Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for North Pole Speedway Inn Drinking Water System,
Fairbanks area, Alaska
PWSID # 310447

June 2003

DRINKING WATER PROTECTION PROGRAM REPORT Report 838
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 North Pole Speedway Inn Source of Public Drinking Water, Fairbanks Area, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability of the public water system serving the North Pole Speedway Inn to potential contamination. This is a Class B (non-community) water system consists of one well on Lions Street near it's intersection with Willeda Street off the Richardson Highway approximately 3 miles northeast of North Pole, 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 North Pole Speedway Inn public water system include: an underground diesel tank, an airport, cropland, roads, heating oil tanks, septic systems, and residential area. These are considered as sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Combining the natural susceptibility of the well with the contaminant risk, the public water system for North Pole Speedway Inn received an overall vulnerability rating of **High** for bacteria and viruses, and volatile organic chemicals; and a **Low** for nitrates and/or nitrites.

NORTH POLE SPEEDWAY INN PUBLIC DRINKING WATER SYSTEM

North Pole Speedway Inn public water system is a Class B (non-community) water system. The system consists of one well on Lions Street near it's intersection with Willeda Street off the Richardson Highway approximately 3 miles northeast of North Pole, Alaska (T1S, R2E, Section 32) (See Map 1 of Appendix A). North Pole is located southeast of Fairbanks in the Fairbanks North Star Borough which is near the center of Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is 82,840 making it the second-largest population center in the state (ADCED, 2002). Communities located within the Borough include : College, Eielson Air Force Base, Ester, Fairbanks, Fox, Harding Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers.

The majority of residents located in the area surrounding the city of Fairbanks use individual water wells or hauled water, and septic systems (ADCED, 2002). Heating oil (typically stored in both above and below ground 275 to 500-gallon tanks) is used for heating homes and buildings. Refuse is transported to the Fairbanks North Star Borough landfill.

The Fairbanks area includes two distinct topographic areas: the alluvial plain between the Tanana River and the Chena River, and the uplands north of this floodplain. The North Pole Speedway Inn water system is located in the alluvial plain at an elevation of approximately 475 feet above sea level.

According to a sanitary survey (6/24/92) for this water system, the depth of the well is 65 feet below the ground surface. Most of the wells in this area are screened in a combination of gravel and sand, and it is assumed that this one is also. The alluvial plain consists of alternating layers of sand and gravel up to over 500 feet thick, in some locations overlain by 1 to 10 feet of silt or sandy silt or a few feet of peat (Glass and others, 1996). Discontinuous permafrost (perennially frozen areas) is also common in the alluvial plain. The depth to permafrost in these areas ranges between 2 and 45 feet below the ground surface with the thickness of the permafrost ranging between 5 and 265 feet (Pewe, T.L. 1958). Areas with discontinuous permafrost may locally affect the ground water flow directions.

Primarily the Tanana River, but also the Chena River contribute water to this alluvial aquifer. The Chena River typically only contributes water when its stage is high and the Tanana is low (Nelson, 1978). The Tanana River gets approximately 85% of its water from snowmelt of the Alaska Range and 15% from the Yukon-Tanana uplands (Anderson, 1970)

This system operates year-round serving approximately 50+ non-residents through one service connection.

NORTH POLE SPEEDWAY INN 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 well 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 using various assumptions. The DWPP uses a combination of two simple, very general 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 by the DWPP is an estimate 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 various United State Geological Survey (USGS) reports, well logs in the area, and the Groundwater textbook by Freeze and Cherry (Freeze and Cherry, 1979).

The water table in the area of the North Pole Speedway Inn, the area between the Tanana and the Chena Rivers, is primarily influenced by the level of water flow in each river. The capture zones were drawn based on three separate configurations of the water table during various stages of the rivers: a period of high stage in the Chena River (October 14-17, 1986), high stage in the Tanana River (July 16-17, 1987), and low stages in both rivers (March 30-April 3, 1988) (Glass and others, 1996). High water levels in the Chena usually occur in the spring due to runoff from the uplands and in late summer due to rainstorms (Nelson, 1978). The Tanana usually experiences high flow during the hot, dry periods of mid-summer when maximum snowmelt from the Alaska Range occurs (Nelson, 1978). Groundwater in this area generally flows toward the northwest, from the Tanana River to the Chena River, however flow is reversed very near the Chena River during its high stage periods (Glass and others, 1996). These flow reversals are of short duration (i.e. days versus months) and of limited extent, generally within 1000 feet of the river (Nakanishi, et all, 1998).

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

Zone	Definition
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 North Pole Speedway Inn 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 North Pole Speedway Inn 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 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 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 4 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

VULNERABILITY OF NORTH POLE SPEEDWAY INN 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 eight 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 8 contain the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites and volatile organic chemicals, respectively.

A score for the Natural Susceptibility is reached by considering the properties of the well and the aquifer.

Susceptibility of the Wellhead (0 – 25 Points)
(Chart 1 of Appendix D)

+

Susceptibility of the Aquifer (0 – 25 Points)
(Chart 2 of Appendix D)

=

Natural Susceptibility (Susceptibility of the Well)
(0 – 50 Points)

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 North Pole Speedway Inn received a Low Susceptibility rating. According to the 10/02/99 Sanitary Survey, the well is capped with a sanitary seal and the well is grouted. However, the land surface is not sloped away from the well. Proper drainage on the surface helps to prevent potential contaminants from traveling down the well casing.

The aquifer the North Pole Speedway Inn well is completed in received a High Susceptibility rating. The highly transmissive aquifer material and the high water table in the area allow contaminants to travel downward from the surface with the precipitation and surface water runoff. Table 2 summarizes the Susceptibility scores and ratings for North Pole Speedway Inn.

Table 2. Susceptibility

Category	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	18	High
Natural Susceptibility	23	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	50	Very High
Nitrates and/or Nitrites	5	Low
Volatile Organic Chemicals	45	Very High

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

Natural Susceptibility (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 (0 – 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	30	Low
Volatile Organic Chemicals	70	High

Bacteria and Viruses

The residential septic systems in the protection area represent the greatest risk to the drinking water well.

Only a small amount of bacteria and viruses are required to endanger public health. Monitoring samples collected on 4/1/03, 8/5/02 and 11/4/02 were positive for total coliform, however were negative for E. coli. Coliforms are found naturally in the environment and although it isn'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).

The positive samples increase the overall vulnerability of the drinking water souce, indicating that the source is susceptible to bacteria and viruses contamination. 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 high.

Nitrates and Nitrites

The residential septic systems in the protection area also represent the greatest risk to this source of public drinking water.

Nitrates are very mobile, moving at approximately the same rate as water. Nitrates have not been detected in recent sampling history for the North Pole Speedway Inn 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 underground diesel storage tank very near the well and the residential heating oil tanks represent the greatest risk for volatile organic chemical contamination to the well.

Both underground and above ground heating oil storage tanks are the standard way of heating homes and businesses in the area surrounding Fairbanks. The most common causes of fuel leaks of these heating oil systems are overfilling the tank, ruptured fuel lines, leaking storage tanks, damaged or faulty valves and vandalism. Regular system maintenance can help prevent many of these harmful fuel leaks.

Volatile Organic Chemicals have not been sampled for in the North Pole Speedway Inn public 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 high.

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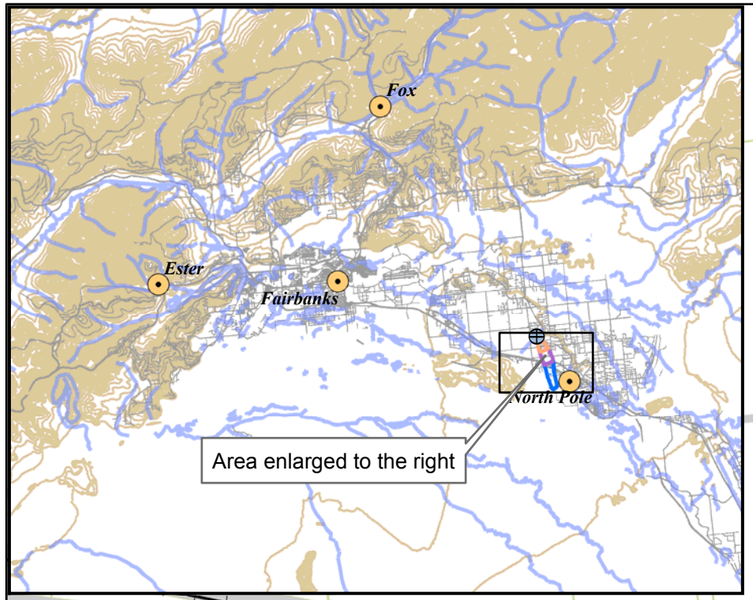
APPENDIX A

North Pole Speedway Inn
Drinking Water Protection Area Location Map
(Map 1)



Zone A
Zone B
Zone C
Zone D

LIONS ROAD
KOONZ DRIVE
TOPAZ AVENUE
DILLON AVENUE
GARNET DRIVE
REGAL AVENUE
DRUM AVENUE
BLACKBURN WAY
MOUNT WRANGELL STREET
HOLLOWELL ROAD
SANDY ROAD
DIXON ROAD
VICTORIA CIRCLE
PLACK ROAD
MAURICE AVENUE
MAULE LANE
SUPER CUB LANE
ERMINE DRIVE
VOYAGER STREET
FLIGHT STREET
VALDINA STREET
KIMI STREET
MILLIE COURT
STONECREST COURT
BADGER ROAD
BOULDER AVENUE
NORTH GOLDENROD CIRCLE
SOUTH GOLDENROD CIRCLE
WILLEDA STREET
LARIX DRIVE
KALISPELL LOOP
BEULAH COURT
ELVIRA AVENUE
AIRWAY DRIVE
GLACIER STATE DRIVE
PERIDOT STREET
ALASKA RAILROAD
JARRED DRIVE
EDWARD DRIVE
KEENEY ROAD
CAMPTON STREET
LOOMIS DRIVE
BURTIS AVENUE
HOLLAND AVIATION STREET
NEW RICHARDSON HIGHWAY
OLD RICHARDSON HIGHWAY
DEWITT DRIVE
WING COURT
HORSESHOE WAY
SPINNER COURT
RUDDER COURT
HURST ROAD
FINELL DRIVE
RUBY DRIVE
SAN AUGUSTIN DRIVE
OUTSIDE BOULEVARD
SINGA STREET
CHAMPION AVENUE
PIPER STREET
GRUMMAN STREET
MOCKLER AVENUE
TANANA DRIVE
PARK WAY
KENAI WAY
PERIMETER DRIVE
HOMESTEAD DRIVE
CROSS WAY
CARY AVENUE
SANTA CLAUS LANE
SNOWMAN LANE
DAVIS BOULEVARD
KIT BOULEVARD
BEAVER BOULEVARD
BEAVER CREEK
THIRD AVENUE
FOURTH AVENUE
FIFTH AVENUE
SIXTH AVENUE
EAST EIGHTH AVENUE
ROAD EZMNT
N.P.H.S. BOULEVARD
PATRIOT DRIVE
NORTH EVOLYN DRIVE
FLOOD CONTROL D

Legend

- North Pole Speedway Inn well
- Zone A *Several months travel time*
- Zone B *Less than 2 years travel time*
- Zone C *Less than 5 years travel time*
- Zone D *Less than 10 years travel time*
- Railroads
- Roads
- Parcels
- Surface water

0 725 1,450 2,900 Feet

1:17,400

Data Sources:
Parcels, Roads - Fairbanks North Star Borough
Water bodies, Railroad - Geographic Data Technology
Elevations contours - USGS digital elevation models (DEMs)

Map 1. North Pole Speedway Inn Drinking Water Protection Area

PWSID 310447

APPENDIX B

Contaminant Source Inventory and Risk Ranking for North Pole Speedway Inn (Tables 1-4)

Table 1

Contaminant Source Inventory for ***North Pole Speedway Inn***

PWSID 310447.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Residential Areas	R01	R0-1	A	2	Approximately 4 acres of residential area located in Zone A
Septic systems (serves one single-family home)	R02		A	2	One septic based on number of tax parcels designated as residential
Tanks, heating oil, residential (above ground)	R08		A	2	One tank based on number of tax parcels designated as residential; assumed above ground
Tanks, diesel (underground)	T08	T08-1	A	2 close-up	As noted in the 10/02/99 sanitary survey
Highways and roads, paved (cement or asphalt)	X20		A	2	One road; Willeda Street
Residential Areas	R01	R01-2	B	2	Approximately 15 acres of residential area located in Zone B
Septic systems (serves one single-family home)	R02		B	2	16 septics based on number of tax parcels designated as residential
Tanks, heating oil, residential (above ground)	R08		B	2	16 tanks based on number of tax parcels designated as residential; assumed above ground
Highways and roads, paved (cement or asphalt)	X20		B	2	5 roads in Zone B
Residential Areas	R01	R01-3	C	2	Approximately 15 acres of residential area located in Zone C
Septic systems (serves one single-family home)	R02		C	2	14 septics based on number of tax parcels designated as residential
Tanks, heating oil, residential (above ground)	R08		C	2	14 tanks based on number of tax parcels designated as residential; assumed above ground
Highways and roads, paved (cement or asphalt)	X20		C	2	2 roads in Zone C
Cropland	A02	A02-1	D	2 inset	Parcel designated as farmland by the Fairbanks North Star Borough tax parcels
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-1	D	2 inset	2751 Old Richardson Hwy; site cleanup completed and site closed by ADEC on 11/1/99
Airports	X14	X14-1	D	2 inset	Bradley Sky Ranch Airport

Table 2

Contaminant Source Inventory and Risk Ranking for North Pole Speedway Inn Sources of Bacteria and Viruses

PWSID 310447.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Septic systems (serves one single-family home)	R02		A	Low	2	One septic based on number of tax parcels designated as residential
Highways and roads, paved (cement or asphalt)	X20		A	Low	2	One road; Willeda Street
Residential Areas	R01	R0-1	A	Low	2	Approximately 4 acres of residential area located in Zone A
Highways and roads, paved (cement or asphalt)	X20		B	Low	2	5 roads in Zone B
Septic systems (serves one single-family home)	R02		B	Low	2	16 septics based on number of tax parcels designated as residential
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Highways and roads, paved (cement or asphalt)	X20		C	Low	2	2 roads in Zone C
Septic systems (serves one single-family home)	R02		C	Low	2	14 septics based on number of tax parcels designated as residential
Residential Areas	R01	R01-3	C	Low	2	Approximately 15 acres of residential area located in Zone C

Table 3

Contaminant Source Inventory and Risk Ranking for North Pole Speedway Inn Sources of Nitrates/Nitrites

PWSID 310447.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20		A	Low	2	One road; Willeda Street
Septic systems (serves one single-family home)	R02		A	Low	2	One septic based on number of tax parcels designated as residential
Residential Areas	R01	R0-1	A	Low	2	Approximately 4 acres of residential area located in Zone A
Highways and roads, paved (cement or asphalt)	X20		B	Low	2	5 roads in Zone B
Septic systems (serves one single-family home)	R02		B	Low	2	16 septics based on number of tax parcels designated as residential
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Septic systems (serves one single-family home)	R02		C	Low	2	14 septics based on number of tax parcels designated as residential
Highways and roads, paved (cement or asphalt)	X20		C	Low	2	2 roads in Zone C
Residential Areas	R01	R01-3	C	Low	2	Approximately 15 acres of residential area located in Zone C
Cropland	A02	A02-1	D	High	2 inset	Parcel designated as farmland by the Fairbanks North Star Borough tax parcels
Airports	X14	X14-1	D	Low	2 inset	Bradley Sky Ranch Airport

Table 4

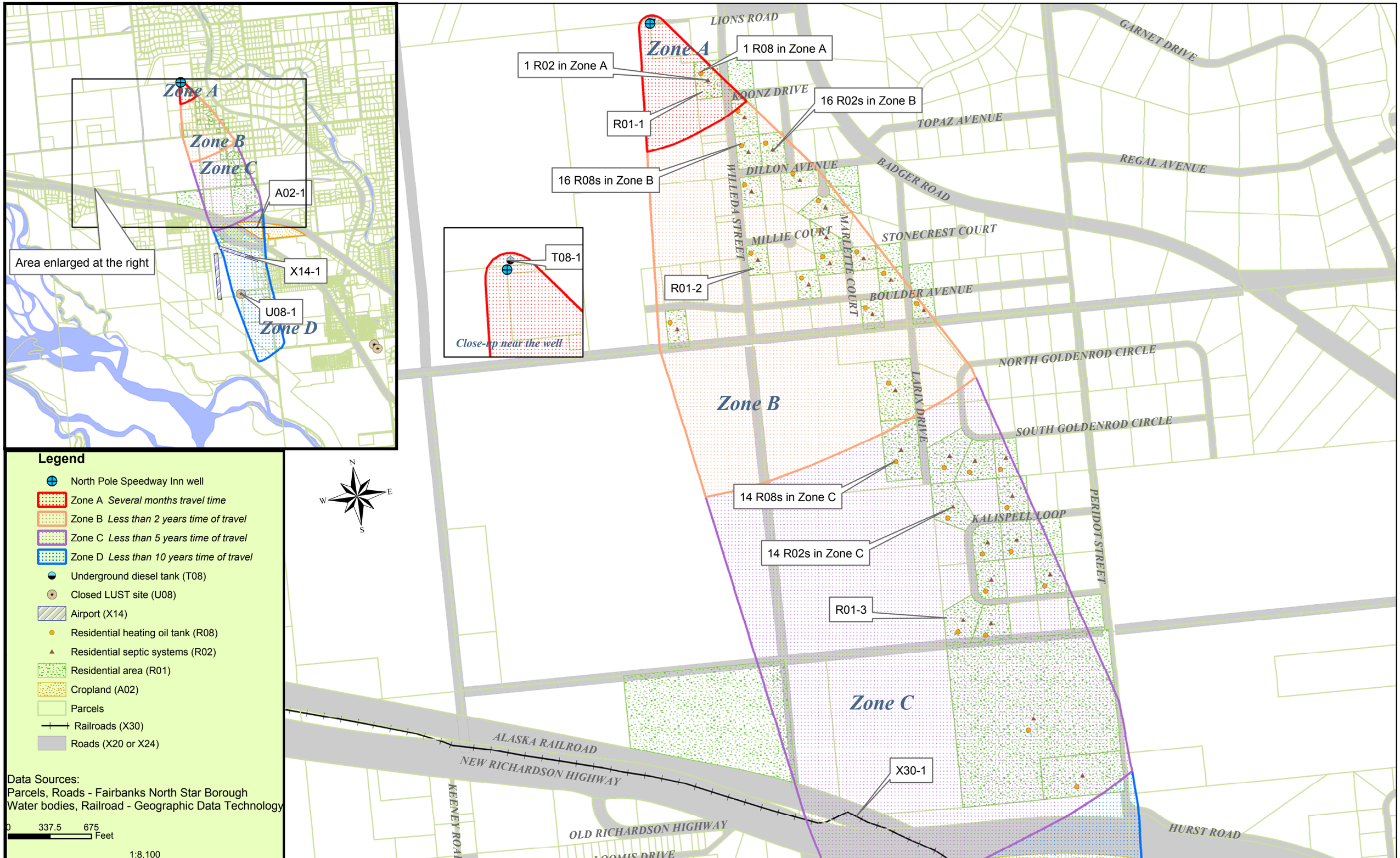
Contaminant Source Inventory and Risk Ranking for North Pole Speedway Inn Sources of Volatile Organic Chemicals

PWSID 310447.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20		A	Low	2	One road; Willeda Street
Septic systems (serves one single-family home)	R02		A	Low	2	One septic based on number of tax parcels designated as residential
Tanks, heating oil, residential (above ground)	R08		A	Medium	2	One tank based on number of tax parcels designated as residential; assumed above ground
Residential Areas	R01	R0-1	A	Low	2	Approximately 4 acres of residential area located in Zone A
Tanks, diesel (underground)	T08	T08-1	A	High	2 close-up	As noted in the 10/02/99 sanitary survey
Septic systems (serves one single-family home)	R02		B	Low	2	16 septics based on number of tax parcels designated as residential
Highways and roads, paved (cement or asphalt)	X20		B	Low	2	5 roads in Zone B
Tanks, heating oil, residential (above ground)	R08		B	Medium	2	16 tanks based on number of tax parcels designated as residential; assumed above ground
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Residential Areas	R01	R01-2	B	Low	2	Approximately 15 acres of residential area located in Zone B
Septic systems (serves one single-family home)	R02		C	Low	2	14 septics based on number of tax parcels designated as residential
Highways and roads, paved (cement or asphalt)	X20		C	Low	2	2 roads in Zone C
Tanks, heating oil, residential (above ground)	R08		C	Medium	2	14 tanks based on number of tax parcels designated as residential; assumed above ground
Residential Areas	R01	R01-3	C	Low	2	Approximately 15 acres of residential area located in Zone C
Airports	X14	X14-1	D	High	2 inset	Bradley Sky Ranch Airport

APPENDIX C

North Pole Speedway Inn
Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map 2)



Legend

- North Pole Speedway Inn well
- Zone A *Several months travel time*
- Zone B *Less than 2 years time of travel*
- Zone C *Less than 5 years time of travel*
- Zone D *Less than 10 years time of travel*
- Underground diesel tank (T08)
- Closed LUST site (U08)
- Airport (X14)
- Residential heating oil tank (R08)
- Residential septic systems (R02)
- Residential area (R01)
- Cropland (A02)
- Parcels
- Railroads (X30)
- Roads (X20 or X24)

Data Sources:
Parcels, Roads - Fairbanks North Star Borough
Water bodies, Railroad - Geographic Data Technology

0 337.5 675 Feet

1:8,100

Map 2. North Pole Speedway Inn Potential Contaminant Sources

PWSID 310447

APPENDIX D

Vulnerability Analysis for North Pole Speedway Inn Public Drinking Water Source

(Charts 1-8)

Chart 1. Susceptibility of the wellhead - North Pole Speedway Inn

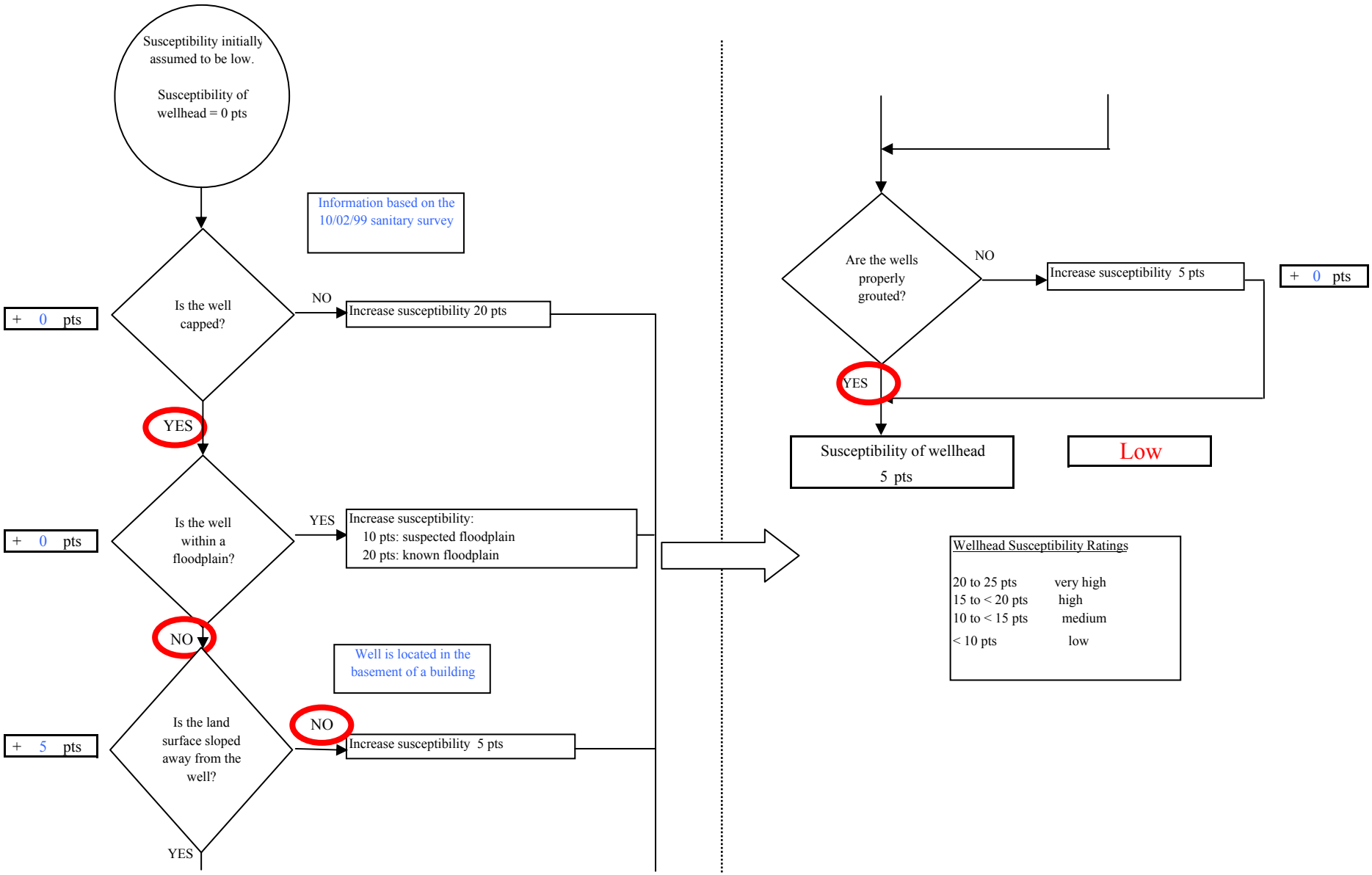


Chart 2. Susceptibility of the aquifer - North Pole Speedway Inn

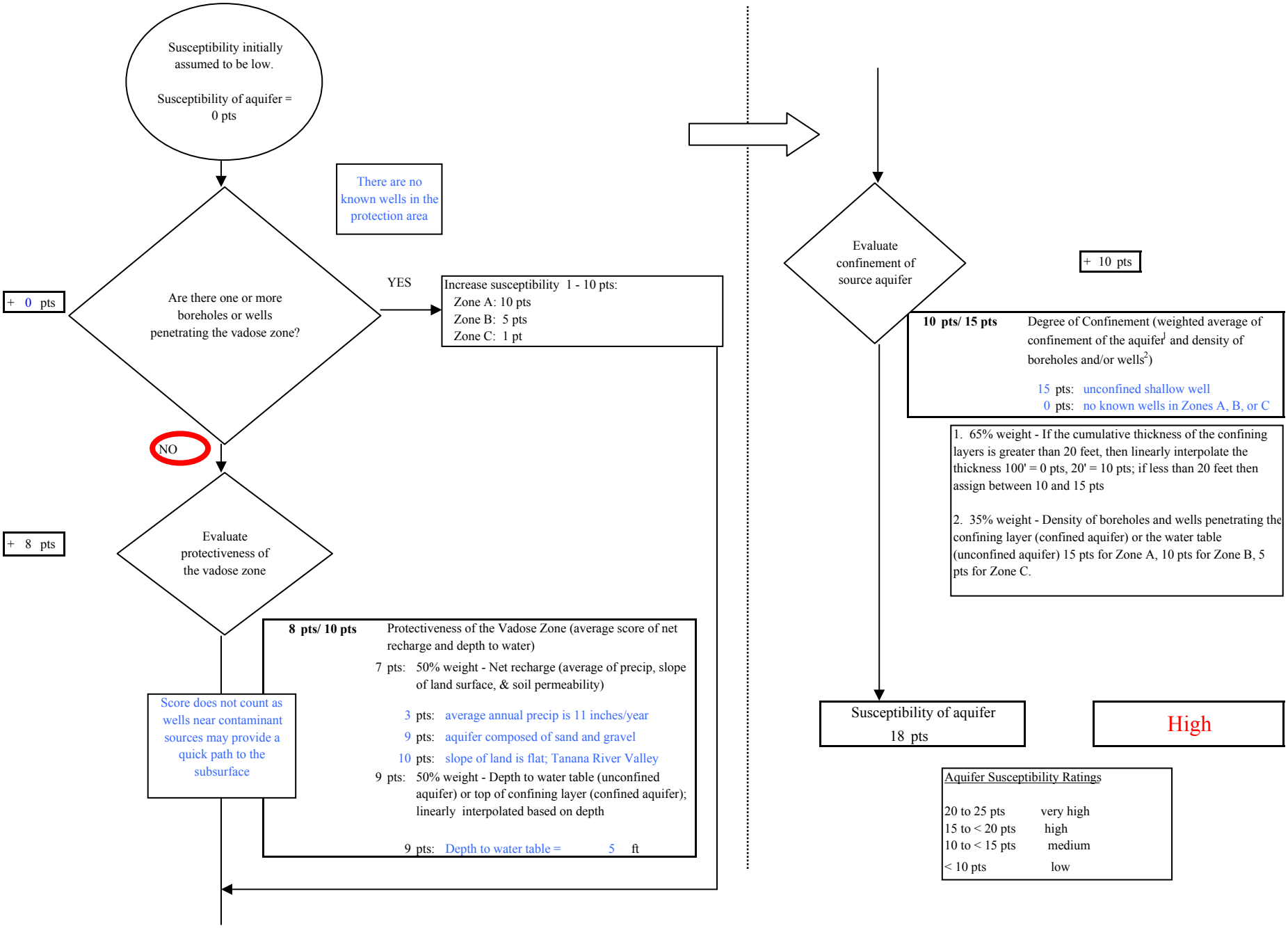
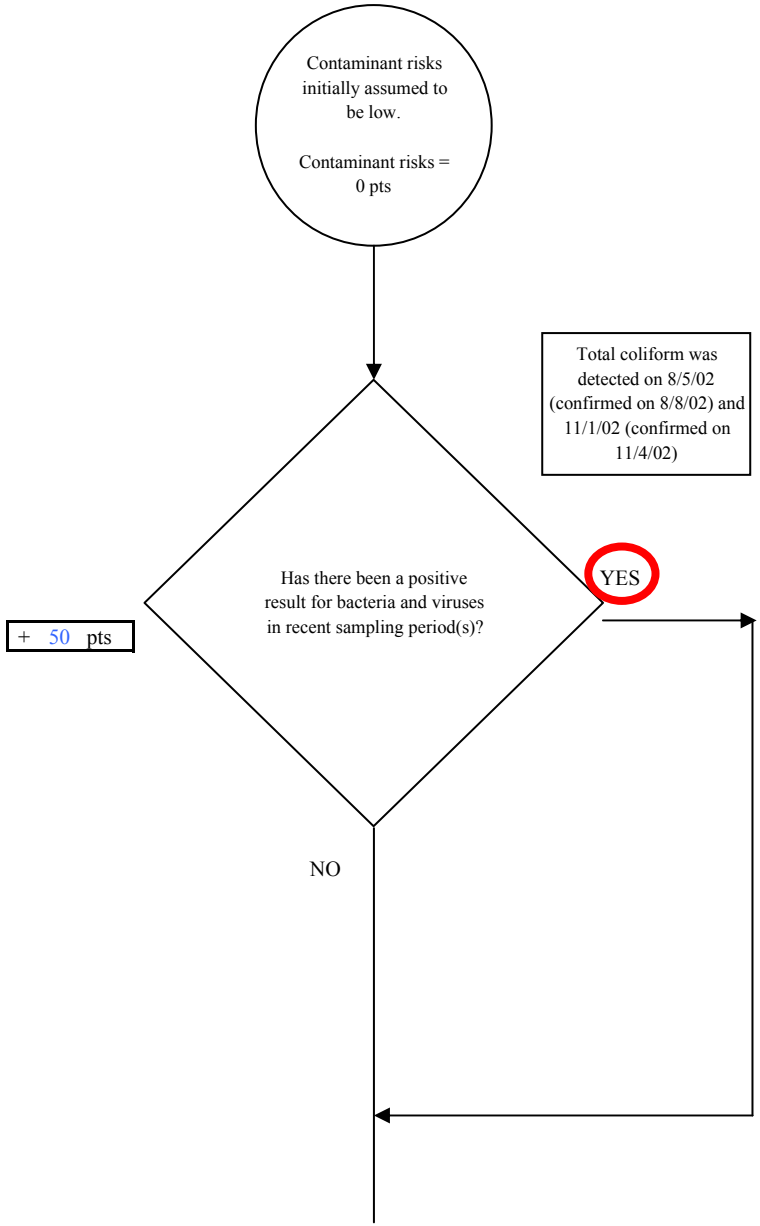
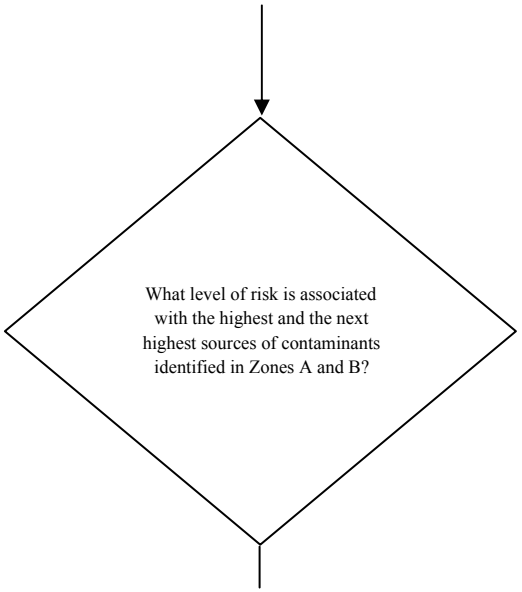


Chart 3. Contaminant risks for North Pole Speedway Inn - Bacteria & Viruses





+ 10 pts

Risk Rankings 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	0
Low(s)	3	5	8

	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 3. Contaminant risks for North Pole Speedway Inn - Bacteria & Viruses

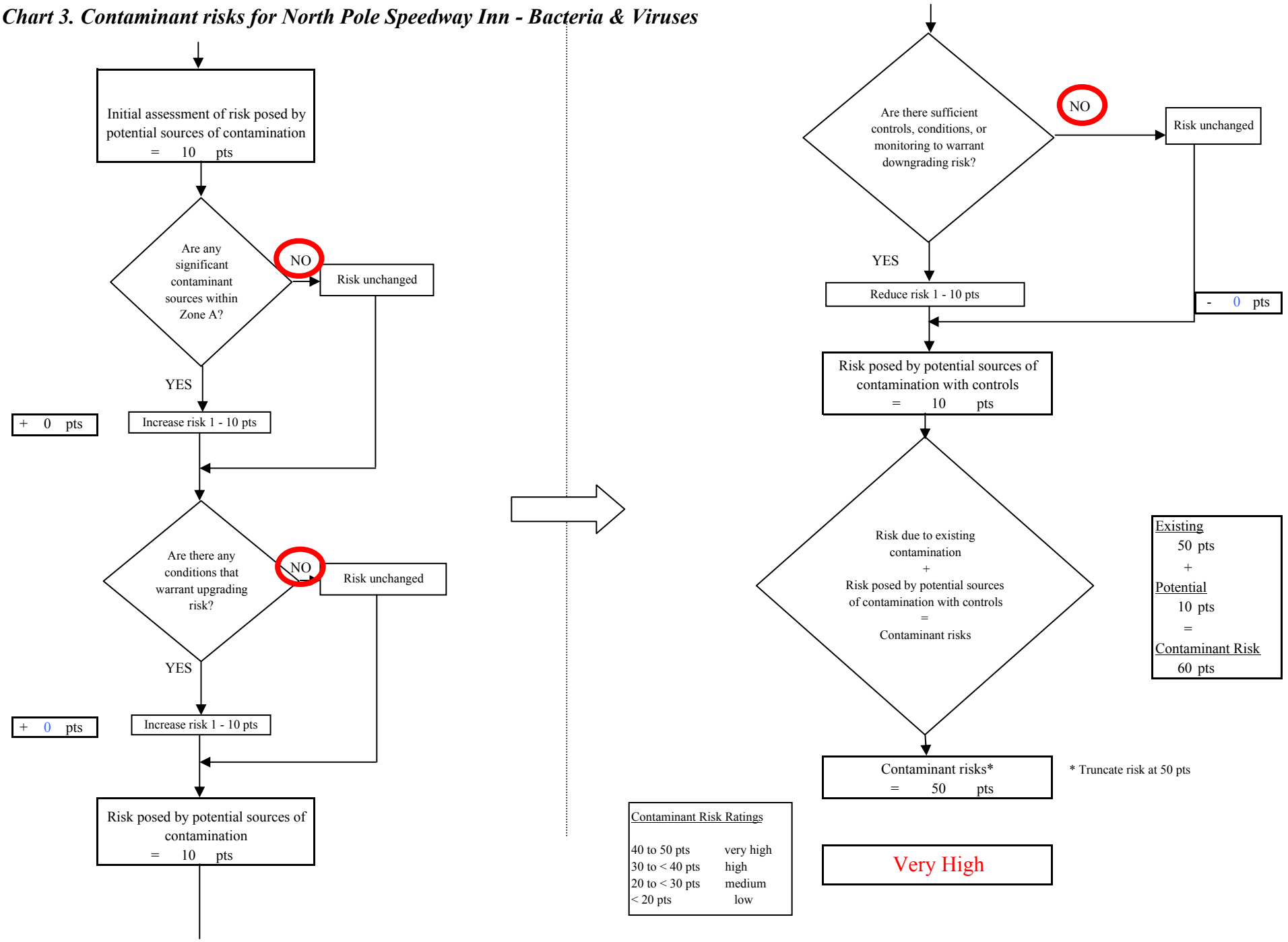


Chart 4. Vulnerability analysis for North Pole Speedway Inn - Bacteria & Viruses

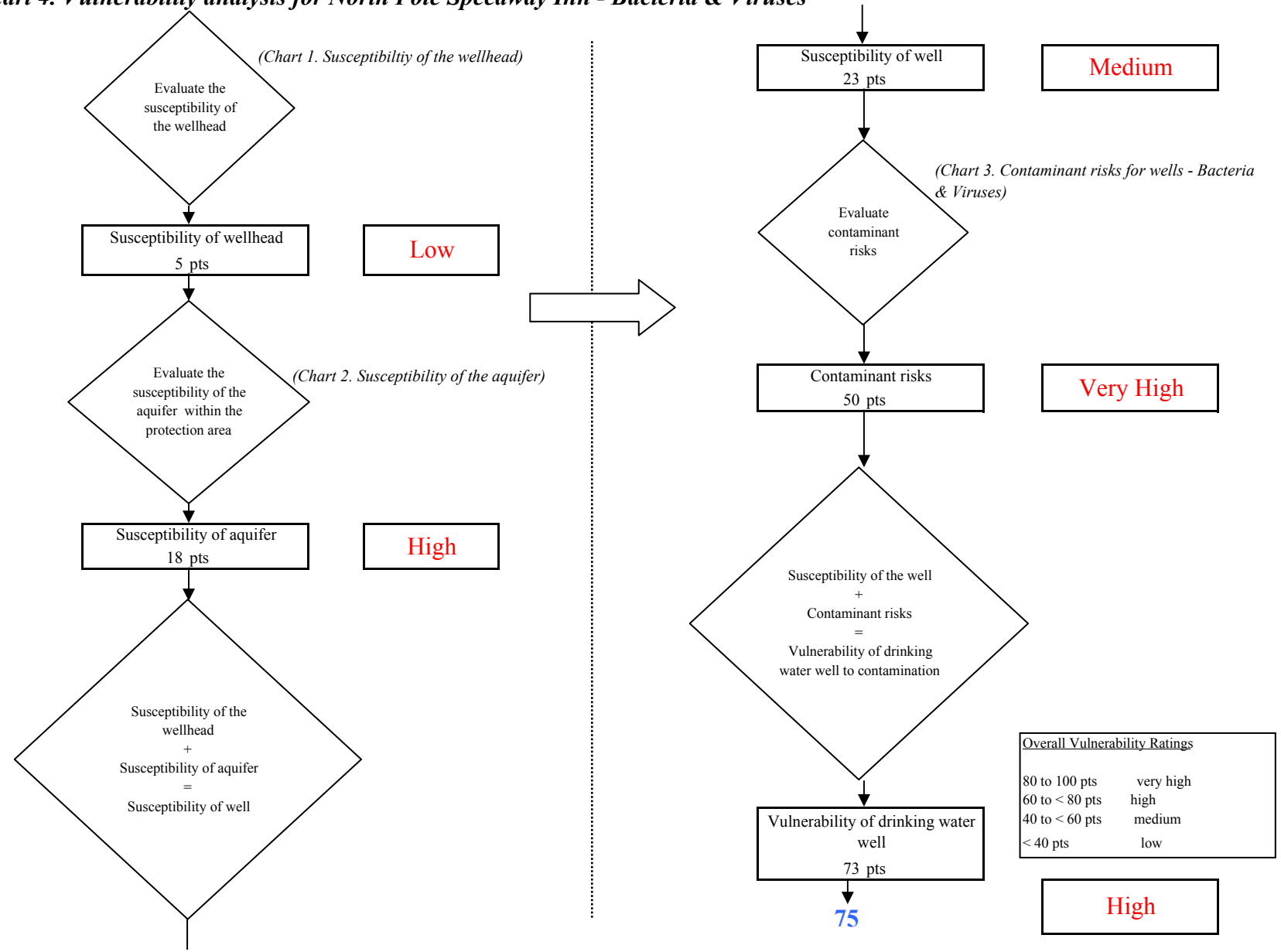


Chart 5. Contaminant risks for North Pole Speedway Inn - Nitrates and Nitrites

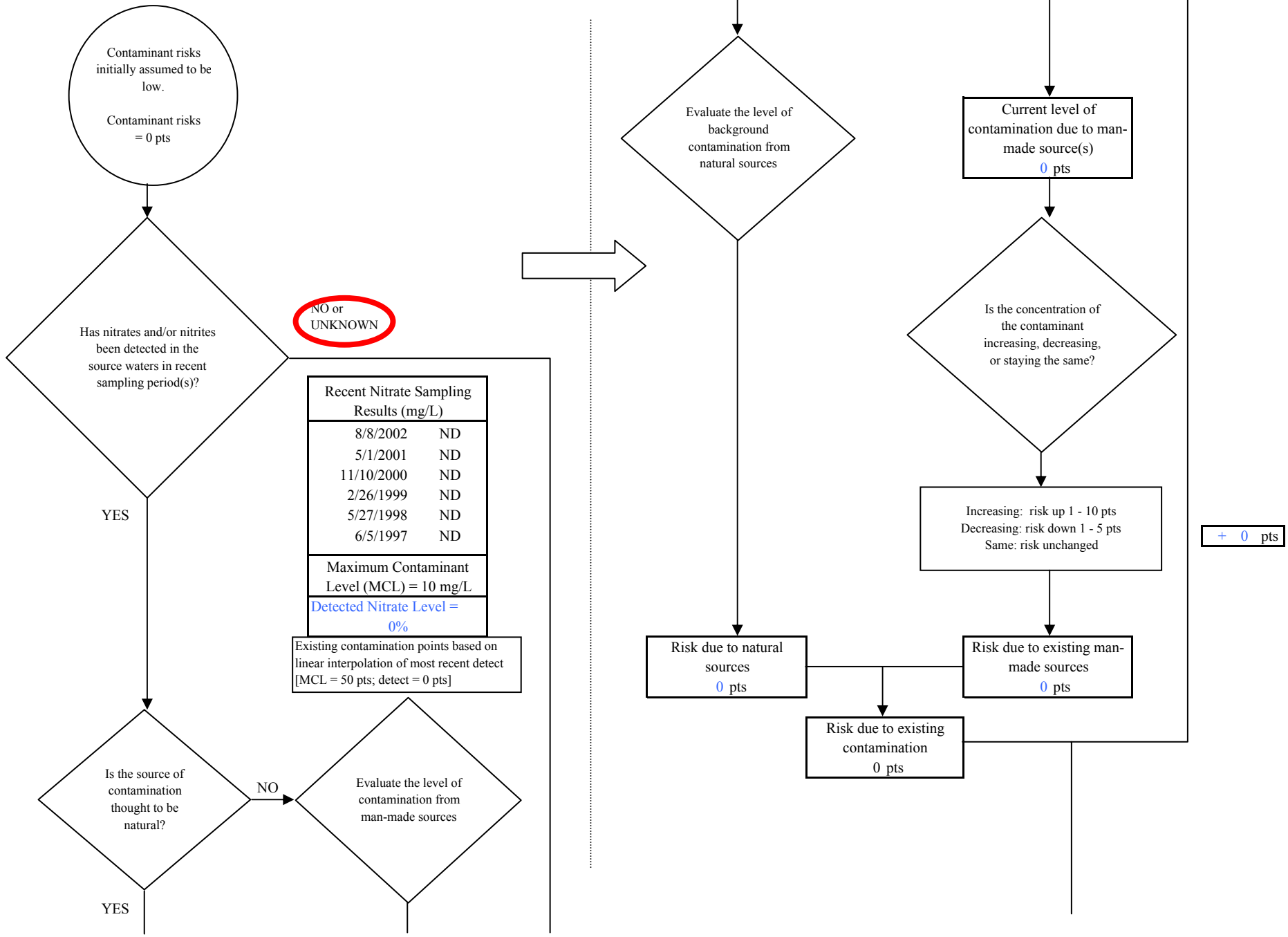


Chart 5. Contaminant risks for North Pole Speedway Inn - Nitrates and Nitrites

+ 10 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	0	0
Low(s)	3	6	9

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

Matrix Score 10

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

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

Is the source aquifer fractured rock or karst?

YES

NO

The highest risk source (cropland) is located in Zone D

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

- 5 pts

Decrease risk 1 - 10 pts

Are any significant sources within Zone A?

NO

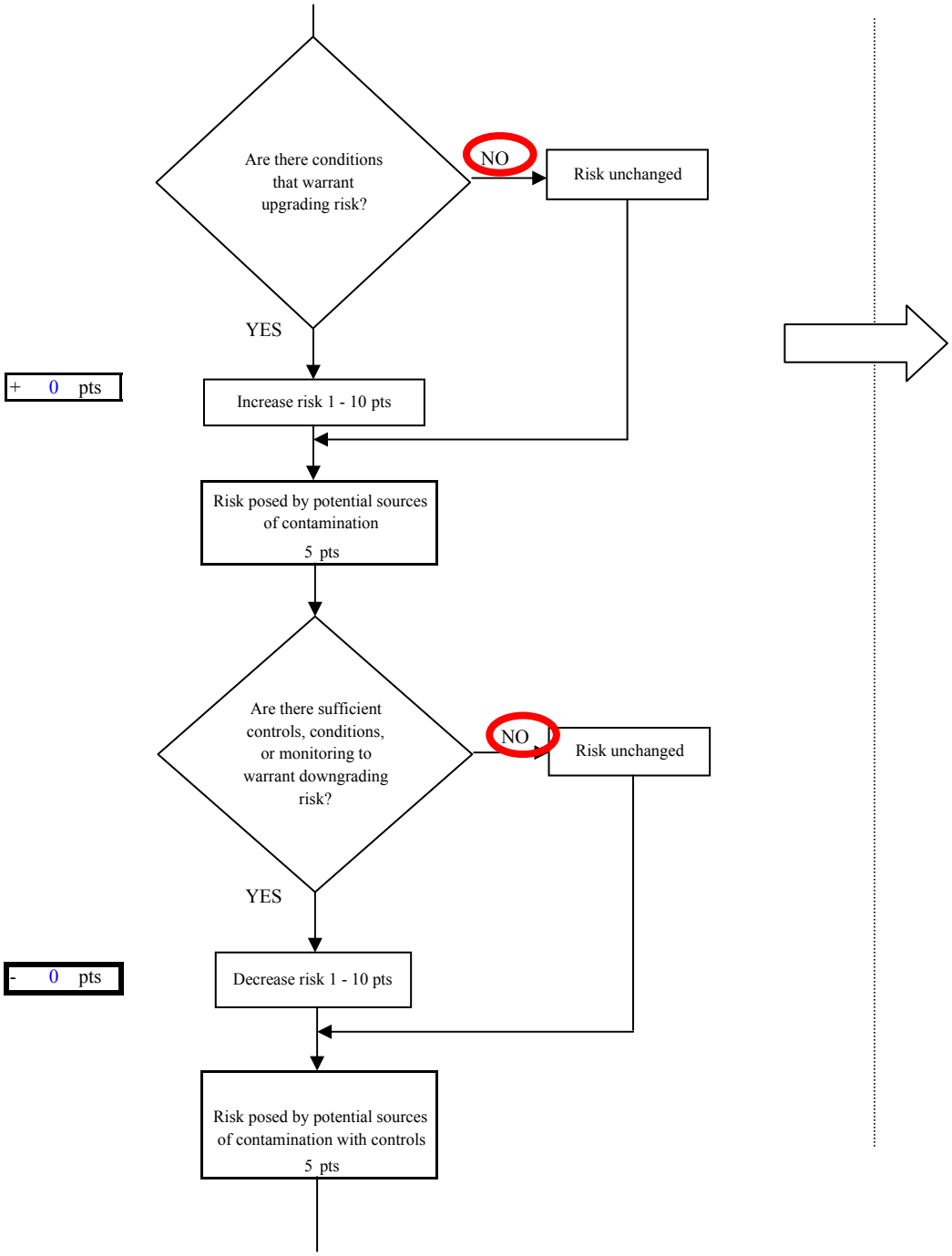
Risk unchanged

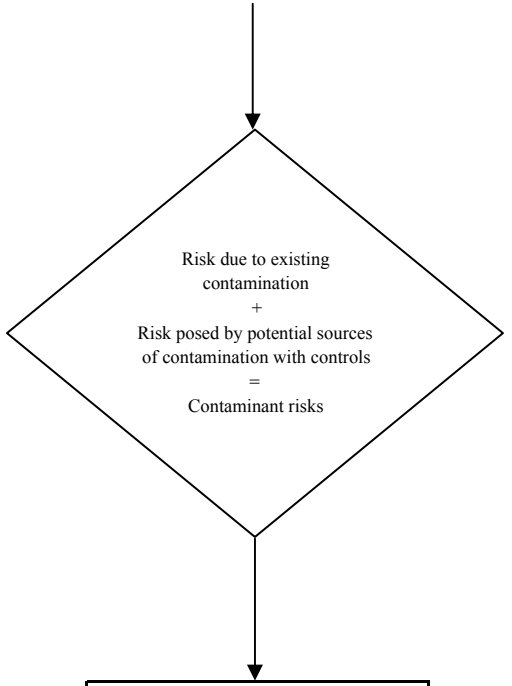
YES

Increase risk 1 - 10 pts

+ 0 pts

Chart 5. Contaminant risks for North Pole Speedway Inn - Nitrates and Nitrites





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

Contaminant risks*
= 5 pts

*Truncate risk at 50 pts

Low

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20 pts	low

Chart 6. Vulnerability analysis for North Pole Speedway Inn - Nitrates and Nitrites

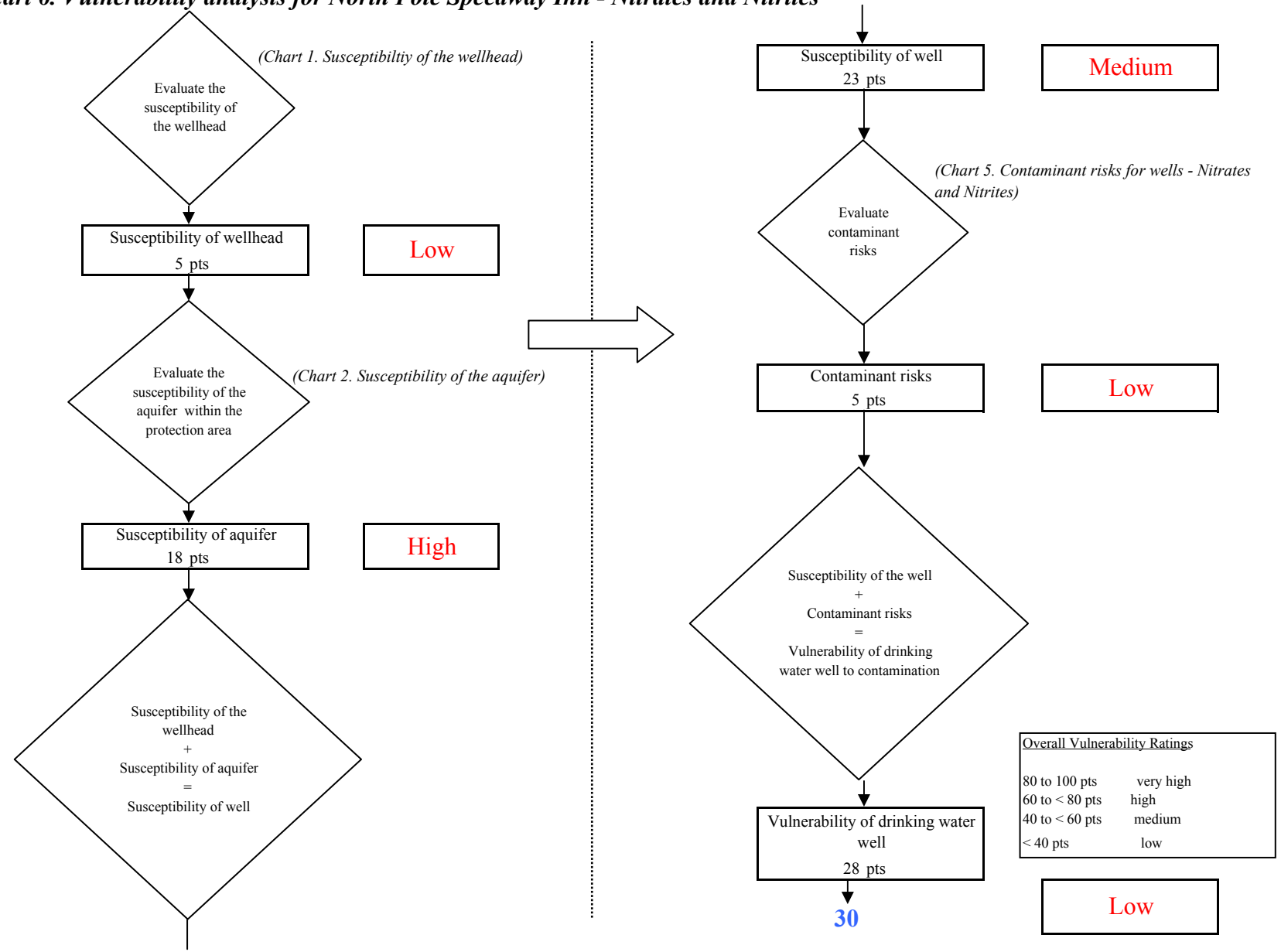


Chart 7. Contaminant risks for North Pole Speedway Inn - Volatile Organic Chemicals

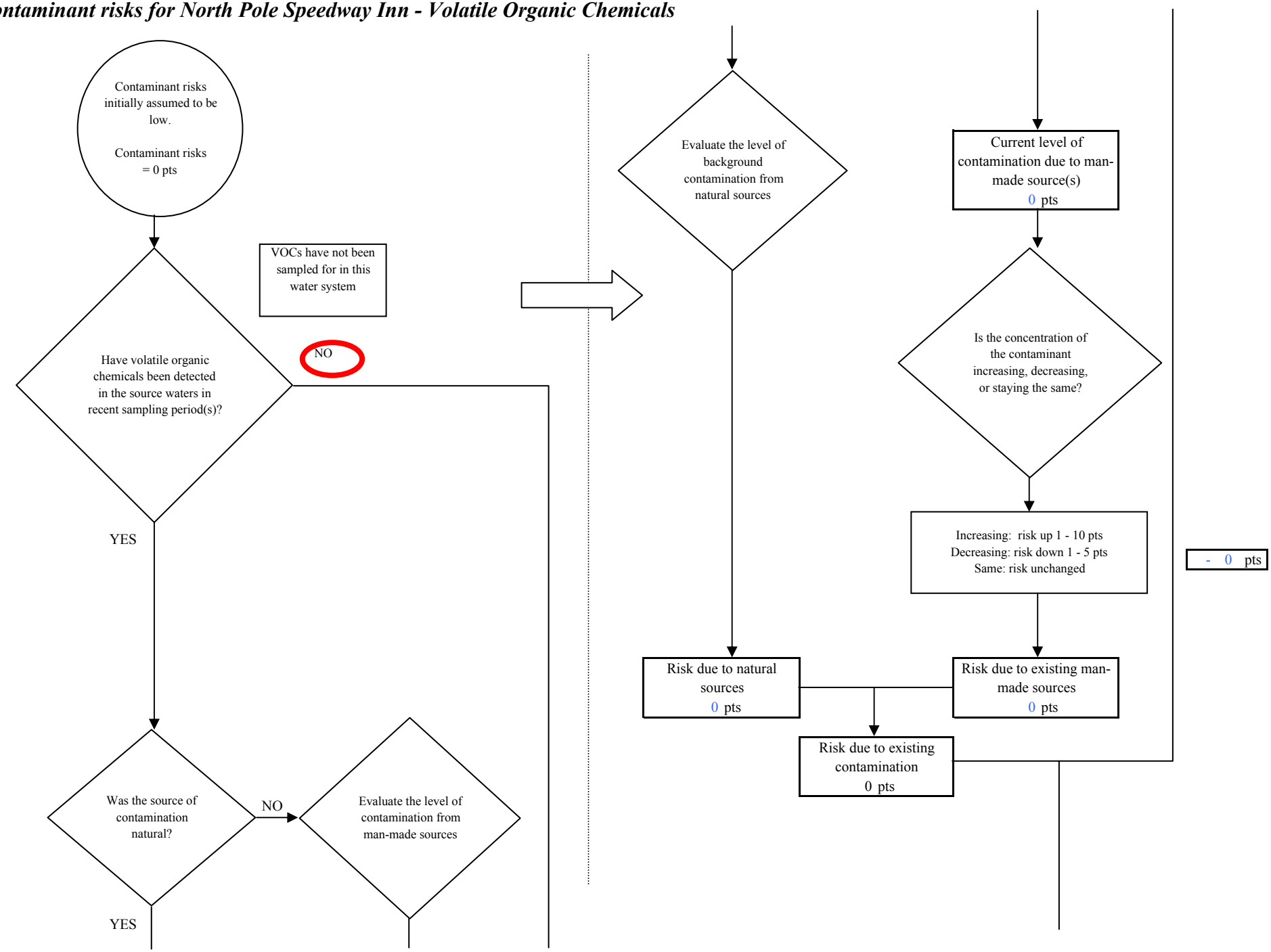


Chart 7. Contaminant risks for North Pole Speedway Inn - Volatile Organic Chemicals

+ 35 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A, B and C?

Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	1	0	1
Medium(s)	2	32	34
Low(s)	3	4	7

	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 35

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

Initial assessment of risk posed by potential sources of contamination = 35 pts

Is the source aquifer fractured rock or karst?

YES

NO

Are all of the higher risk sources beyond Zones A and B?

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

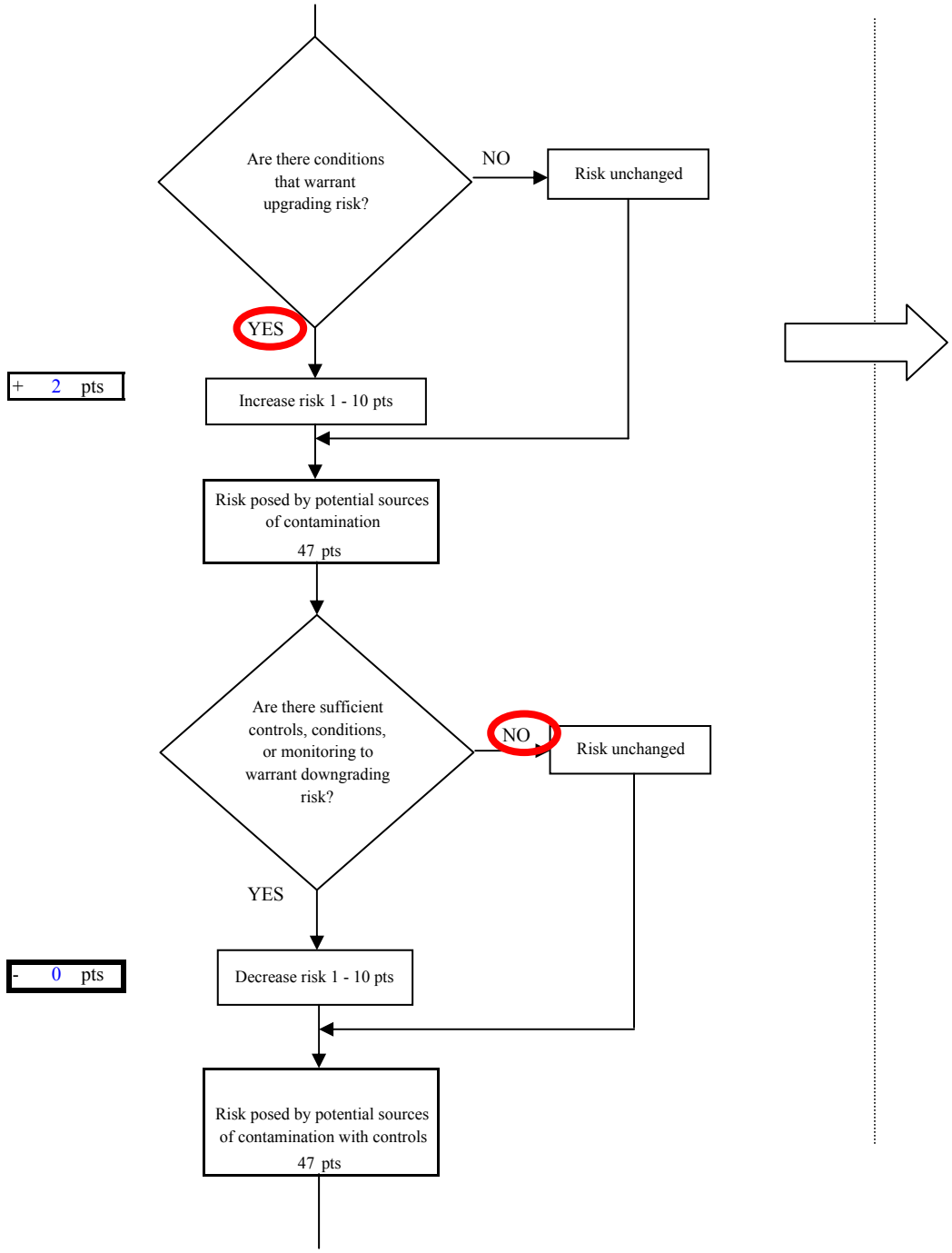
YES

Increase risk 1 - 10 pts

+ 10 pts

The 10/2/99 sanitary survey notes an underground diesel fuel tank located 40 feet

Chart 7. Contaminant risks for North Pole Speedway Inn - Volatile Organic Chemicals



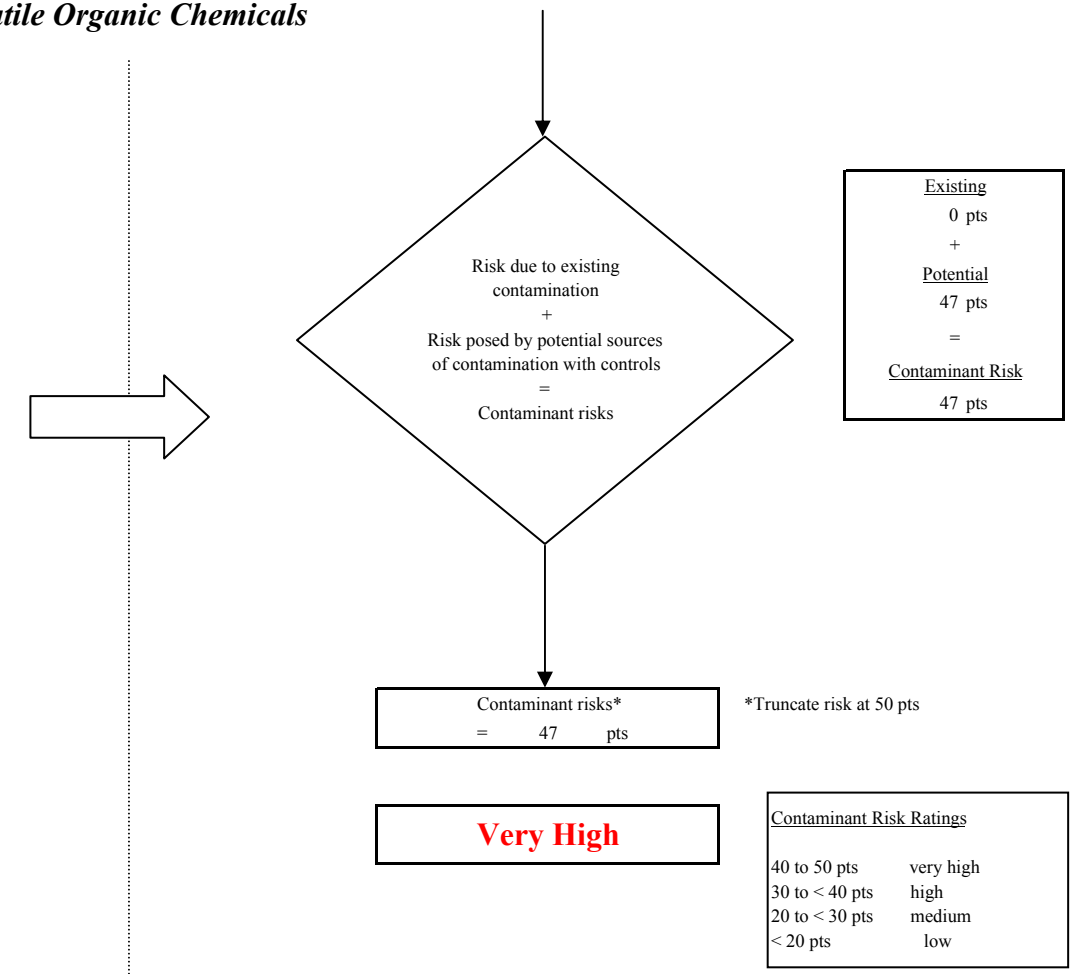


Chart 8. Vulnerability analysis for North Pole Speedway Inn - Volatile Organic Chemicals