Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Bay View Motel Homer, Alaska PWSID 241795

June 2004

DRINKING WATER PROTECTION PROGRAM REPORT Report 1556
Alaska Department of Environmental Conservation

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Bay View Motel
Homer, Alaska
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The Drinking Water Protection Program (DWPP) is producing Source Water Assessments in compliance with the Safe Drinking Water Act Amendments of 1996. Each assessment includes a delineation of the source water area, an inventory of potential and existing contaminant sources that may impact the water, a risk ranking for each of these contaminants, and an evaluation of the potential vulnerability of these drinking water sources.

These assessments are intended to provide public water systems owners/operators, communities, and local governments with the best available information that may be used to protect the quality of their drinking water. The assessments combine information obtained from various sources, including the U.S. Environmental Protection Agency, Alaska Department of Environmental Conservation (ADEC), public water system owners/operators, and other public information sources. The results of this assessment are subject to change if additional data becomes available. It is anticipated this assessment will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of public drinking water source. If you have any additional information that may affect the results of this assessment, please contact the Program Coordinator of DWPP, (907) 269-7521.

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Source Water Assessment for Bay View Motel
Homer, Alaska

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EXECUTIVE SUMMARY

This source water assessment provides an evaluation of the vulnerability to potential contamination of the public water system serving Bay View Motel. This Class B (non-community) water system consists of a spring located along the Sterling Highway just west of Homer, Alaska. The spring received a natural susceptibility rating of **Very High**. This rating is a combination of a susceptibility rating of **Very High** for the spring intake and a **Very High** rating for the aquifer in which the water is coming from. Identified potential and current sources of contamination for the Bay View Motel public water system include: septic systems, residential areas, roads, a gasoline station, landfills, fuel storage tanks a petroleum product bulk station, and DEC-recognized contaminated sites. These are considered as sources of bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals. Combining the natural susceptibility of the spring with the contaminant risk, the public water system for Bay View Motel received an overall vulnerability rating of **Very High** for all three contaminant categories: bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals.

BAY VIEW MOTEL PUBLIC DRINKING WATER SYSTEM

The Bay View Motel public water system is a Class B (non-community) water system. Its spring intake is located along the Sterling Highway just west of Homer, Alaska (T6S, R14W, Section 23) (See Map 1 of Appendix A). Homer is located on the north shore of Kachemak Bay on the southwestern edge of the Kenai Peninsula. It is within the Kenai Peninsula Borough which is located in south-central Alaska (Please see the inset of Map 1 in Appendix A for location). The Kenai Peninsula Borough is comprised of the Kenai Peninsula, Cook Inlet and a large unpopulated area northeast of the Alaska Peninsula The Borough's current population is almost 50,000 (ADCED, 2002). Communities located within the Borough include: Anchor Point, Grouse Creek Group, Beluga, Clam Gulch, Cohoe, Cooper Landing, Crown Point, Diamond Ridge, Fox River, Fritz Creek, Funny River, Halibut Cove, Happy Valley, Homer, Hope, Kachemak, Kalifornsky, Kasilof, Kenai, Lowell Point, Miller Landing, Moose Pass, Nanwalek, Nikiski, Nikolaevsk, Ninilchik, Port Graham, Primrose, Ridgeway, Salamatof, Seldovia, Seldovia Village, Seward, Soldotna, Sterling, Sunrise and Tyonek.

Most residents of Homer are connected to the water and sewer system serving the area (ADCED, 2002). Residents primarily use heating oil (typically stored in both above and below ground 275 to 500-gallon tanks), but also electricity or bottled gas to heat homes and buildings (ADCED, 2002). Refuse is collected by Peninsula Sanitation, a private firm, and hauled to the Borough-operated Class 2 landfill and balefill in Homer, at mile 169.3 Sterling Highway (ADCED, 2002).

The Bay View Motel spring lies on the north shore of Kachemak Bay an elevation of approximately 600 feet above sea level.

Sediments in the area generally consist of a combination of sand, gravel, silt, and clay and were deposited by glacially-fed streams, abandoned-channel deposits, glacial moraines and alluvium from existing streams (Glass, 1996). There can be a significant variation in the composition of sediment layers over relatively small areas. Consequently, confinement of the aquifers in the area can vary over short distances (Glass, 1996).

The Bay View Motel public drinking water system serves approximately 8 residents and 25 non-residents through 6 service connections.

BAY VIEW MOTEL DRINKING WATER PROTECTION AREA

Identifying the pathways most likely for surface contamination to reach water intake areas is the first step in determining the water system's risk. These are initially determined by looking at the drainage area contributing overland water flow to a spring source intake. The entire drainage area is also known as the "drinking water protection area". Please refer to pages 9-10 of the "Guidance Manual for Class B Public Water Systems" for additional information.

The protection area established for spring source intakes by the ADEC is usually separated into three zones, limited by the watershed boundary. These zones correspond to differing distances from the spring intake location. The ADEC Drinking Water Protection

Program's Technical Advisory Committee developed guidelines for derivation of these zones in 1998. The following is a summary of the three protection area zones:

Table 1. Definition of Zones

Zone	Definition
A	Areas within 1000-ft of the spring intake
B	Areas within 1-mile of the spring intake
C	The watershed boundary

The protection area for the Bay View Motel intake includes each of these Zones (See Map 1 of Appendix A).

The drinking water protection area outlined for the Bay View Motel 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 Bay View Motel 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; and
- 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.

Only "Very High" and "High" rankings are inventoried within the outer Zone C due to the probability of contaminant dilution by the time the contaminants get to the spring intake.

Tables 2 through 4 in Appendix B contain the ranking of inventoried potential and existing sources of contamination with respect to the three contaminant categories.

VULNERABILITY OF BAY VIEW MOTEL DRINKING WATER SYSTEM

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

- Natural susceptibility of the spring; and
- Contaminant risks.

Appendix D contains 8 charts, which together form the 'Vulnerability Analysis' for the public drinking water Source Water Assessment. Chart 1 analyzes the 'Susceptibility of the spring outlet/intake" to contamination by looking at the climate, terrain, and intake location. Chart 2 analyzes the "Susceptibility of the Aquifer" by looking at some basic aquifer characteristics. 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 contamination that has or may have occurred, but has not arrived or been detected at the intake area. Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses', which is a composite score of the Vulnerability Analysis and the overall Susceptibility. Charts 5 through 8 repeat the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, and volatile organic chemicals, respectively.

A score for the Natural Susceptibility of the spring is reached by considering the properties of the spring and the surrounding area. The derivation of this information is presented below and the data for this source is shown in Charts 1 and 2 of Appendix D.

Susceptibility of the Spring (0 - 25 points)

+

Susceptibility of the Aquifer (0 - 25 points)

=

Natural Susceptibility of the Spring
(0 – 50 Points)

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

Surface Water Source Susceptibility Ratings	
40 to 50 pts	Very High
30 to 39 pts	High
20 to 29 pts	Medium
0 to 19 pts	Low

The spring intake for the Bay View Motel received a Very High Susceptibility rating. The 10/20/00 Sanitary Survey indicates the intake is not protected from flooding. Flood waters can easily carry surface contaminants with them.

The aquifer the Bay View Motel spring is in received a Very High Susceptibility rating. The highly transmissive aquifer material (unconfined sand and gravel) in the area allows contaminants to travel downward from the surface with the precipitation and surface water runoff. Wells in the area can also provide a quick pathway for contaminants to travel down into the aquifer if the wells are not grouted correctly. Table 2 summarizes the Susceptibility scores and ratings for Bay View Motel.

Table 2. Susceptibility

	Score	Rating
Susceptibility of the Spring	25	Very High
Susceptibility of the Aquifer	25	Very High
Natural Susceptibility	50	Very High

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	50	Very High
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	100	Very High
Nitrates and/or Nitrites	100	Very High
Volatile Organic Chemicals	95	Very High

Bacteria and Viruses

The large capacity septic systems represents the greatest risk of Bacteria and Viruses to this water system. A Large Capacity Septic System Class V Injection well differs from a residential septic system when it receives sanitary waste from multiple family residences or a non-residential establishment and has the capacity to serve 20 or more persons per day.

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 detected coliforms in this water system.

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

Nitrates and Nitrites

The septic systems and the landfill represent the greatest 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 consistently been detected around 1 mg/L or about 10% of its Maximum Contaminant Level (MCL). An MCL is the highest concentration of a contaminant allowed in drinking water by the Environmental Protection Agency (EPA).

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

Volatile Organic Chemicals

The gasoline station and its associated underground gasoline tanks as well as the landfill represent the greatest risk for volatile organic chemical contamination to the spring.

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

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

REFERENCES

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

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

Glass, R.L., 1996, Ground-water conditions and quality in the western part of Kenai Peninsula, southcentral Alaska, Prepared in cooperation with the Alaska Department of Natural Resources, Kenai Peninsula Borough, Kenai Soil and Water Conservation District, U.S. Geological Survey, Anchorage, AK, and Branch of Information Services, Denver, CO.

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

APPENDIX A

Bay View Motel
Drinking Water Protection Area Location Map
(Map 1)

Map 1-Bay View Motel-Drinking Water Protection Area

PWSID: 241795.001

Alaska Department of Environmental Conservation

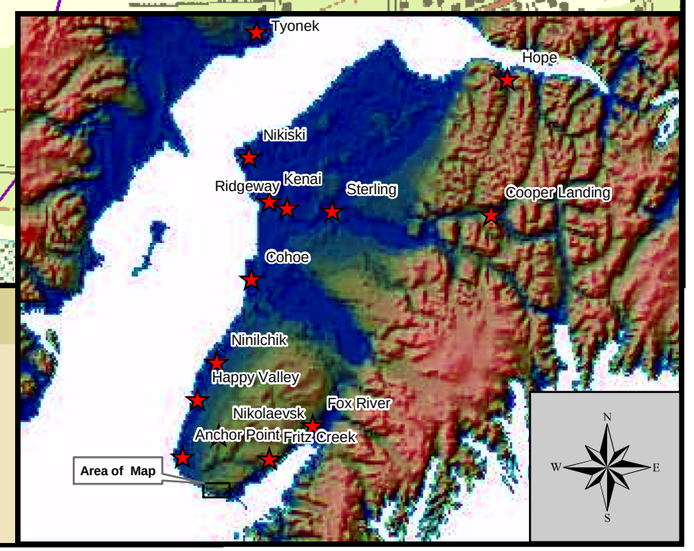
Alaska Drinking Water Protection Program

Feet
0 500 1,000 2,000

1:22,062

Data Sources:
Kenai Borough: Roads and parcels
63,000 Topographic map:USGS
Potential Sources of Contamination: ADEC

- Wells
- Zone A Protection Area
- Zone B Protection Area
- Zone C Protection Area
- Zone D Protection Area
- Roads
- Rivers and Streams
- Water



APPENDIX B

Contaminant Source Inventory and Risk Ranking for Bay View Motel (Tables 1-4)

Table 2

Contaminant Source Inventory and Risk Ranking for Bay View Motel Sources of Bacteria and Viruses

PWSID 241795.001

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	D10-1-3	A	High	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-1-3	A	Low	2	Zone A has 3 roads identified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	High	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-4-8	B	Low	2	
Campgrounds and RV Parks	X35	X35-1	B	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9-12	C	High	2	Zone C has 4 large capacity septic systems identified.

Table 3

Contaminant Source Inventory and Risk Ranking for Bay View Motel Sources of Nitrates/Nitrites

PWSID 241795.001

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	D10-1-3	A	High	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-1-3	A	Low	2	Zone A has 3 roads identified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	High	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	Very High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-4-8	B	Low	2	
Campgrounds and RV Parks	X35	X35-1	B	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-9-12	C	High	2	Zone C has 4 large capacity septic systems identified.

Table 4

Contaminant Source Inventory and Risk Ranking for Bay View Motel Sources of Volatile Organic Chemicals

PWSID 241795.001

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	D10-1-3	A	Low	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-1-3	A	Low	2	Zone A has 3 roads identified.
Gasoline stations (with repair shop)	C16	C16-1	B	High	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	Low	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Tanks, gasoline (underground)	T12	T12-1	B	High	2	
Tanks, gasoline (underground)	T12	T12-2	B	High	2	
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	B	Medium	2	Asphalt Plant Remnants
Highways and roads, paved (cement or asphalt)	X20	X20-4-8	B	Low	2	
Campgrounds and RV Parks	X35	X35-1	B	Low	2	
Petroleum product bulk station/terminals	X11	X11-1	C	Very High	2	

Table 5

Contaminant Source Inventory and Risk Ranking for Bay View Motel

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 241795.001

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	D10-1-3	A	Low	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-1-3	A	Low	2	Zone A has 3 roads identified.
Gasoline stations (with repair shop)	C16	C16-1	B	Low	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	Low	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Tanks, gasoline (underground)	T12	T12-1	B	Medium	2	
Tanks, gasoline (underground)	T12	T12-2	B	Medium	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4-8	B	Low	2	
Petroleum product bulk station/terminals	X11	X11-1	C	Low	2	

Table 6

Contaminant Source Inventory and Risk Ranking for Bay View Motel

Sources of Synthetic Organic Chemicals

PWSID 241795.001

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	D10-1-3	A	Low	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	Low	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	Very High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Petroleum product bulk station/terminals	X11	X11-1	C	Low	2	

Table 7

Contaminant Source Inventory and Risk Ranking for Bay View Motel

Sources of Other Organic Chemicals

PWSID 241795.001

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	D10-1-3	A	Low	2	Zone A has 3 large capacity septic systems identified.
Residential Areas	R01	R01	A	Low	2	Zone A has 25 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-1	A	Low	2	Zone A has 18 residential septic systems identified.
Highways and roads, paved (cement or asphalt)	X20	X20-1-3	A	Low	2	Zone A has 3 roads identified.
Gasoline stations (with repair shop)	C16	C16-1	B	Medium	2	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-4-8	B	Low	2	Zone B has 5 large capacity septic systems identified.
Landfills (municipal; Class II)	D50	D50-1	B	Very High	2	
Landfills (industrial; type of industrial waste?)	D52	D52-1	B	Very High	2	
Residential Areas	R01	R01-2	B	Low	2	Zone B has 134 residential acres identified.
Septic systems (serves one single-family home)	R02	R02-19-102	B	Low	2	Zone B has 74 residential septic systems identified.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-1	B	Medium	2	Asphalt Plant Remnants
Highways and roads, paved (cement or asphalt)	X20	X20-4-8	B	Low	2	
Petroleum product bulk station/terminals	X11	X11-1	C	High	2	

APPENDIX C

Bay View Motel
Potential Contaminant Sources
(Map 2)

Zone C has:
4 large capacity septic systems (D10)
134 residential septic systems (R02)
300 residential acres (R01)
20 roads (X20)

Zone A has:
18 residential septic systems (R02)
25 residential acres (R01)
3 large capacity septic systems (D10)
3 roads (X20)

Zone B has:
74 residential septic systems (R02)
134 residential acres (R01)
5 large capacity septic systems (D10)
5 roads (X20)

Map 2 Bay View Motel: Potential Sources of Contamination

PWSID: 241795.001

Alaska Department of Environmental Conservation

Alaska Drinking Water Protection Program

0 1,484 2,968 Feet

1:17,812

Data Sources:
Roads and parcels: Kenai Borough
Aerial Photo: USGS and Microsoft Terraserver
63K topographic map: USGS
Potential Sources of Contamination: ADEC

- Public Water System
- Zone A
- Zone B
- Zone C
- Rivers and Streams
- Water
- Roads
- Parcels
- Gasoline stations (with repair shop) (C16)
- Tanks, gasoline (underground) (T12)
- ADEC Recognized Contaminated Site (U04)
- Petroleum product bulk station/terminals (X11)
- Campgrounds and RV Parks (X35)
- Residential Area (R02)
- Large Capacity Septic System (D10)
- Septic systems (R02)
- Landfills (municipal; Class II) (D50)
- Landfills (industrial D52)

APPENDIX D

Vulnerability Analysis for Bay View Motel Public Drinking Water Source

(Charts 1-8)

Chart 1. Susceptibility of the spring outlet/intake - Bay View Motel

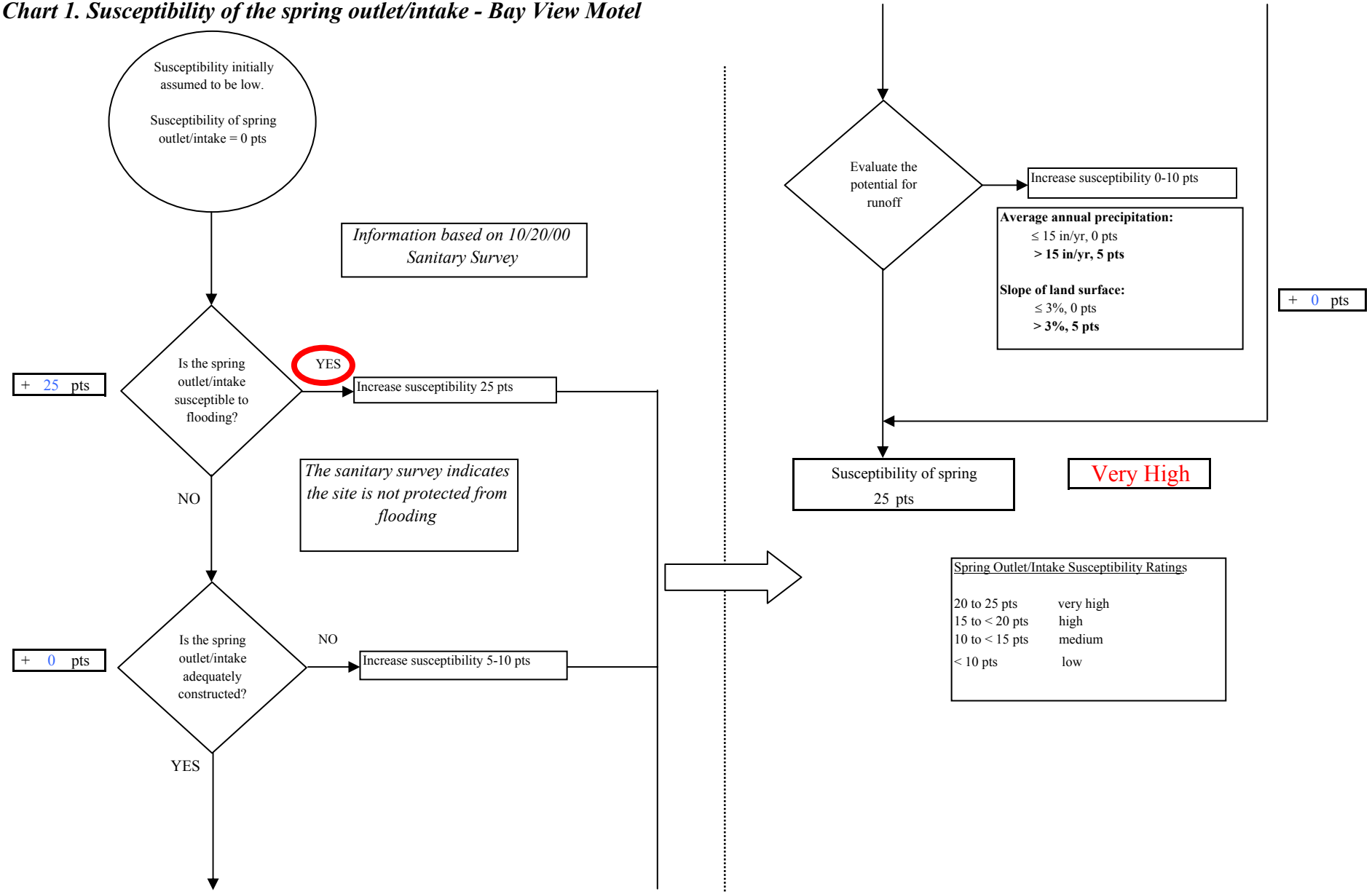


Chart 2. Susceptibility of the aquifer - Bay View Motel

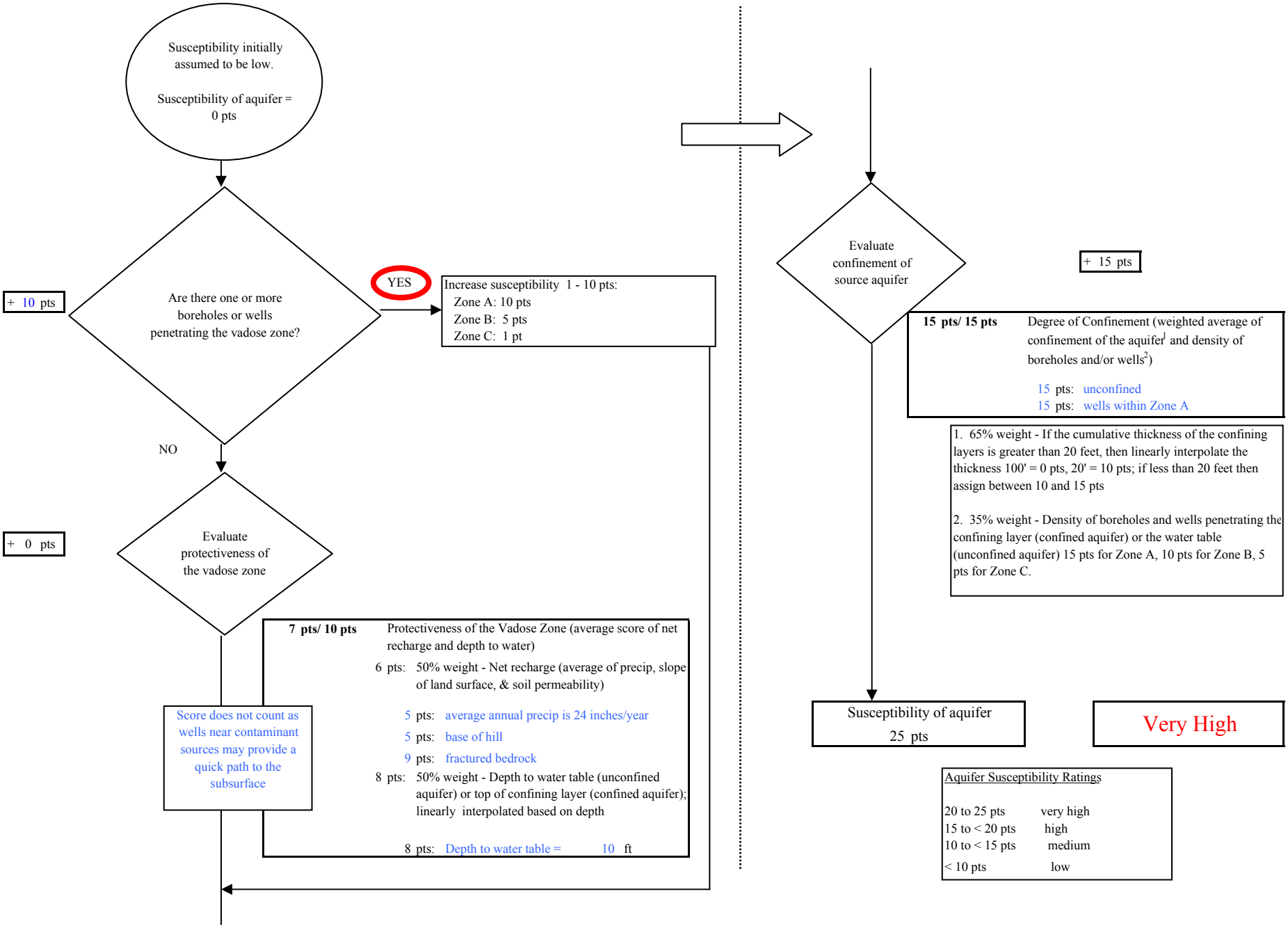
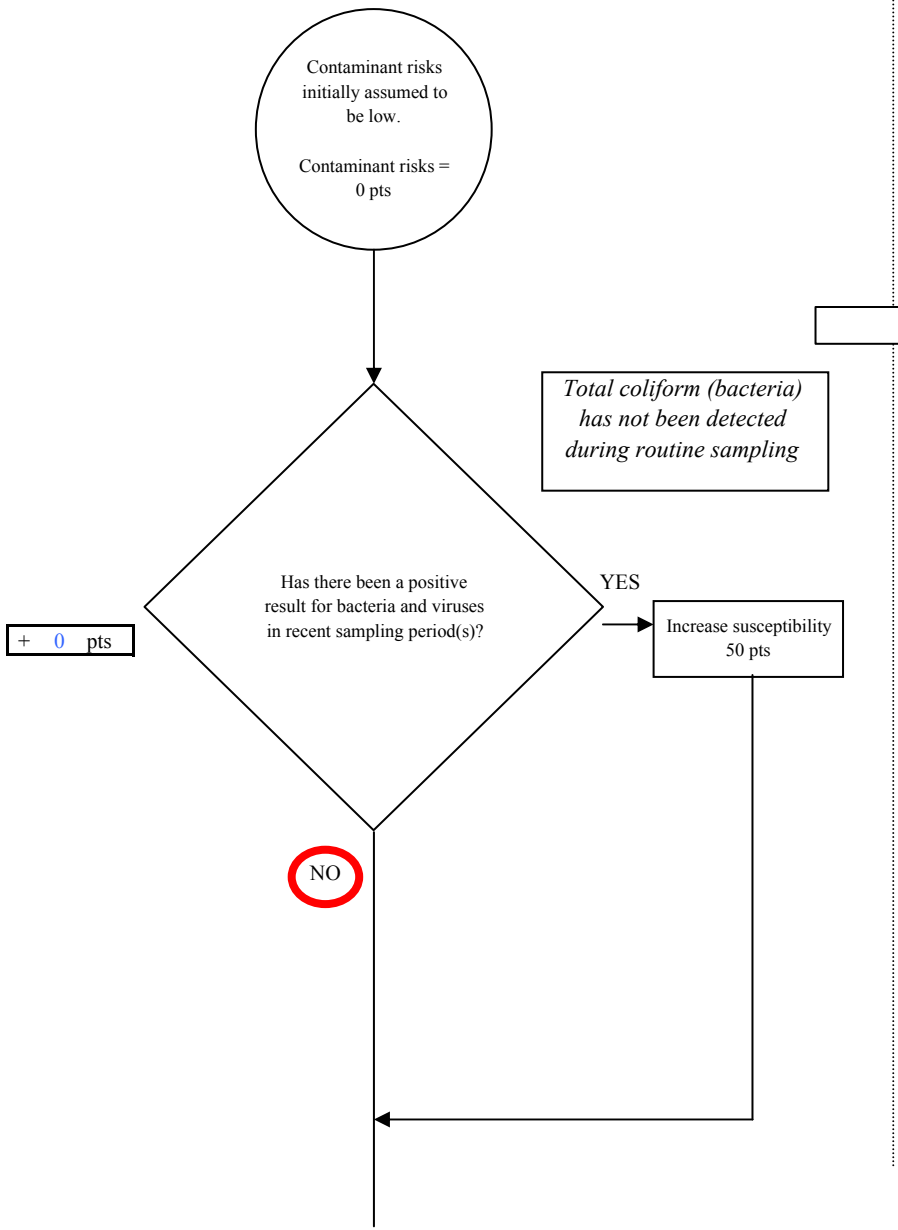
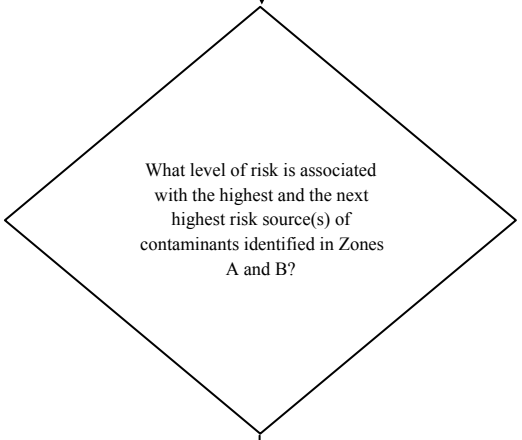


Chart 3. Contaminant risks for Bay View Motel - Bacteria & Viruses



Total coliform (bacteria) has not been detected during routine sampling



+ 40 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)	3	6	9
Medium(s)	0	0	0
Low(s)	20	12	32

	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 40

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 Bay View Motel - Bacteria & Viruses

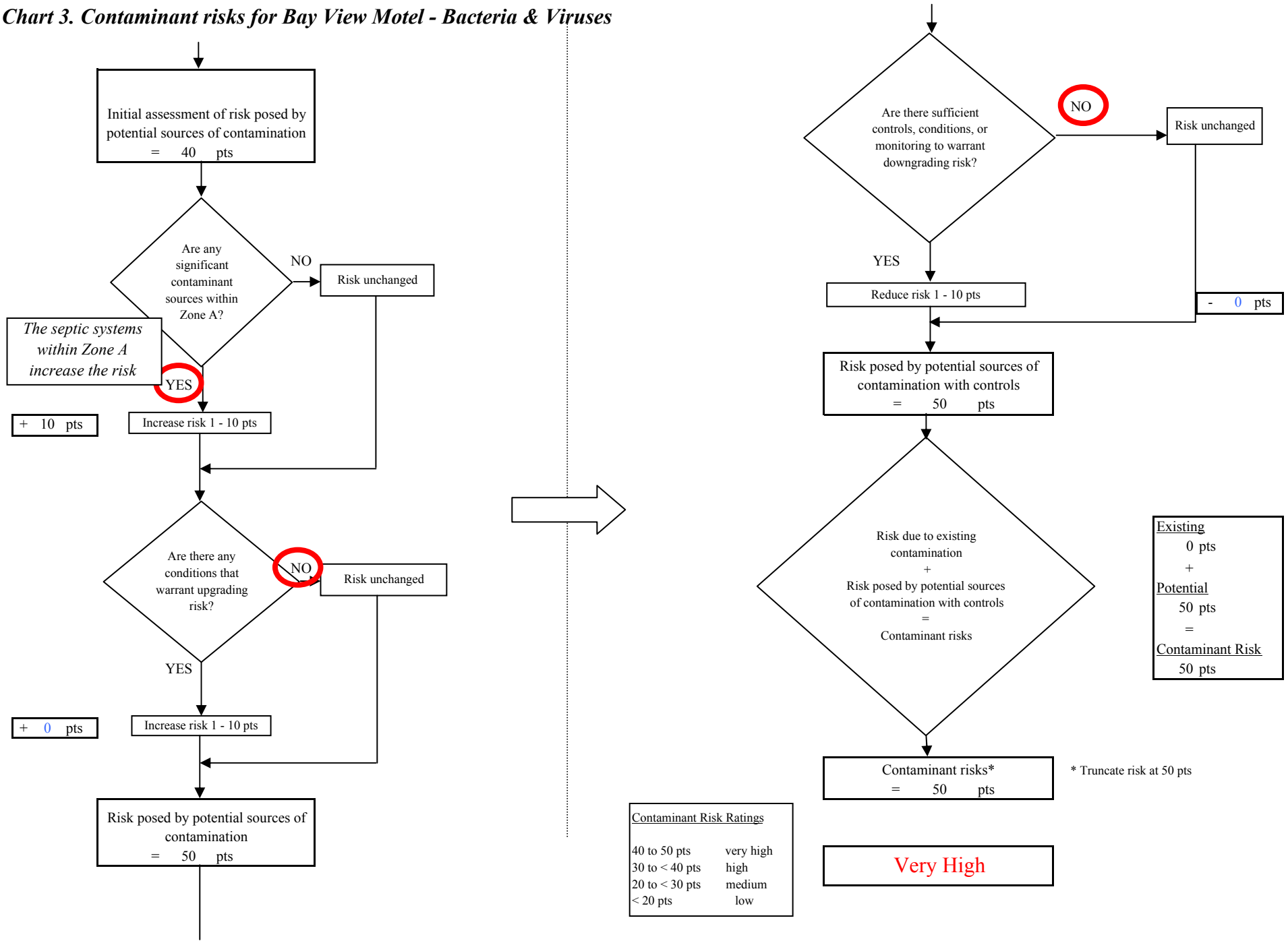


Chart 4. Vulnerability analysis for Bay View Motel - Bacteria & Viruses

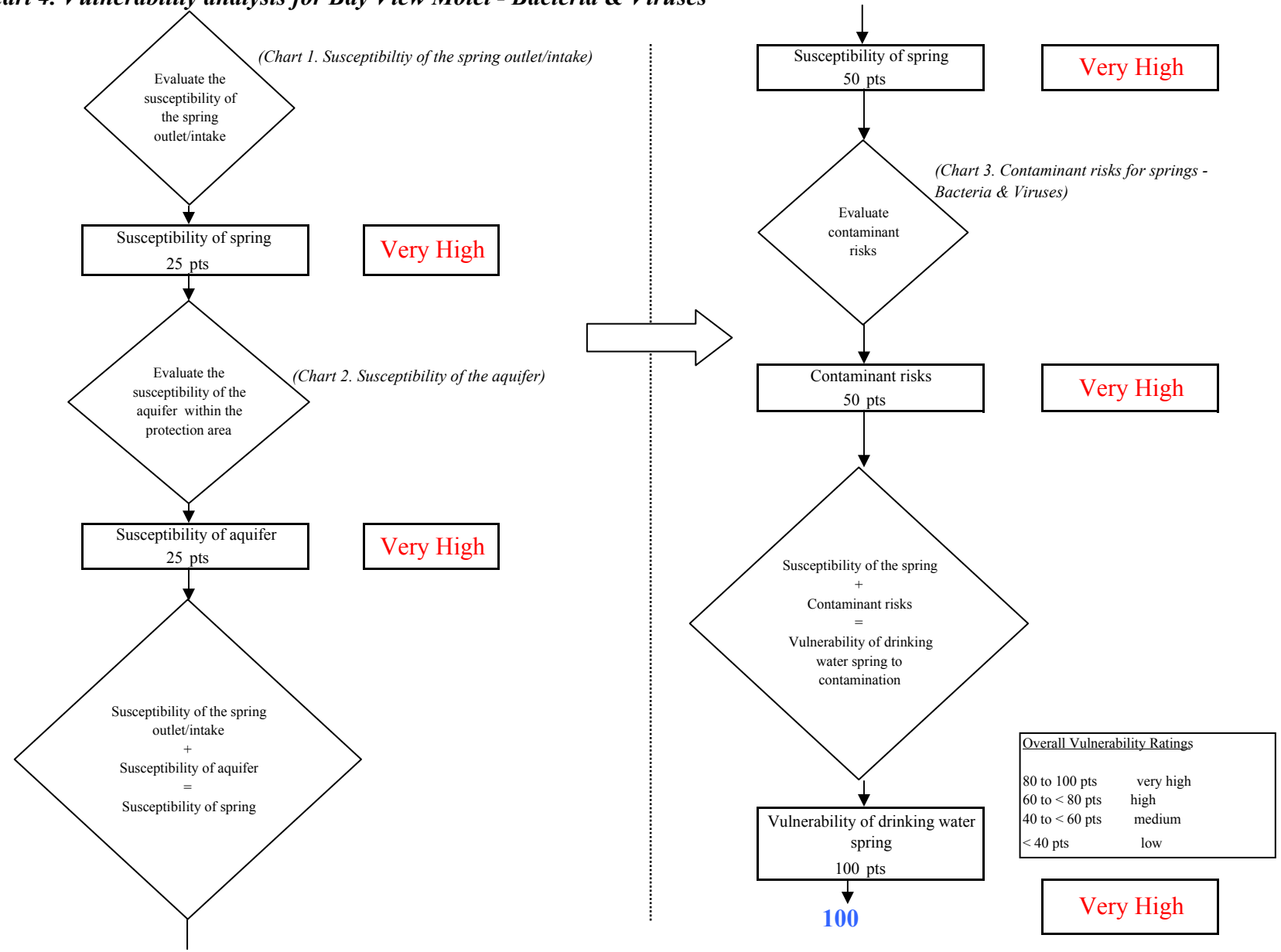


Chart 5. Contaminant risks for Bay View Motel - Nitrates and Nitrites

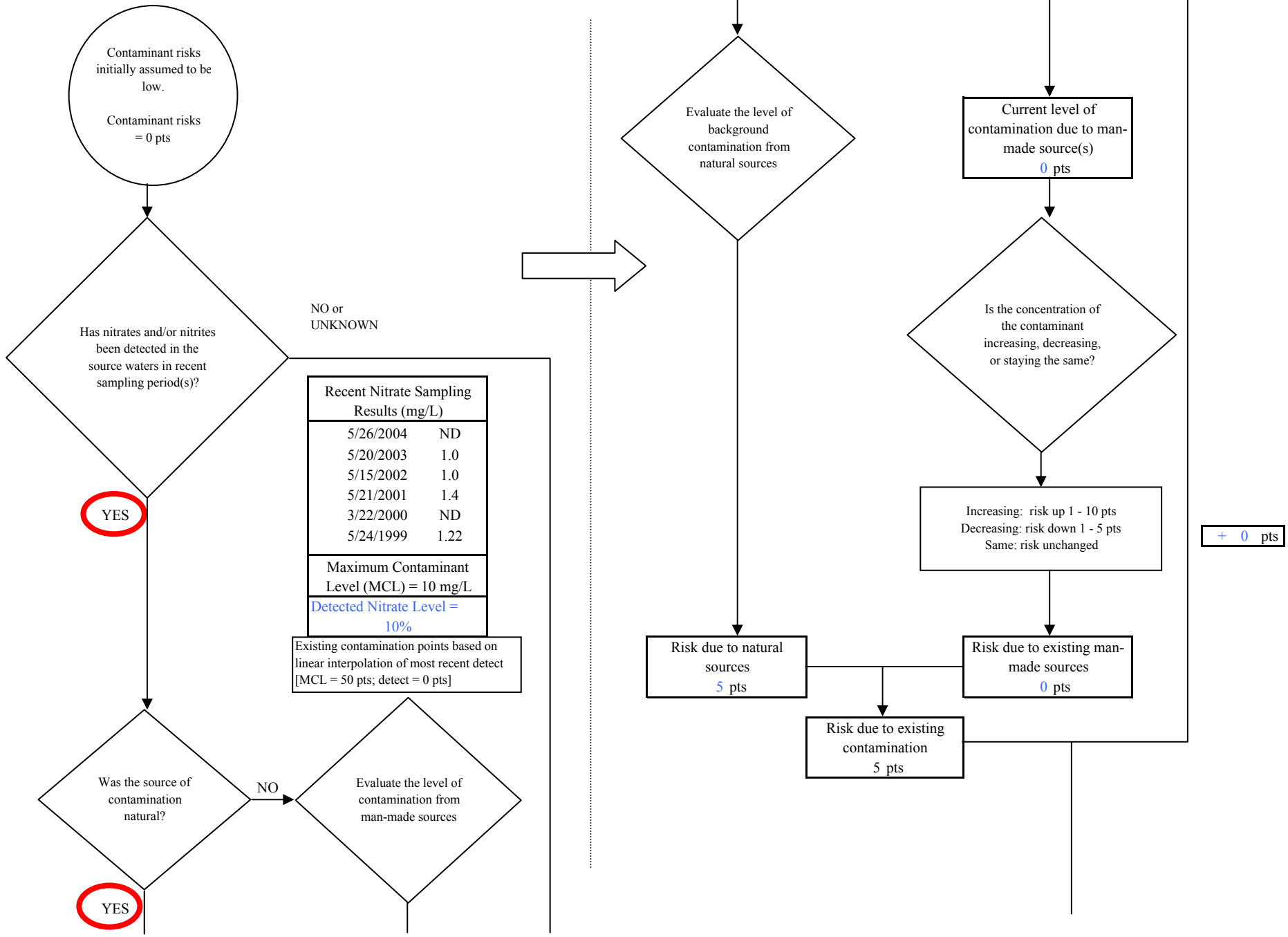


Chart 5. Contaminant risks for Bay View Motel - Nitrates and Nitrites

+ 50 pts

What level of risk is associated with the highest and the next highest risk sources(s) of contaminants identified in Zones A and B? (see Risk Matrix below)

Risk Levels for Contaminant Sources identified in Zones A and B

	Zone A	Zone B	Total
Very Highs(s)	0	1	1
High(s)	3	5	8
Medium(s)	0	0	0
Low(s)	20	12	32

	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 50

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 = 50 pts

The septic systems within Zone A increase the risk

Are any significant sources in Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 10 pts

Chart 5. Contaminant risks for Bay View Motel - Nitrates and Nitrites

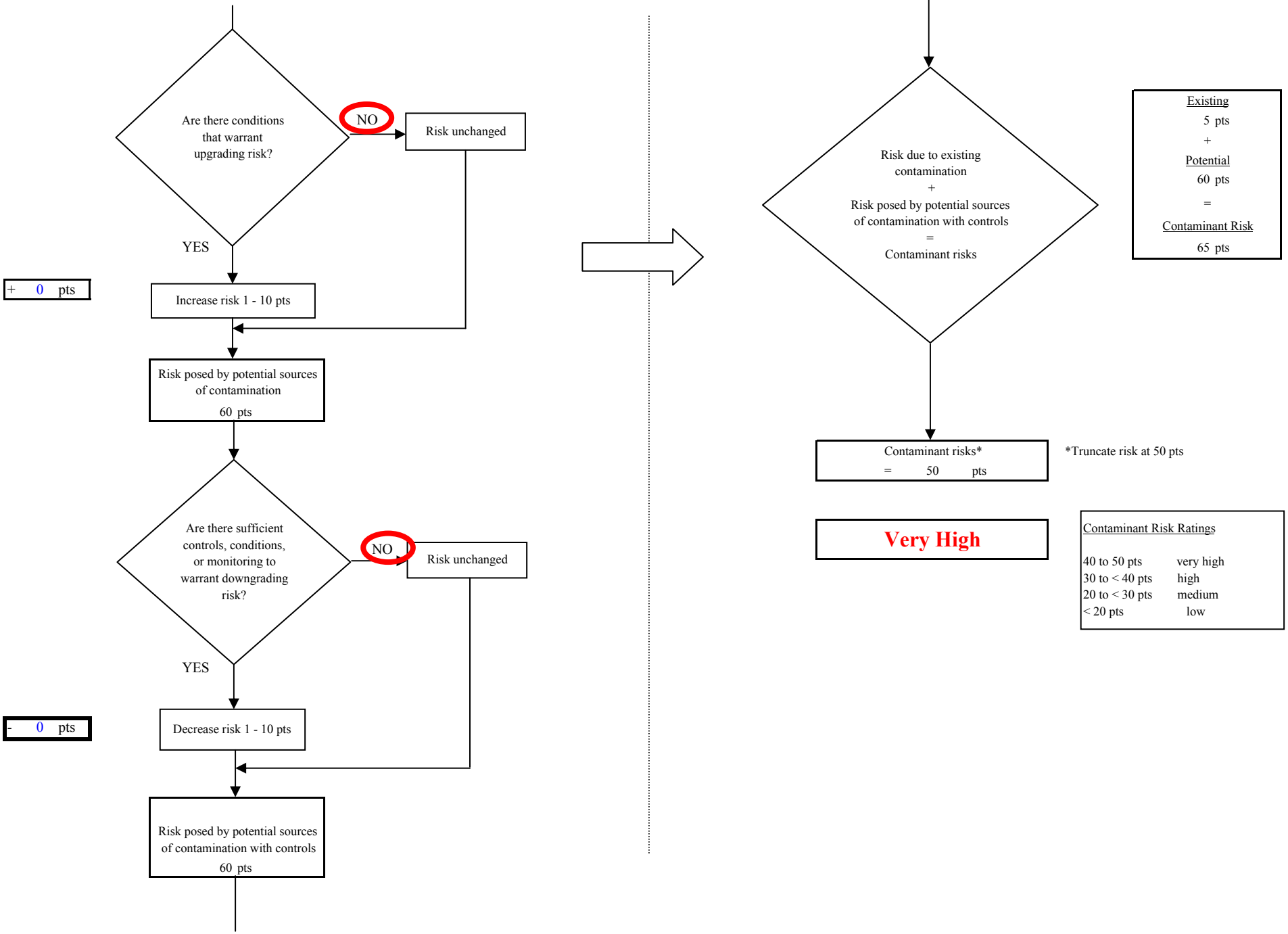


Chart 6. Vulnerability analysis for Bay View Motel - Nitrates and Nitrites

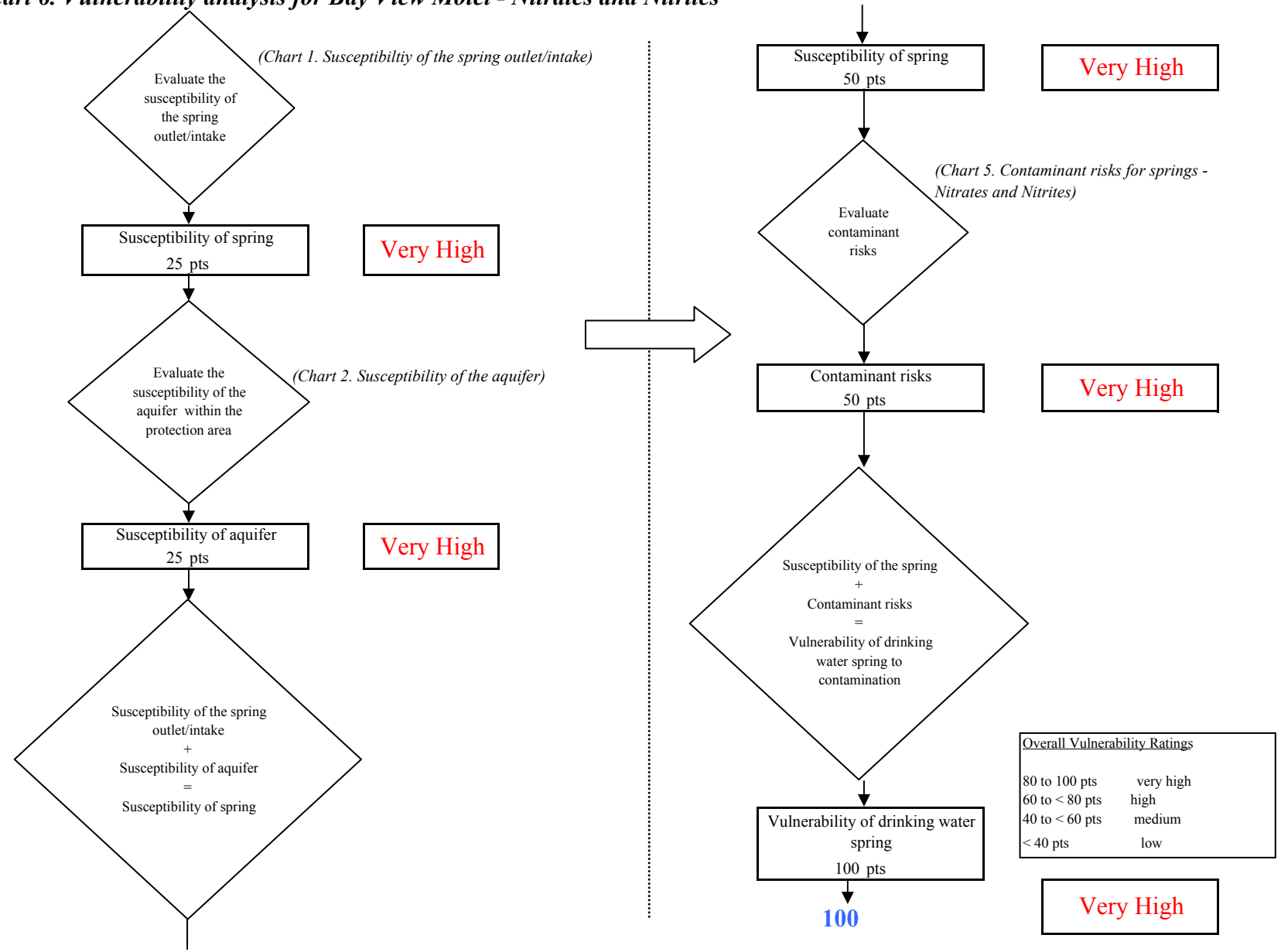


Chart 5. Contaminant risks for Bay View Motel - Volatile Organic Chemicals

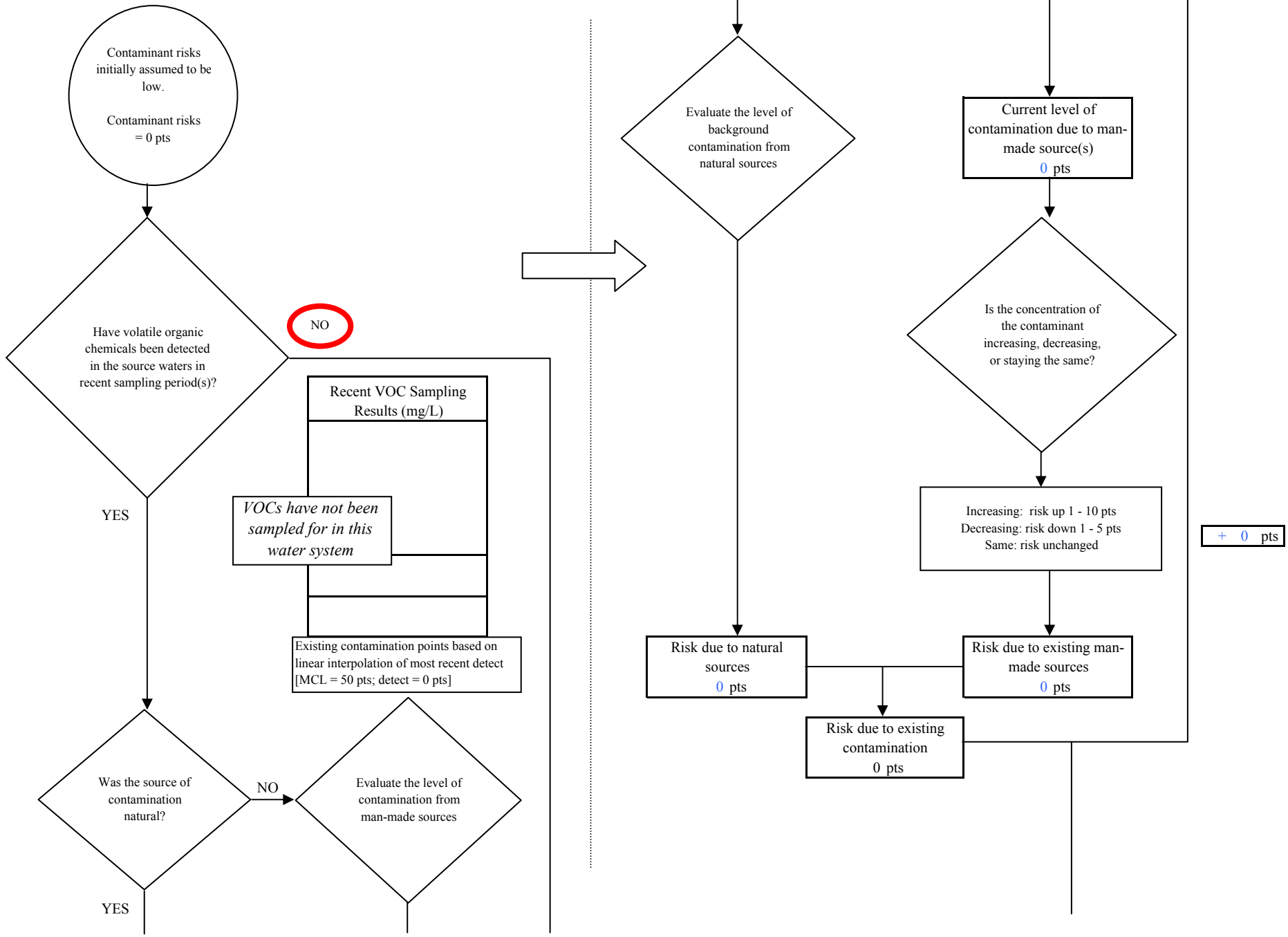
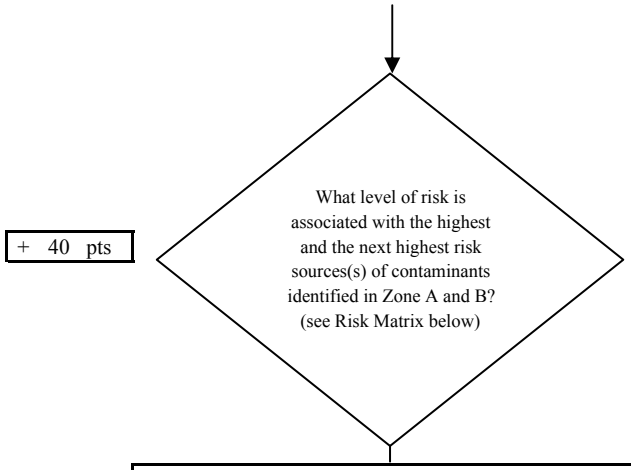


Chart 5. Contaminant risks for Bay View Motel - Volatile Organic Chemicals



+ 40 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	4	4
Medium(s)	0	0	0
Low(s)	6	10	16

	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 40

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.

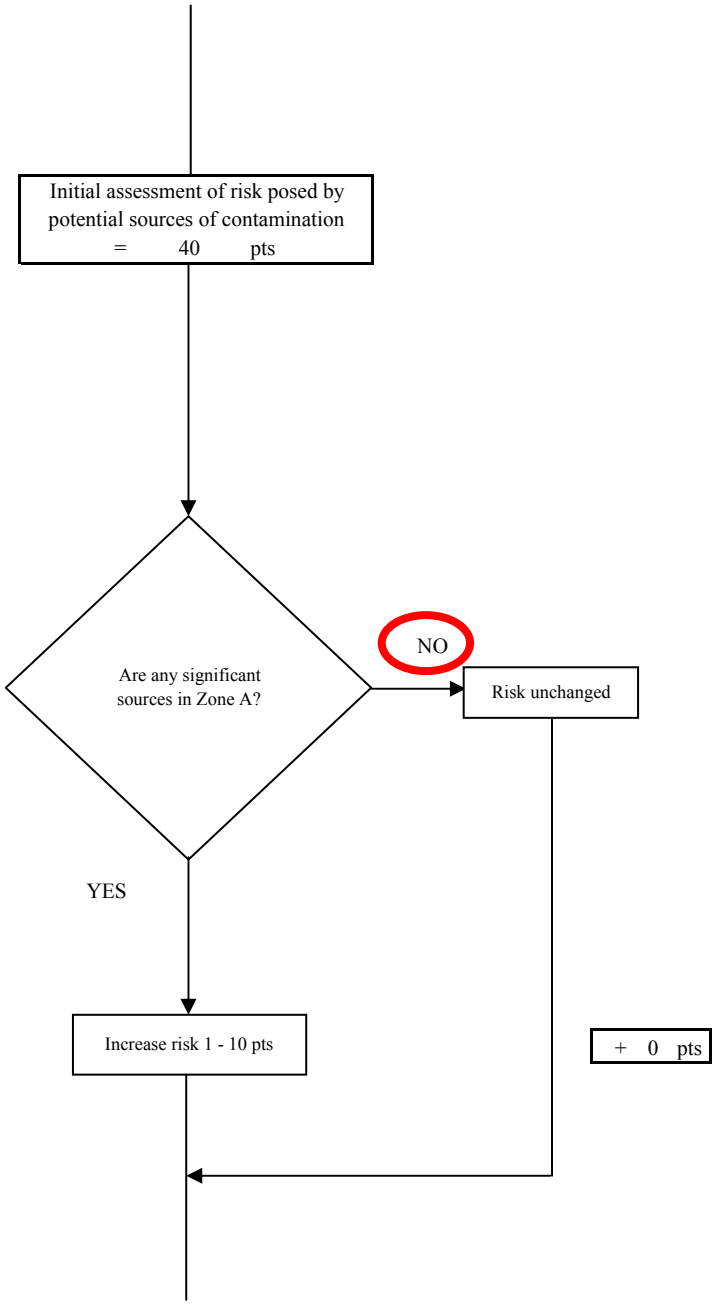


Chart 5. Contaminant risks for Bay View Motel - Volatile Organic Chemicals

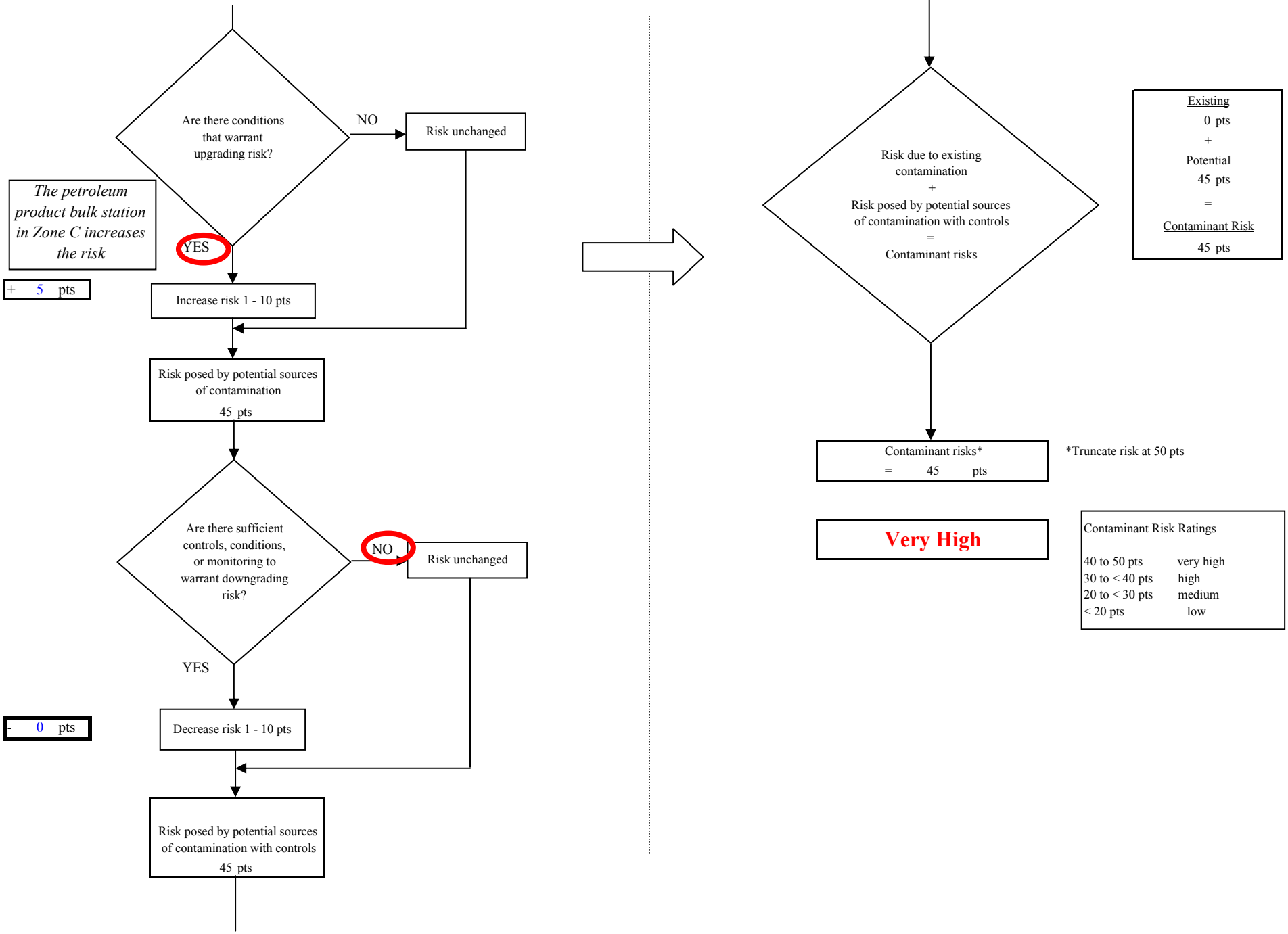


Chart 8. Vulnerability analysis for Bay View Motel - Volatile Organic Chemicals