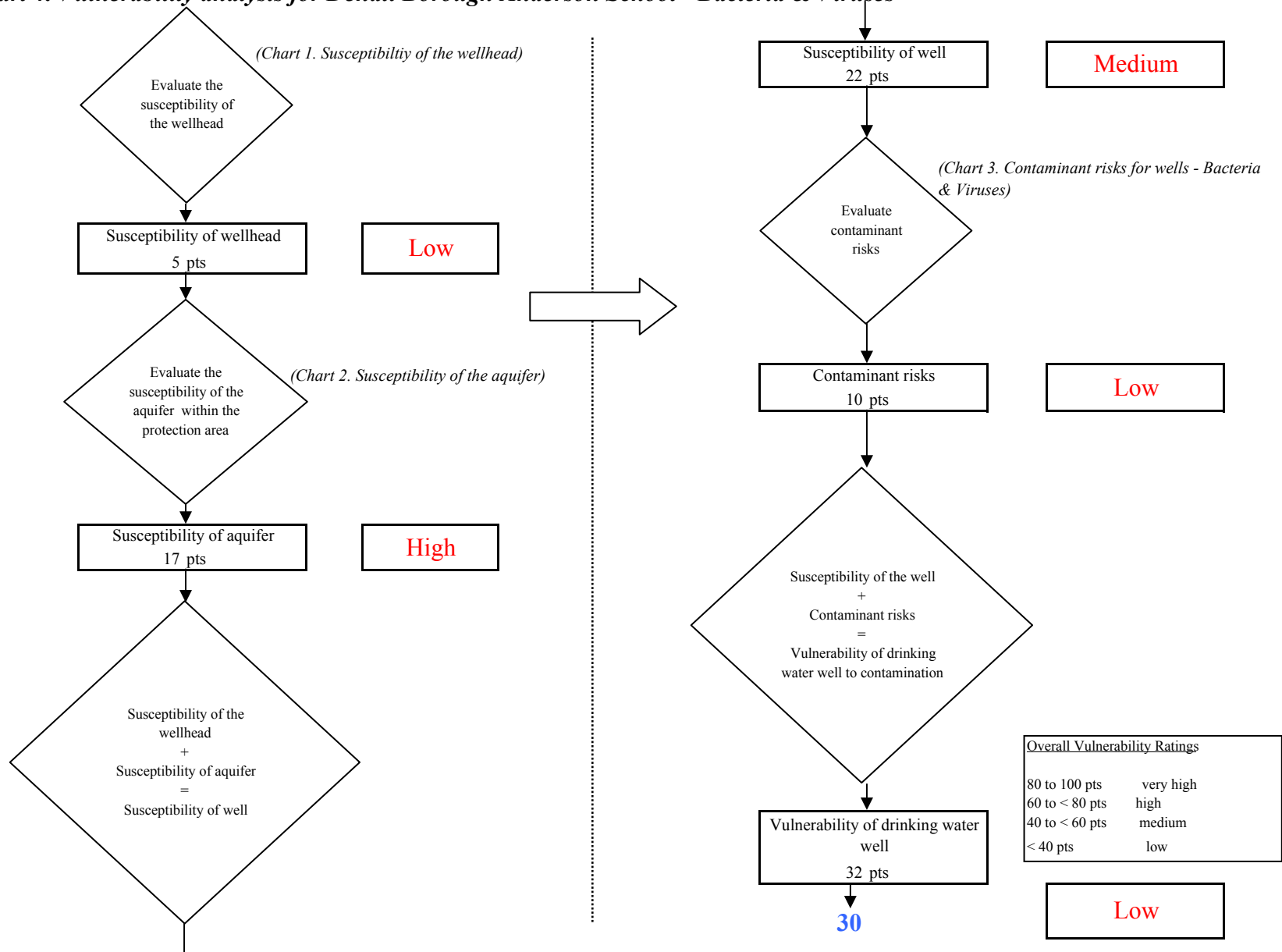


Contaminant Risk Ratings	
40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20 pts	low

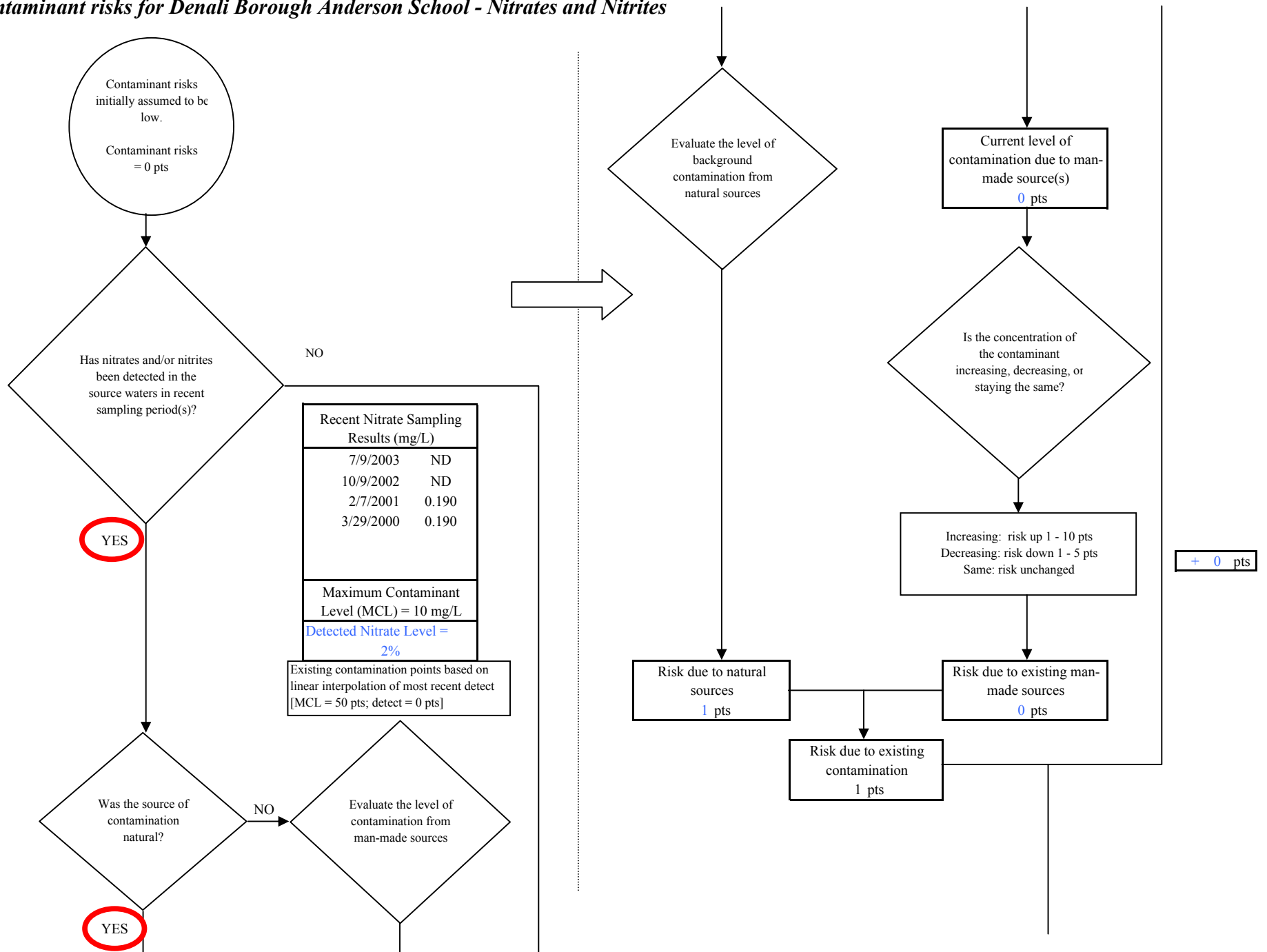
Existing	0 pts
+	
Potential	10 pts
=	
Contaminant Risk	10 pts



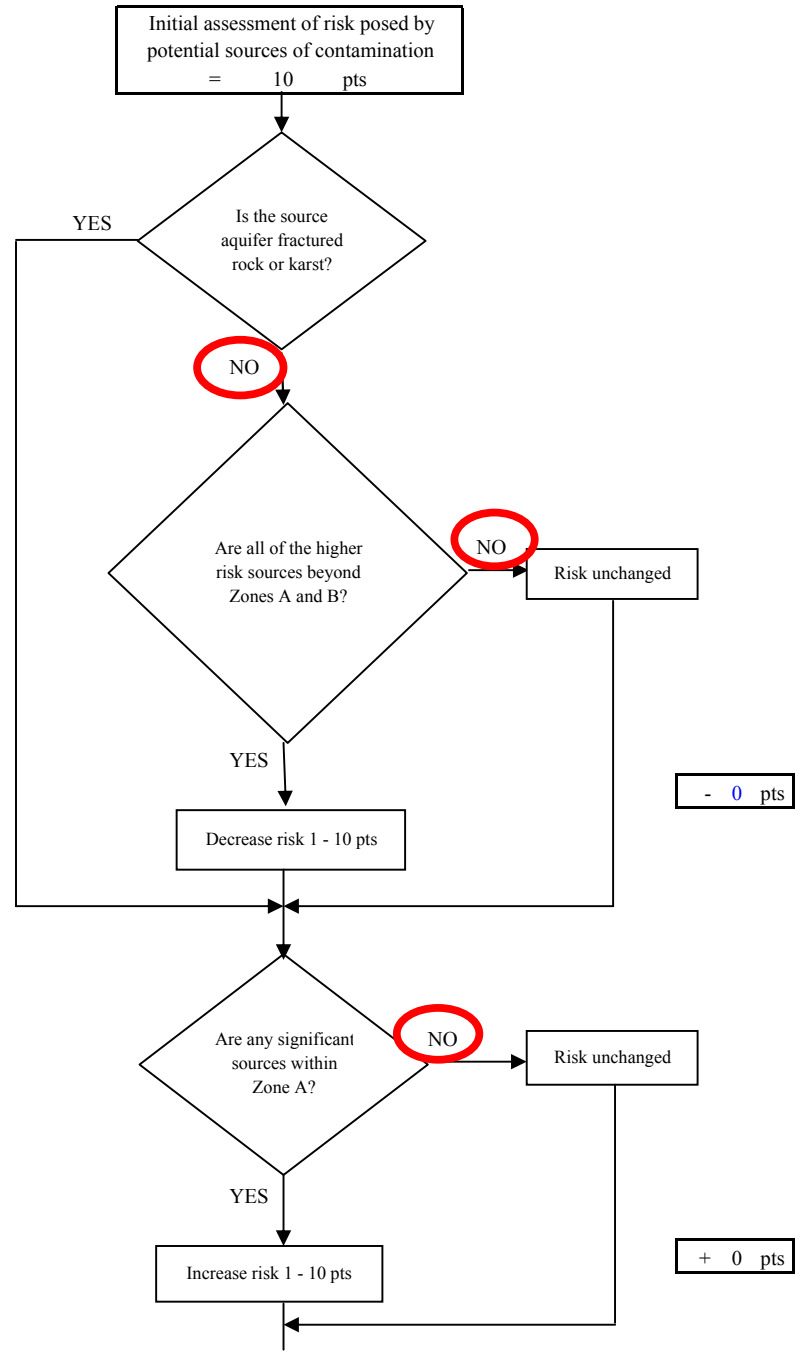
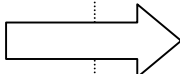
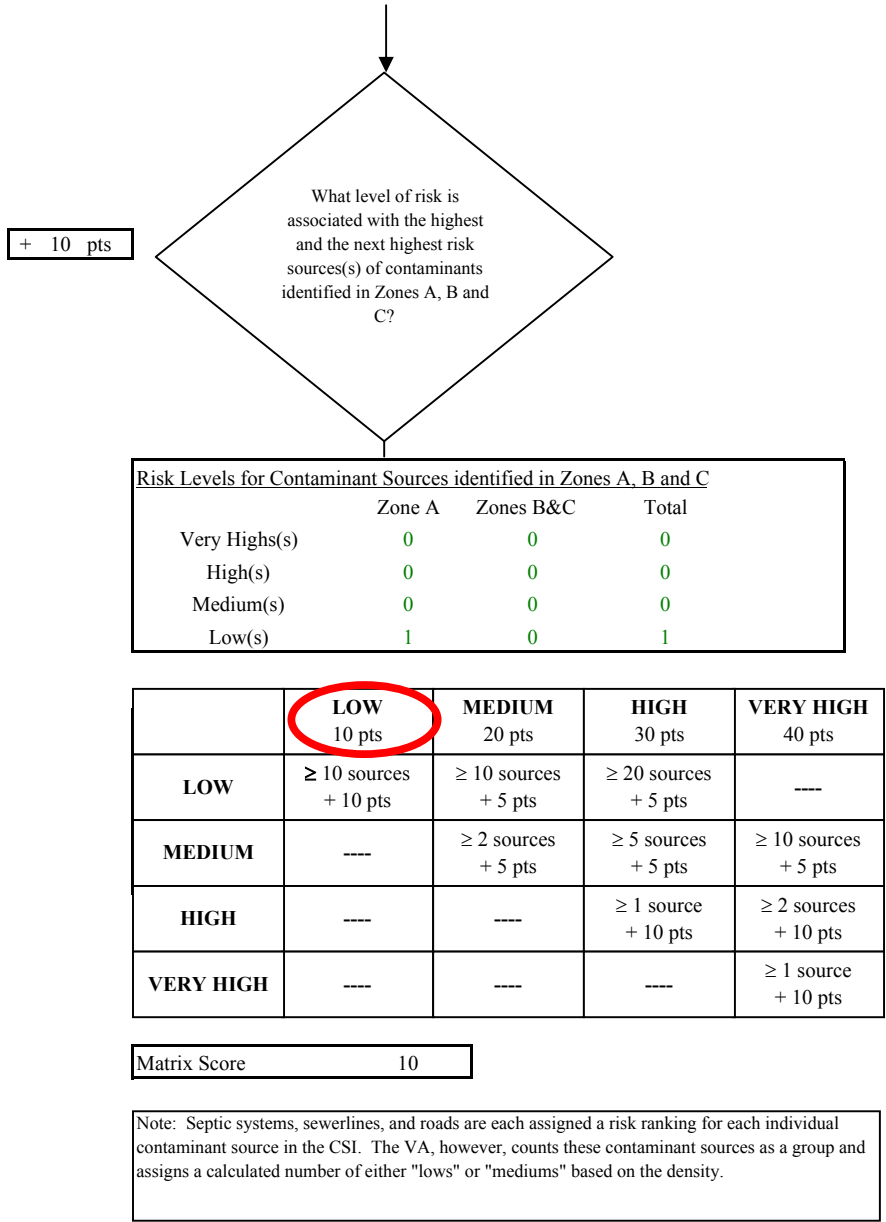
**Chart 4. Vulnerability analysis for Denali Borough Anderson School - Bacteria & Viruses**



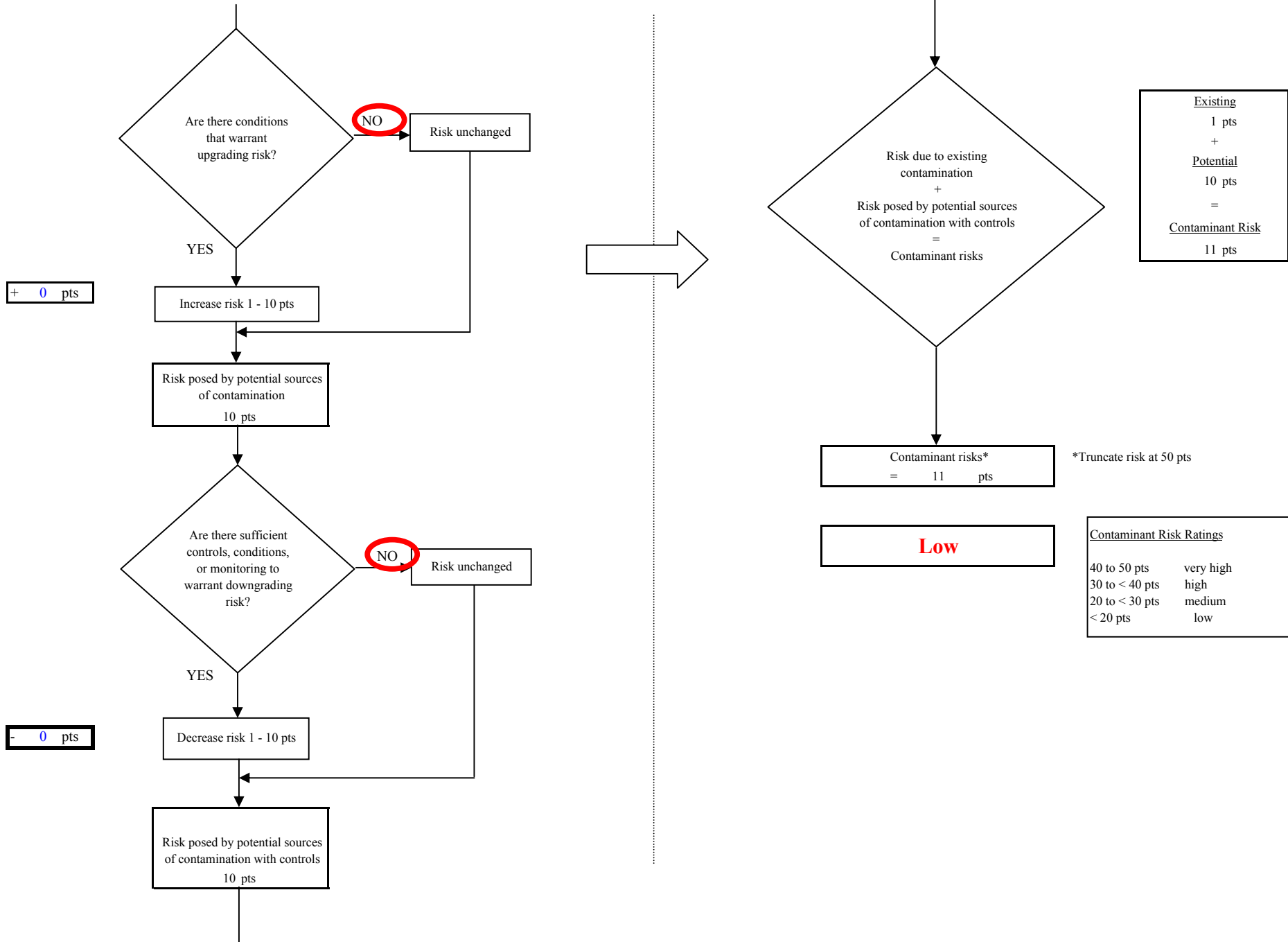
**Chart 5. Contaminant risks for Denali Borough Anderson School - Nitrates and Nitrites**



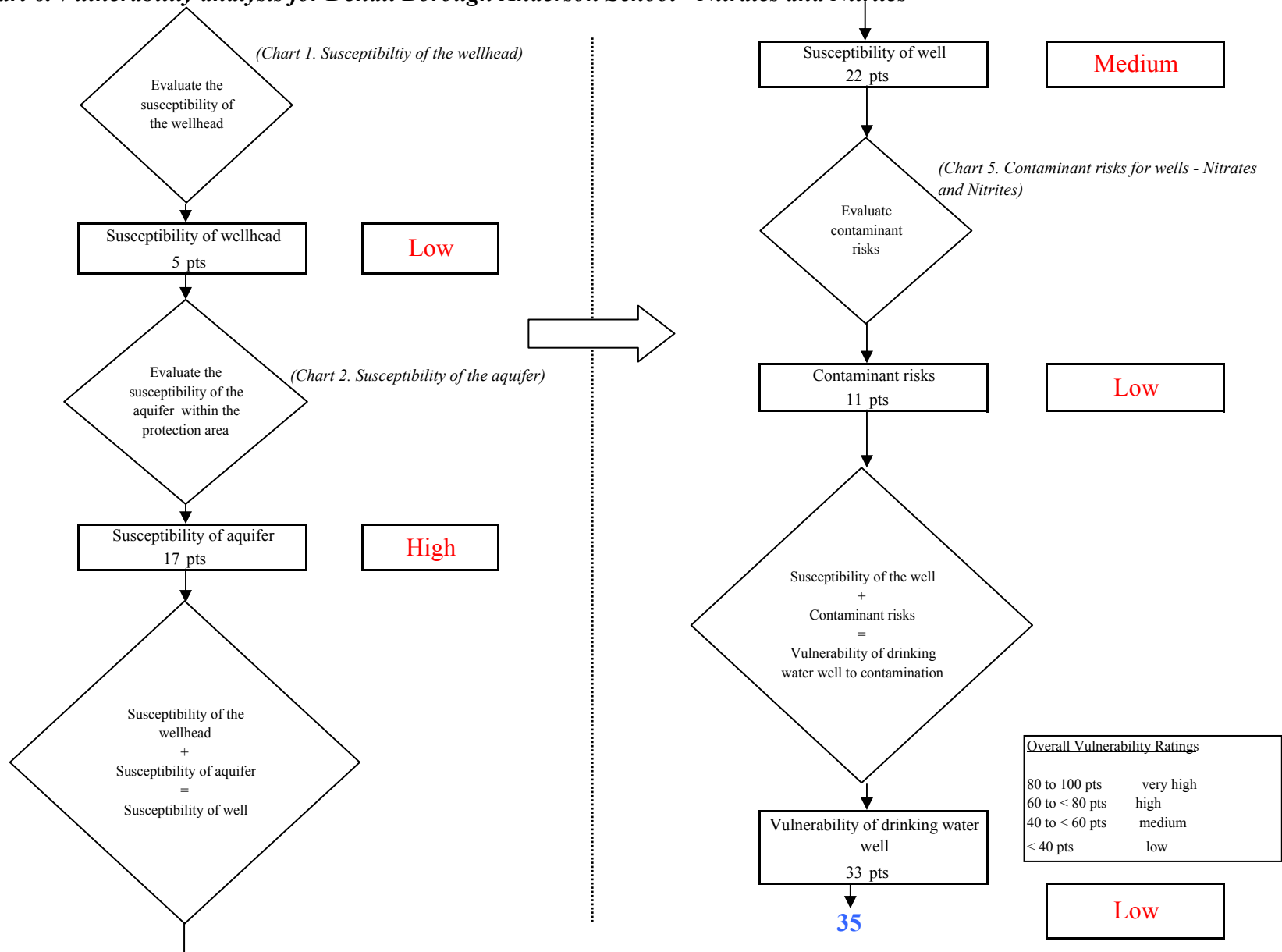
**Chart 5. Contaminant risks for Denali Borough Anderson School - Nitrates and Nitrites**



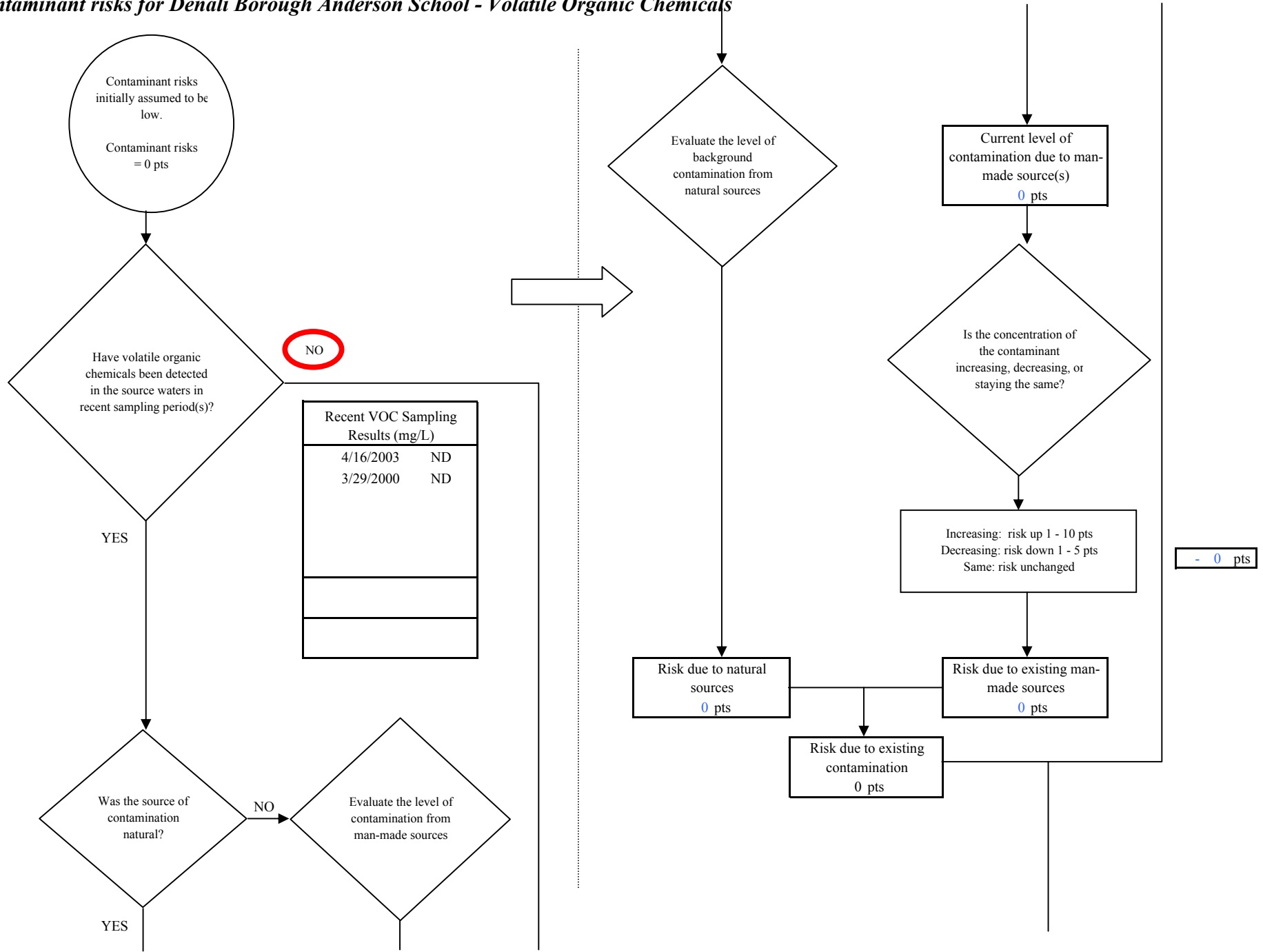
**Chart 5. Contaminant risks for Denali Borough Anderson School - Nitrates and Nitrites**



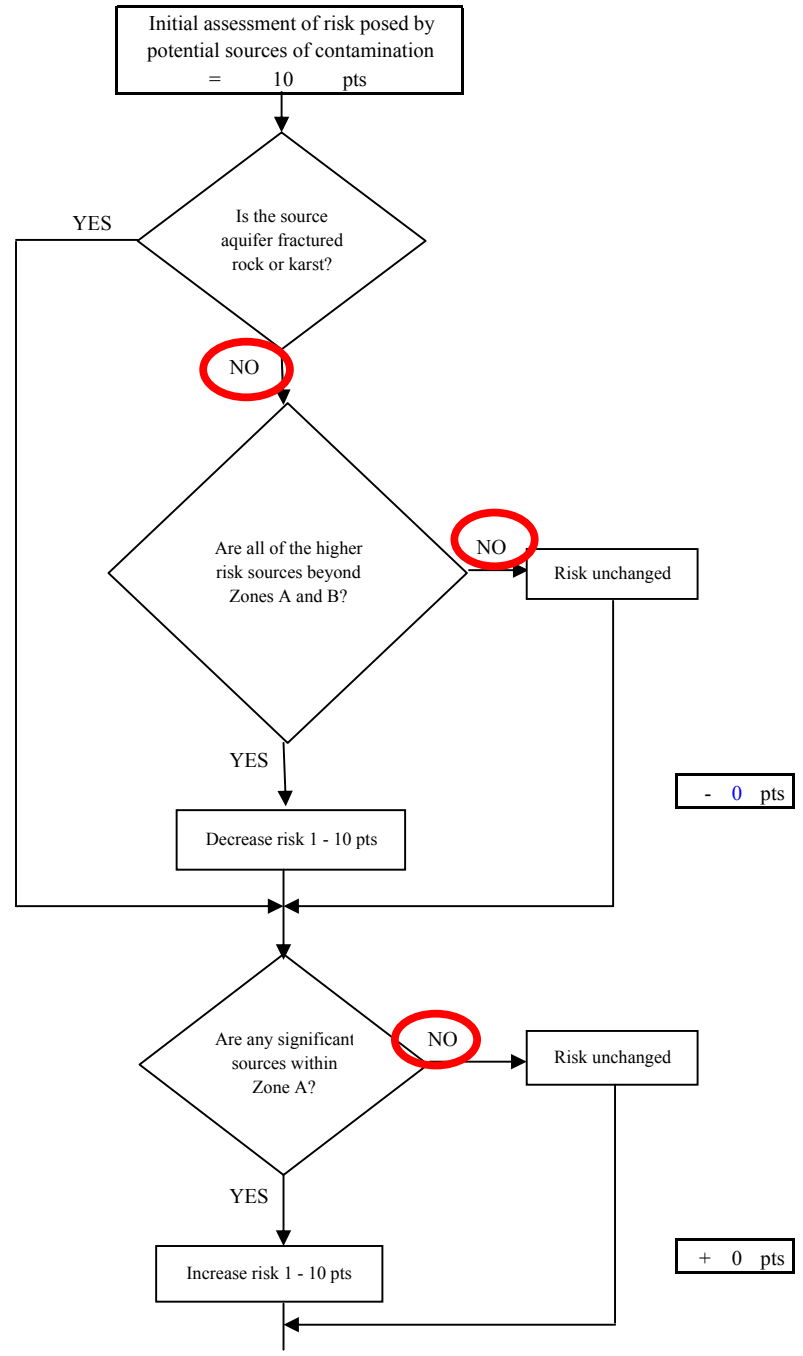
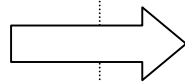
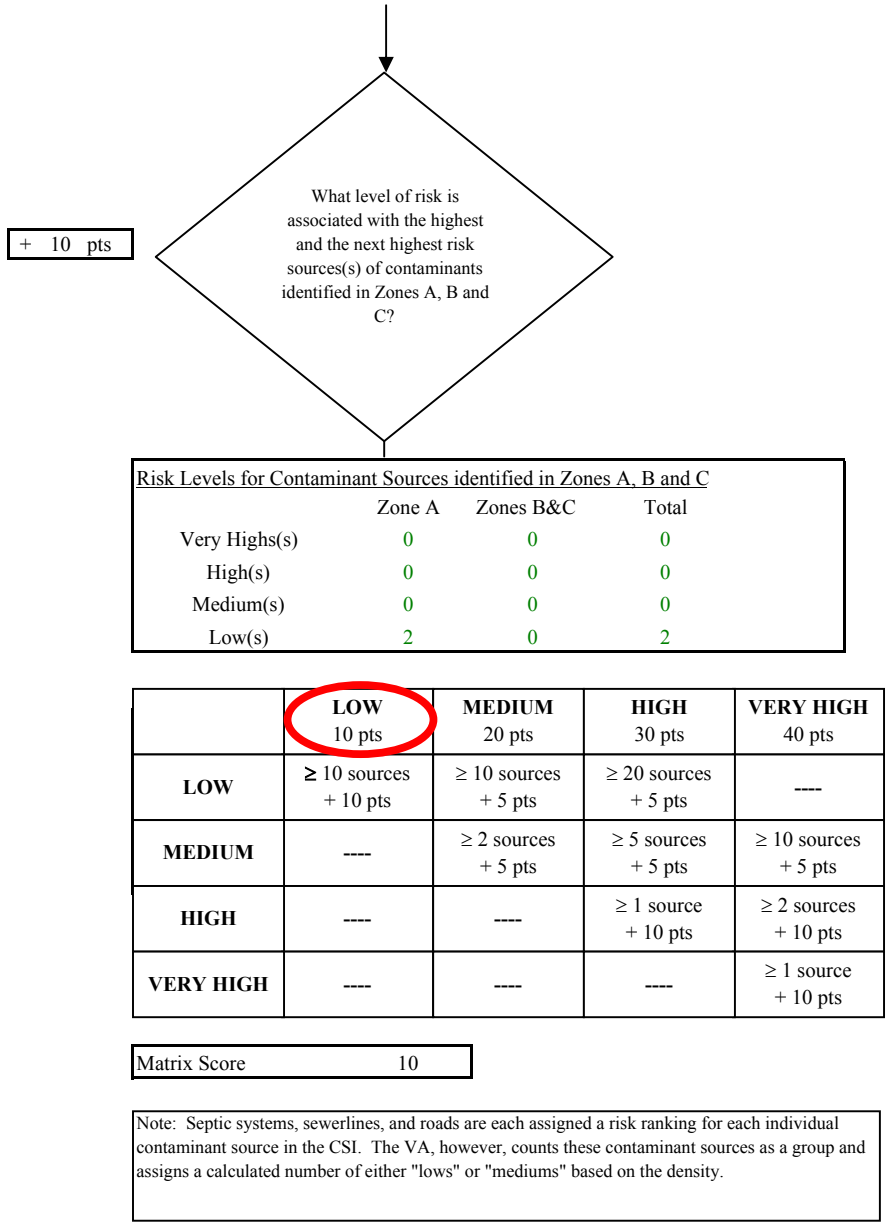
**Chart 6. Vulnerability analysis for Denali Borough Anderson School - Nitrates and Nitrites**



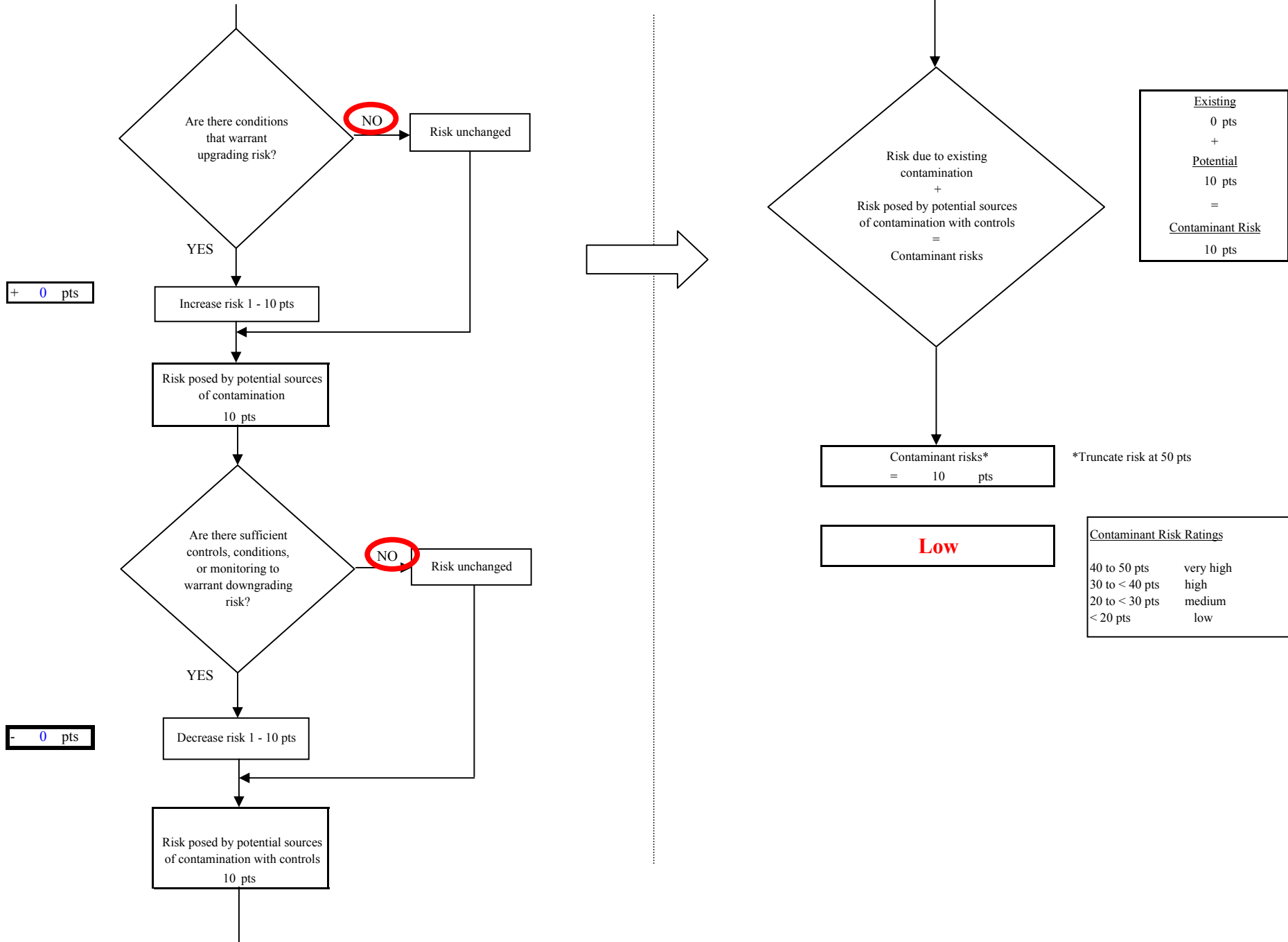
**Chart 7. Contaminant risks for Denali Borough Anderson School - Volatile Organic Chemicals**



**Chart 7. Contaminant risks for Denali Borough Anderson School - Volatile Organic Chemicals**

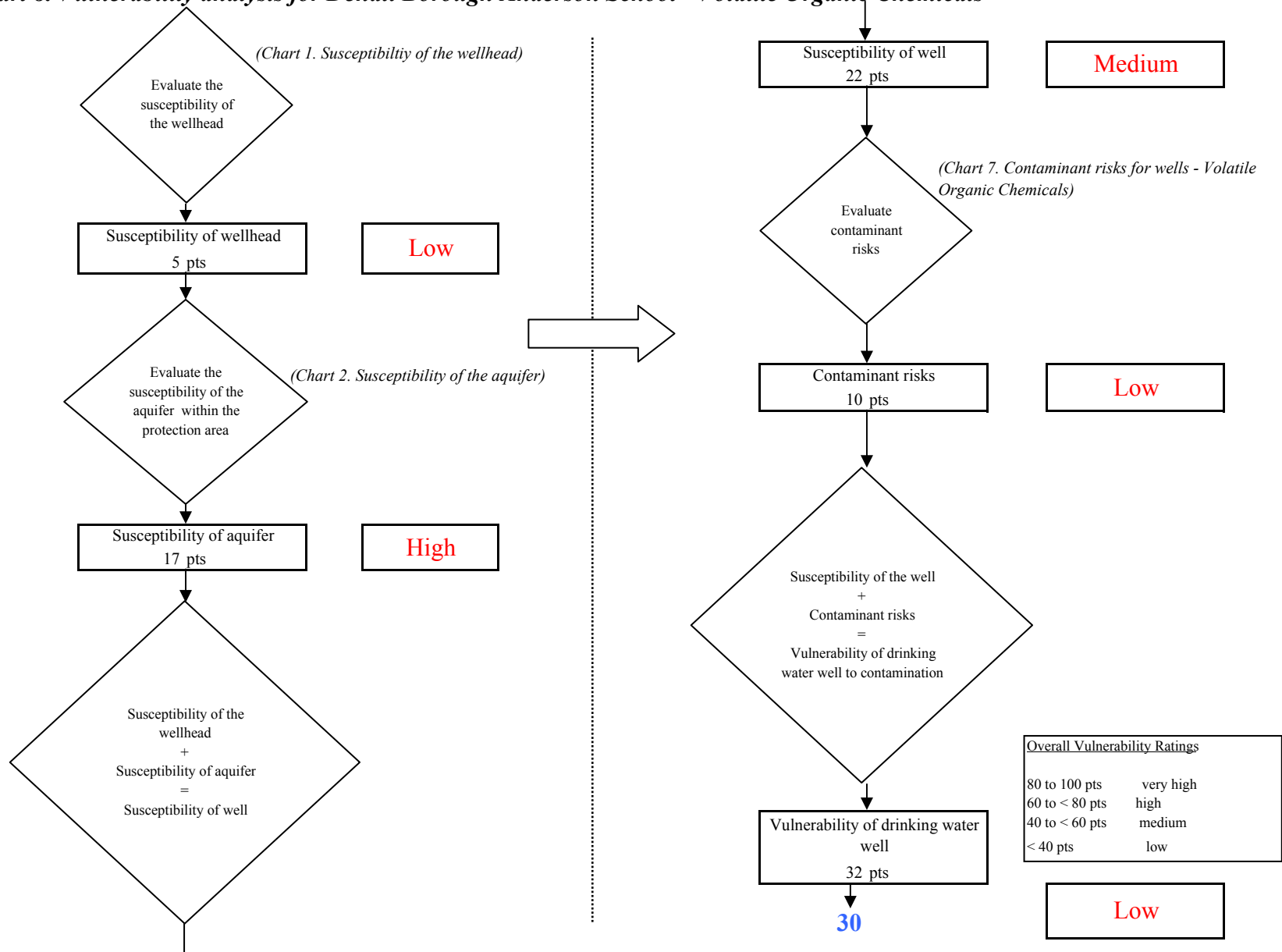


**Chart 7. Contaminant risks for Denali Borough Anderson School - Volatile Organic Chemicals**

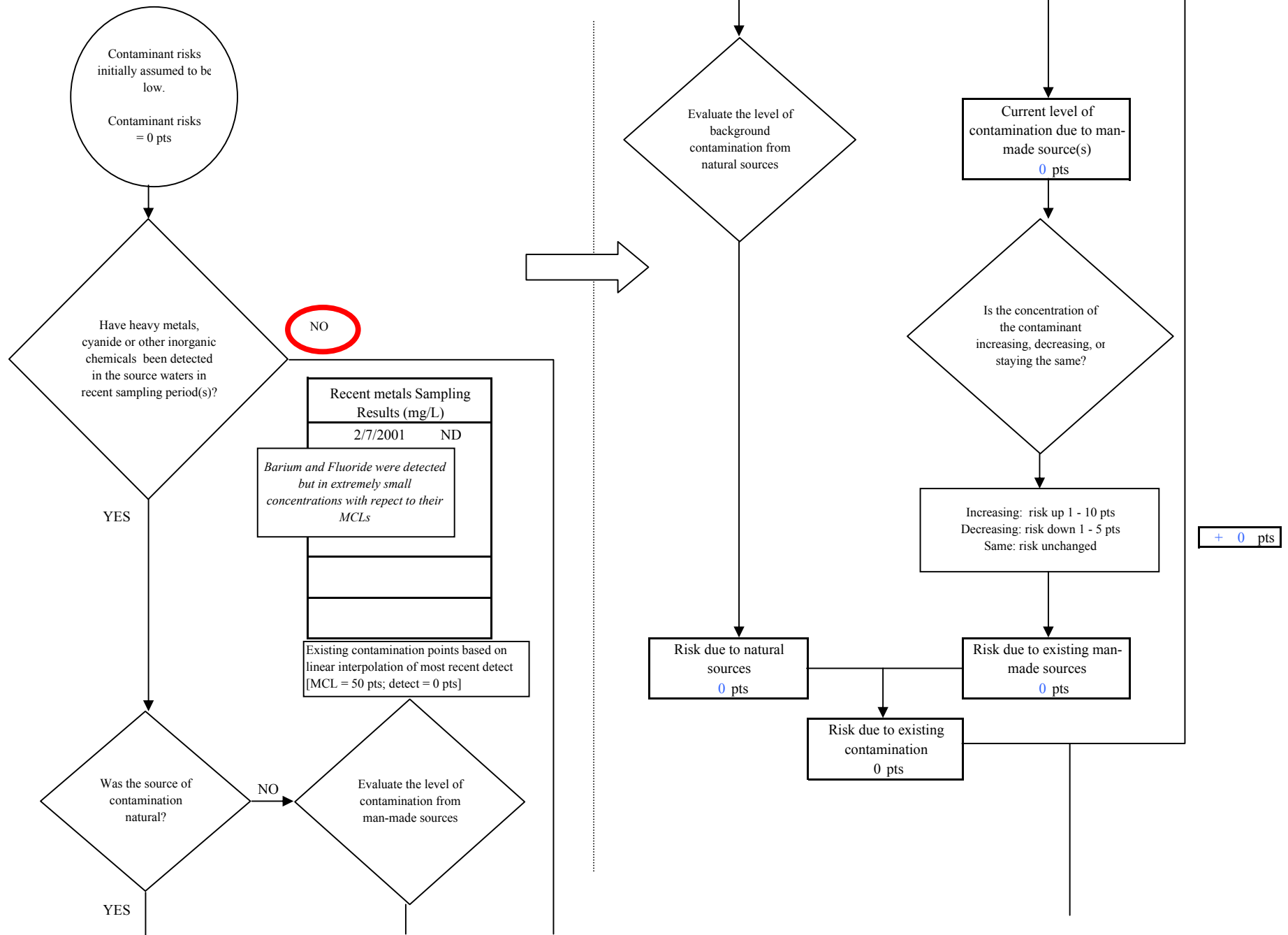




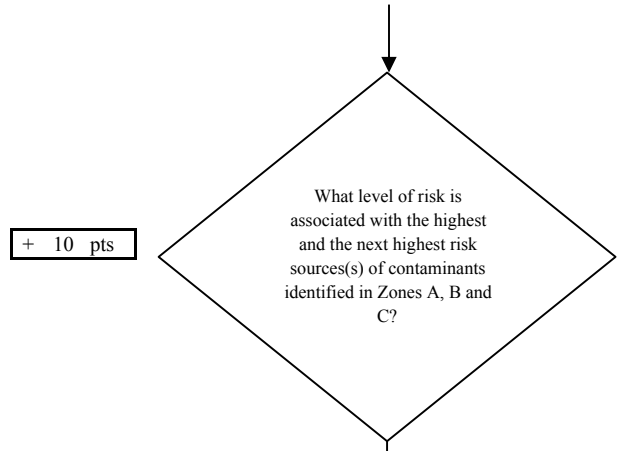
**Chart 8. Vulnerability analysis for Denali Borough Anderson School - Volatile Organic Chemicals**



**Chart 9. Contaminant risks for Denali Borough Anderson School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 9. Contaminant risks for Denali Borough Anderson School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



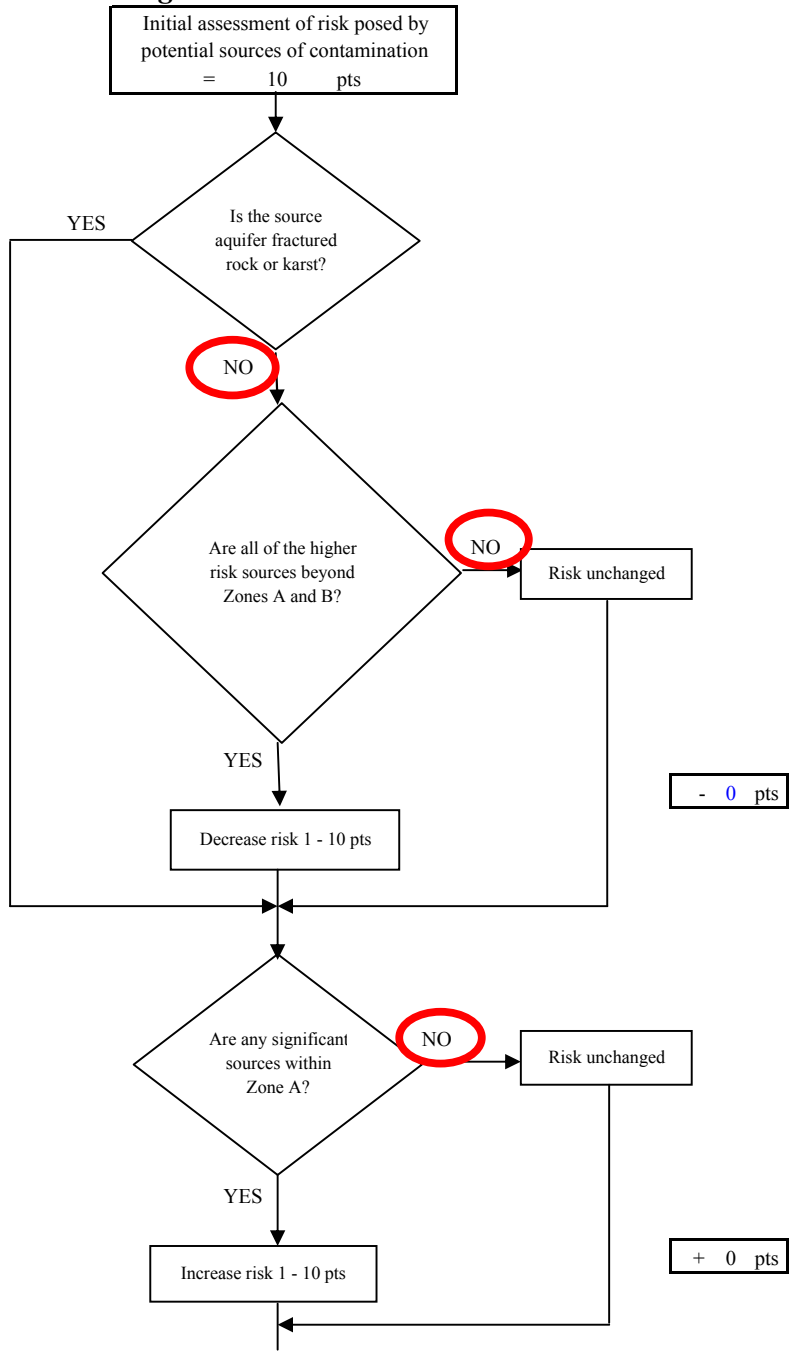
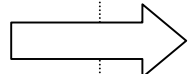
+ 10 pts

Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	2	0	2

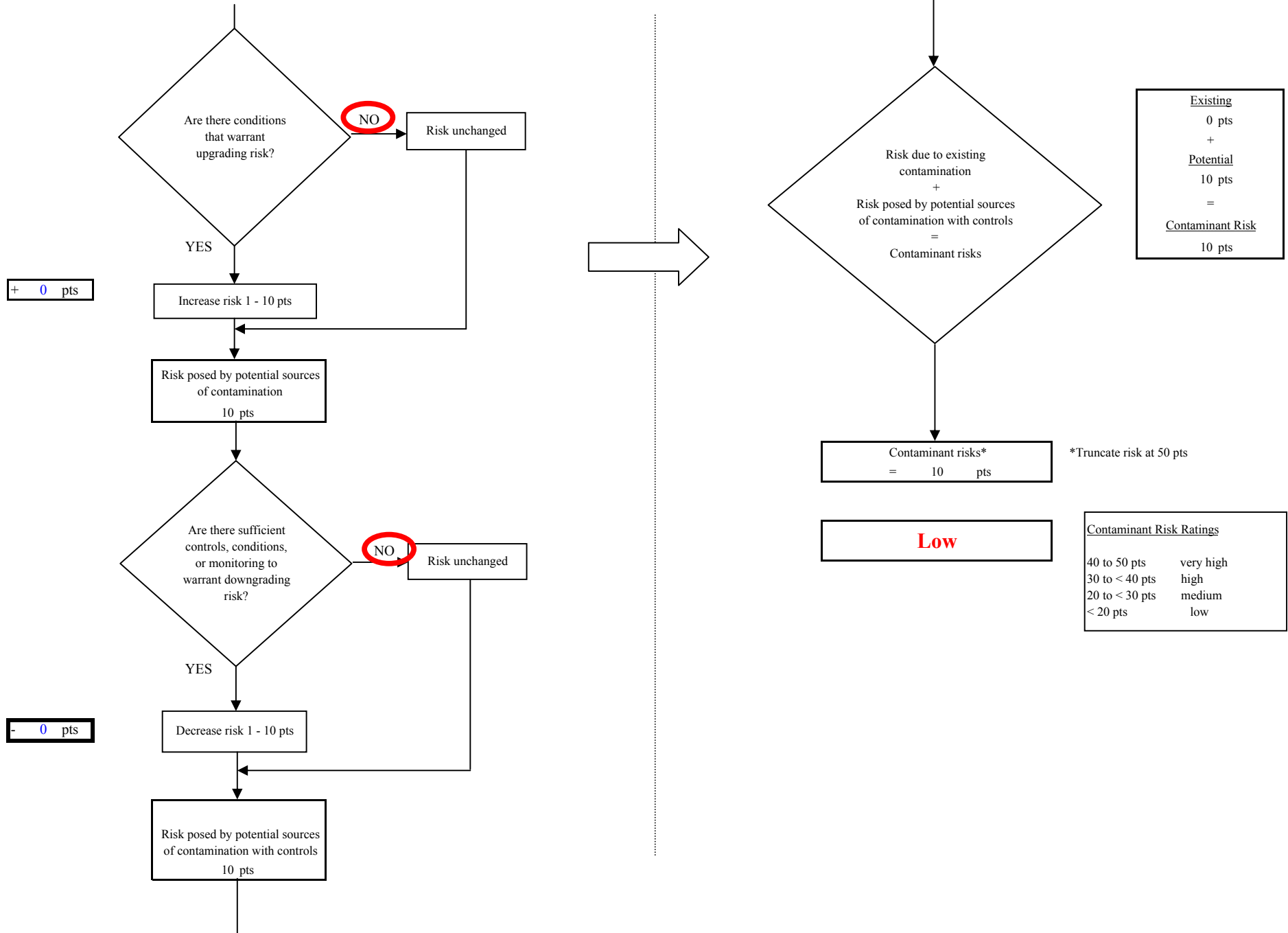
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
LOW	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
MEDIUM	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
HIGH	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
VERY HIGH	----	----	----	≥ 1 source + 10 pts

Matrix Score      10

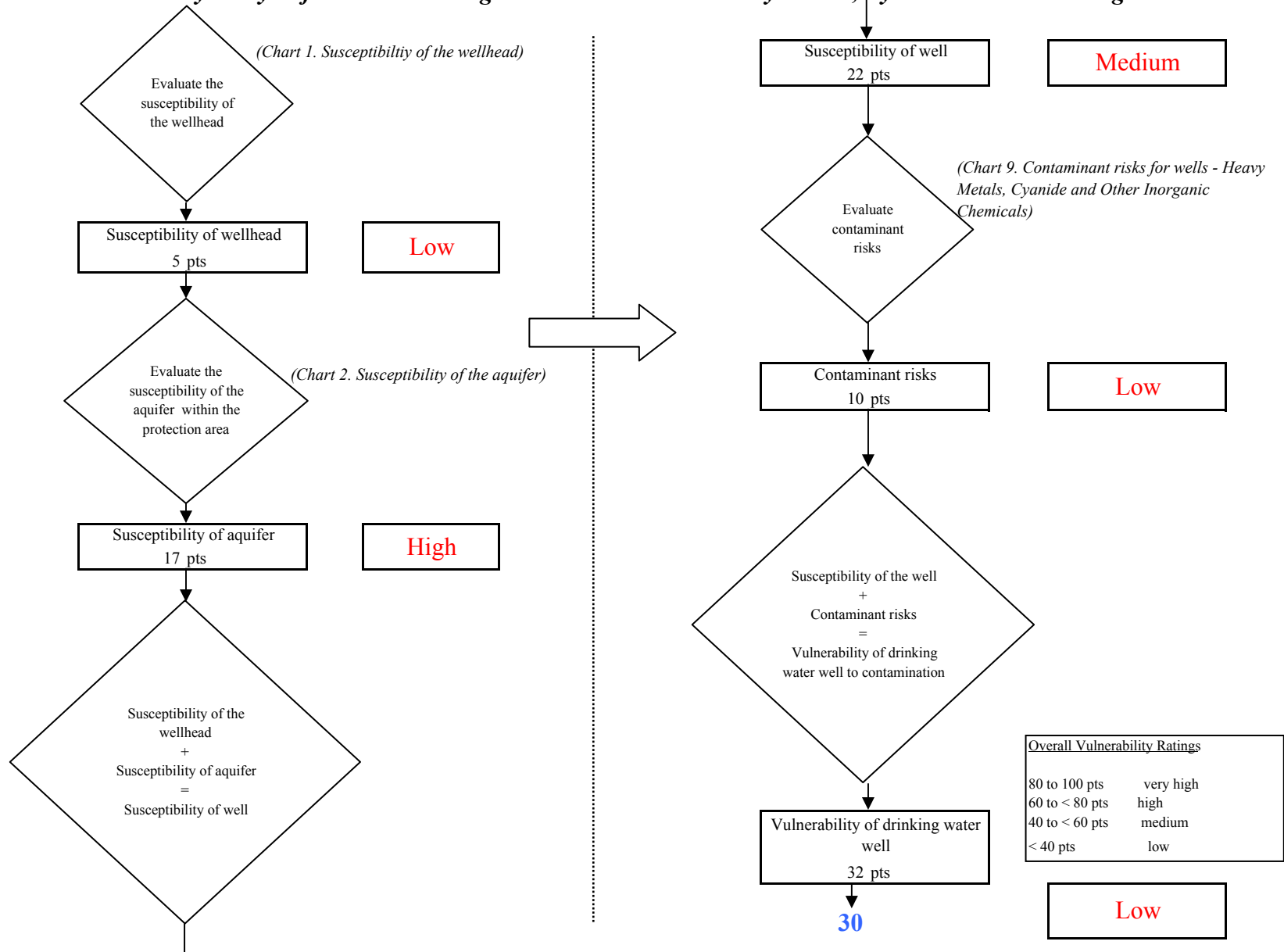
Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



**Chart 9. Contaminant risks for Denali Borough Anderson School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 10. Vulnerability analysis for Denali Borough Anderson School - Heavy Metals, Cyanide and Other Inorganic Chemicals**



**Chart 11. Contaminant risks for Denali Borough Anderson School - Synthetic Organic Chemicals**

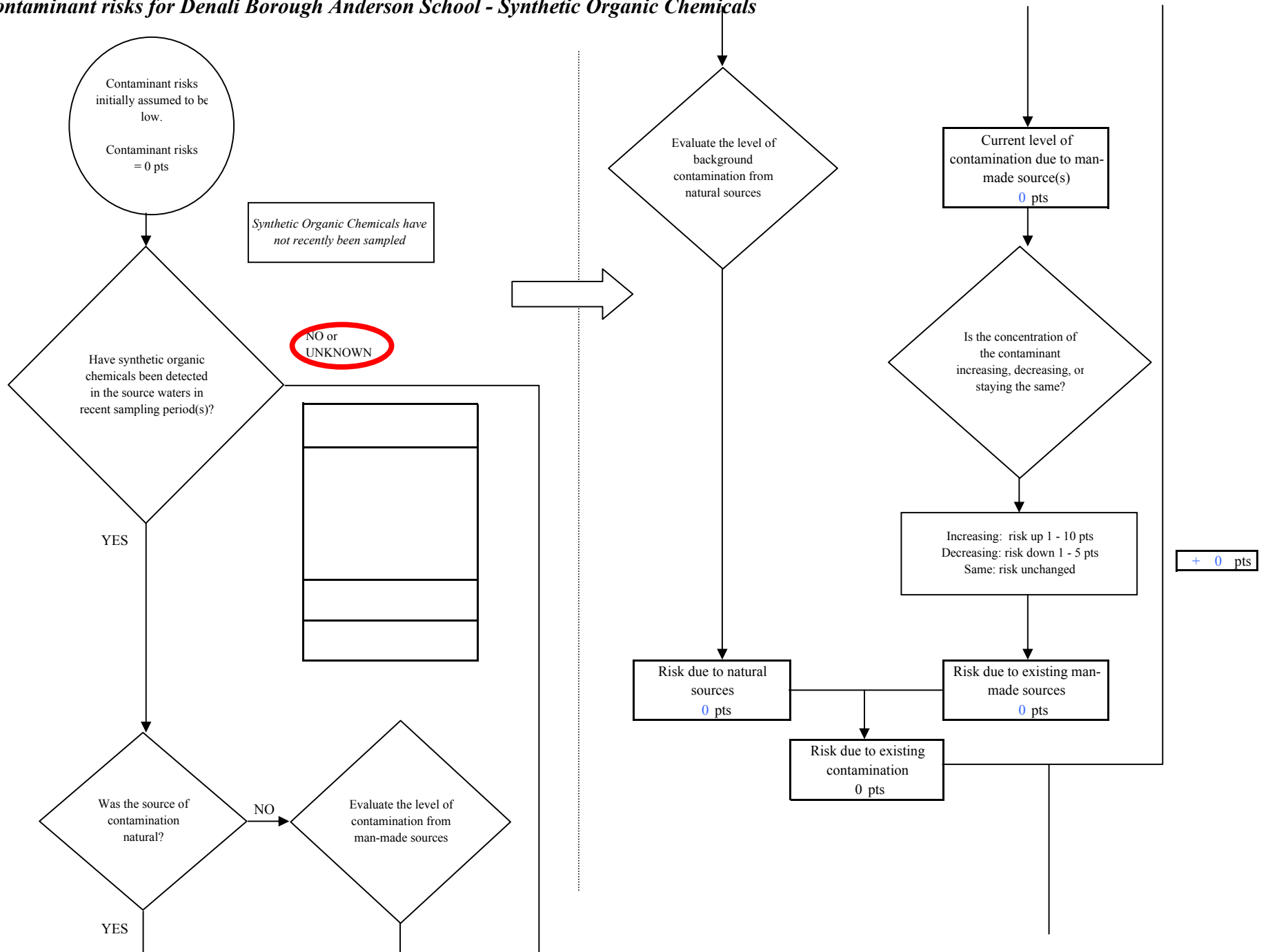
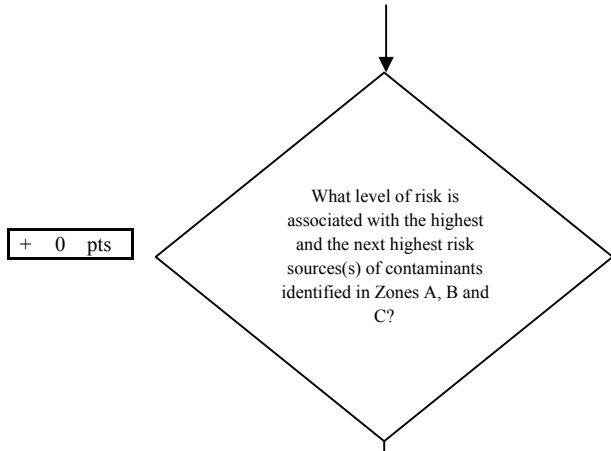


Chart 11. Contaminant risks for Denali Borough Anderson School - Synthetic Organic Chemicals

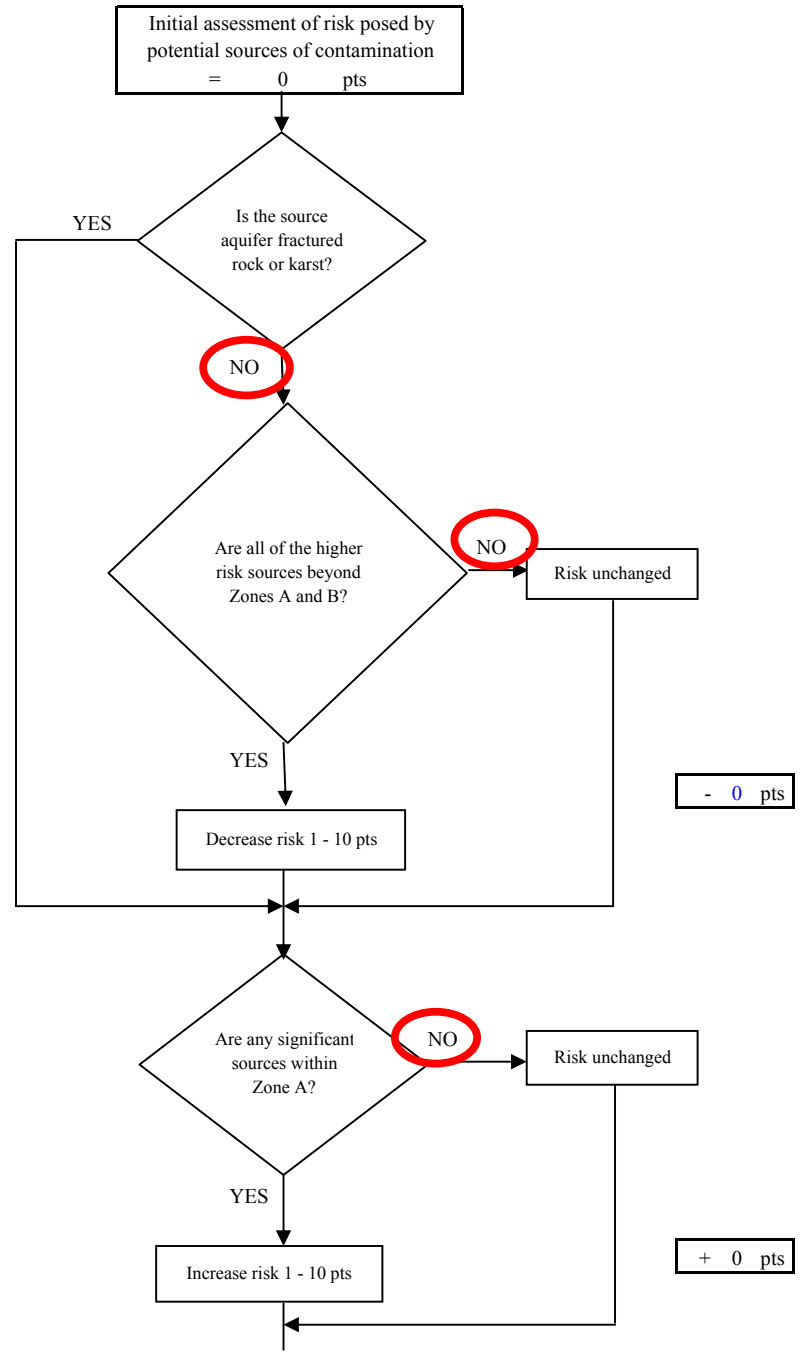
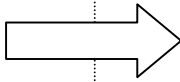


Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	0	0	0

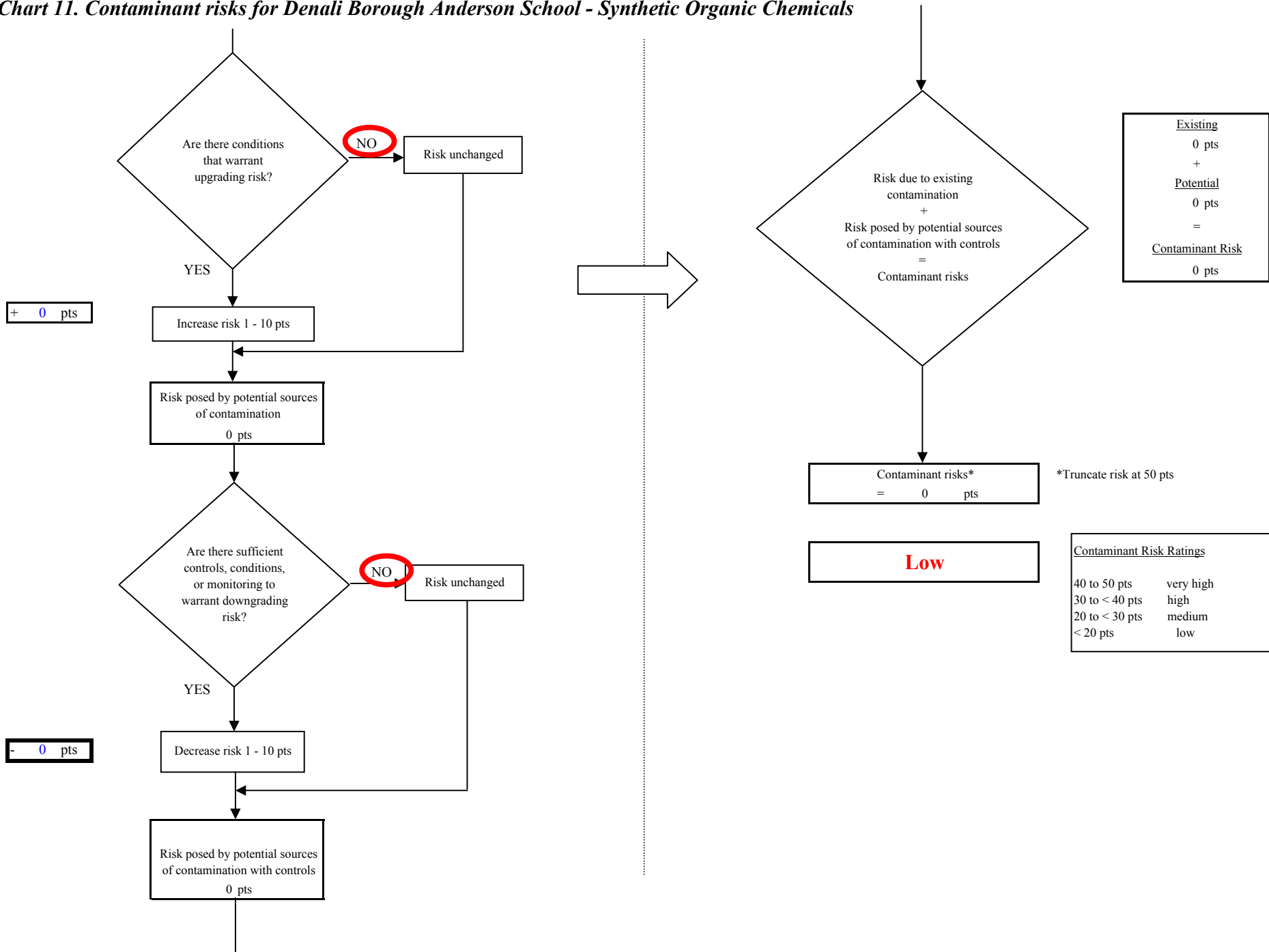
	LOW 10 pts	MEDIUM 20 pts	HIGH 30 pts	VERY HIGH 40 pts
<b>LOW</b>	≥ 10 sources + 10 pts	≥ 10 sources + 5 pts	≥ 20 sources + 5 pts	----
<b>MEDIUM</b>	----	≥ 2 sources + 5 pts	≥ 5 sources + 5 pts	≥ 10 sources + 5 pts
<b>HIGH</b>	----	----	≥ 1 source + 10 pts	≥ 2 sources + 10 pts
<b>VERY HIGH</b>	----	----	----	≥ 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 11. Contaminant risks for Denali Borough Anderson School - Synthetic Organic Chemicals**





**Chart 12. Vulnerability analysis for Denali Borough Anderson School - Synthetic Organic Chemicals**

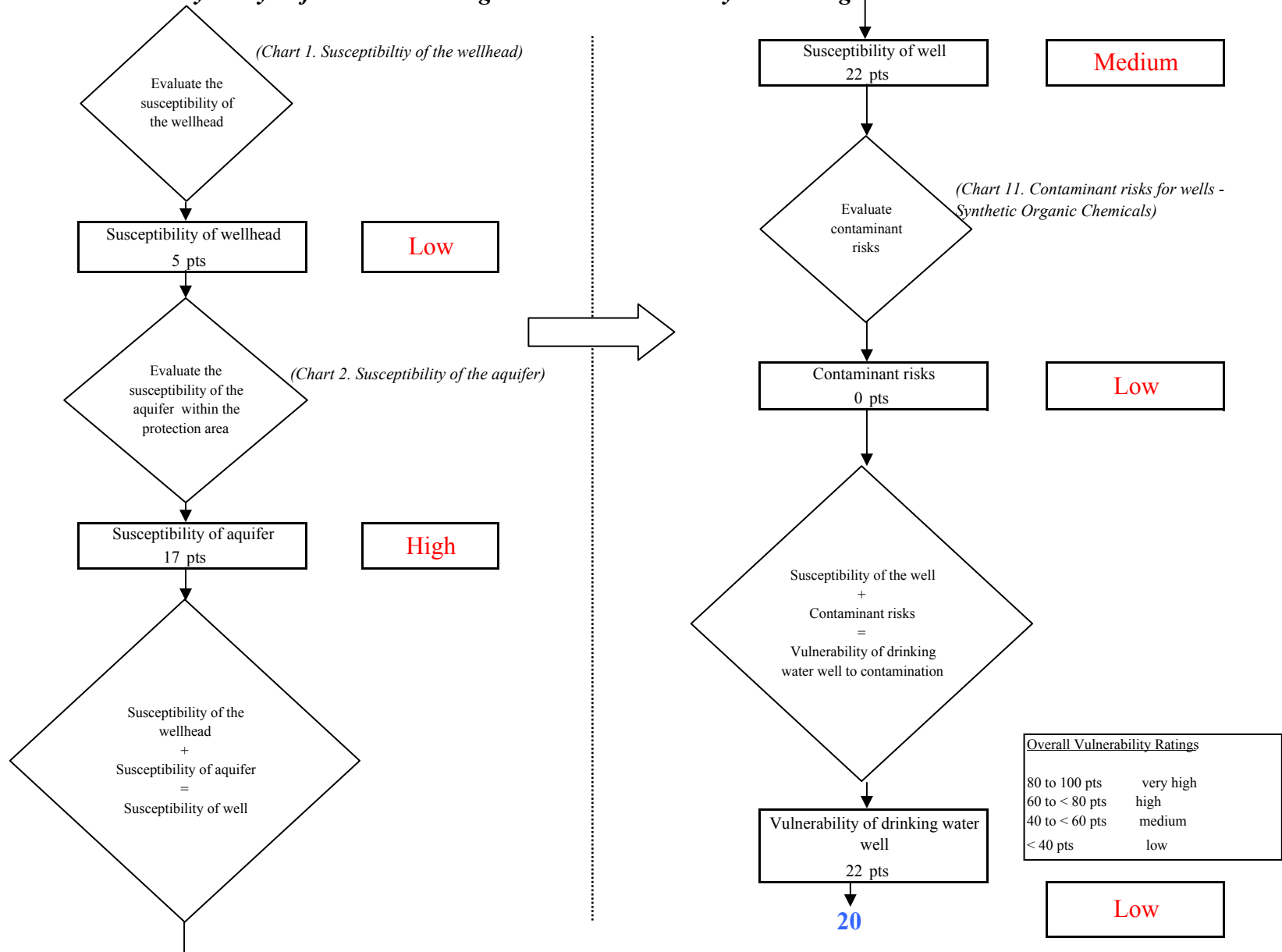
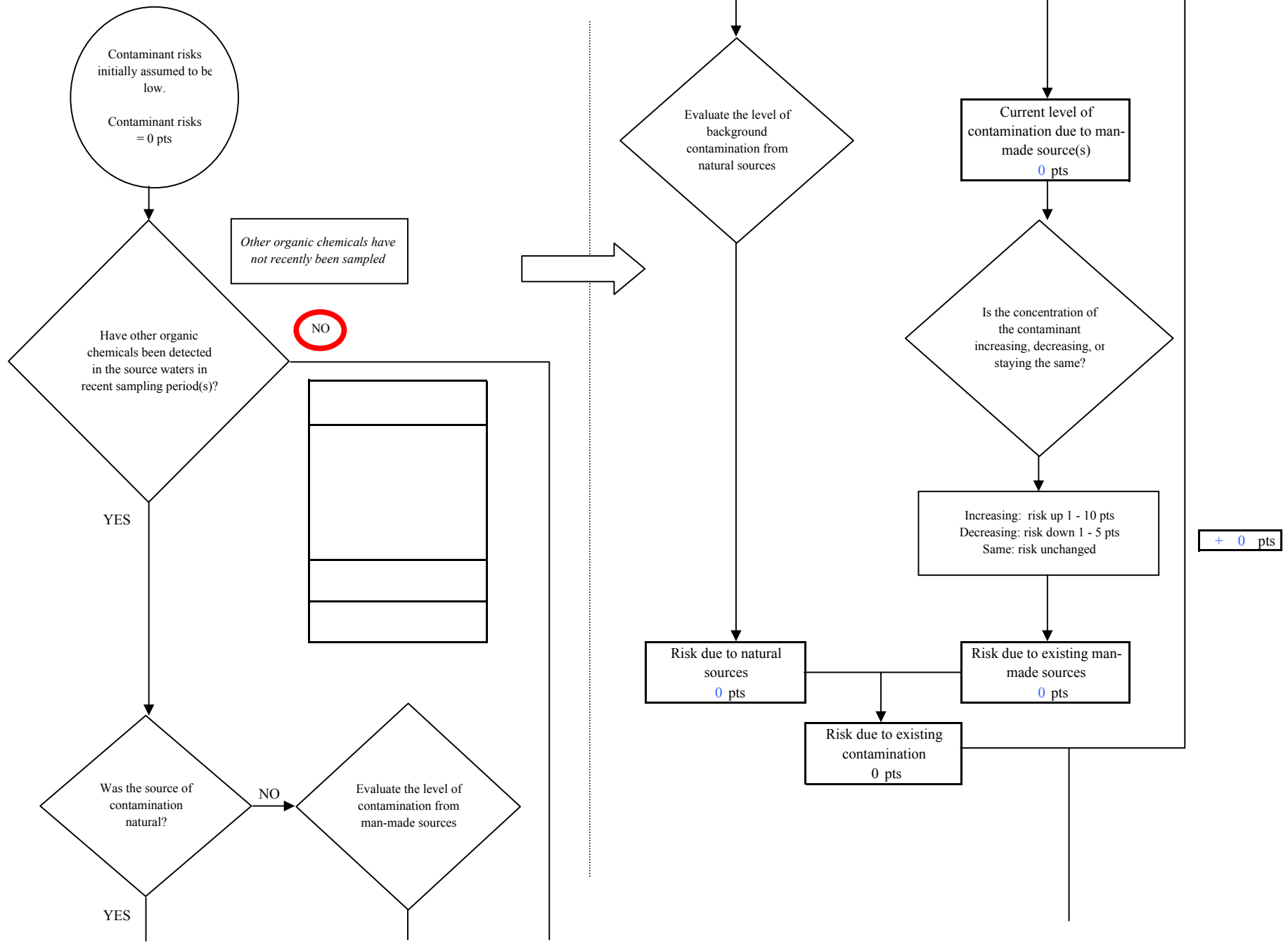
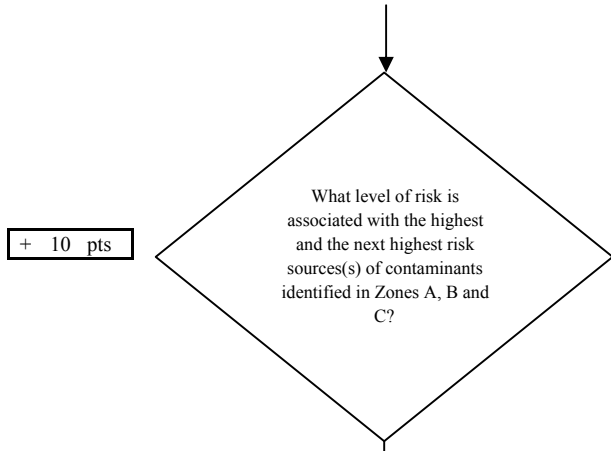


Chart 13. Contaminant risks for Denali Borough Anderson School - Other Organic Chemicals



**Chart 13. Contaminant risks for Denali Borough Anderson School - Other Organic Chemicals**



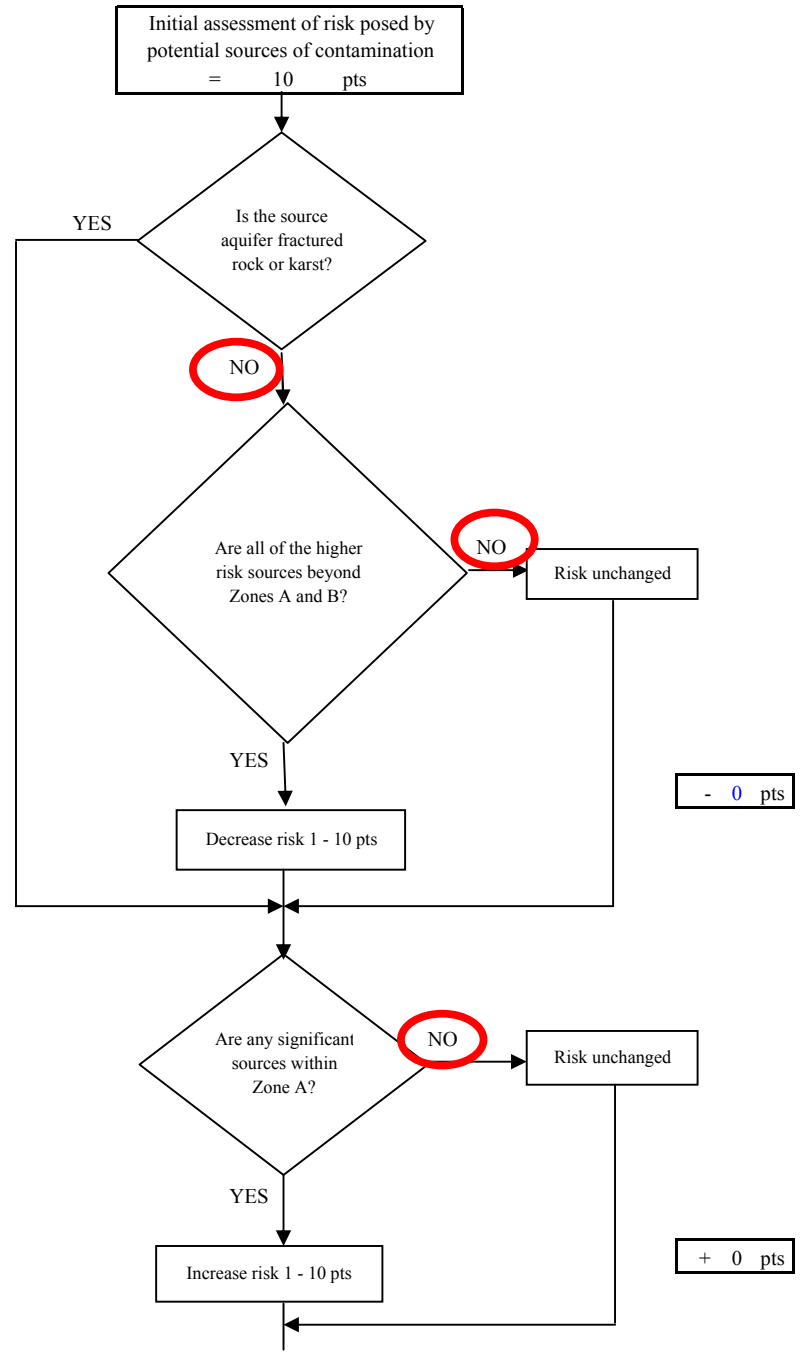
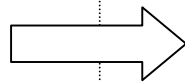
+ 10 pts

Risk Levels for Contaminant Sources identified in Zones A, B and C			
	Zone A	Zones B&C	Total
Very High(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

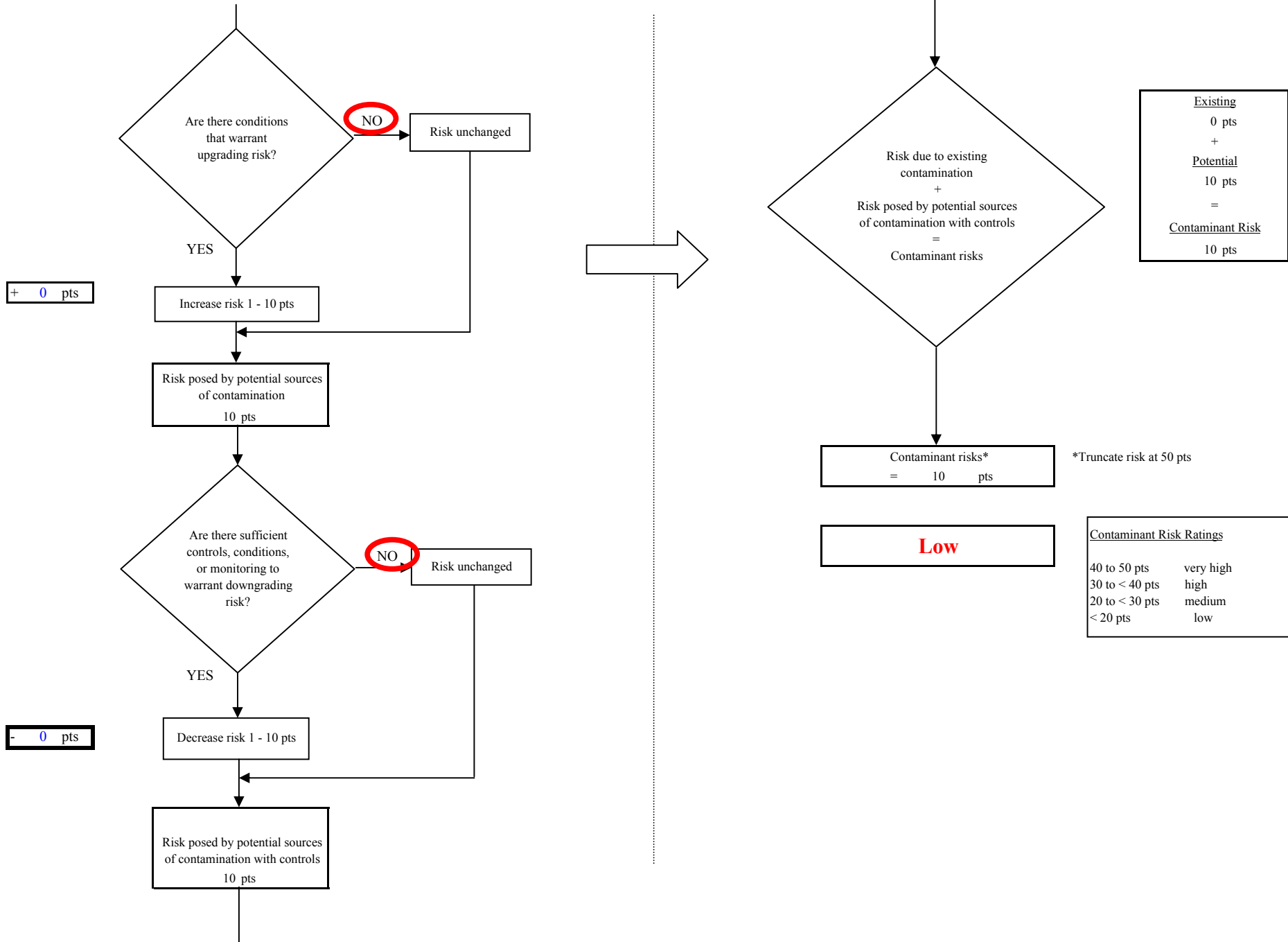
Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individual contaminant source in the CSI. The VA, however, counts these contaminant sources as a group and assigns a calculated number of either "lows" or "mediums" based on the density.



- 0 pts

+ 0 pts

**Chart 13. Contaminant risks for Denali Borough Anderson School - Other Organic Chemicals**



**Chart 14. Vulnerability analysis for Denali Borough Anderson School - Other Organic Chemicals**

