



Source Water Assessment

A Hydrogeologic Susceptibility and
Vulnerability Assessment for
Homestead Trailer Park,
Ketchikan, Alaska

PWSID # 120046

September 2003

Drinking Water Protection Program Report #834
Alaska Department of Environmental Conservation

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

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

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Source Water Assessment for Homestead Trailer Park – Ketchikan, Alaska

Drinking Water Protection Program Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The primary public water system for Homestead Trailer Park is a Class A (community) water system that obtains water from Homestead Creek. The system's intake is located approximately 0.5-miles upstream from the shoreline and is accessible via South Tongass Highway. The overall protection area received a susceptibility rating of "**very high**". *A rating of high to very high is typical for all surface water catchment areas.* Potential and existing sources of the following contaminants were evaluated for this assessment: bacteria and viruses, nitrates and/or nitrites, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, volatile organic chemicals, and other organic chemicals. No current or potential sources of contaminants were identified for the drinking water source. Combining the natural susceptibility of the surface water source with the contaminant risk, this water system has received a vulnerability rating of "**medium**" for bacteria and viruses, nitrates and/or nitrites, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals and other organic chemicals; and "**very high**" for volatile organic chemicals.

DRINKING WATER SYSTEM AND AREA OVERVIEW

The Homestead Trailer Park water system is a Class A (community) water system that operates year round and serves approximately 100 people. The system's intake is located approximately 2,500-feet upstream of the shoreline on Homestead Creek, approximately 4-miles southeast of Ketchikan (T76S, R90E, Section 3). Road access is available via South Tongass Highway, at the Mile 4 marker (See Map 1 of Appendix A). Ketchikan and surrounding areas are located in the Ketchikan Gateway Borough in the Southeast Panhandle of Alaska (Please see the inset of Map 1 in Appendix A for location). The Borough's current population is 14,070 (ADCED, 2003).

The majority of residents in the Ketchikan/Saxman area are connected to the water and sewer services provided by Ketchikan Public Utilities and the City of Saxman. Heating oil (stored in both above and below ground tanks) is most commonly used for heating homes and buildings. Refuse is transported to Deer Mountain

Landfill, which is equipped with an incinerator. Refuse is also baled and shipped out-of-state (ADCED, 2003).

The Ketchikan area is characterized by some of the most unique topography in Southeast Alaska. Predominate to the region are steep mountain slopes and large areas of rock outcroppings. This, coupled with area soils, results in forest production of moderate to low levels. Area streams are typically deeply incised. Footslopes and valley floors are often coated with glacial till, resulting in forested wetland areas (USDA, 2001).

Strong winds and frequent precipitation are normal here. Summer temperatures range from 51 to 65 degrees Fahrenheit; winter temperatures range from 29 to 48 degrees Fahrenheit. The Saxman area averages 163 inches (13.6 feet) of precipitation annually, including 69 inches of snowfall (ADCED, 2003).

The most recent Sanitary Survey (2001) indicates that the intake is composed of a screened box. Water is diverted to a small (0.08-acre) reservoir and flows via gravity to the treatment facility. The survey also indicates that the system has a storage capacity of 5,500 gallons with an average daily production of 3,500 gallons. Raw water is filtered and chlorinated.

HOMESTEAD TRAILER PARK DRINKING WATER PROTECTION AREA

Identifying the pathways most likely for surface contamination to reach water intake areas is the first step in determining the water system's risk. These are initially determined by looking at the drainage area contributing to a surface water source. The entire drainage area is also known as the "drinking water protection area". Please refer to pages 10-11 of the "Guidance Manual for Class A Public Water Systems" for additional information.

The protection area established for surface water sources by the ADEC is usually separated into three zones, limited by the watershed boundary. These zones correspond to the overland-flow distance that water travels to reach the source. The ADEC Drinking Water Protection Program's Technical Advisory Committee developed guidelines for derivation of these zones in 1998. The following is a summary of the three protection area zones:

Table 1. Definition of Zones

| Zone | Definition |
|-------------|--|
| A | Areas within 1000-ft of lakes or streams |
| B | Areas within 1-mile of lakes or streams |
| C | The watershed boundary |

The protection area for Homestead Trailer Park includes each of these Zones (See Map 1 of Appendix A). It should be noted here that, because of the small watershed size, the Homestead Trailer Park Zone C and Zone B areas are identical.

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within the Homestead Trailer Park protection area. This inventory was completed through a search of agency records and other publicly available information. There are a wide variety of potential contamination sources to surface water. These contaminants are found within agricultural, residential, commercial, and industrial areas, but *can also occur within areas that have little or no development.*

For Class A public water system assessments, six categories of drinking water contaminants are inventoried. They include:

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

Sources identified in the Homestead Trailer Park protection area are displayed on Map 2 of Appendix C and summarized in Table 1 of Appendix B.

RANKING OF CONTAMINANT RISKS

Once potential and existing sources of contamination have been identified, they are assigned a ranking according to what category and level of risk they represent. Ranking of contaminant risks for “potential” or “existing” sources of contamination is a function of the toxicity and the volume of specific contaminants associated with that source. Rankings assignments include:

- Low;
- Medium;

- High; and
- Very High.

The time-of-travel for contaminants within the water is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zones A because of their short life span. Only “Very High” and “High” rankings are inventoried within Zones B and C due to the probability of contaminant dilution by the time the contaminants reach the water intake.

Tables 2 through 5 in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, metals, synthetic organic compounds, and other organic compounds. *Note: Tables 2 through 5 were not necessary for the Homestead Trailer Park area because no contaminant sources were identified in the protection zones.*

VULNERABILITY OF HOMESTEAD TRAILER PARK DRINKING WATER SYSTEM

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

- Surface Water Susceptibility; and
- Contaminant risks.

Appendix D contains 13 charts, which together form the ‘Vulnerability Analysis’ for the public drinking water Source Water Assessment. Chart 1 analyzes the ‘Susceptibility of the Surface Water Source’ to contamination by looking at the climate, terrain, and intake location. Chart 2 analyzes ‘Contaminant Risks’ for the drinking water source with respect to bacteria and viruses. The ‘Contaminant Risks’ portion of the analysis considers potential sources of contaminants as well as a review of contamination that has or may have occurred, but has not arrived or been detected at the well. Chart 3 contains the ‘Vulnerability Analysis for Bacteria and Viruses’, which is a composite score of the Vulnerability Analysis and the overall Susceptibility. Charts 4 through 13 repeat the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, volatile organic chemicals, heavy metals, cyanide, and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals, respectively.

A score for the Surface Water Susceptibility of the source is reached by considering the properties of the water intake and the surrounding area. The derivation of this information is presented below and the data for this source is shown in Chart 1 of Appendix D.

Susceptibility of the Surface Water Source – always considered to be “high” (30 points)

+

Adequate Construction of the Intake (0 – 5 Points)

+

Runoff Potential Within Zone B (0 – 5 Points)

+

Dilution Capacity of the Surface Water (0 – 10 Points)

=

Natural Susceptibility
(0 – 50 Points)

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

| Surface Water Source Susceptibility Ratings | |
|---|-----------|
| 40 to 50 pts | Very High |
| 30 to < 40 pts | High |

Table 2. Susceptibility of the Homestead Trailer Park Surface Water Source

| | Score | Rating |
|----------------------------------|-------|-----------|
| Minimum Allowable Susceptibility | 30 | |
| Intake Construction Adequate | 0 | |
| Runoff Potential | 5 | |
| Dilution Capacity | 10 | |
| Overall Susceptibility | 45 | Very High |

For contaminants, risks to a drinking water source depend on the type, number or density, and distribution of the contaminant sources. The Contaminant Risk score has been derived from an examination of existing, and historical contamination sources that have been detected in the protection area through routine sampling. It also evaluates potential sources of contamination. Flow charts are used to assign a point score, and ratings are assigned in the same way as the susceptibility:

| Contaminant Risk Ratings | |
|--------------------------|-----------|
| 40 to 50 pts | Very High |
| 30 to < 40 pts | High |
| 20 to < 30 pts | Medium |
| < 20 pts | Low |

Table 3 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 3. Homestead Contaminant Risks

| Category | Score | Rating |
|--|-------|-----------|
| Bacteria and Viruses | 0 | Low |
| Nitrates and/or Nitrites | 1 | Low |
| Volatile Organic Chemicals | 40 | Very High |
| Heavy Metals, Cyanide, and Other Inorganic Chemicals | 0 | Low |
| Synthetic Organic Chemicals | 0 | Low |
| Other Organic Chemicals | 0 | Low |

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

Susceptibility of the Surface Water Source
(0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

Vulnerability of the
Drinking Water Source to Contamination (0 – 100).

Again, rankings are assigned according to a point score:

| Overall Vulnerability Ratings | |
|-------------------------------|-----------|
| 80 to 100 pts | Very High |
| 60 to < 80 pts | High |
| 40 to < 60 pts | Medium |
| < 40 pts | Low |

Table 4 contains the overall vulnerability scores and ratings for each of the six categories of drinking water contaminants. Note: scores are rounded off to the nearest five.

Table 4. Overall Vulnerability

| Category | Score | Rating |
|----------------------------|-------|-----------|
| Bacteria and Viruses | 45 | Medium |
| Nitrates and Nitrites | 50 | Medium |
| Volatile Organic Chemicals | 85 | Very High |
| Heavy Metals, Cyanide, and | | |

| | | |
|-----------------------------|----|--------|
| Other Inorganic Chemicals | 45 | Medium |
| Synthetic Organic Chemicals | 45 | Medium |
| Other Organic Chemicals | 45 | Medium |

Bacteria and Viruses

The contaminant risk for bacteria and viruses in this protection area is “low”. Typically, there is positive coliform detection in water samples, which is normal in raw water samples collected from surface water sources. (See Chart 2 – Contaminant Risks for Bacteria and Viruses in Appendix D).

Coliforms (a bacteria) are found naturally in the environment and although they aren’t necessarily a health threat, they are 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. Harmful bacteria can cause diarrhea, cramps, nausea, headaches, or other symptoms (EPA, 2003). Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination.

After combining the contaminant risk for bacteria and viruses with the natural susceptibility of the source, the overall vulnerability of the source to bacteria and virus contamination is considered “medium”.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is “low” (See Chart 4 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D). In general, nitrates are very mobile, moving at approximately the same rate as water.

Sampling history for the Homestead Trailer Park water source indicates that nitrates have not been detected in the past 5 years. The Maximum Contaminant Level (MCL) for nitrates is 10 milligrams per liter (mg/L). The MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects (EPA, 2003).

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

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is “very high” (See Chart 6 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Ethylbenzene and xylenes, both volatile organic chemicals, have been detected during recent sampling, although below MCL levels. Both of these chemicals come from human-made sources. After combining the contaminant risk for volatile organic chemicals with the natural susceptibility of the source, the overall vulnerability of the well to contamination is “very high”.

Heavy Metals, Cyanide, and Other Inorganic Chemicals

The contaminant risk for heavy metals is “low”. Both lead and copper have been detected in samples collected in during 1997 and 2000. However, detected levels were below the MCL. (See Chart 8 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

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

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is “low”. After combining the contaminant risk with the natural susceptibility of the source, the overall vulnerability to synthetic organic chemicals of the well is “medium” (See Chart 11 – Contaminant Risks for Synthetic Organic Chemicals in Appendix D).

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

Other Organic Chemicals

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

Review of historical sampling data indicates that no other organic chemicals have been sampled or detected in the past 5 years.

REFERENCES

Alaska Department of Community and Economic Development (ADCED), 2003 [WWW document]. URL http://www.dced.state.ak.us/cbd/commdb/CF_COMDB.htm

United States Forest Service – Alaska Region (USDA), 2001. Technical Publication No. R10-TP-75. Ecological Subsections of Southeast Alaska and Neighboring Areas of Canada.

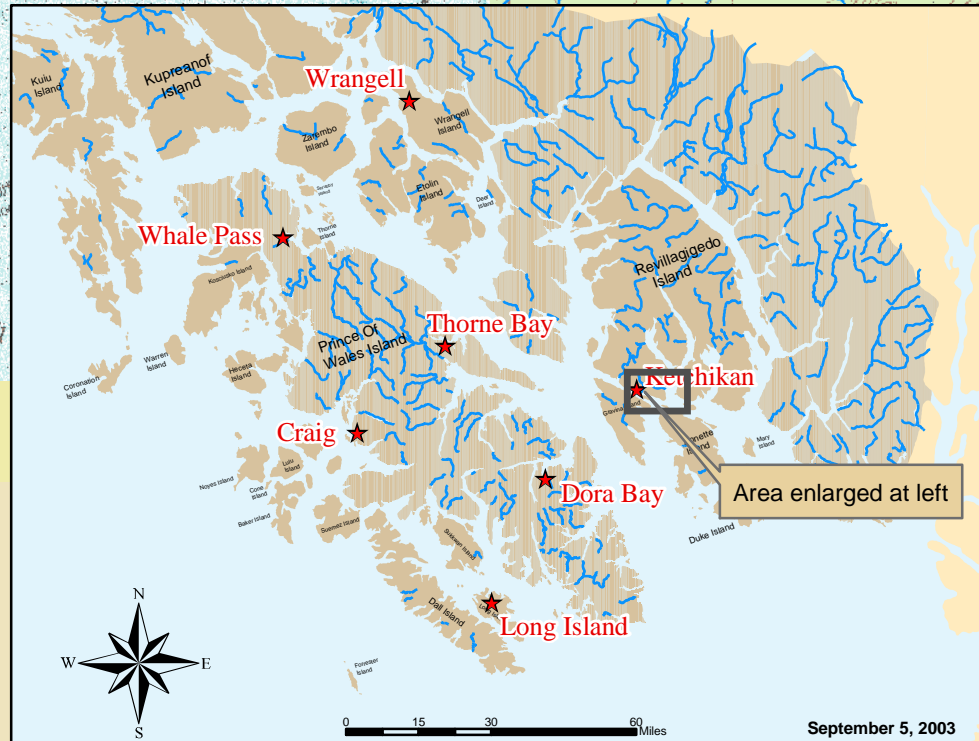
United States Environmental Protection Agency (EPA), 2003 [WWW document]. URL <http://www.epa.gov/safewater/mcl.html>.

APPENDIX A

Homestead Trailer Park Drinking Water Protection Area Location Map (Map 1)



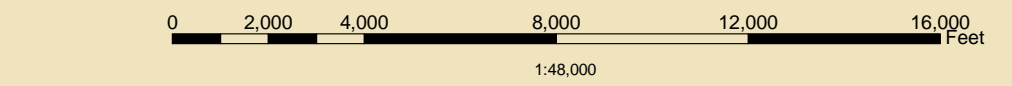
Homestead Creek -
Drinking Water Protection Area



Area enlarged at left

Map 1: Homestead Creek Drinking Water Protection Area

PWSID: 120046.001



Data Sources:
 Background image - USGS 1:63,000 mapping
 Lakes & streams - U.S. Forest Service, Tongass
 Roads - Ketchikan Gateway Borough

Protection zones were delineated based upon streams noted on USGS 1:63,000 mapping.
 For this PWS, Zone C (the entire watershed) covers the same area as Zone B (areas within 1-mile of the stream).

Legend

- Homestead Trailer Park
- Zone A Protection Area
- Zone B Protection Area
- Zone C Protection Area
- Lake
- Streams



APPENDIX B

Contaminant Source Inventory and Risk Rankings (Table 1)

Table 1

**Contaminant Source Inventory for
Homestead Trailer Park**

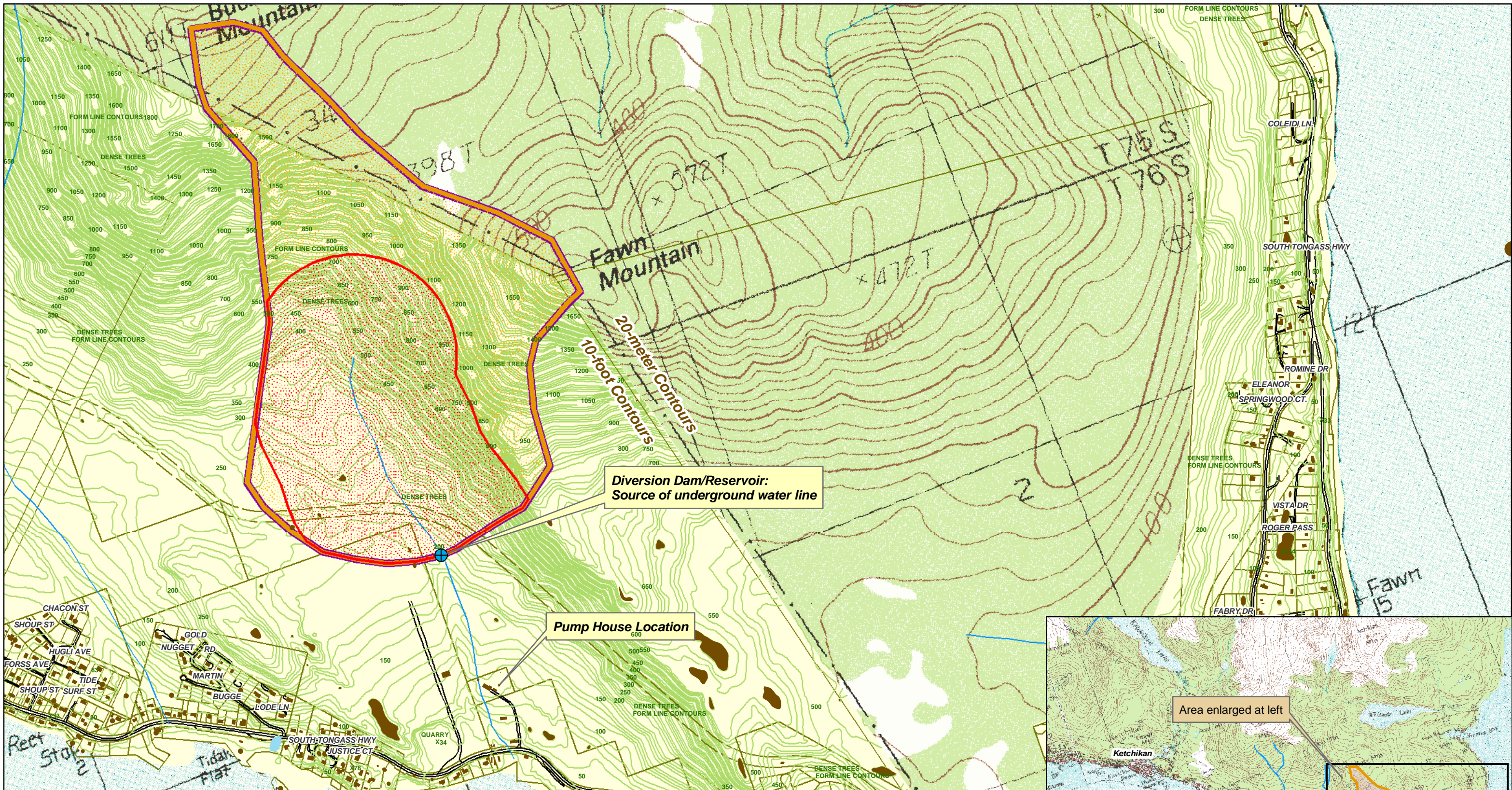
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| Contaminant Source Type | Contaminant Source ID | CS ID tag | Zone | Map Number | Comments |
|--------------------------------|------------------------------|------------------|-------------|-------------------|-----------------|
|--------------------------------|------------------------------|------------------|-------------|-------------------|-----------------|

No Contaminant Sources Mapped

APPENDIX C

Homestead Trailer Park Drinking Water Protection Area and Potential and Existing Contaminant Sources (Map 2)

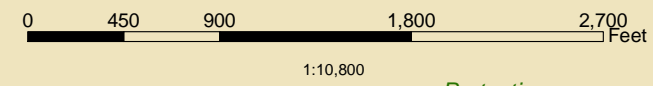


Map 2: Potential and Existing Contaminant Sources

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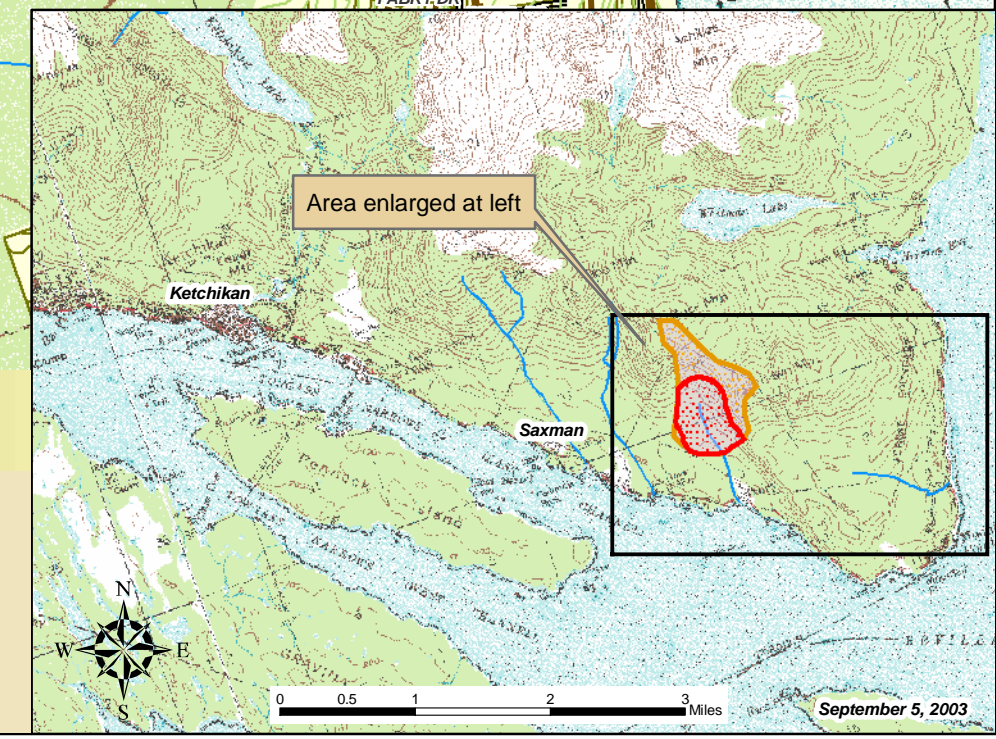


Data Sources:
 Background image - USGS 1:63,000 mapping
 Lakes & streams - U.S. Forest Service, Tongass
 Roads, property lines - Ketchikan Gateway Borough



Protection zones were delineated based upon streams noted on USGS 1:63,000 mapping.
 For this PWS, Zone C (the entire watershed) covers the same area as Zone B (areas within 1-mile of the stream).

- Legend**
- Homestead Trailer Park
 - Lake
 - Zone A Protection Area
 - Zone B Protection Area
 - Zone C Protection Area
 - Stream
 - Roads
 - Elevation contours



APPENDIX D

Vulnerability Analysis for Homestead Trailer Park Drinking Water Source (Charts 1-13)

Chart 1. Susceptibility of the Surface Water Source - Homestead Trailer Park

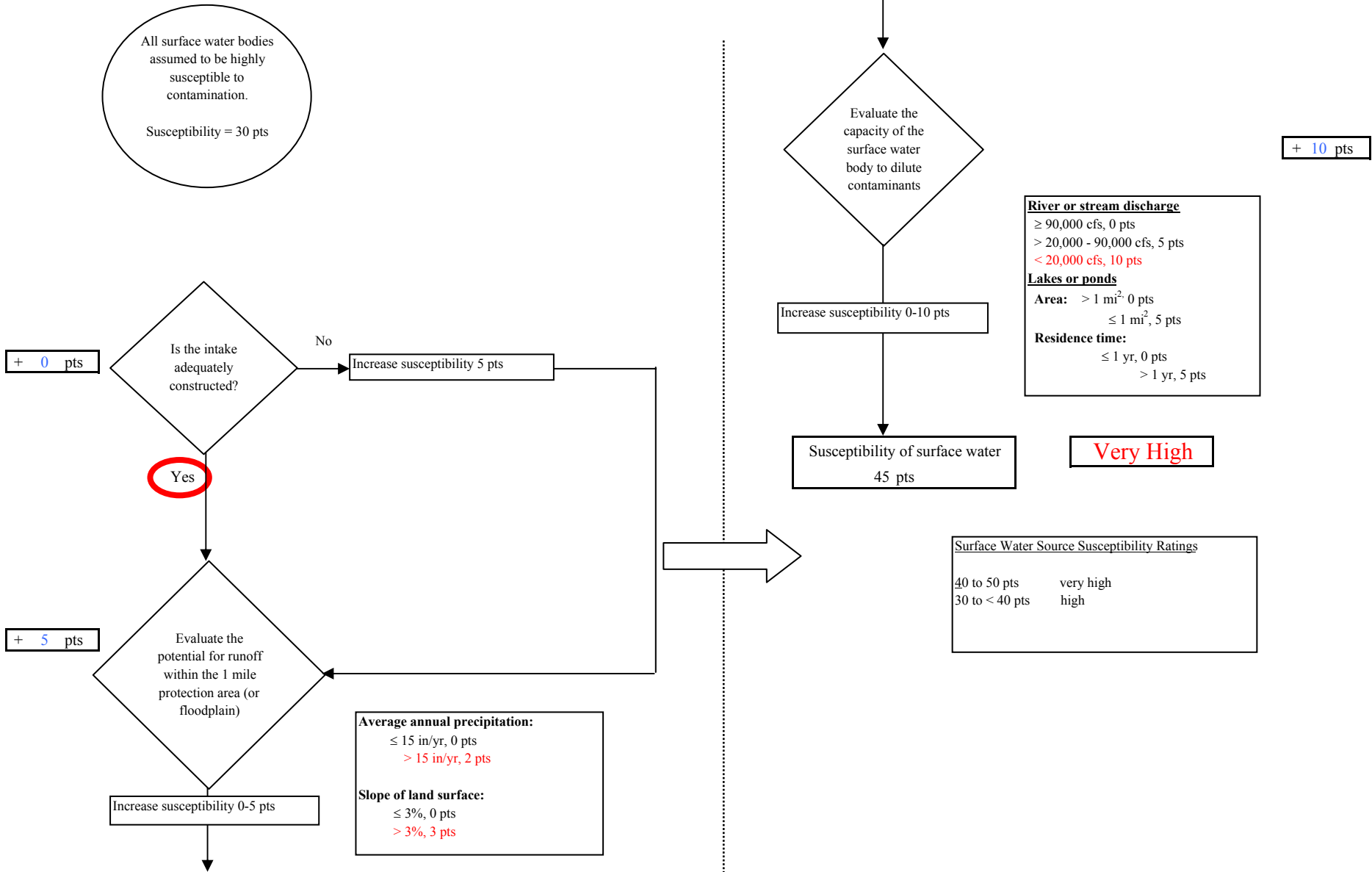
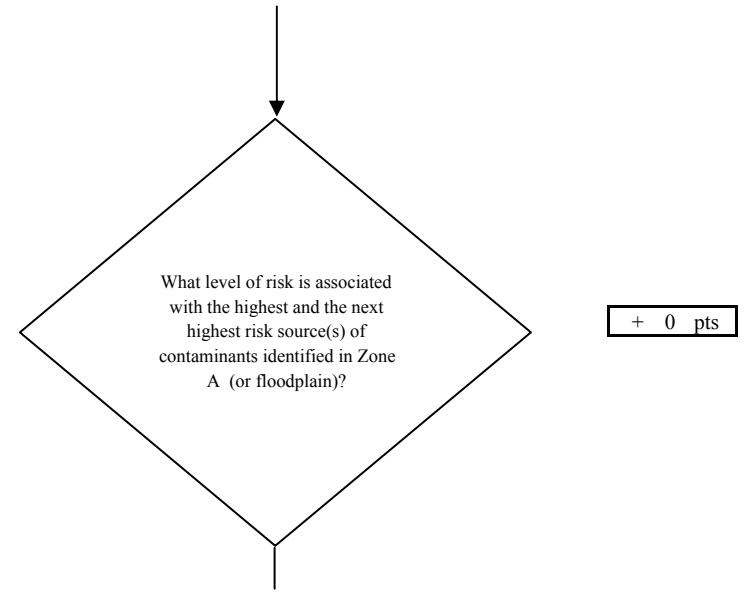
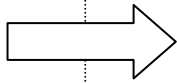
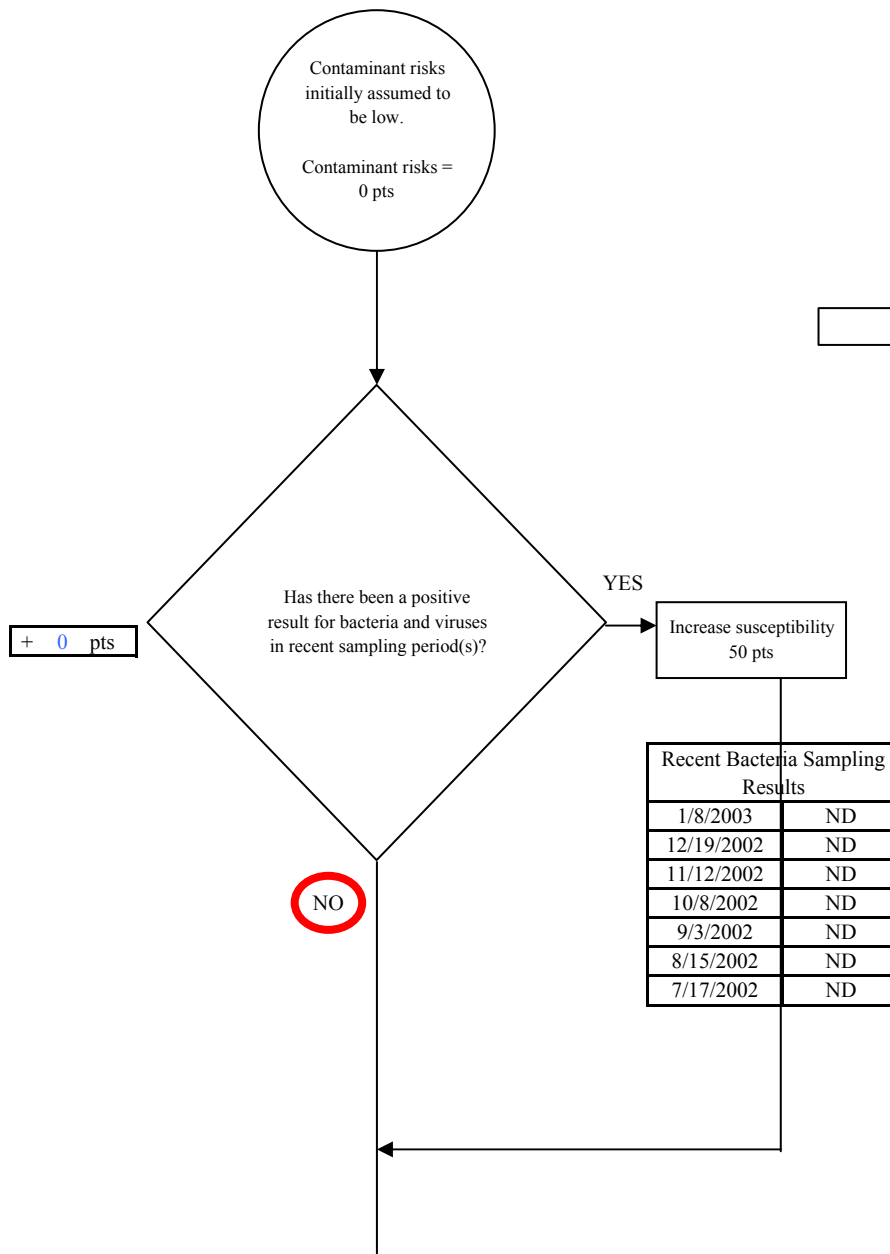


Chart 2. Contaminant risks for Homestead Trailer Park - Bacteria & Viruses



Risk Rankings for Contaminant Sources Identified in Zone A

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

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

Matrix Score 0

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

Chart 2. Contaminant risks for Homestead Trailer Park - Bacteria & Viruses

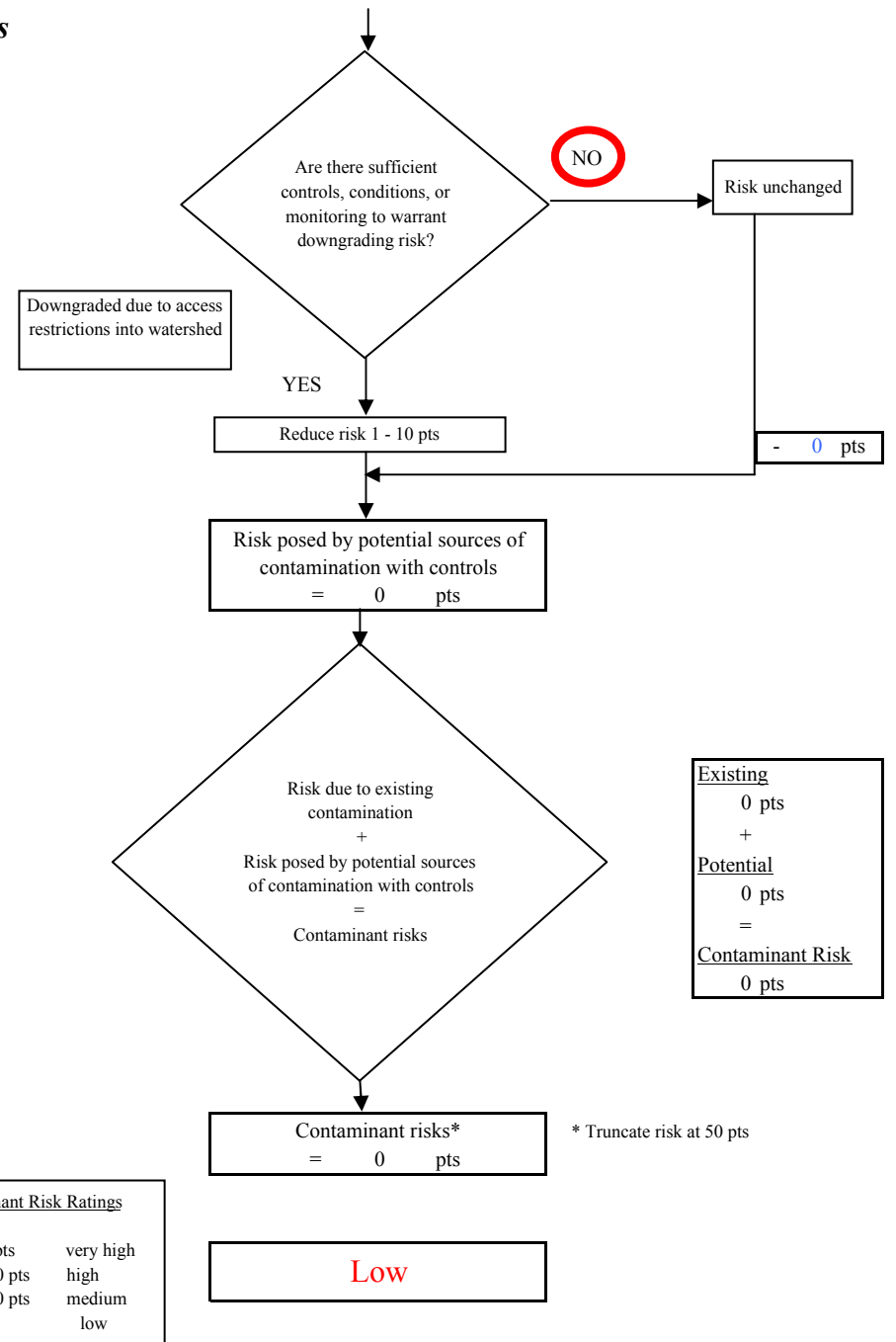
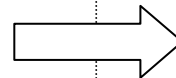
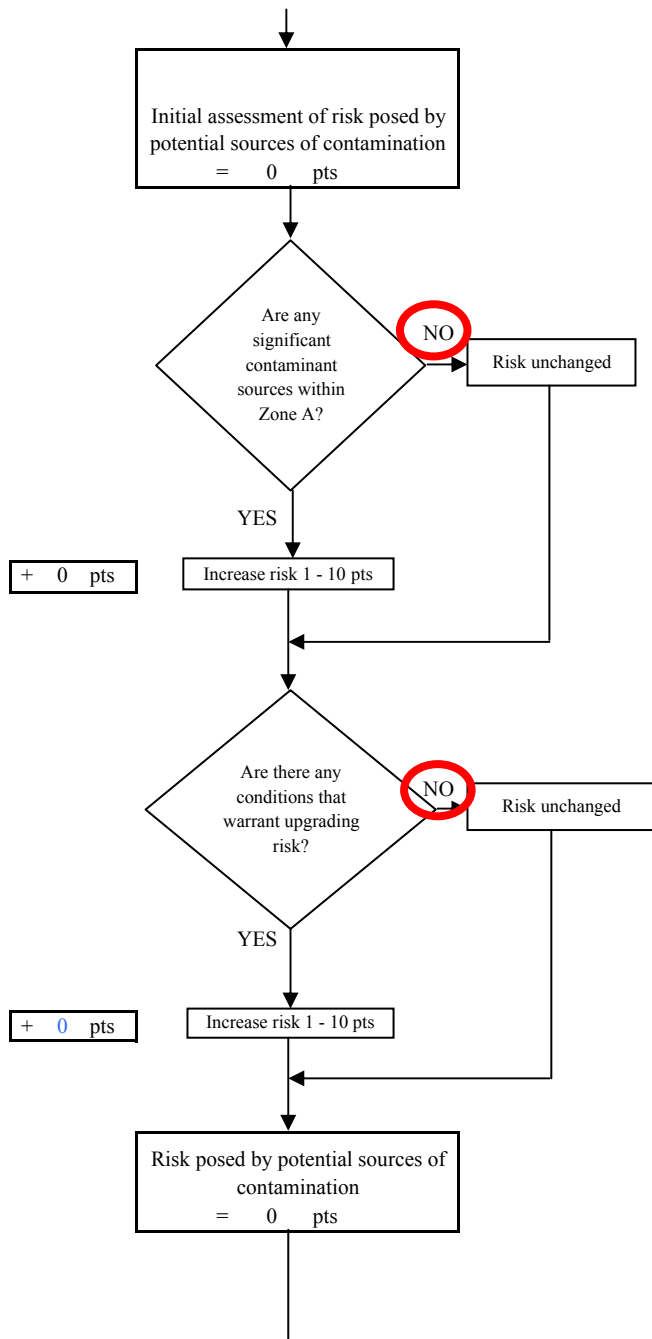


Chart 3. Vulnerability analysis for Homestead Trailer Park - Bacteria & Viruses

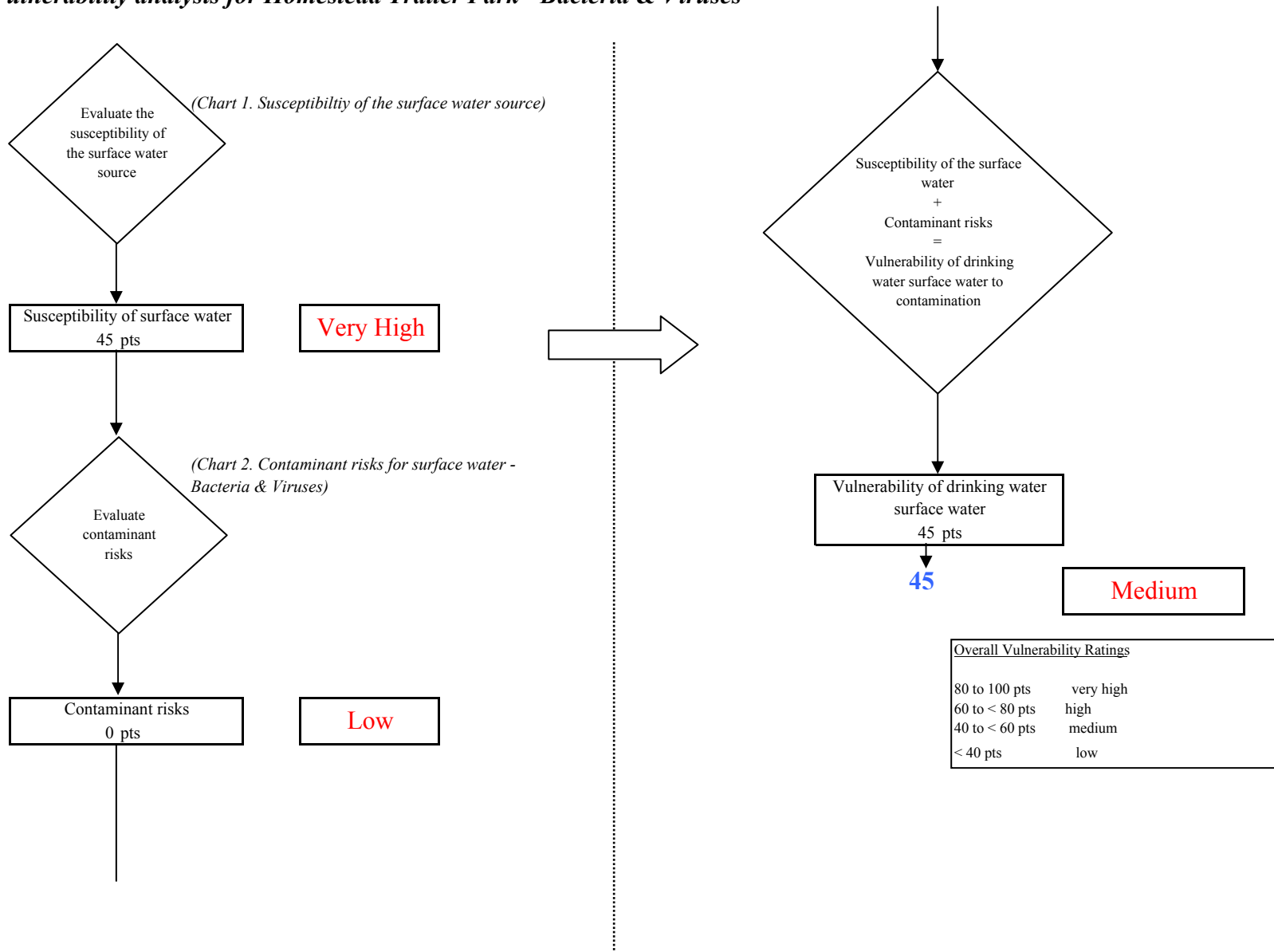


Chart 4. Contaminant risks for Homestead Trailer Park - Nitrates and Nitrites

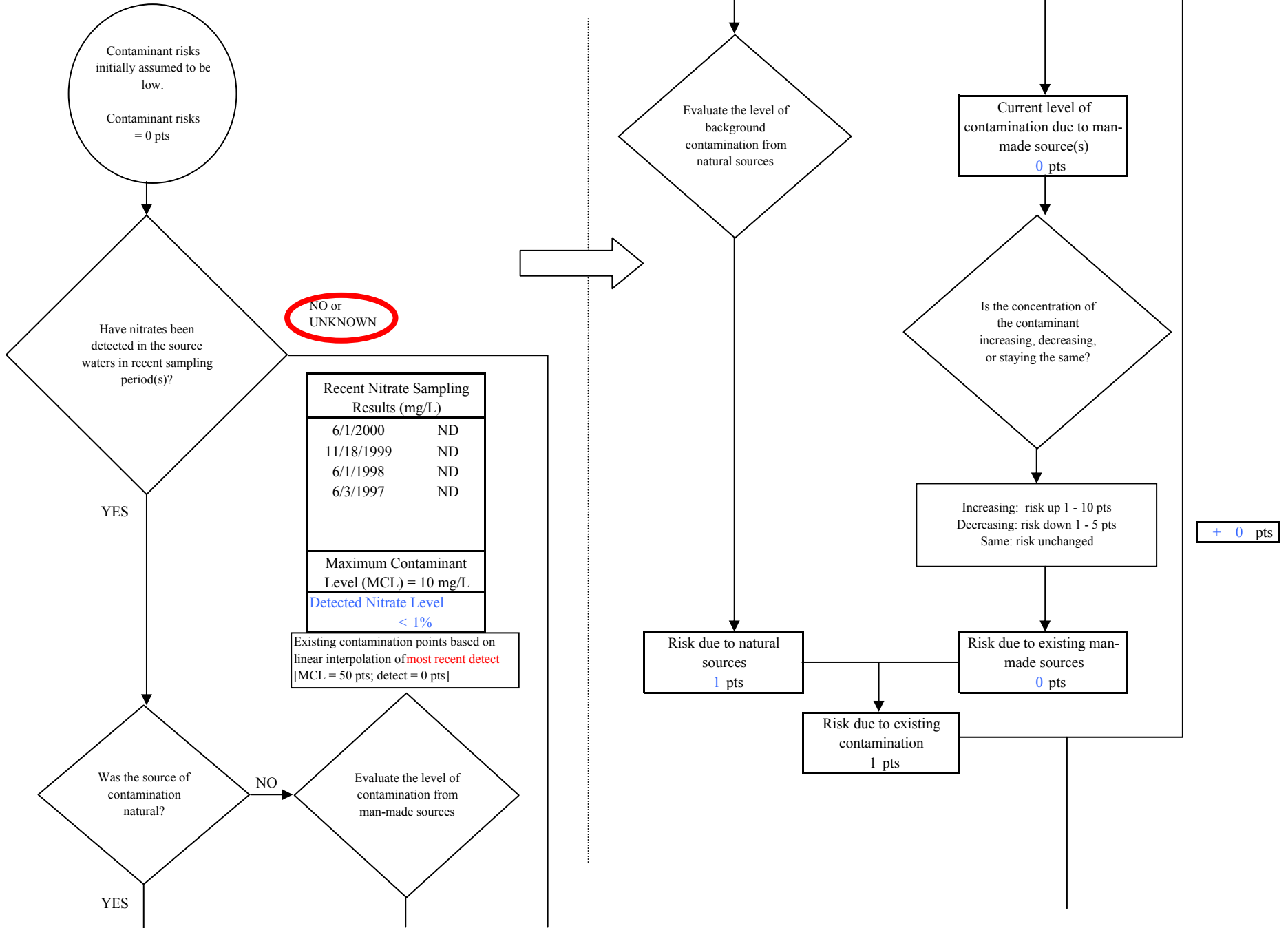
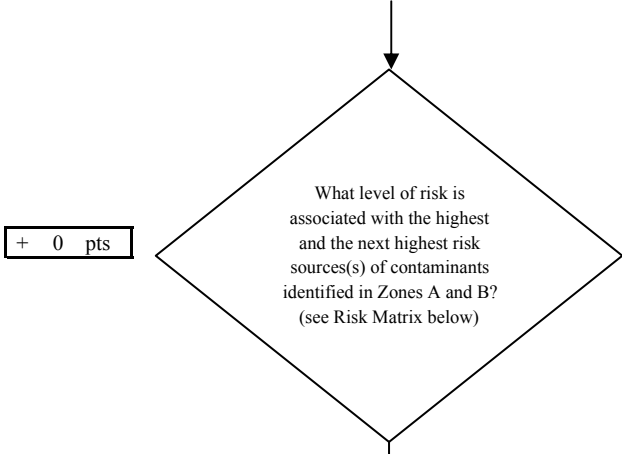


Chart 4. Contaminant risks for Homestead Trailer Park - Nitrates and Nitrites



Risk Levels for Contaminant Sources identified in Zones A and B

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

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

Matrix Score 0

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

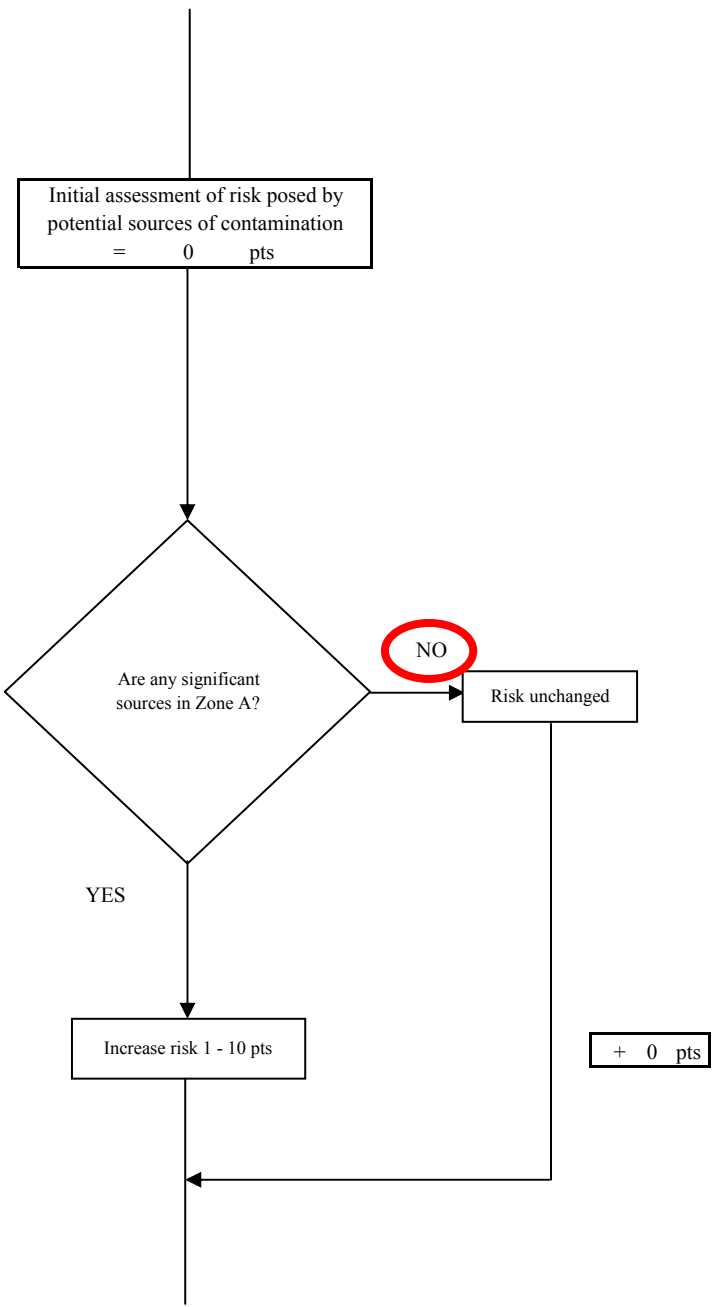
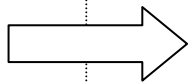


Chart 4. Contaminant risks for Homestead Trailer Park - Nitrates and Nitrites

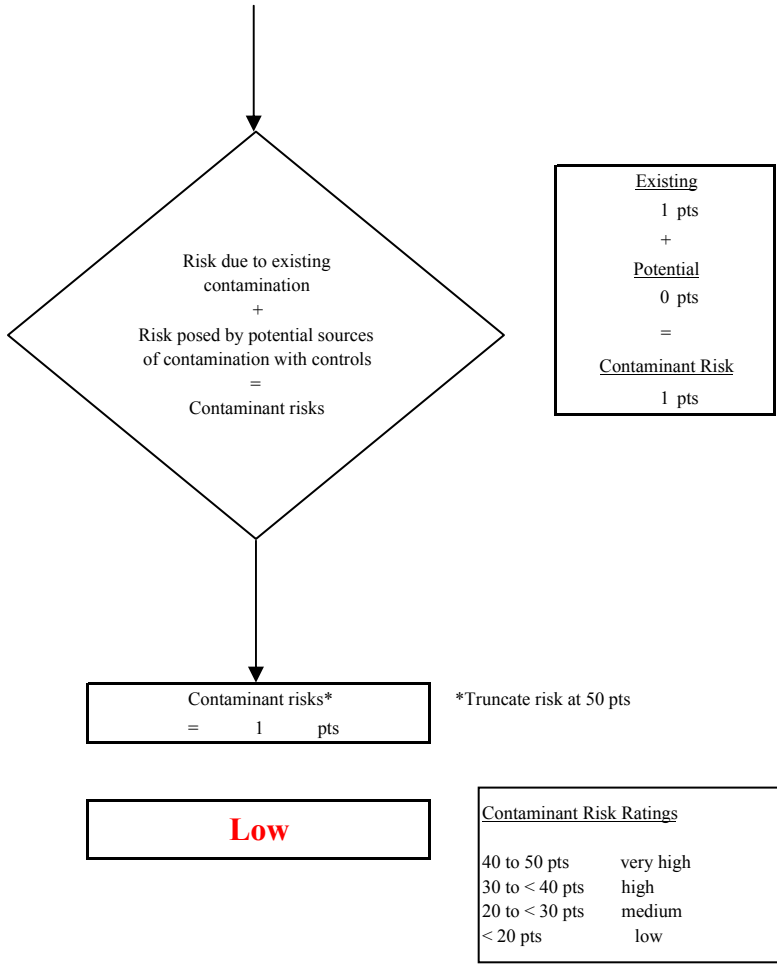
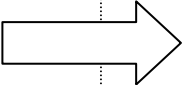
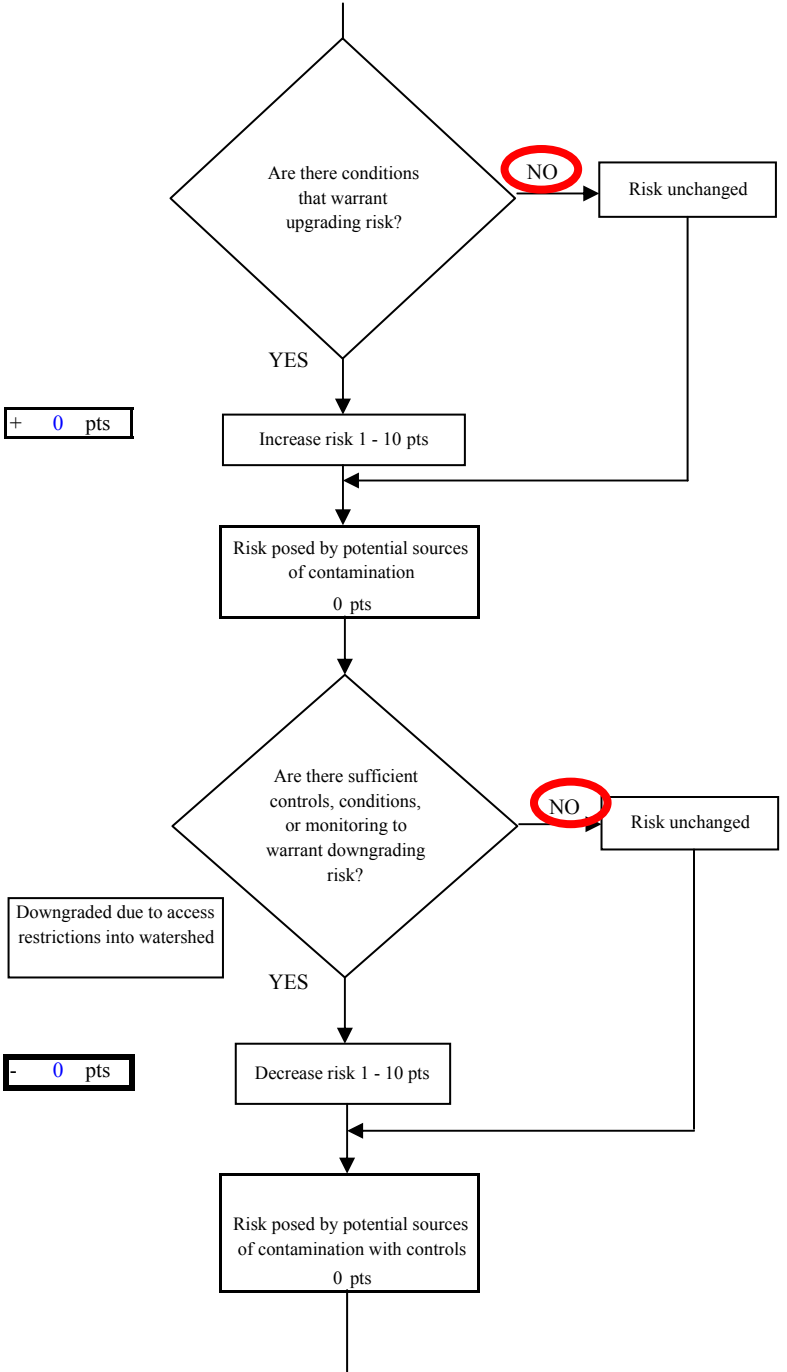


Chart 5. Vulnerability analysis for Homestead Trailer Park - Nitrates and Nitrites

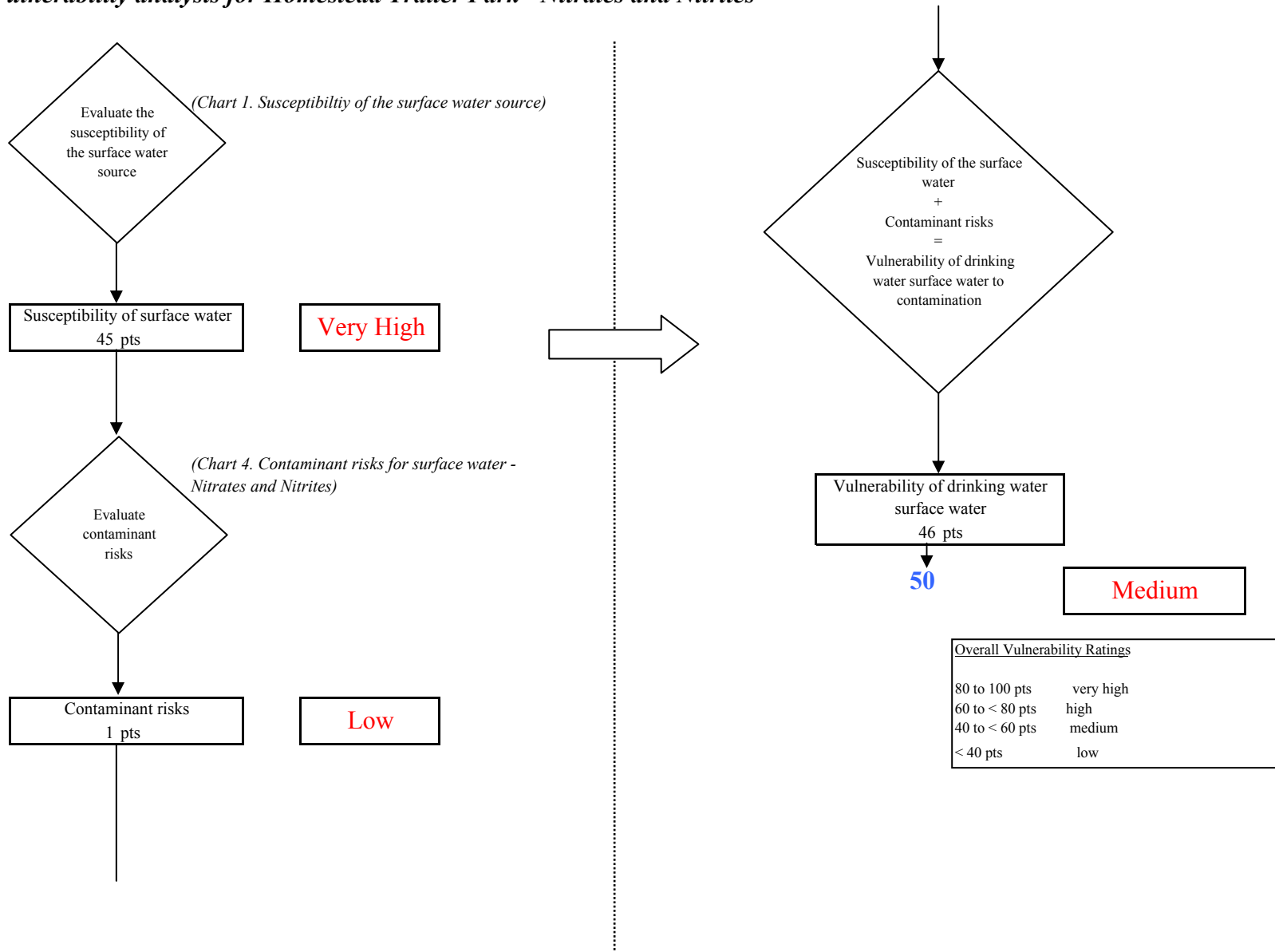


Chart 6. Contaminant risks for Homestead Trailer Park - Volatile Organic Chemicals

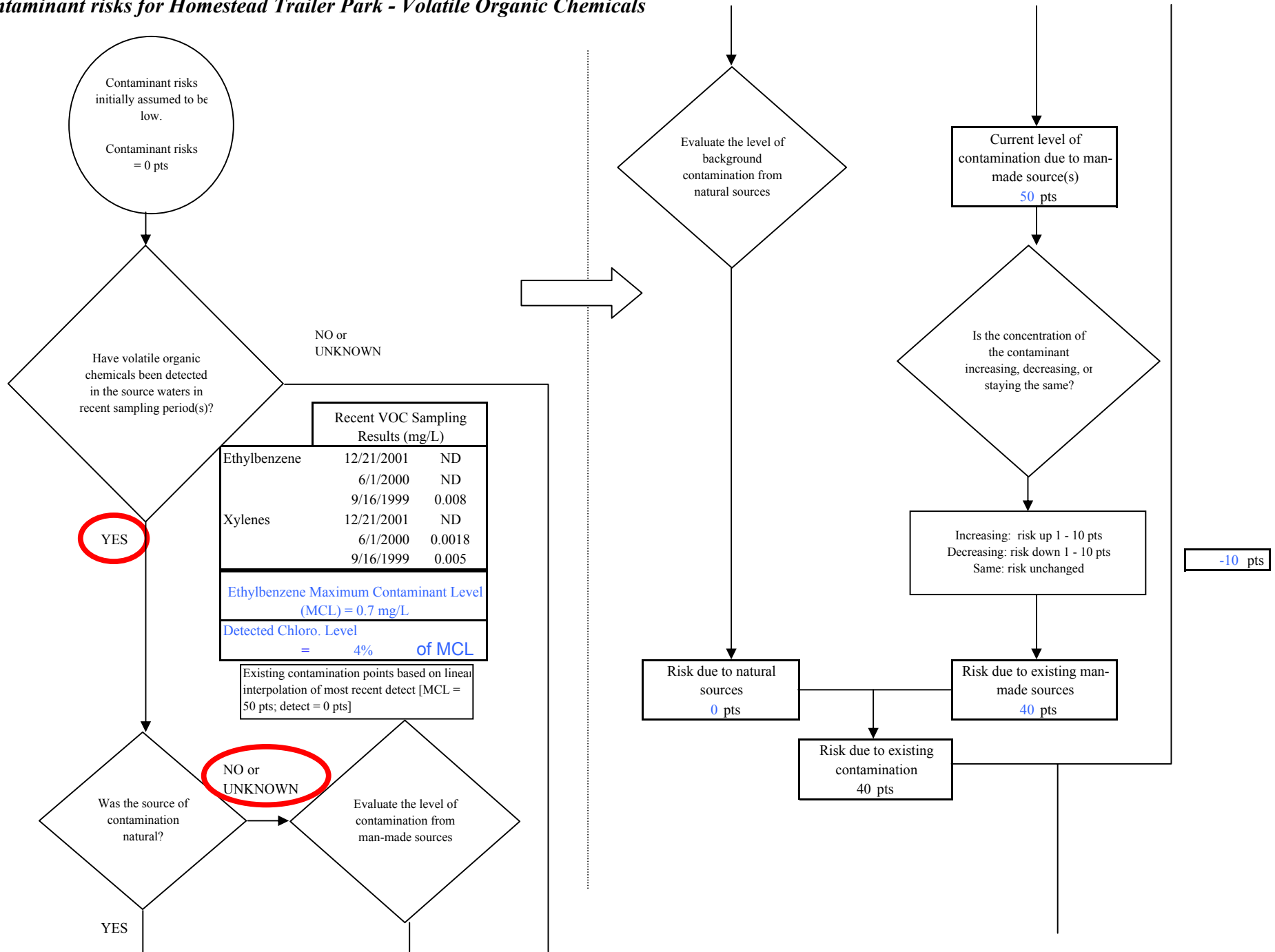


Chart 6. Contaminant risks for Homestead Trailer Park - Volatile Organic Chemicals

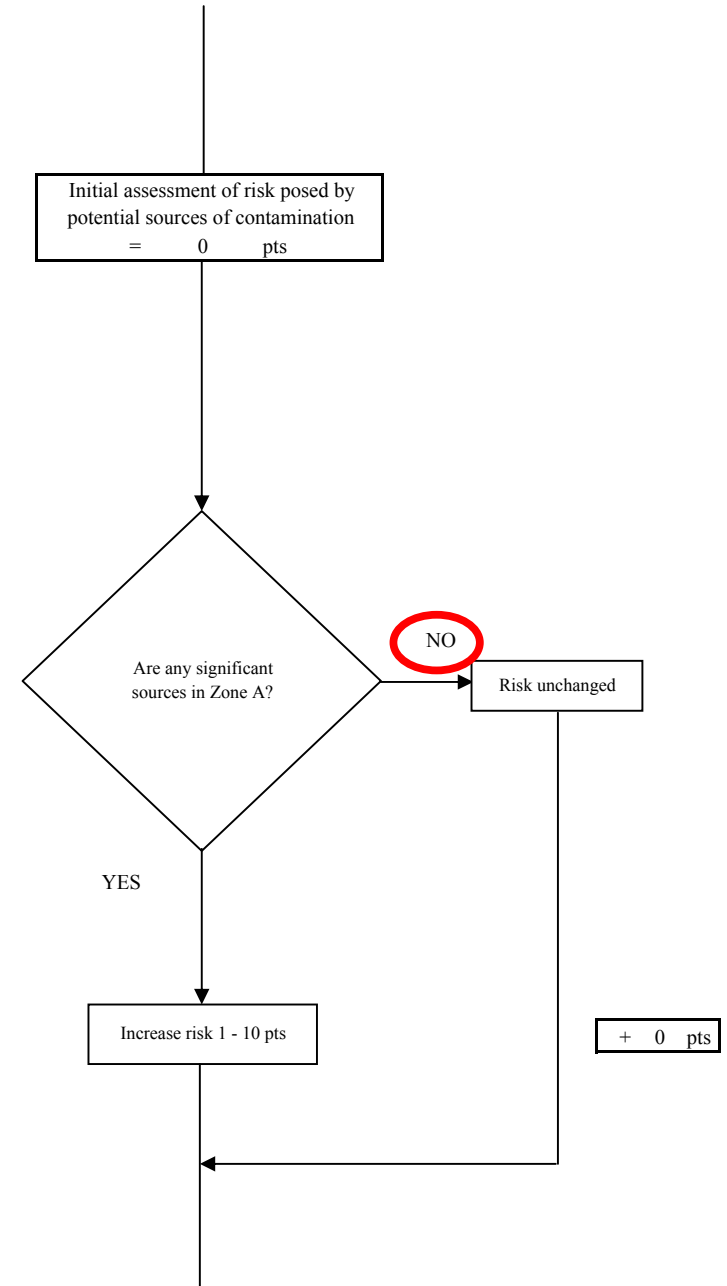
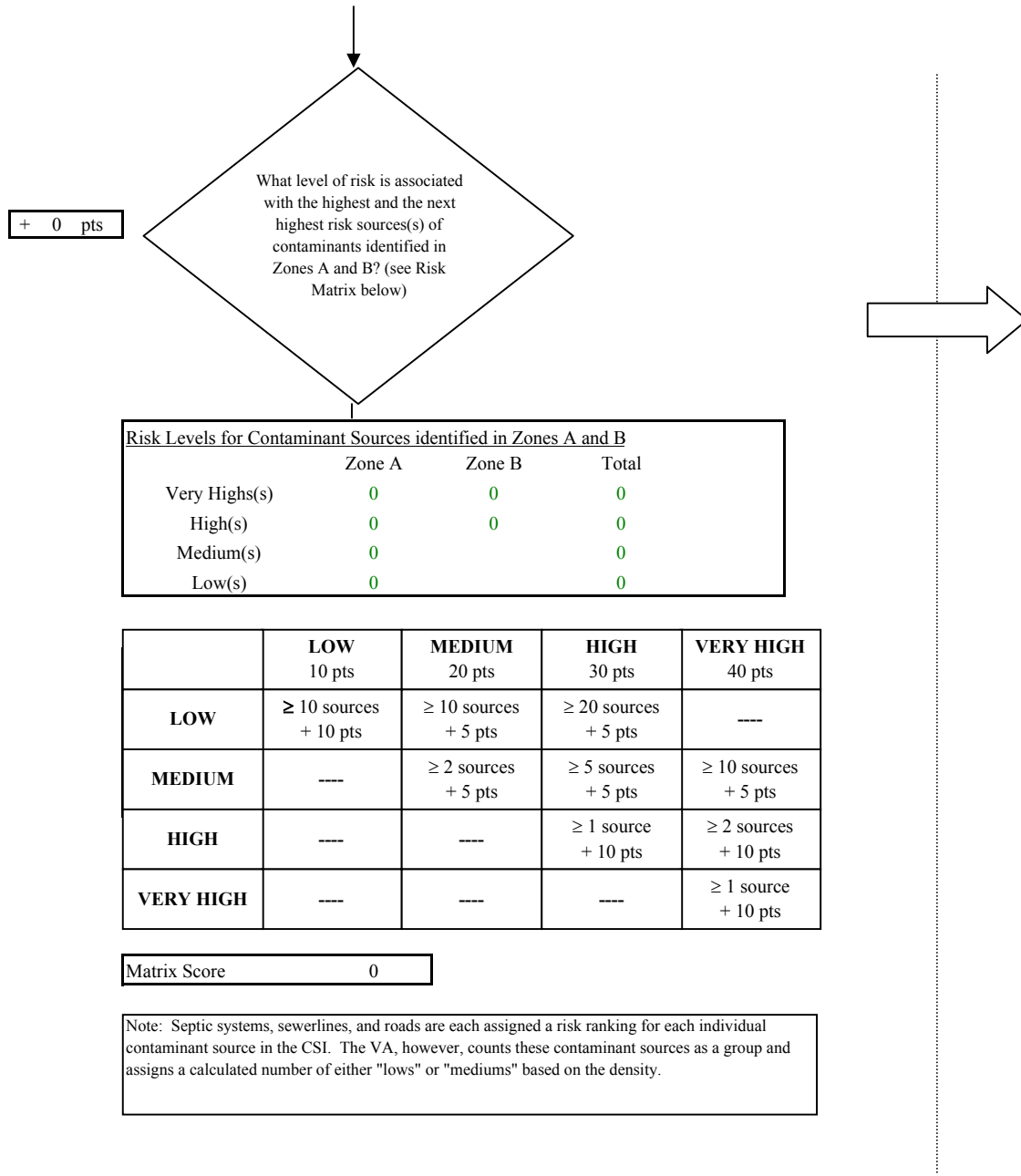
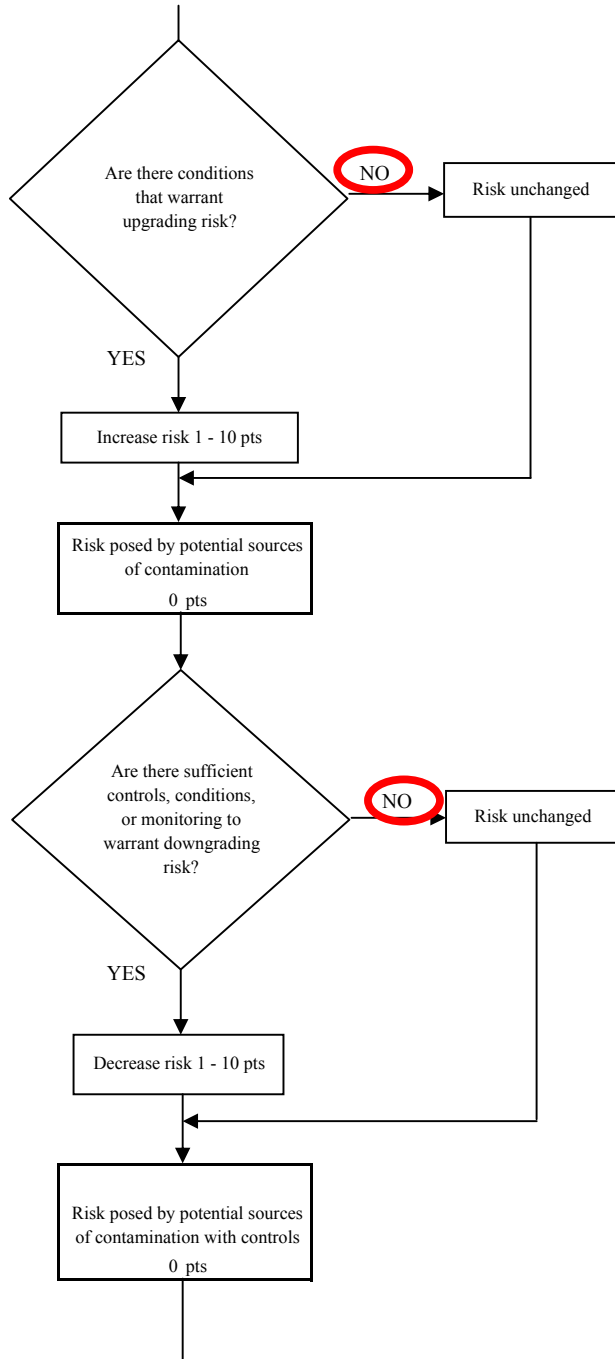


Chart 6. Contaminant risks for Homestead Trailer Park - Volatile Organic Chemicals

+ 0 pts



- 0 pts

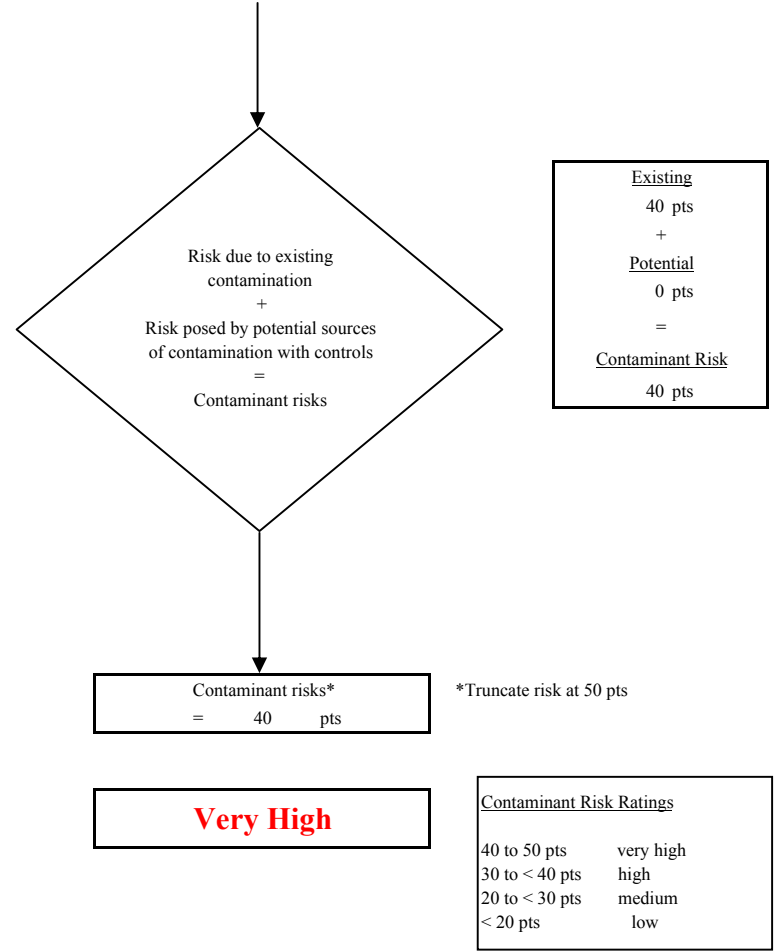
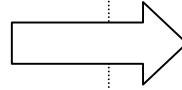


Chart 7. Vulnerability analysis for Homestead Trailer Park - Volatile Organic Chemicals

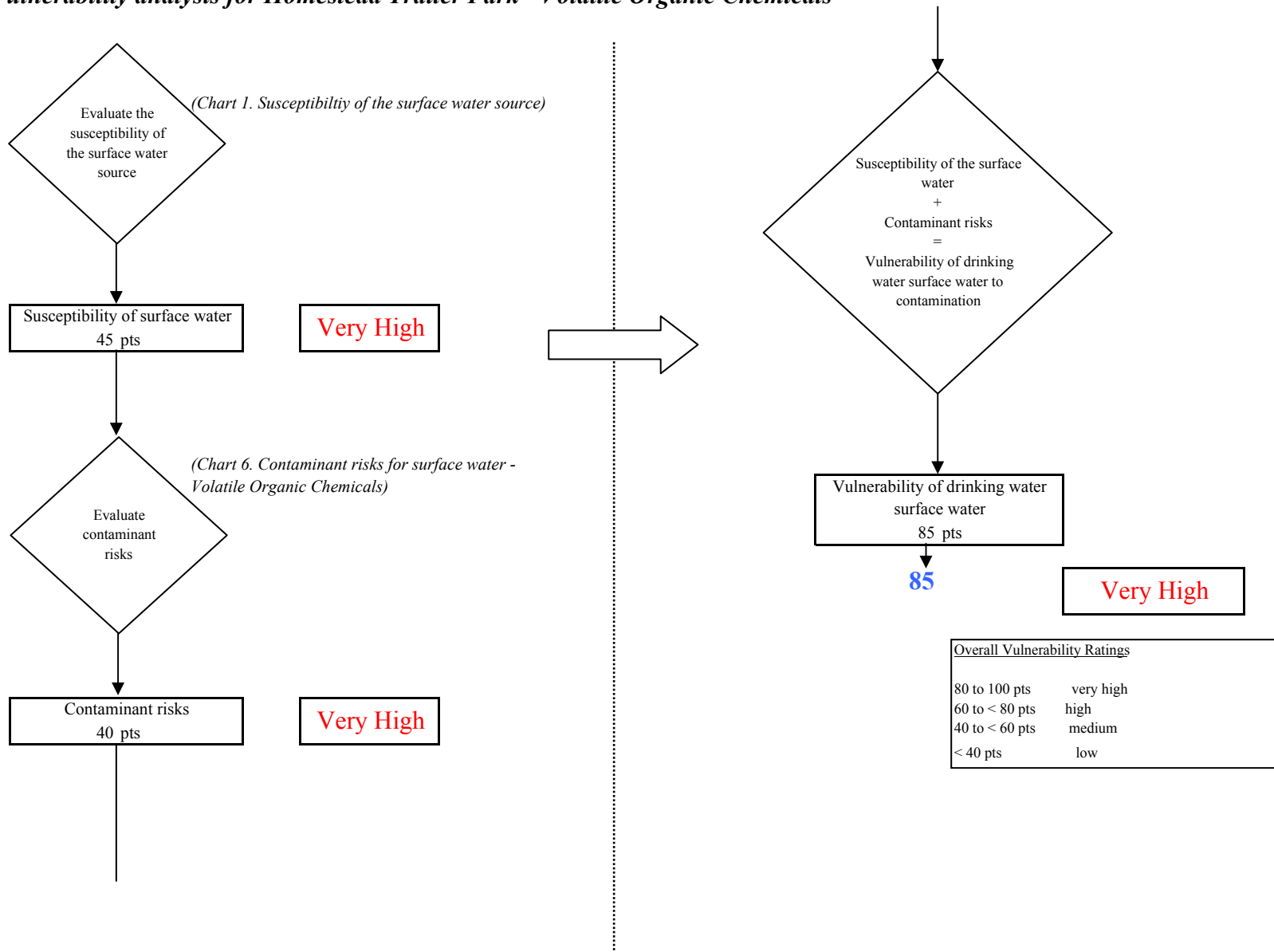


Chart 8. Contaminant risks for Homestead Trailer Park - Heavy Metals, Cyanide and Other Inorganic Chemicals

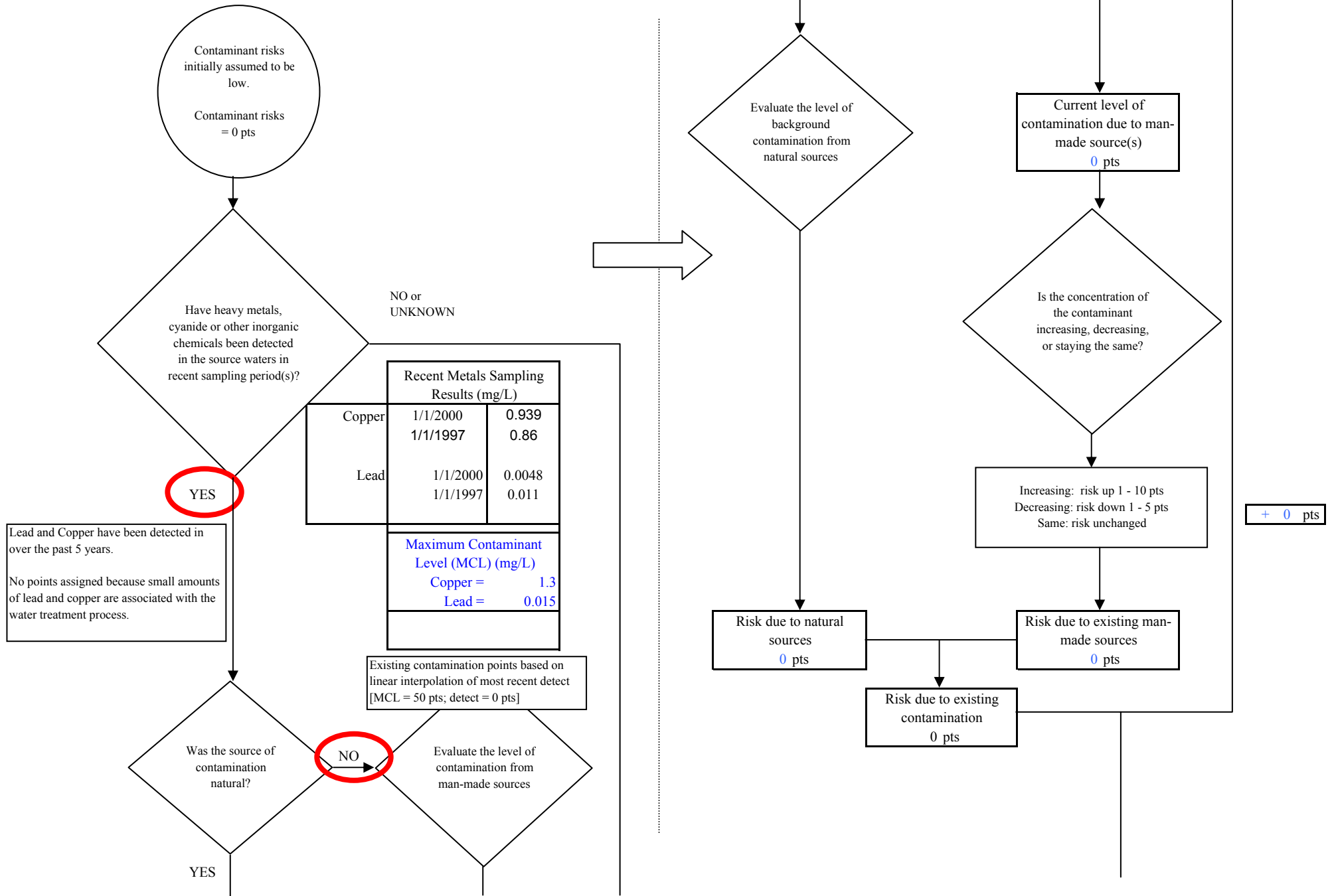


Chart 8. Contaminant risks for Homestead Trailer Park - Heavy Metals, Cyanide and Other Inorganic Chemicals

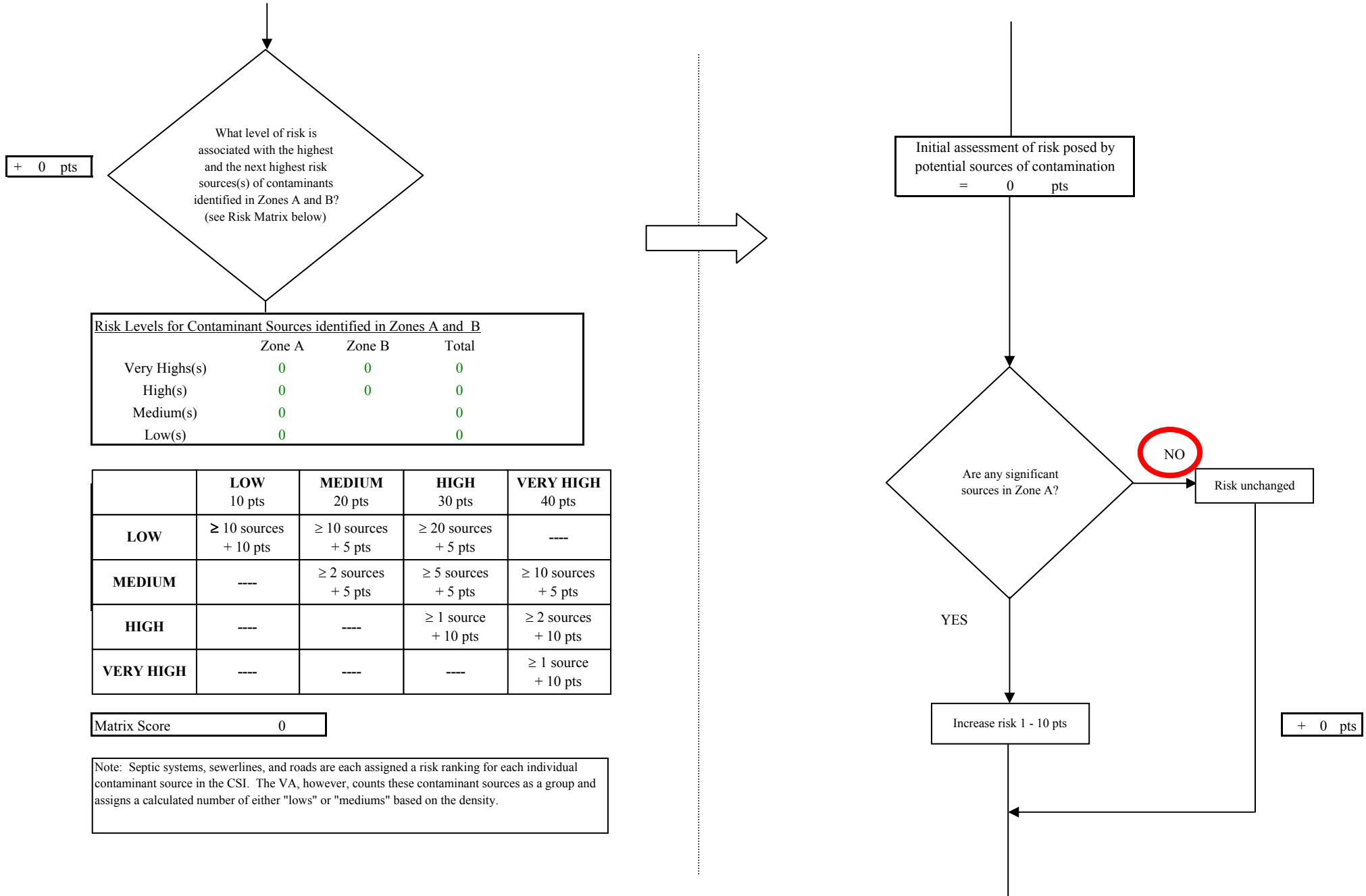


Chart 8. Contaminant risks for Homestead Trailer Park - Heavy Metals, Cyanide and Other Inorganic Chemicals

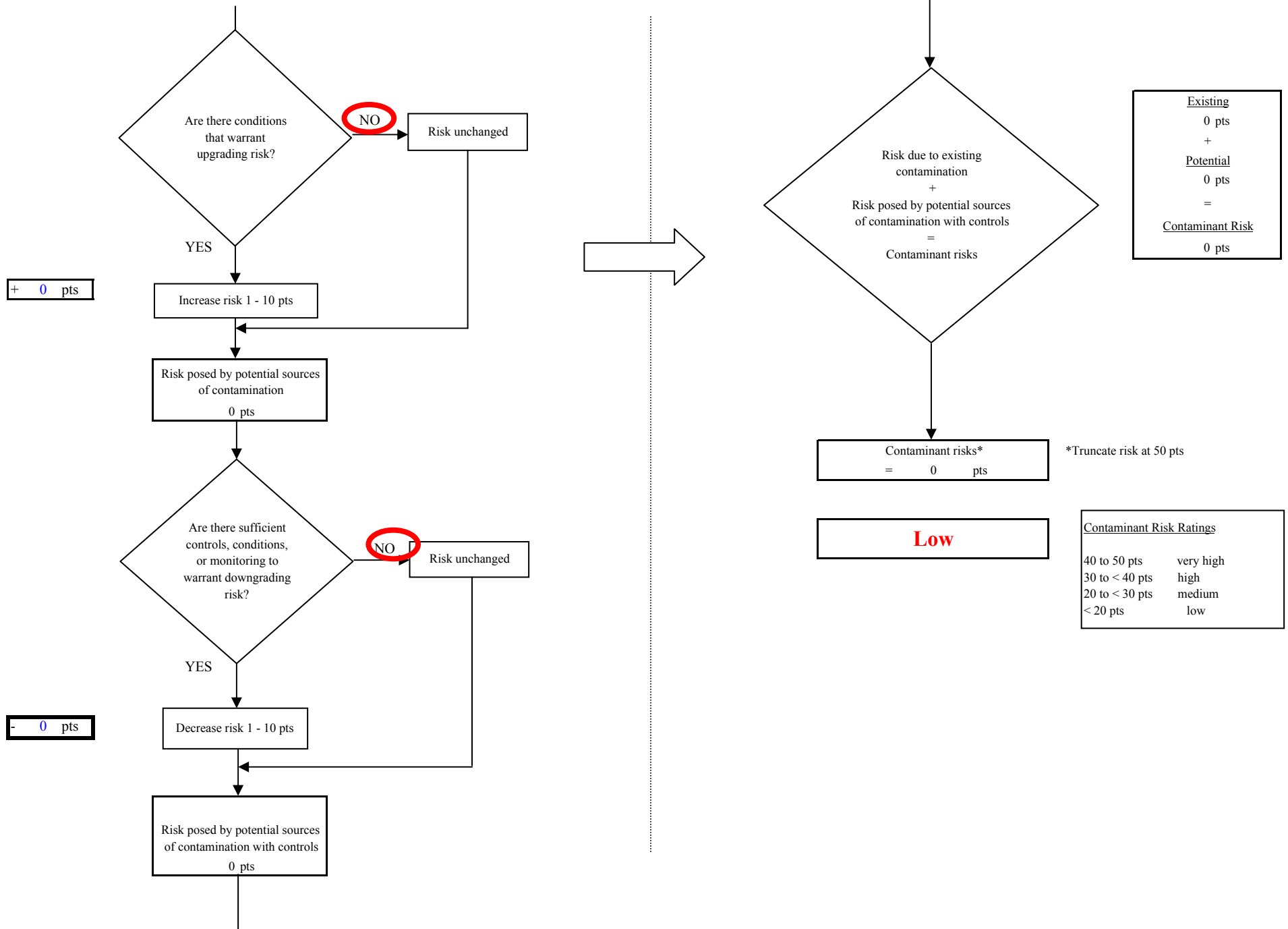


Chart 9. Vulnerability analysis for Homestead Trailer Park - Heavy Metals, Cyanide and Other Inorganic Chemicals

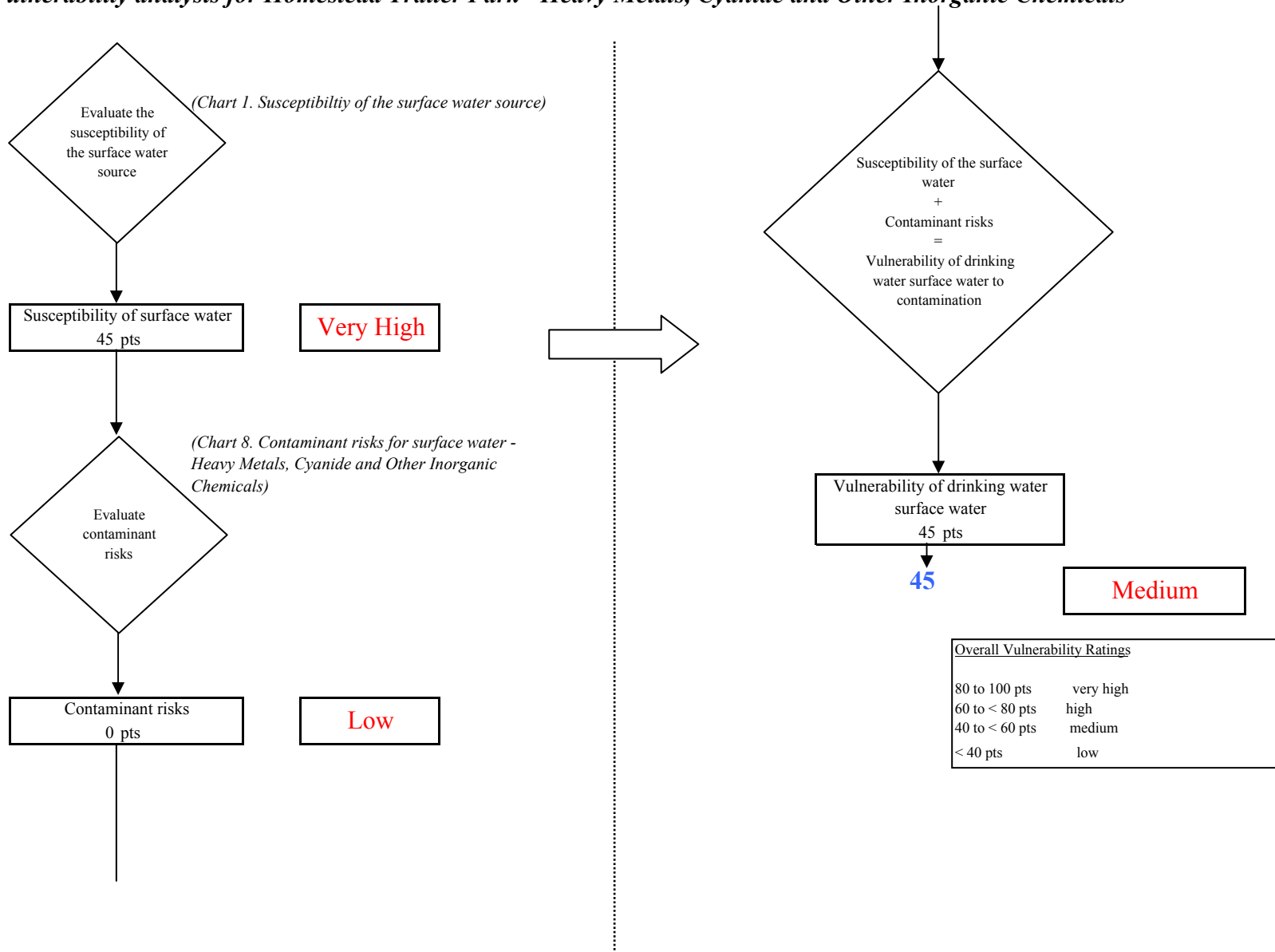


Chart 10. Contaminant risks for Homestead Trailer Park - Synthetic Organic Chemicals

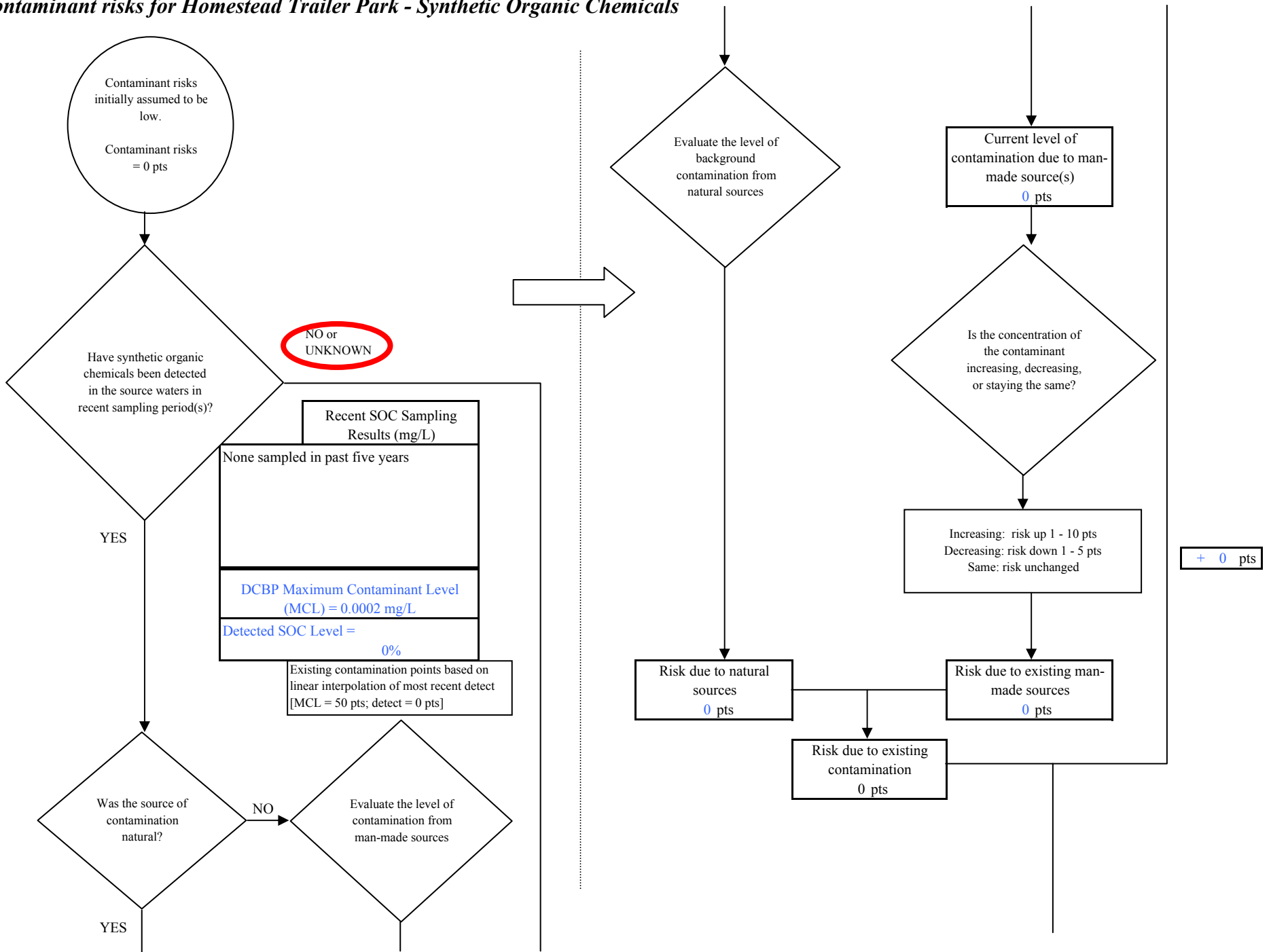
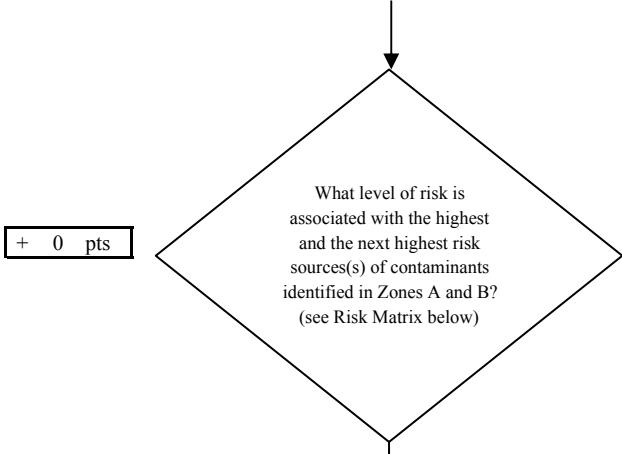


Chart 10. Contaminant risks for Homestead Trailer Park - Synthetic Organic Chemicals



Risk Levels for Contaminant Sources identified in Zones A and C

| | Zone A | Zone B | 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 |
|------------------|--------------------------|-------------------------|-------------------------|----------------------------|
| LOW | ≥ 10 sources + 10 pts | ≥ 10 sources + 5 pts | ≥ 20 sources + 5 pts | ---- |
| MEDIUM | ---- | ≥ 2 sources + 5 pts | ≥ 5 sources + 5 pts | ≥ 10 sources + 5 pts |
| HIGH | ---- | ---- | ≥ 1 source + 10 pts | ≥ 2 sources + 10 pts |
| VERY HIGH | ---- | ---- | ---- | ≥ 1 source + 10 pts |

Matrix Score 0

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

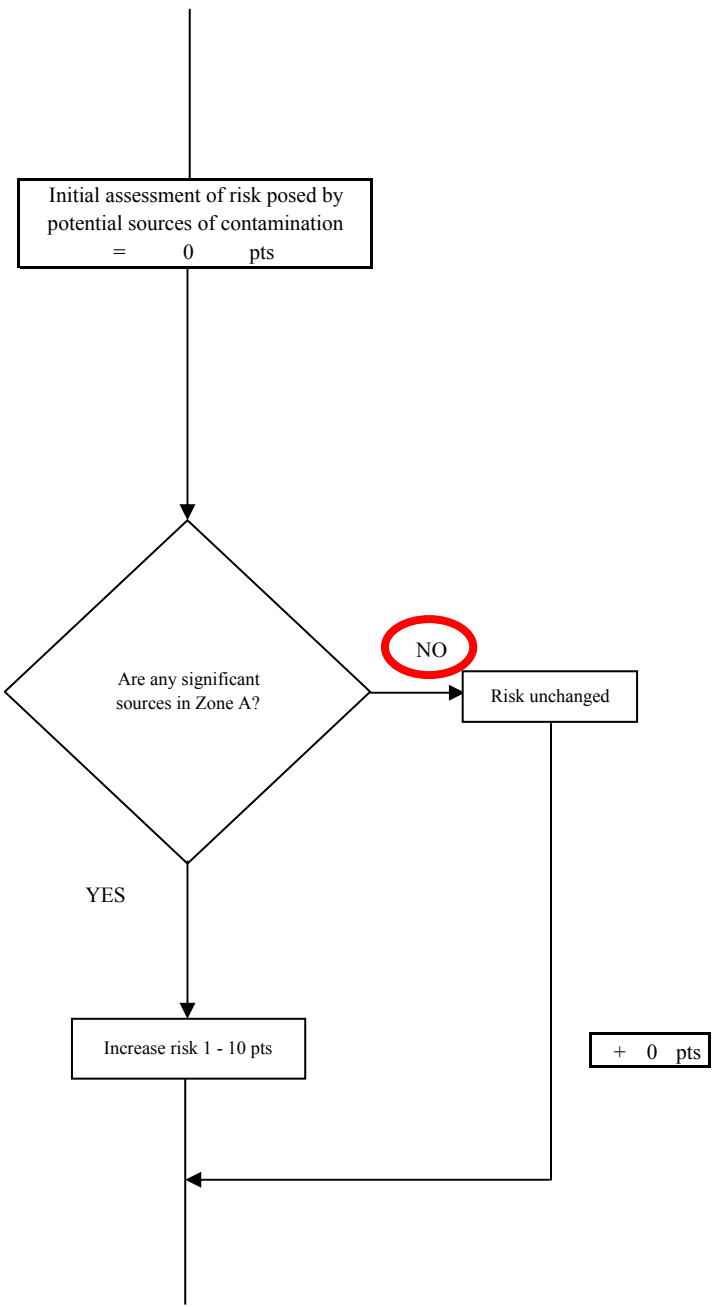
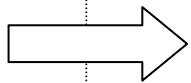


Chart 10. Contaminant risks for Homestead Trailer Park - Synthetic Organic Chemicals

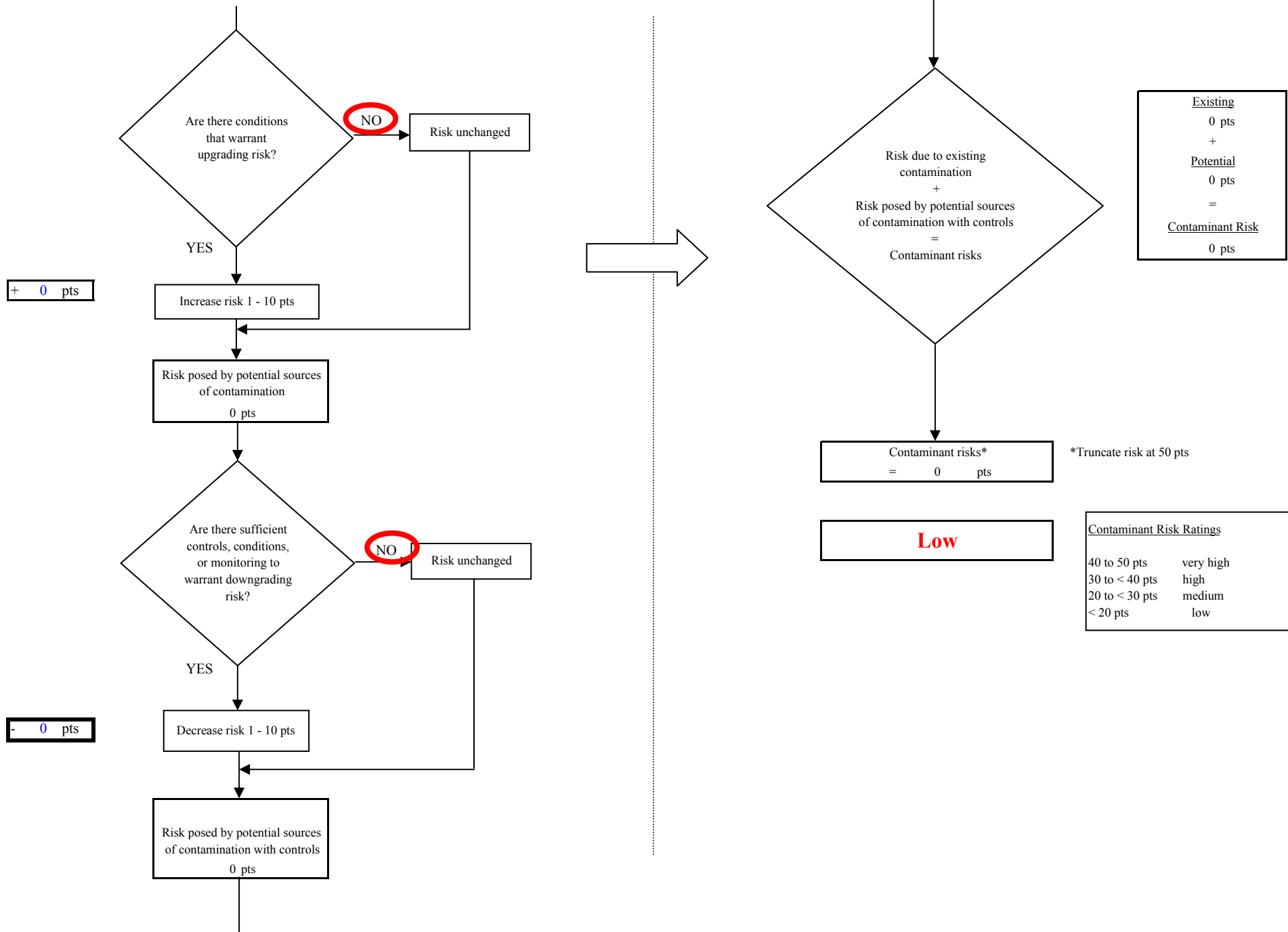


Chart 11. Vulnerability analysis for Homestead Trailer Park - Synthetic Organic Chemicals

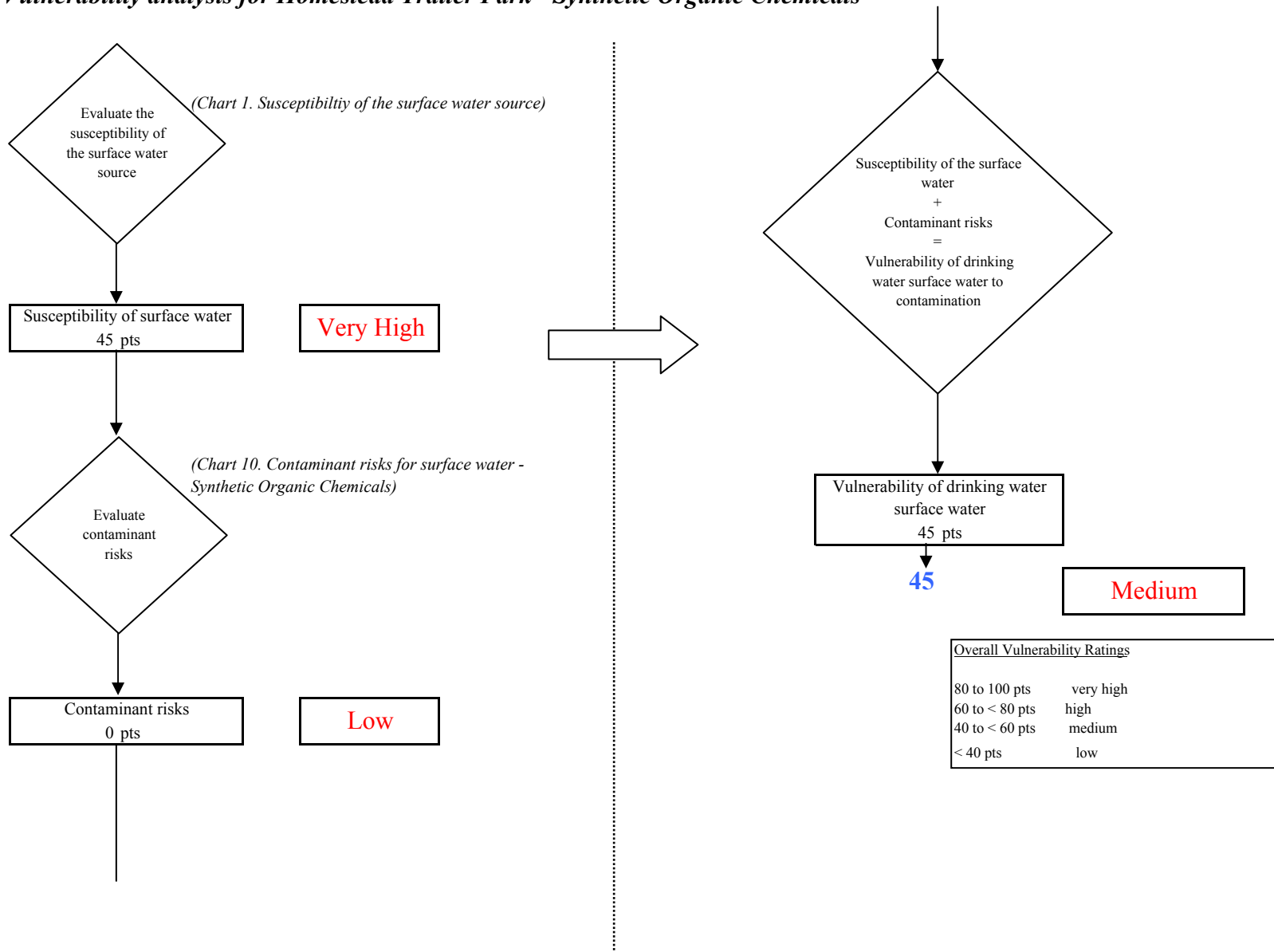


Chart 12. Contaminant risks for Homestead Trailer Park - Other Organic Chemicals

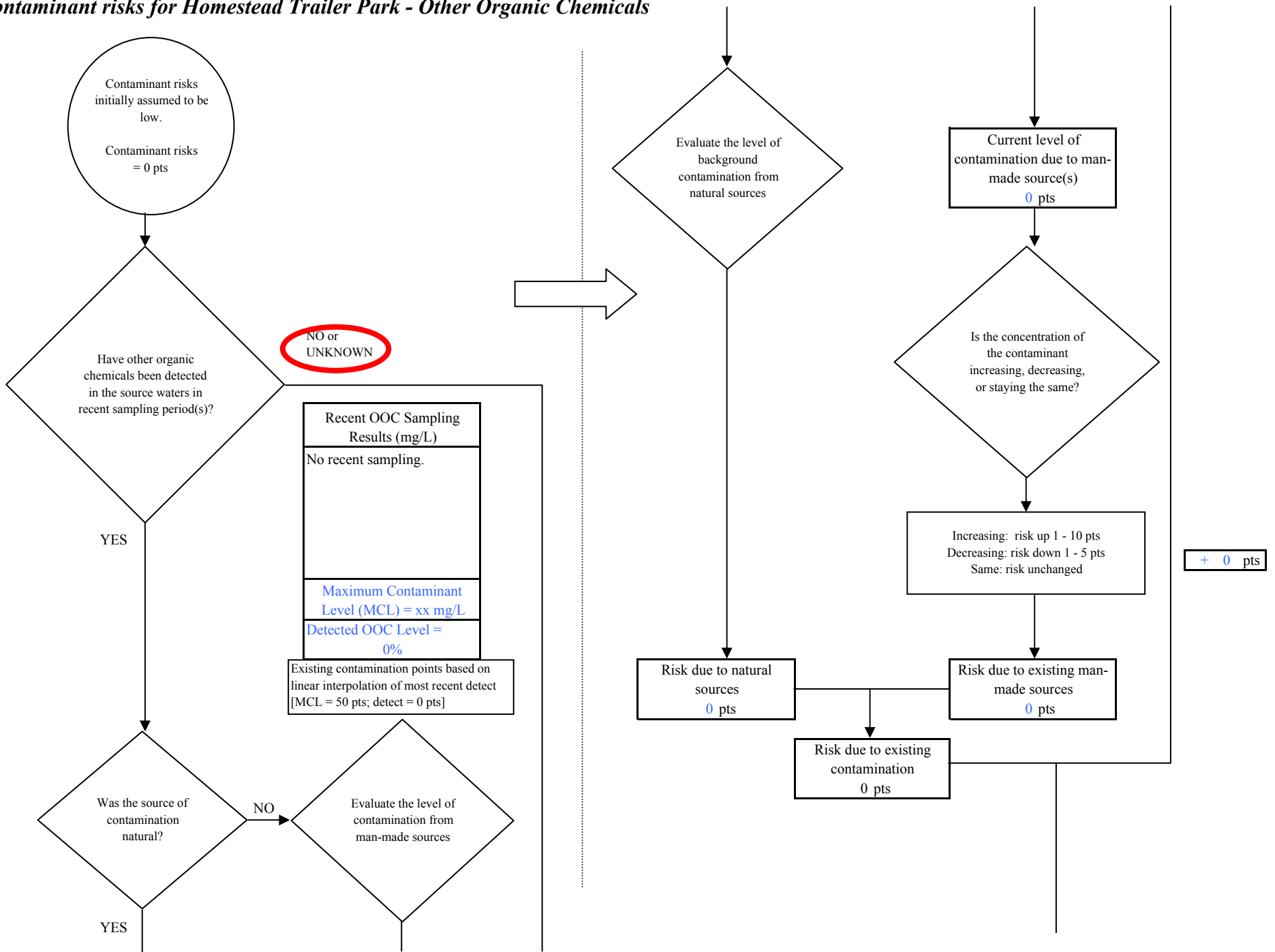


Chart 12. Contaminant risks for Homestead Trailer Park - Other Organic Chemicals

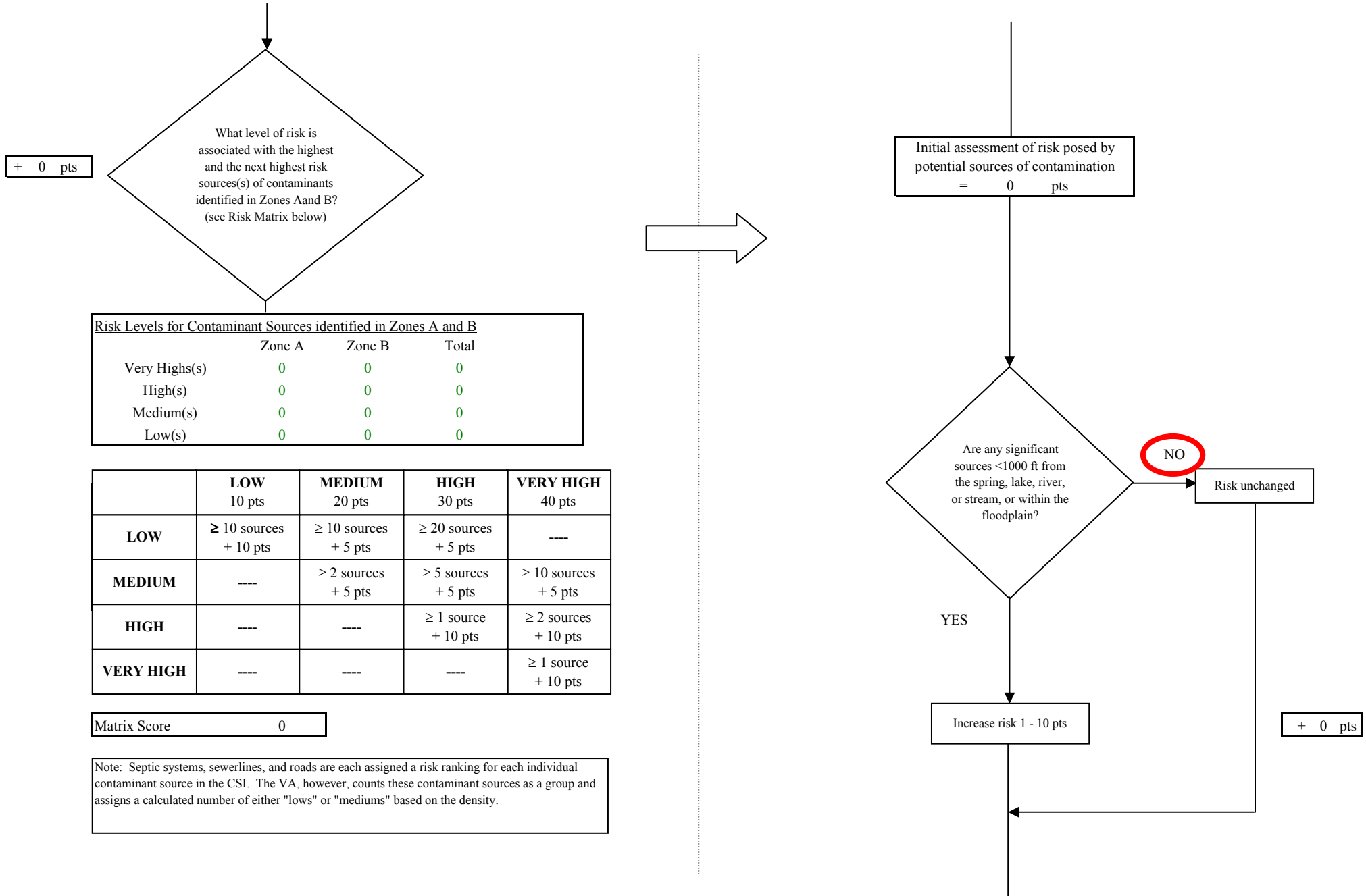


Chart 12. Contaminant risks for Homestead Trailer Park - Other Organic Chemicals

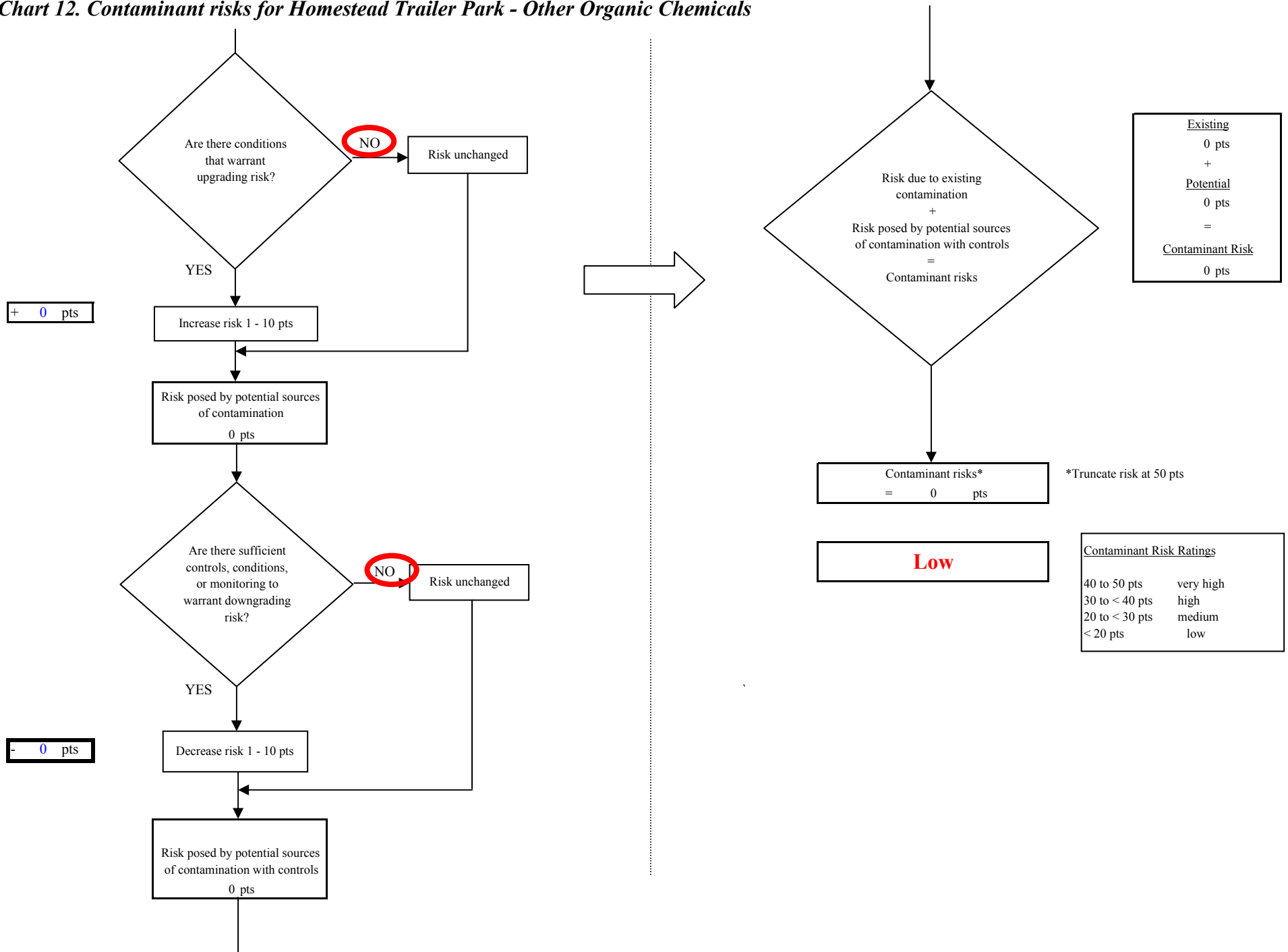


Chart 13. Vulnerability analysis for Homestead Trailer Park - Other Organic Chemicals

