Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Allakaket Drinking Water System, Allakaket, Alaska

PWSID # 300206.001

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DRINKING WATER PROTECTION PROGRAM REPORT 1314
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 Allakaket Public Water System Source of Public Drinking Water, Allakaket, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The City of Allakaket has one Public Water System (PWS) well. The well has been used as a drinking water source since it was drilled in 1973.

The well is a Class A (community and non-transient/non-community) water system located south of the Koyukuk River, just north of the community of Allakaket, Alaska. ADEC records indicate that there is a storage tank with a 100,000-gallon capacity. Records also indicate that the drinking water source is treated with fluoride and chlorine. This system operates year round and serves approximately 200 residents through 3 service connections. The wellhead received a susceptibility rating of **Very High** and the aquifer received a susceptibility rating of **High**. Combining these two ratings produce a **High** rating for the natural susceptibility of the well.

Identified potential and current sources of contaminants for the public drinking water source include: a sewage lagoon, fuel tanks, power generation facilities, landfills, ADEC recognized contaminated sites, and airports. A detailed inventory of potential or existing contamination sources can be found in Appendix B, Table 1. These identified potential and existing sources of contamination are considered as sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals contaminant categories.

Overall, the water well received a vulnerability rating of **Very High** for bacteria and viruses, nitrates and nitrites, volatile organic chemicals, other organic chemicals and synthetic organic chemicals and a vulnerability rating of **High** for heavy metals, cyanide and other inorganic chemicals.

PUBLIC DRINKING WATER SYSTEM

The Allakaket PWS well is a Class A (community/non-transient/non-community) public water system. The system is located approximately 35 feet from the bank of the Koyukuk River, north of the community of Allakaket, Alaska. (Sec. 14, T020N, R024W, Fairbanks Meridian; see Map A of Appendix A). Allakaket is located on the south bank of the Koyukuk River, approximately 190 air miles northwest of Fairbanks. The community has a population of 102 (ADCED, 2003). Average annual precipitation for Allakaket is 13 inches, including approximately 72 inches of snowfall. Temperatures typically range between –40 to 70°F.

Residents of Allakaket haul water from the community water system located at the washeteria. Pit privies are used or honeybuckets are hauled to the sewage lagoon. No homes are plumbed in the community. Refuse is collected and disposed of at the City operated landfill (ADCED, 2003). Alaska Power Company provides electricity. Power-generating facilities are powered with diesel (ADCED, 2003).

According to the 1992 Sanitary Survey supplied by ADEC for the Allakaket PWS, the depth of the water well is 35 feet below the ground surface. Based on available well construction details, the well is screened from 30 to 35 feet. The well is completed in an unconfined aquifer and is located within a floodplain. A major flood in 1994 severely damaged most public facilities in the community, and major components have been replaced that include the washeteria, water treatment plant, and sewage lagoon.

ADEC records for the public water system indicated that the land surface was sloped away from the well. Generally, land surfaces that slope away from the wellhead promote surface water drainage, which reduces the potential of contaminant migration down the well casing annulus. The sanitary survey indicates that the well is grouted according to ADEC regulations. Proper grouting provides added protection against contaminants traveling along the well casing annulus and into source waters.

Allakaket is located in Koyukuk drainage basin, just south of the boundary between the Rocky Mountain System and the Intermontane Plateaus physiographic

divisions. The area is separated from the Brooks Range to the north by a major east-trending fault. Bedrock consists of an interbedded volcanic greywacke and mudstone sequence, which is exposed in the Alatna Hills to the west and the Jack White Range to the east.

Allakaket is near the limit of the Pleistocene glaciation by Brooks Range glaciers. The surficial geology is characterized by alluvial and glacial-fluvial sediments in the Koyukuk River Valley and surrounding lowlands. Discontinuous permafrost occurs in the alluvial sediments of the Koyukuk River Valley and may be absent in close proximity to large water bodies.

Soils are classified as inceptisols. Lowland soils are derived from the silty alluvium and loess of the Koyukuk River Valley. A thick, peaty surface mat is present above the saturated active layer. Freezing and thawing of the active layer produces an irregular land surface. Where present, the underlying permafrost is usually ice-rich. Similar soils are found in the uplands but are usually more gravelly and loamy in texture (Cowan, 1995).

DRINKING WATER PROTECTION AREA

In order to evaluate whether a drinking water source is at risk, we must first evaluate what the most likely pathways for surface contamination to reach the groundwater are. 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 recharge area. This area is designated as the drinking water protection area (DWPA). Because releases of contaminants within the protection area are most likely to impact the drinking water well, this area will serve as the focus for voluntary protection efforts. An analytical calculation was used to determine the size and shape of the DWPA for the Allakaket PWS. The input parameters describing the attributes of the aquifer in this calculation were adopted from Groundwater (Freeze and Cherry, 1979). Available geology and groundwater contours were also considered to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at a meaningful protection area.

The protection areas established for wells by the ADEC are usually separated into four zones, limited by the watershed. These zones correspond to differences in the time-of-travel (TOT) of the water moving through the aquifer to the well (Please refer to the Guidance Manual for Class A Public Water Systems for additional information).

The time of travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. The following is a summary of the four protection area 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 the 2 year time-of-travel
C	Less Than the 5 year time-of-travel
D	Less than the 10 year time-of-travel

The DWPA for the Allakaket PWS was determined using an analytical calculation and includes Zones A, B, C, and D (See Map A of Appendix A).

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within the Allakaket DWPA. This inventory was completed through a search of agency records and other publicly available information. Potential sources of contamination to the drinking water aquifer include a wide range of categories and types. Potential drinking water contaminants are found within agricultural, residential, commercial, and industrial areas, but can also occur within areas that have little or no development.

For the basis of all Class A public water system assessments, six categories of drinking water contaminants were inventoried. They include:

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

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

RANKING OF CONTAMINANT RISKS

Once the potential and existing sources of contamination have been identified, they are assigned

a ranking according to what type and level of risk they represent. Ranking of contaminant risks for a "potential" or "existing" source of contamination is a function of toxicity and volumes of specific contaminants associated with that source. Rankings include:

- Low,
- Medium,
- High, and
- Very High.

The time-of-travel for contaminants within the water varies and is dependent on the physical and chemical characteristics of each contaminant. Bacteria and Viruses are only inventoried in Zones A and B because of their short life span. Only "Very High" and "High" rankings are inventoried within the outer Zone D due to the probability of contaminant dilution by the time the contaminants get to the well. Tables 2 through 7 in Appendix B contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals.

VULNERABILITY OF THE DRINKING WATER SYSTEM

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

- Natural susceptibility, and
- Contaminant risks.

Appendix D contains fourteen charts, which together form the 'Vulnerability Analysis' for a source water assessment for a public drinking water source. Chart 1 analyzes the 'Susceptibility of the Wellhead' to contamination by looking at the construction of the well and its surrounding area. Chart 2 analyzes the 'Susceptibility of the Aquifer' to contamination by looking at the naturally occurring attributes of the water source and influences on the groundwater system that might lead to contamination. 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 well. Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses'. Charts 5 through 14 contain the Contaminant Risks and Vulnerability Analyses for nitrates and nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, synthetic organic chemicals, and other organic chemicals, respectively.

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

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 Allakaket water well is completed in an unconfined aquifer. Unconfined aquifers are more susceptible to potential groundwater quality impacts posed by the migration of surface water contaminants downward from the surface. Table 2 shows the susceptibility scores and ratings for this PWS.

Table 2. Susceptibility

	Score	**Rating**
Susceptibility of the Wellhead	20	Very High
Susceptibility of the Aquifer	17	High
Natural Susceptibility	37	High

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. This score has been derived from an examination of existing and historical contamination that has been detected at the drinking water source 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 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	50	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	35	High
Synthetic Organic Chemicals	42	Very High
Other Organic Chemicals	50	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 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	85	Very High
Nitrates and Nitrites	85	Very High
Volatile Organic Chemicals	85	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	70	High
Synthetic Organic Chemicals	80	Very High
Other Organic Chemicals	85	Very High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Very High**. The risk is primarily attributed to the presence of a sewage lagoon located in Zone A and a landfill located in Zone B. Numerous other contaminant sources are located in the protection area (see Table 2 – Appendix B).

Coliform (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 coliform 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).

No positive bacteria counts have been reported in recent (within five years) sampling events (See Chart 3 – Contaminant Risks for Bacteria and Viruses in Appendix D). Only a small amount of bacteria and viruses are required to endanger public health.

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 **Very High**.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is **Very High**. The risk to this source of public drinking water is primarily attributed to the presence of a sewage lagoon located in Zone A and a landfill located in Zone B. Numerous other contaminant sources are located in the protection area (see Table 3 – Appendix B).

Nitrates are very mobile, moving at approximately the same rate as water. The sampling history for this well indicates that nitrates have been detected in recent sampling events, however they did not exceed the MCL of 10 mg/L. Nitrate concentrations in uncontaminated groundwater are typically less than 2 mg/L; therefore, nitrate concentrations above 2 mg/L

may be indicative of man-made sources (See Chart 5 - Contaminant Risks for Nitrates and/or Nitrites in Appendix D).

Nitrate levels are often derived from the decomposition of organic matter in soils. Although the nitrate source in unknown, such occurrences may be attributed to septic systems or other sources.

After combining the contaminant risk for nitrates and nitrites with the natural susceptibility of the well, the overall vulnerability of the well to nitrate and nitrite contamination is **Very High**.

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Very High**. The risk is primarily attributed to the presence of bulk fuel facilities located in Zones A and B. Other potential contaminant sources are also found within the protection area (see Table 4 – Appendix B).

Recent sampling indicated the presence of Total trihalomethanes (TTHM's). TTHM's are considered water treatment byproducts and are not representative of source water conditions, therefore no risk points were assigned since the analyte did not exceed 100% of the MCL (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Possible sources of volatile organic chemicals include facilities with automobiles, residential areas, fuel tanks, and roads. See Table 4 in Appendix B for a complete listing.

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 **Very High**.

Heavy Metals, Cyanide and Other Inorganic Chemicals

The contaminant risk for heavy metals, cyanide and other inorganic chemicals is **High**. The risk is primarily attributed to the presence of the landfill in Zone B (see Table 5 – Appendix B).

Based on a review of recent sampling records for this public water system, copper and lead have been detected however, they have not exceeded their MCL's of 1.3 and 0.015 mg/L (respectively) (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

The reported concentrations of copper and lead are likely attributed to the water treatment/conveyance system. No risk points were assigned since neither analyte exceeded 100% of the MCL in recent sampling events.

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

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is **Very High**. The risk is primarily attributed to the presence of a landfill in Zone B. (see Table 6 – Appendix B).

No recent sampling data was available in ADEC records for the Allakaket PWS (See Chart 11 – Contaminant Risks for Synthetic Organic Chemicals in Appendix D).

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

Other Organic Chemicals

The contaminant risk for other organic chemicals is **Very High**. The risk is primarily attributed to the presence of a landfill in Zone B, and bulk fuel facilities and electric power generation facilities in Zone A. Other potential contaminant sources are also found within the protection area (see Table 7 – Appendix B).

No recent sampling data was available in ADEC records for the Allakaket PWS (See Chart 13 – Contaminant Risks for Other Organic Chemicals in Appendix D).

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

Using the Source Water Assessment

This assessment of contaminant risks can be used as a foundation for local voluntary protection efforts as well as a basis for the continuous efforts on the part of the community of Allakaket to protect public health. It is anticipated that Source Water Assessments will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of the drinking water source.

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APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

APPENDIX B

Contaminant Source Inventory and Risk Ranking (Tables 1-7)

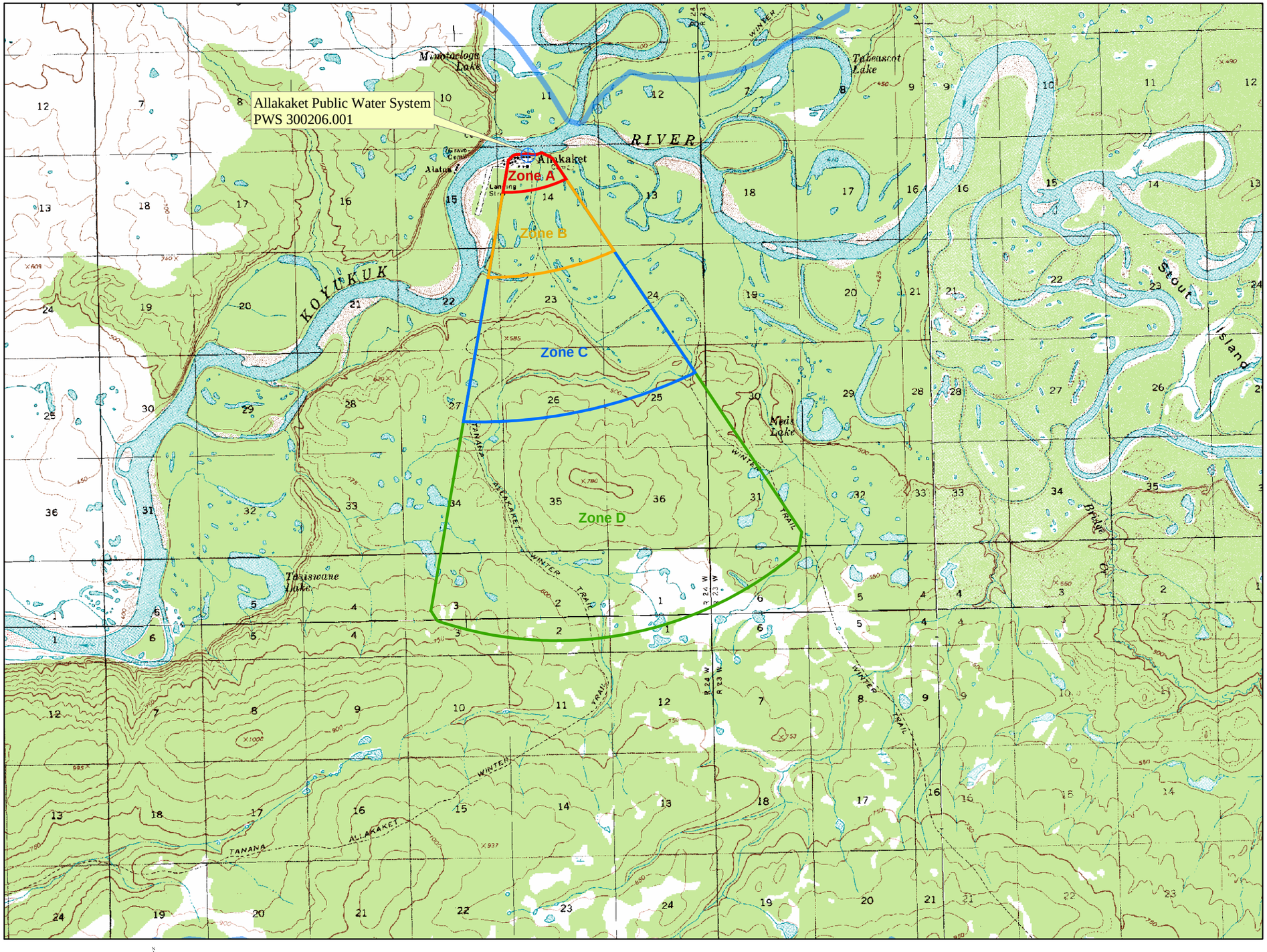
APPENDIX C

Drinking Water Protection Area
and Potential and Existing Contaminant Sources
(Map C)

APPENDIX D

Vulnerability Analysis for Public Drinking Water Source (Charts 1-14)

Public Water Well System for PWS #300206.001 Allakaket Public Water System



LEGEND

- Public Water System Well

Hydrography/Physical

- Parcels
- Stream
- Lake or Pond
- Contours
- Watershed Boundary

Transportation

- Primary Route (Class 1)
- Secondary Route (Class 2)
- Road (Class 3)
- Road (Class 4)
- Road (Class 5, Four-wheel drive)

Groundwater Protection Zones

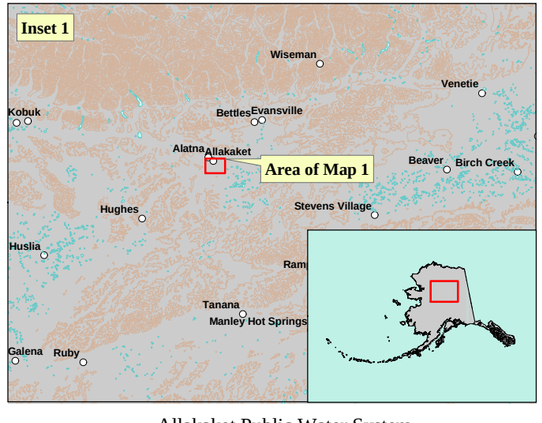
- Zone A Protection Area– Several Months Travel Time
- Zone B Protection Area– 2 Years Travel Time
- Zone C Protection Area– 5 Years Travel Time
- Zone D Protection Area– 10 Years Travel Time

Data Sources:
Contaminant Sources, Public Water System Wells, Contours
Alaska Department of Environmental Conservation (ADEC)

All other data:
United States Geological Survey (USGS)

Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class A Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or validity of the data provided.



0 0.5 1 2 3 4 Miles

Allakaket Public Water System
PWS 300206.001
Appendix A Map A

Table 1

Contaminant Source Inventory for ***Allakaket Public WS***

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	C	
Motor /motor vehicle repair shops	C31	C31-01	A	C	City Garage
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	C	
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	C	Assume 40 or less pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	C	Assume 2 or less residential septic systems in Zone A
Tanks, heating oil, residential (above ground)	R08	R08-01	A	C	Assume 1 or more residential heating oil tanks in Zone A
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	C	City Power Generators
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	C	ALLAKAKET SCHOOL
Petroleum product bulk station/terminals	X11	X11-01	A	C	Power Plant Tank
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 1-20 roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	C	City Power Generators
Landfills (municipal; Class III)	D51	D51-01	B	C	Allakaket Landfill (City of)
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	B	C	City Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	B	C	VPSO Office
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	C	Allakaket School Tank Farm

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	B	C	Allakaket Airport Apron
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	C	C	Proposed AP+T Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	C	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	C	C	Community Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	C	C	Community Center
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	C	C	Tribal Office
Cemeteries	X01	X01-01	C	C	
Petroleum product bulk station/terminals	X11	X11-01	C	C	Airport Offloading Tanks
Petroleum product bulk station/terminals	X11	X11-02	C	C	Intermediate Tank at Water Plant
Petroleum product bulk station/terminals	X11	X11-03	C	C	Tank Farm and Dispenser
Airports	X14	X14-01	C	C	
Pipelines (oil and gas)	X28	X28-01	C	C	Airport to Tank Farm line
Pipelines (oil and gas)	X28	X28-02	C	C	Airport to Tank Farm line
Electric power generation (fossil fuels)	X36	X36-01	C	C	Proposed AP+T Power Plant
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	C	C	

Table 2

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS
Sources of Bacteria and Viruses

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 40 or less pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Landfills (municipal; Class III)	D51	D51-01	B	High	C	Allakaket Landfill (City of)

Table 3

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS
Sources of Nitrates/Nitrites

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Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 40 or less pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Landfills (municipal; Class III)	D51	D51-01	B	Very High	C	Allakaket Landfill (City of)
Cemeteries	X01	X01-01	C	Medium	C	
Airports	X14	X14-01	C	Low	C	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	C	Low	C	

Table 4

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS
Sources of Volatile Organic Chemicals

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Laundromats without dry cleaning	C22	C22-01	A	Low	C	
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 40 or less pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 1 or more residential heating oil tanks in Zone A
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	City Power Generators
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	ALLAKAKET SCHOOL
Petroleum product bulk station/terminals	X11	X11-01	A	Very High	C	Power Plant Tank
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	City Power Generators
Landfills (municipal; Class III)	D51	D51-01	B	High	C	Allakaket Landfill (City of)
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	B	Low	C	City Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	B	Low	C	VPSO Office

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	High	C	Allakaket School Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	B	High	C	Allakaket Airport Apron
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	C	Low	C	Proposed AP+T Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	C	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	C	Low	C	Community Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	C	Low	C	Community Center
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	C	Low	C	Tribal Office
Petroleum product bulk station/terminals	X11	X11-01	C	Very High	C	Airport Offloading Tanks
Petroleum product bulk station/terminals	X11	X11-02	C	Very High	C	Intermediate Tank at Water Plant
Petroleum product bulk station/terminals	X11	X11-03	C	Very High	C	Tank Farm and Dispenser
Airports	X14	X14-01	C	High	C	
Pipelines (oil and gas)	X28	X28-01	C	Medium	C	Airport to Tank Farm line
Pipelines (oil and gas)	X28	X28-02	C	Medium	C	Airport to Tank Farm line
Electric power generation (fossil fuels)	X36	X36-01	C	Medium	C	Proposed AP+T Power Plant
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	C	Low	C	

Table 5

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 40 or less pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	City Power Generators
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-05	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-06	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-07	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-08	A	Low	C	ALLAKAKET SCHOOL
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Power Plant Tank
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	City Power Generators
Landfills (municipal; Class III)	D51	D51-01	B	High	C	Allakaket Landfill (City of)
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	B	Low	C	City Office
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	B	Low	C	VPSO Office
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Allakaket School Tank Farm

Table 5 (continued)

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	B	Low	C	Allakaket Airport Apron
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	C	Low	C	Proposed AP+T Power Plant
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	C	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-13	C	Low	C	Community Church
Tanks, heating oil, nonresidential (aboveground)	T14	T14-14	C	Low	C	Community Center
Tanks, heating oil, nonresidential (aboveground)	T14	T14-15	C	Low	C	Tribal Office
Cemeteries	X01	X01-01	C	Low	C	
Petroleum product bulk station/terminals	X11	X11-01	C	Low	C	Airport Offloading Tanks
Petroleum product bulk station/terminals	X11	X11-02	C	Low	C	Intermediate Tank at Water Plant
Petroleum product bulk station/terminals	X11	X11-03	C	Low	C	Tank Farm and Dispenser
Airports	X14	X14-01	C	Low	C	
Pipelines (oil and gas)	X28	X28-01	C	Low	C	Airport to Tank Farm line
Pipelines (oil and gas)	X28	X28-02	C	Low	C	Airport to Tank Farm line
Electric power generation (fossil fuels)	X36	X36-01	C	Medium	C	Proposed AP+T Power Plant
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	C	Low	C	

Table 6

Contaminant Source Inventory and Risk Ranking for Allakaket Public WS

Sources of Synthetic Organic Chemicals

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Power Plant Tank
Landfills (municipal; Class III)	D51	D51-01	B	Very High	C	Allakaket Landfill (City of)
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Allakaket School Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	B	Low	C	Allakaket Airport Apron
Cemeteries	X01	X01-01	C	Medium	C	
Petroleum product bulk station/terminals	X11	X11-01	C	Low	C	Airport Offloading Tanks
Petroleum product bulk station/terminals	X11	X11-02	C	Low	C	Intermediate Tank at Water Plant
Petroleum product bulk station/terminals	X11	X11-03	C	Low	C	Tank Farm and Dispenser
Airports	X14	X14-01	C	Medium	C	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	C	Low	C	

Table 7

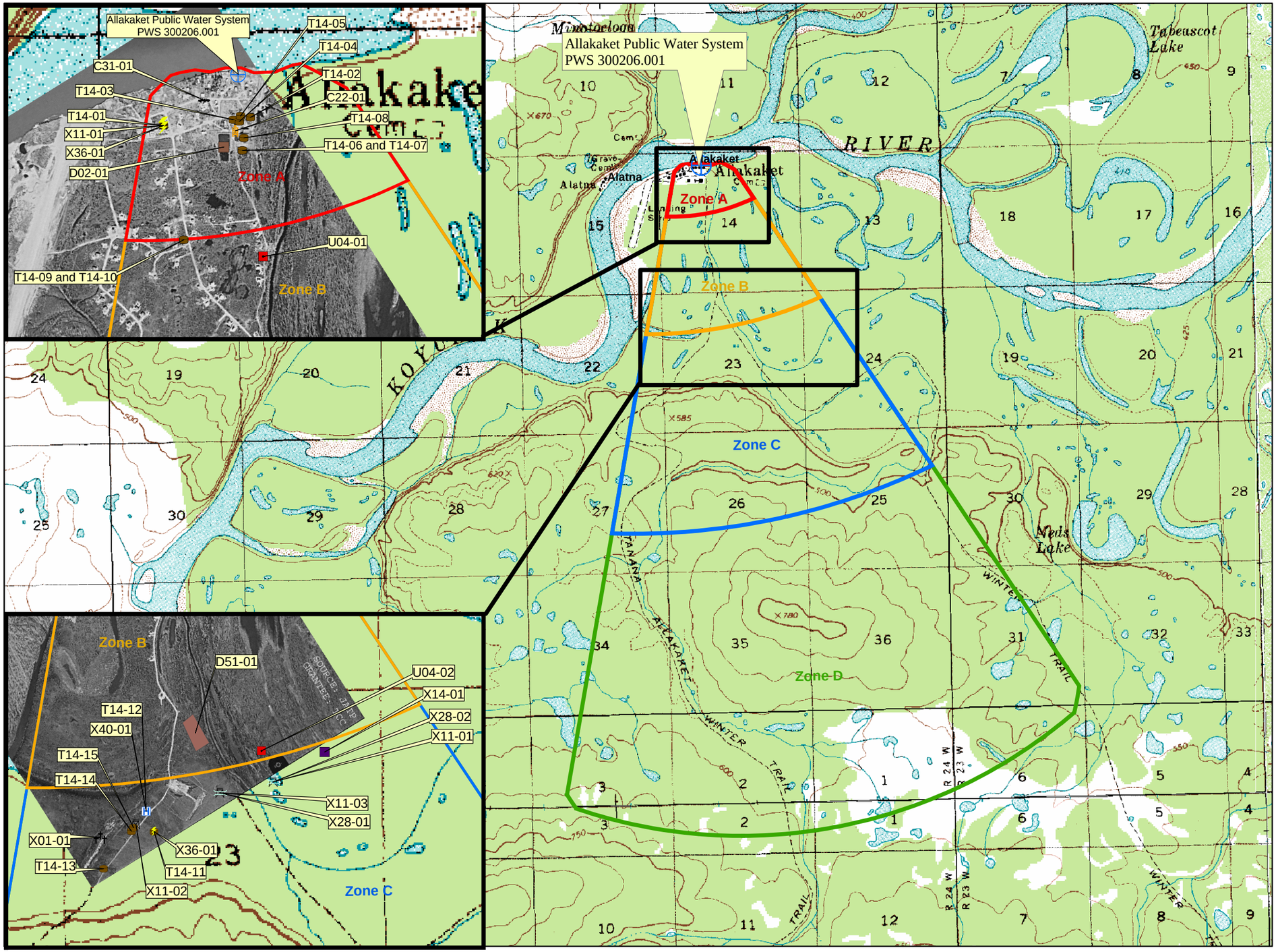
Contaminant Source Inventory and Risk Ranking for Allakaket Public WS

Sources of Other Organic Chemicals

PWSID 300206.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 2 or less residential septic systems in Zone A
Petroleum product bulk station/terminals	X11	X11-01	A	High	C	Power Plant Tank
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Electric power generation (fossil fuels)	X36	X36-01	A	High	C	City Power Generators
Landfills (municipal; Class III)	D51	D51-01	B	Very High	C	Allakaket Landfill (City of)
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Allakaket School Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	B	Low	C	Allakaket Airport Apron
Petroleum product bulk station/terminals	X11	X11-01	C	High	C	Airport Offloading Tanks
Petroleum product bulk station/terminals	X11	X11-02	C	High	C	Intermediate Tank at Water Plant
Petroleum product bulk station/terminals	X11	X11-03	C	High	C	Tank Farm and Dispenser
Airports	X14	X14-01	C	Medium	C	
Pipelines (oil and gas)	X28	X28-01	C	High	C	Airport to Tank Farm line
Pipelines (oil and gas)	X28	X28-02	C	High	C	Airport to Tank Farm line
Electric power generation (fossil fuels)	X36	X36-01	C	High	C	Proposed AP+T Power Plant

Public Water Well System for PWS #300206.001 Allakaket Public Water System
Sources of Potential and Existing Contamination



LEGEND

Public Water System Well

Hydrography/Physical

- Parcels
- Stream
- Lake or Pond
- Contours

Transportation

- Primary Route (Class 1)
- Secondary Route (Class 2)
- Road (Class 3)
- Road (Class 4)
- Road (Class 5, Four-wheel drive)

Groundwater Protection Zones

- Zone A Protection Area– Several Months Travel Time
- Zone B Protection Area– 2 Years Travel Time
- Zone C Protection Area– 5 Years Travel Time
- Zone D Protection Area– 10 Years Travel Time

Existing or Potential Contaminant Sources

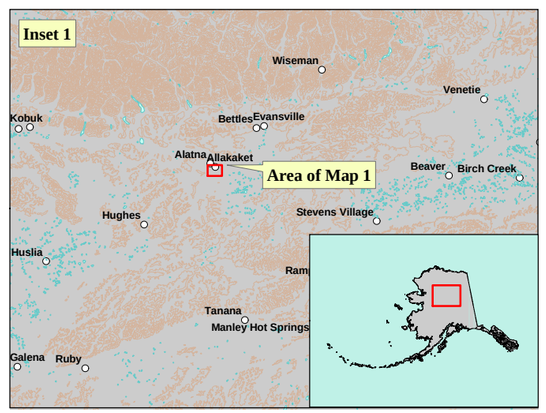
- Laundromats without dry cleaning (C22)
- Motor/motor vehicle repair shops (C31)
- Tanks, heating oil, nonresidential (aboveground) (T14)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Cemeteries (X01)
- Petroleum product bulk station/terminals (X11)
- Pipeline (oil and gas) (X28)
- Electric power generation (fossil fuels) (X36)
- Medical/veterinary facilities (X40)
- Domestic wastewater treatment plant disposal pond/lagoon (D02)
- Landfills (municipal; Class III) (D51)
- Airport (X14)

Data Sources:
Contaminant Sources, Public Water System Wells, Contours
Alaska Department of Environmental Conservation (ADEC)

All other data:
United States Geological Survey (USGS)

Drinking Water Protection Areas based on "Alaska Drinking Water Protection Program - Guidance Manual for Class A Public Water Systems" published by ADEC

URS Corporation does not guarantee the accuracy or validity of the data provided.



0 0.375 0.75 1.5 2.25 3 Miles

Allakaket Public Water System
PWS 300206.001
Appendix C Map C

Chart 1. Susceptibility of the wellhead - Allakaket Public Water System (PWS No. 300206.001)

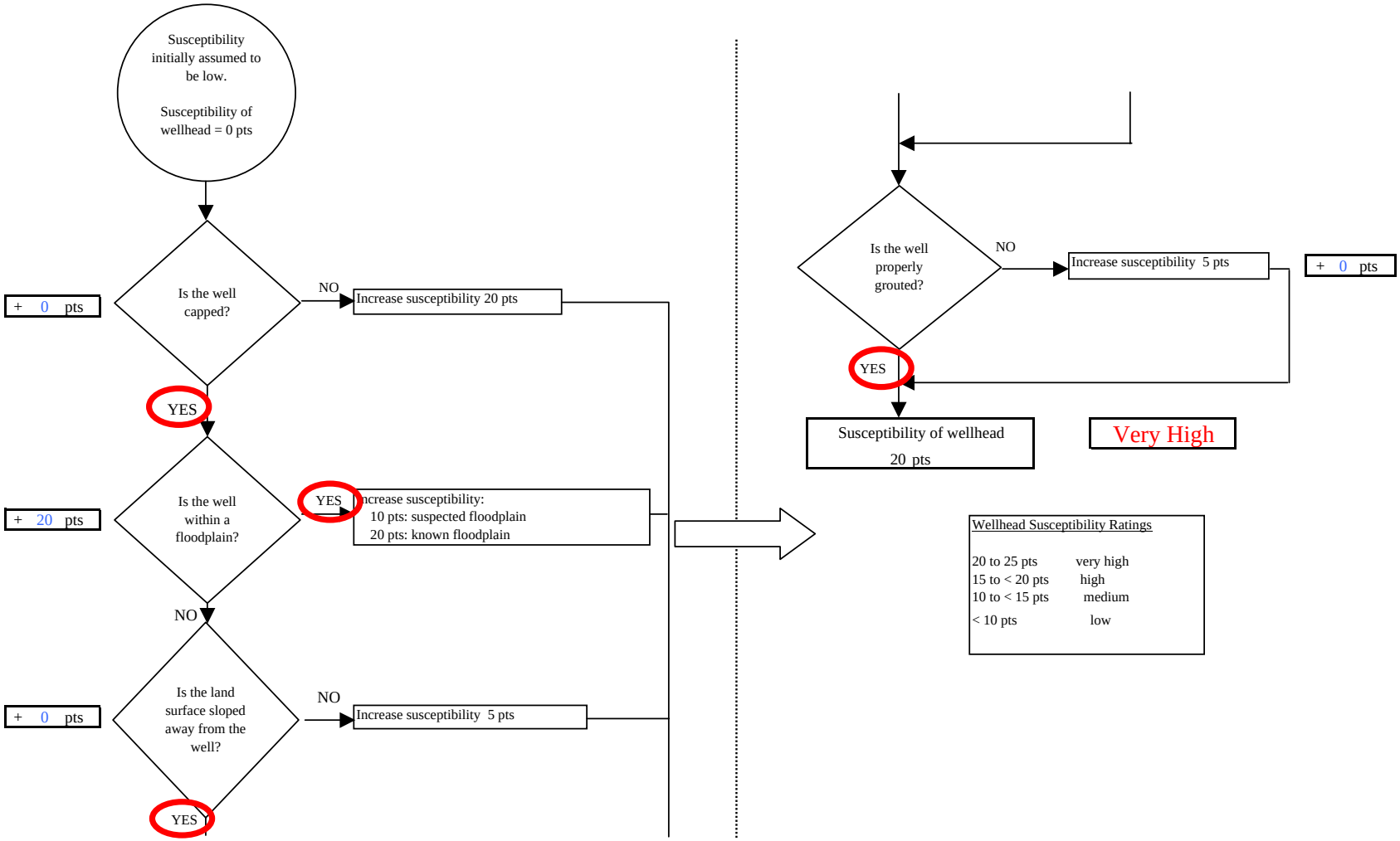


Chart 2. Susceptibility of the aquifer Allakaket Public Water System (PWS No. 300206.001)

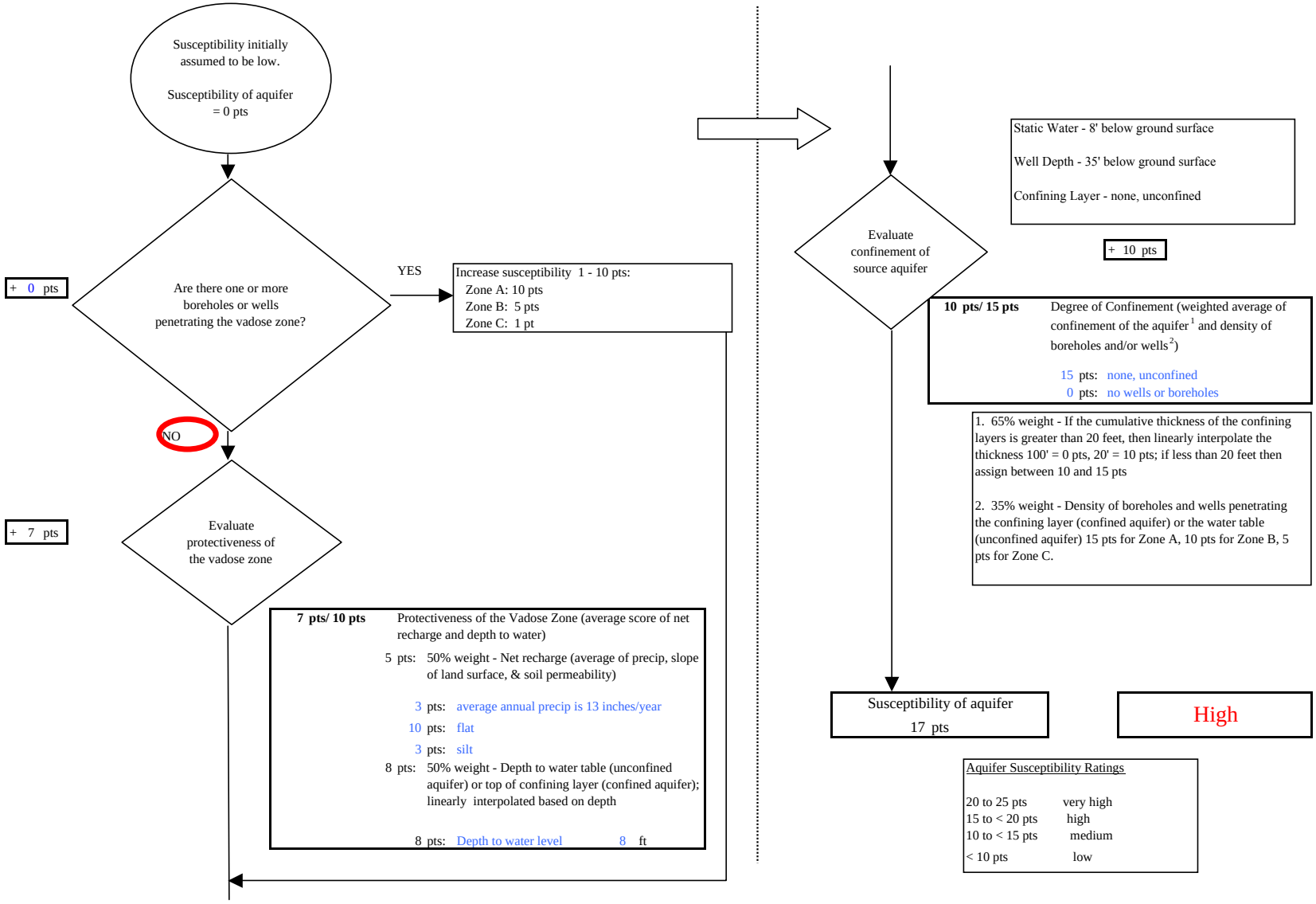
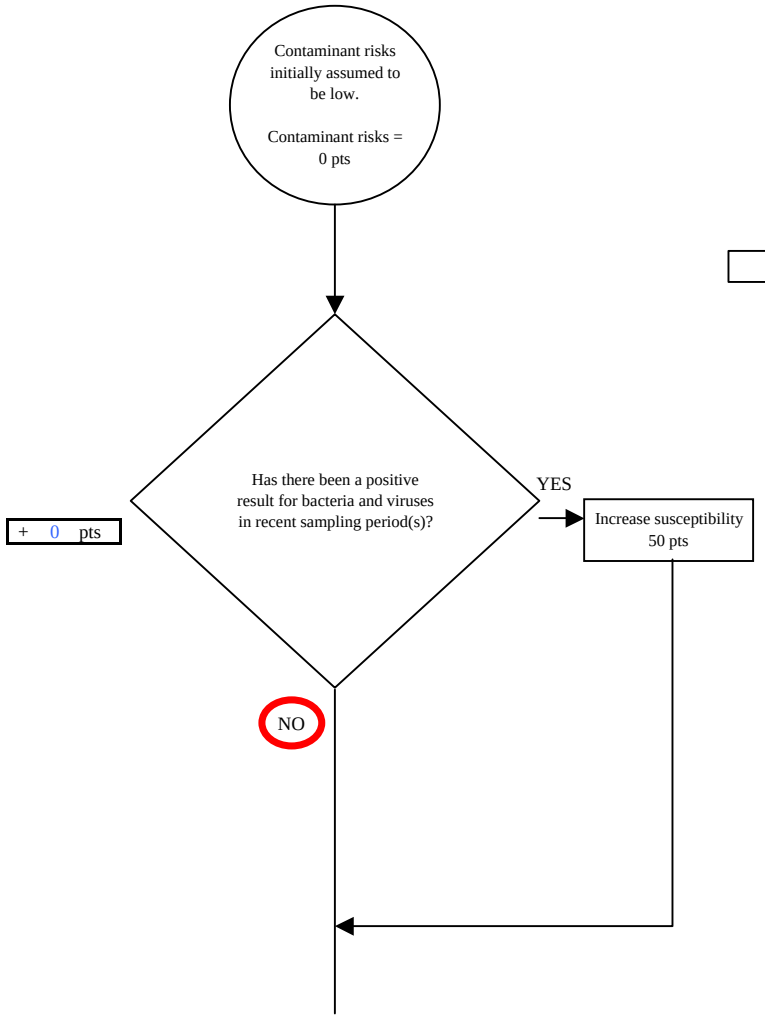
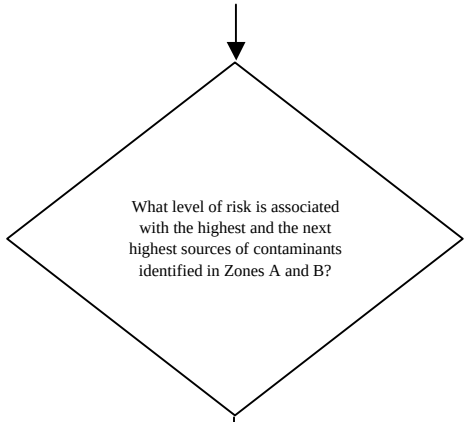


Chart 3. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Bacteria & Viruses





+ 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)	1	1	2
Medium(s)	40	0	40
Low(s)	3	0	3

	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 Allakaket Public Water System (PWS No. 300206.001) - Bacteria & Viruses

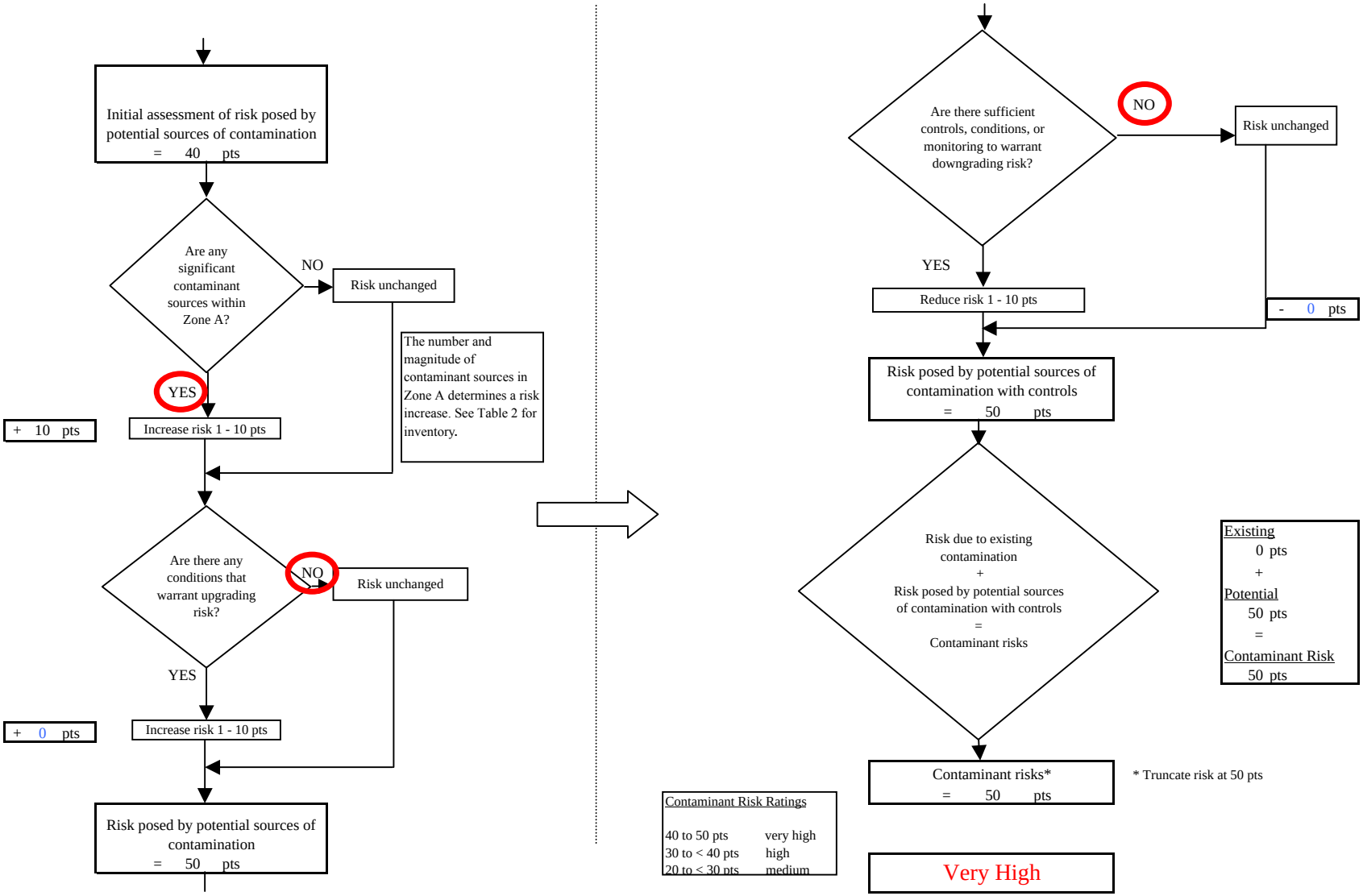


Chart 4. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Bacteria & Viruses

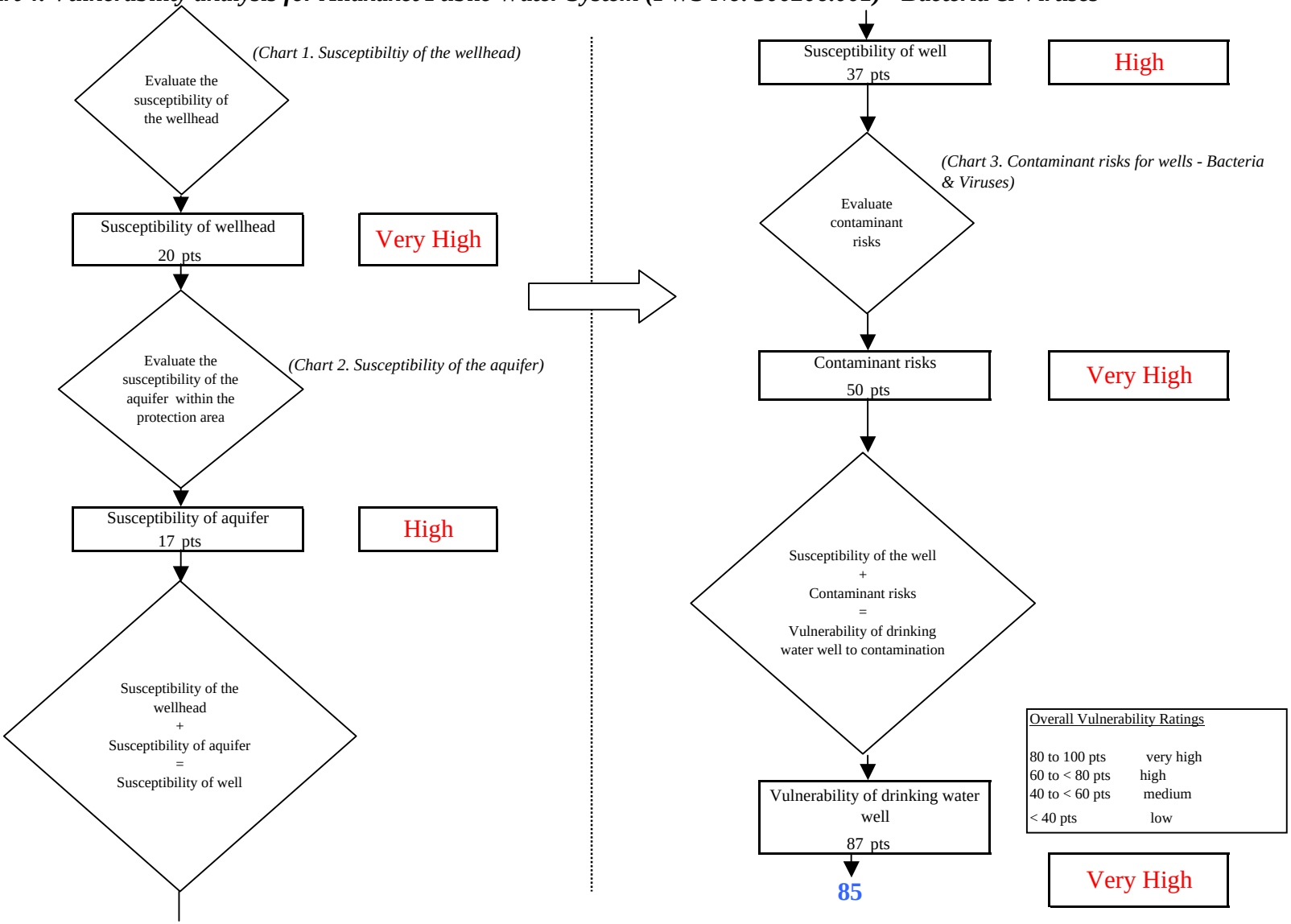


Chart 5. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Nitrates and Nitrites

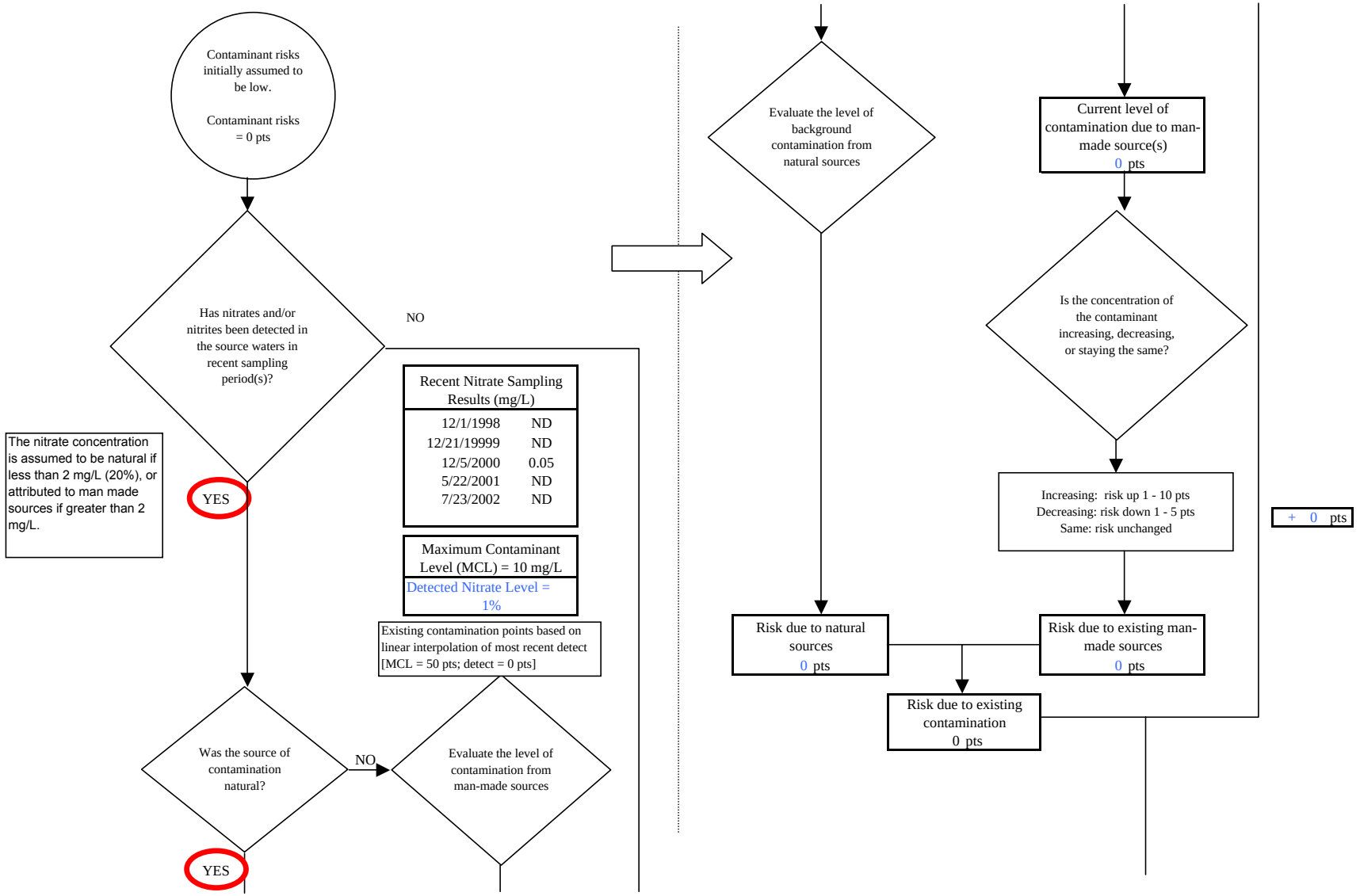
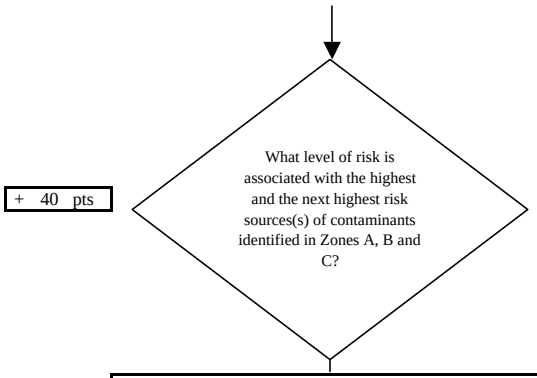


Chart 5. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Nitrates and Nitrites



+ 40 pts

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

	Zone A	Zones B&C	Total
Very Highs(s)	0	1	1
High(s)	1	0	1
Medium(s)	40	1	41
Low(s)	3	2	5

	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.

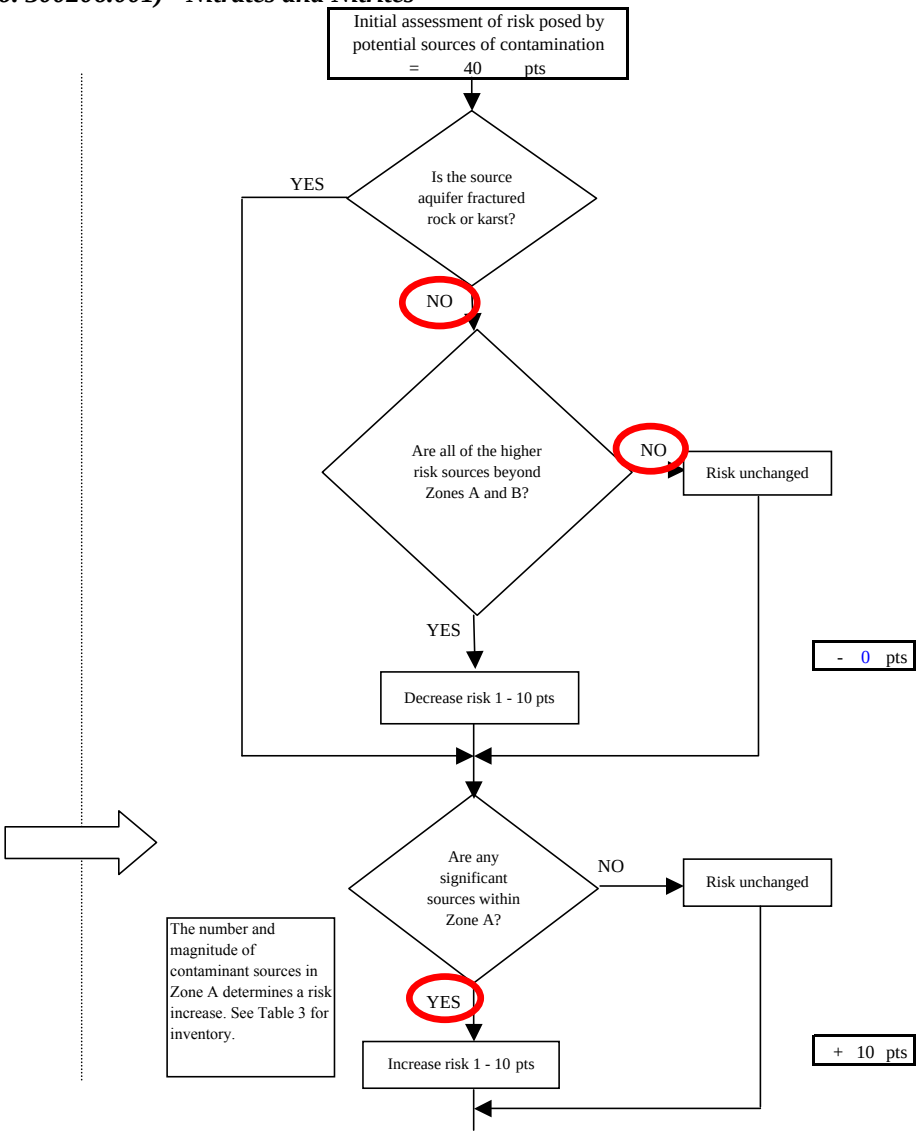


Chart 5. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Nitrates and Nitrites

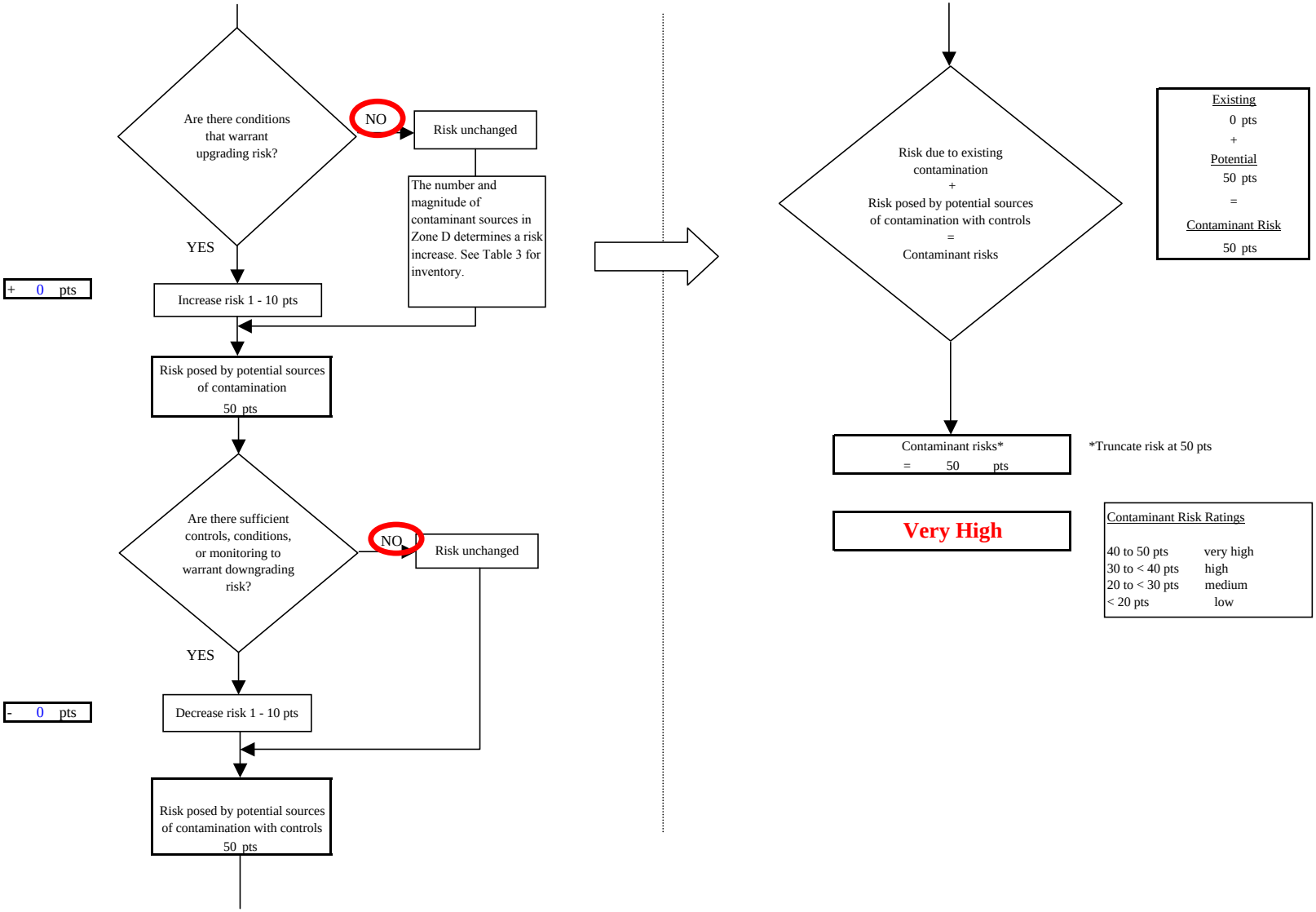


Chart 6. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Nitrates and Nitrites

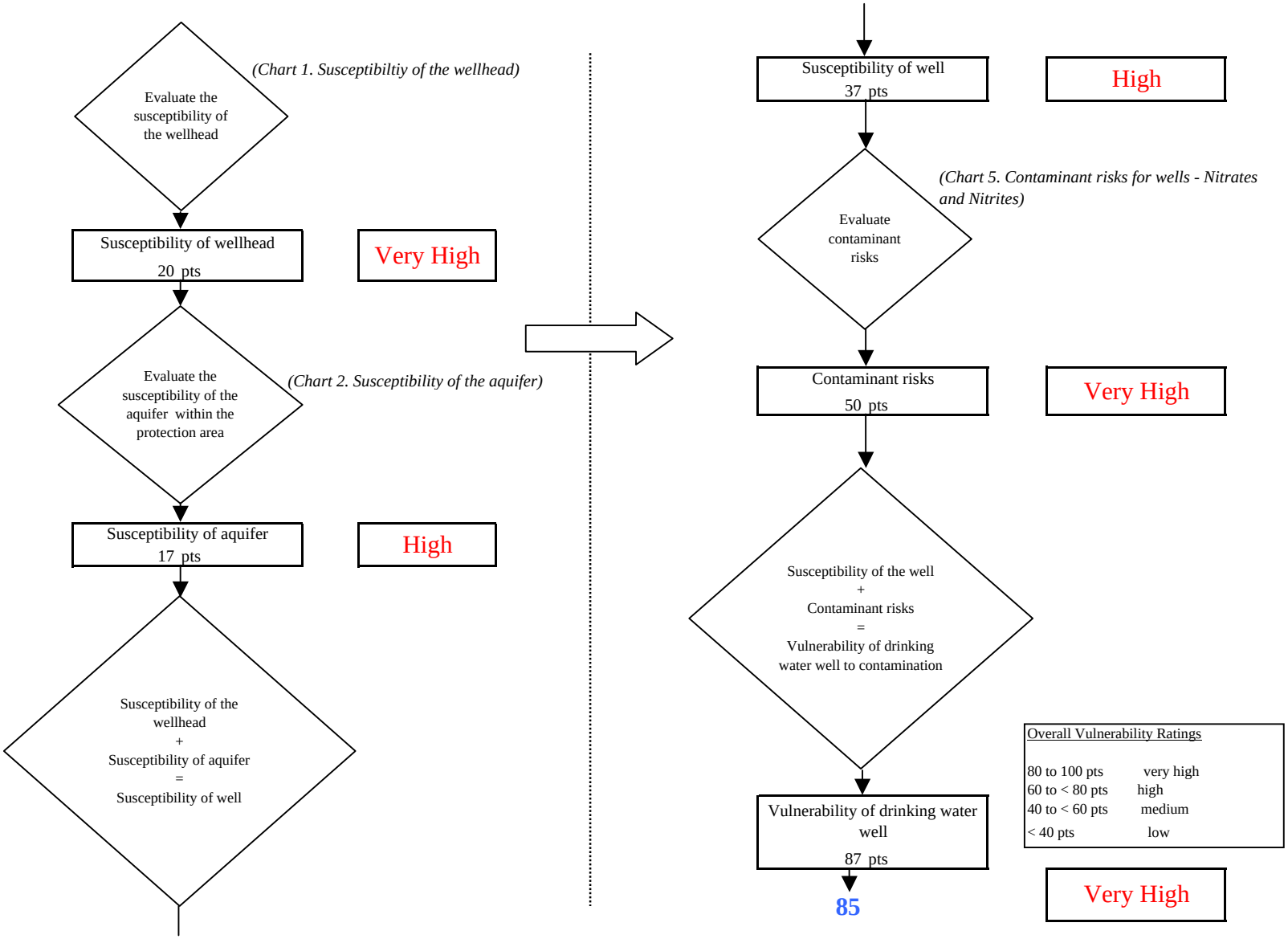


Chart 7. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Volatile Organic Chemicals

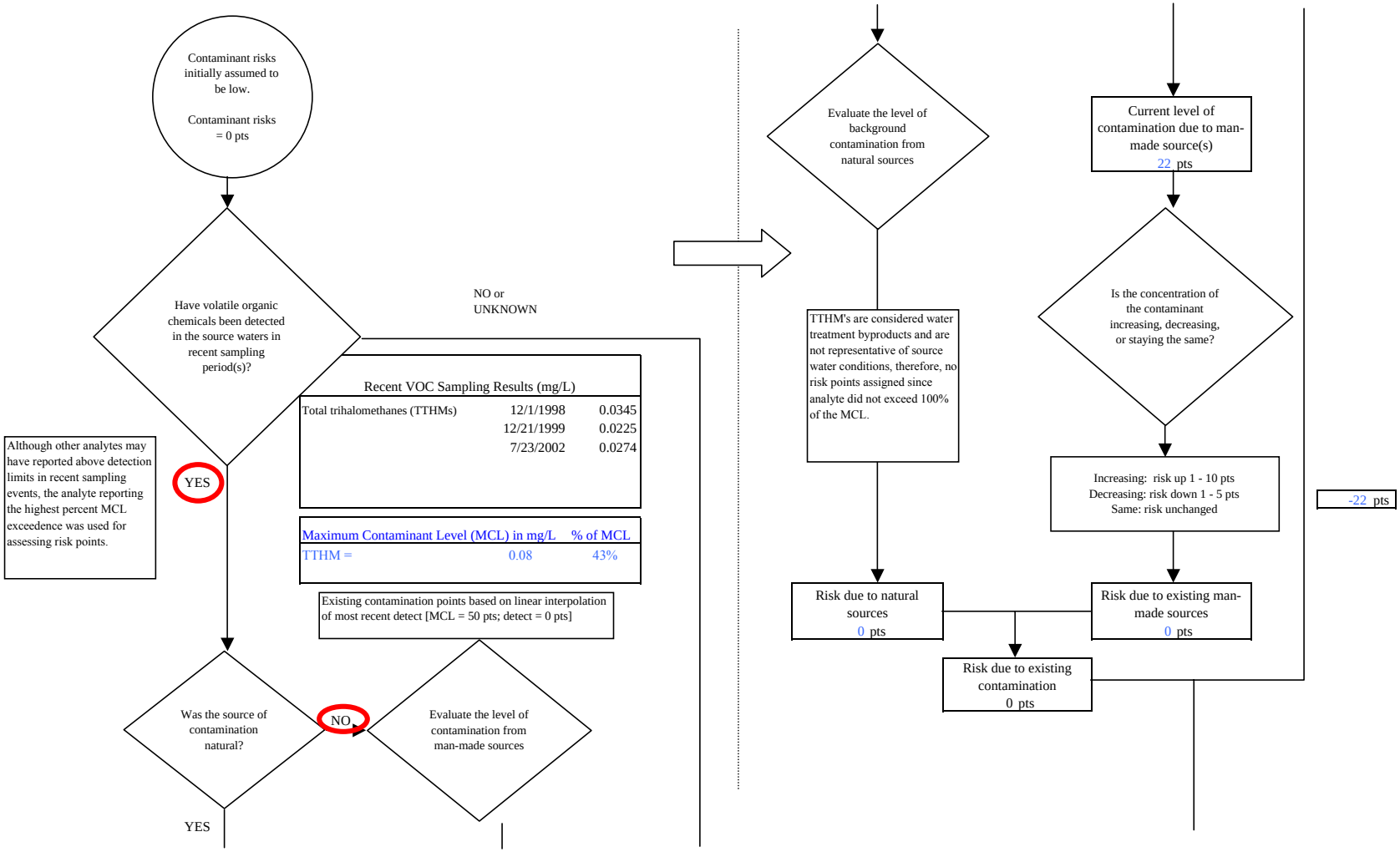


Chart 7. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Volatile Organic Chemicals

+ 50 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)	1	3	4
High(s)	0	4	4
Medium(s)	3	3	6
Low(s)	52	8	60

	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

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

- 1 pts

Decrease risk 1 - 10 pts

Are any significant sources within Zone A?

NO → Risk unchanged

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 4 for inventory.

YES

+ 10 pts

Increase risk 1 - 10 pts

Chart 7. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Volatile Organic Chemicals

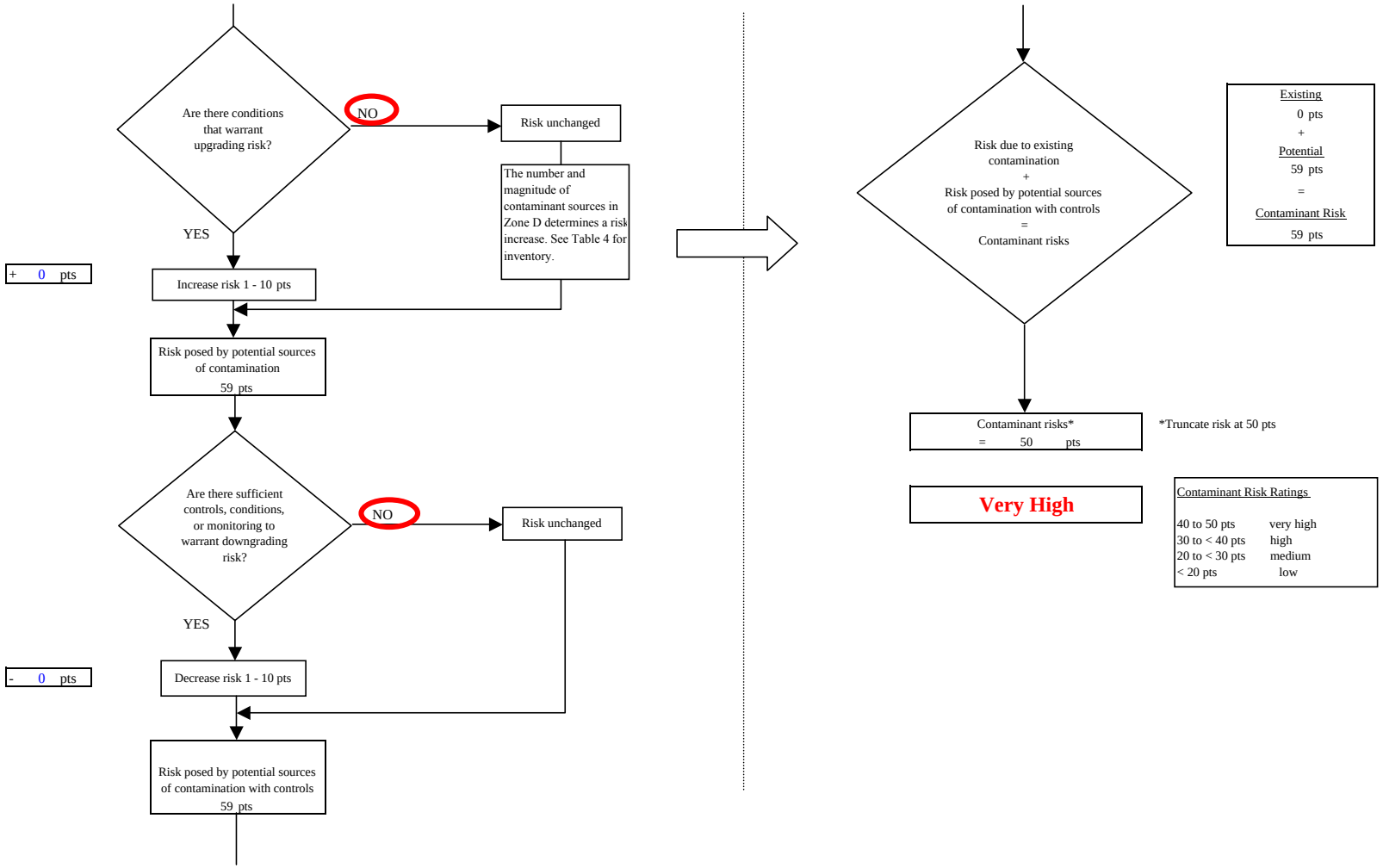


Chart 8. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Volatile Organic Chemicals

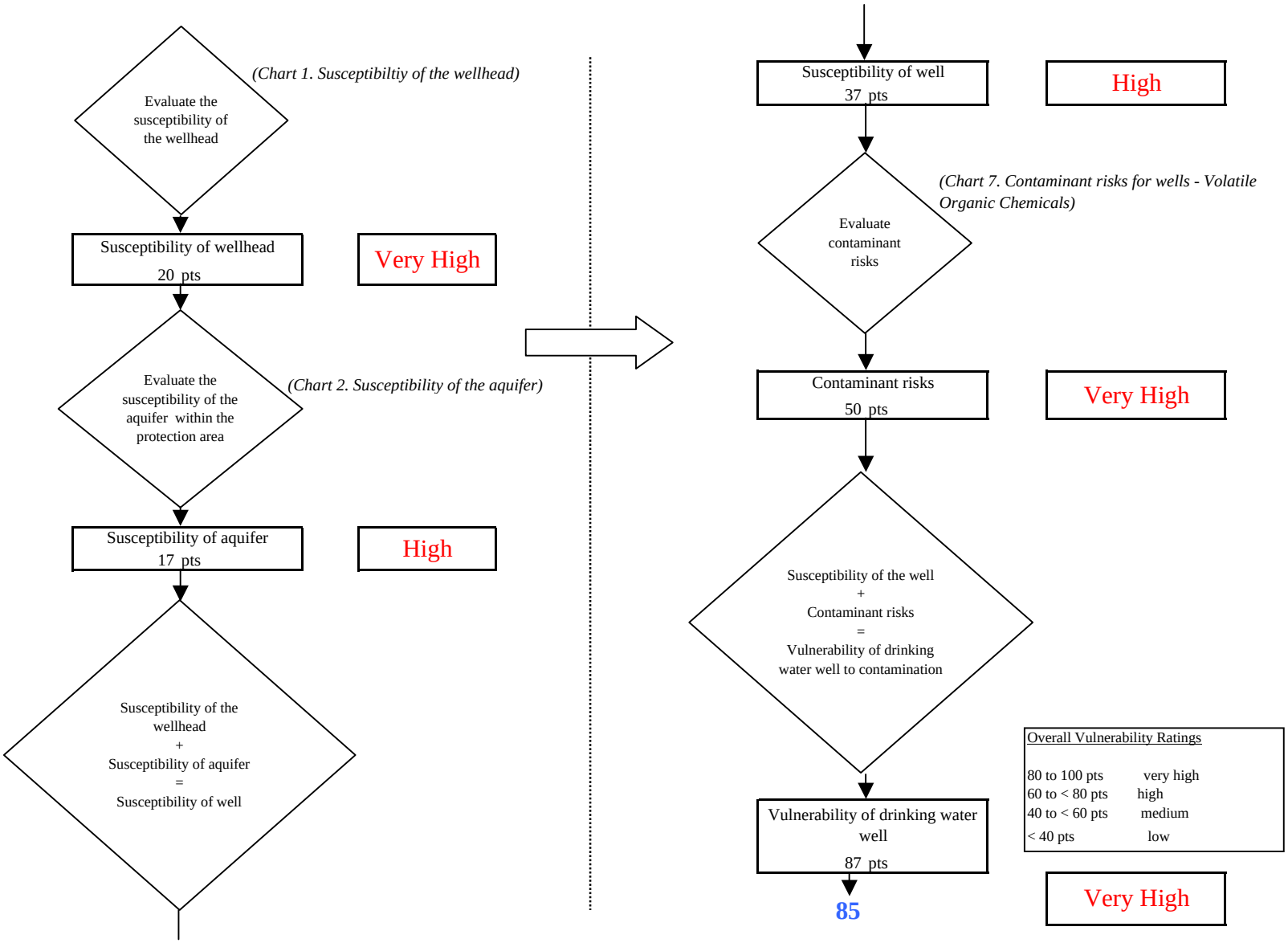


Chart 9. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

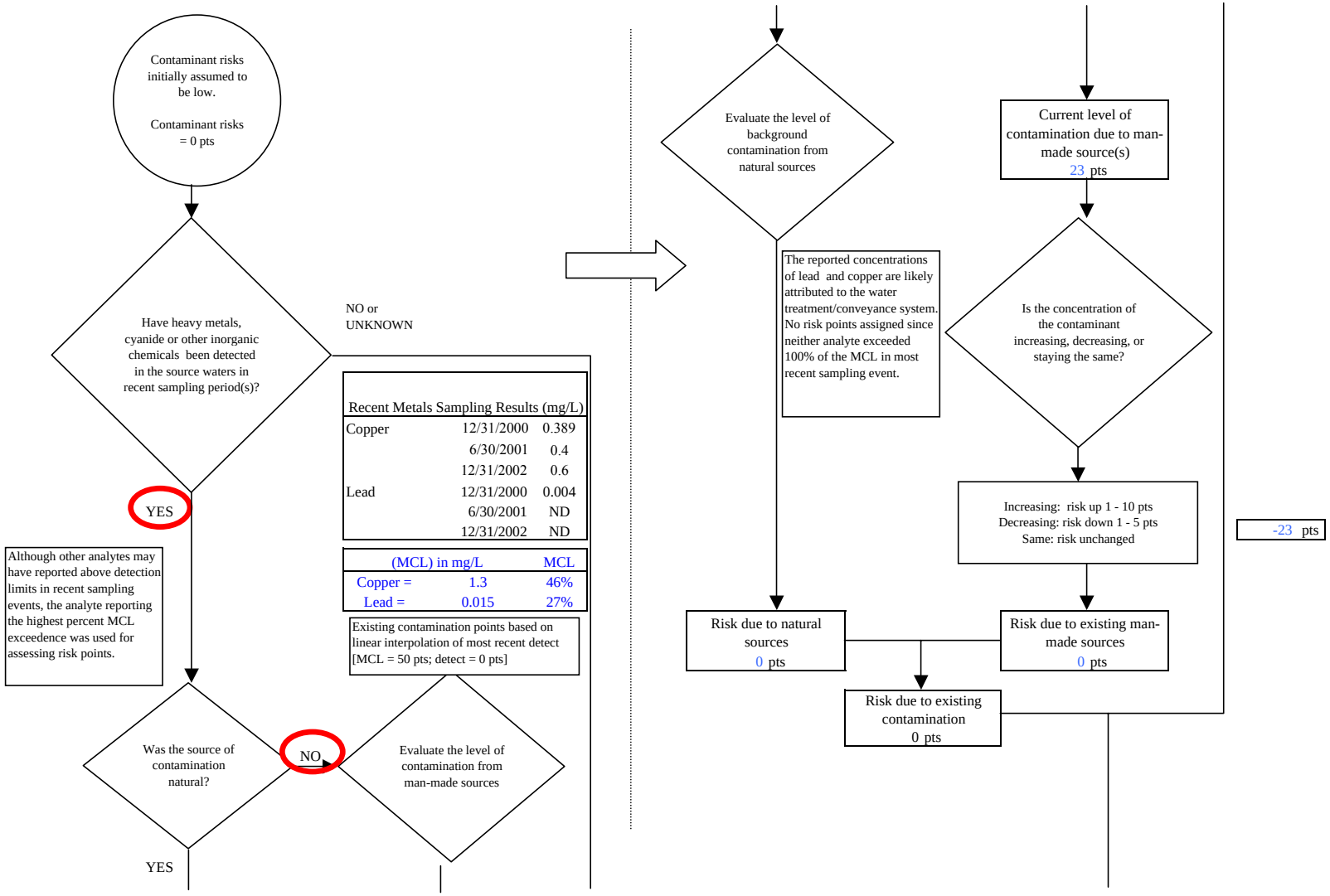


Chart 9. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

+ 30 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	1	1
Medium(s)	2	1	3
Low(s)	52	17	69

	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 30

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

Initial assessment of risk posed by potential sources of contamination = 30 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

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 5 for inventory.

YES

Increase risk 1 - 10 pts

+ 5 pts

Chart 9. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

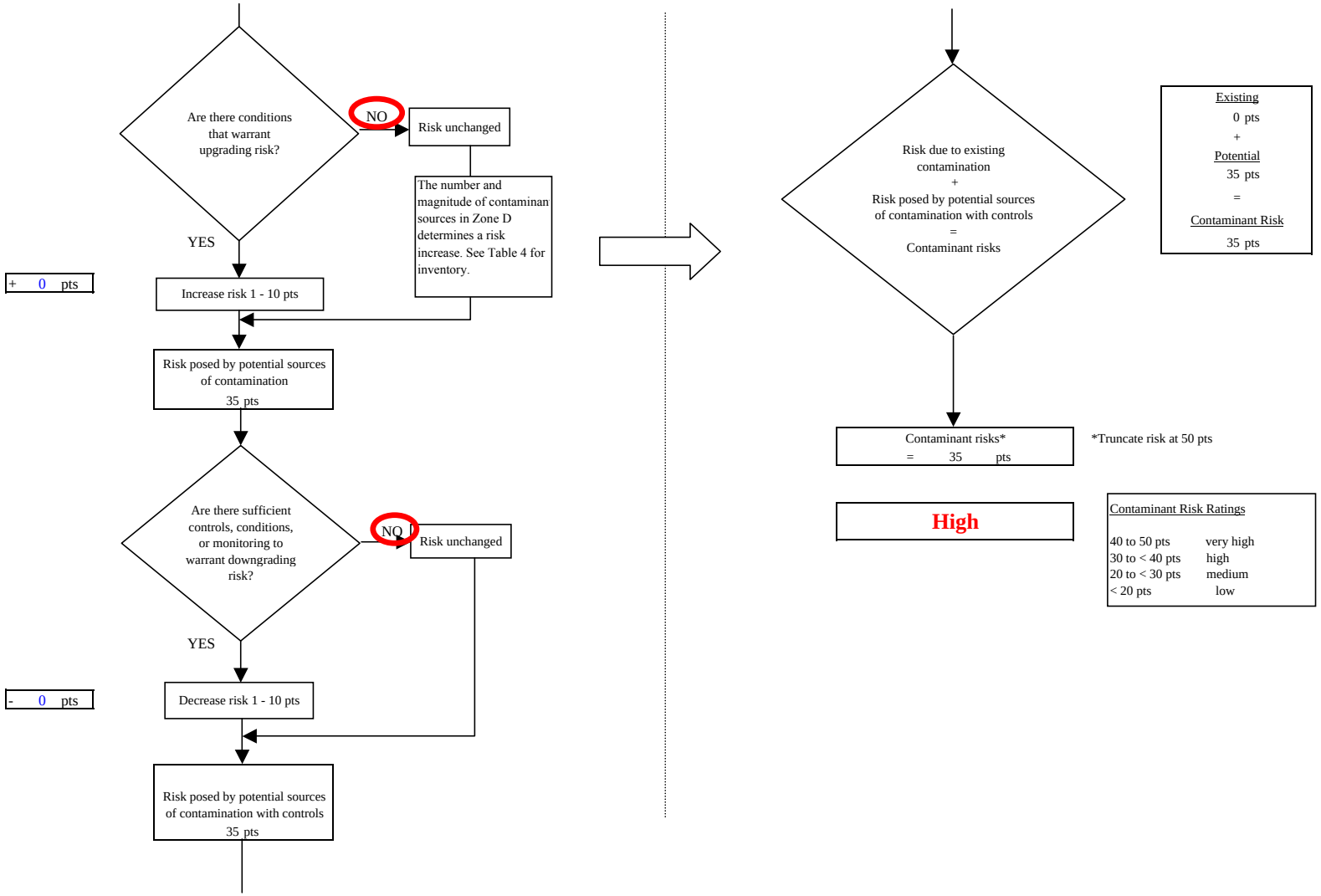


Chart 10. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Heavy Metals, Cyanide and Other Inorganic Chen

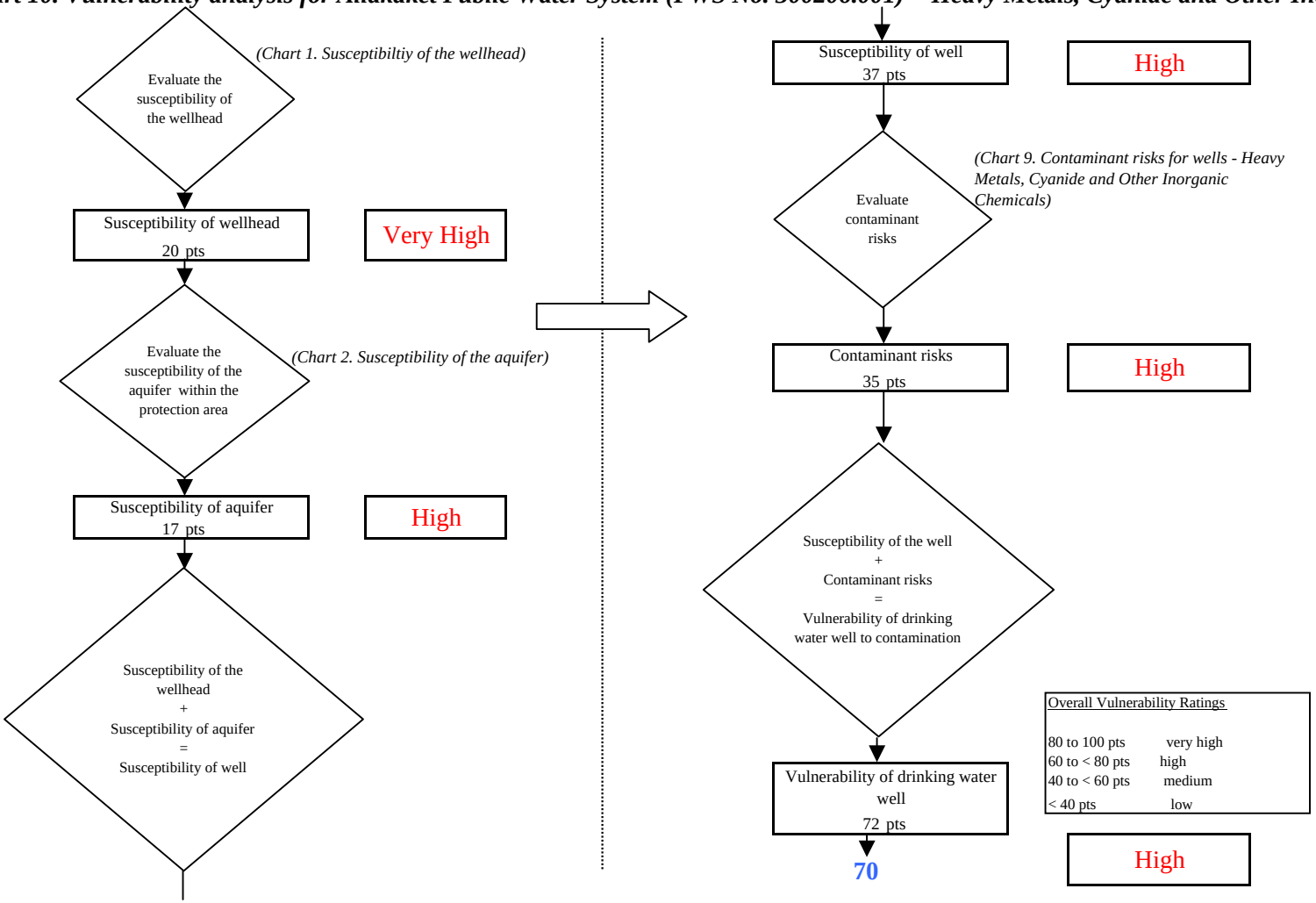


Chart 11. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Synthetic Organic Chemicals

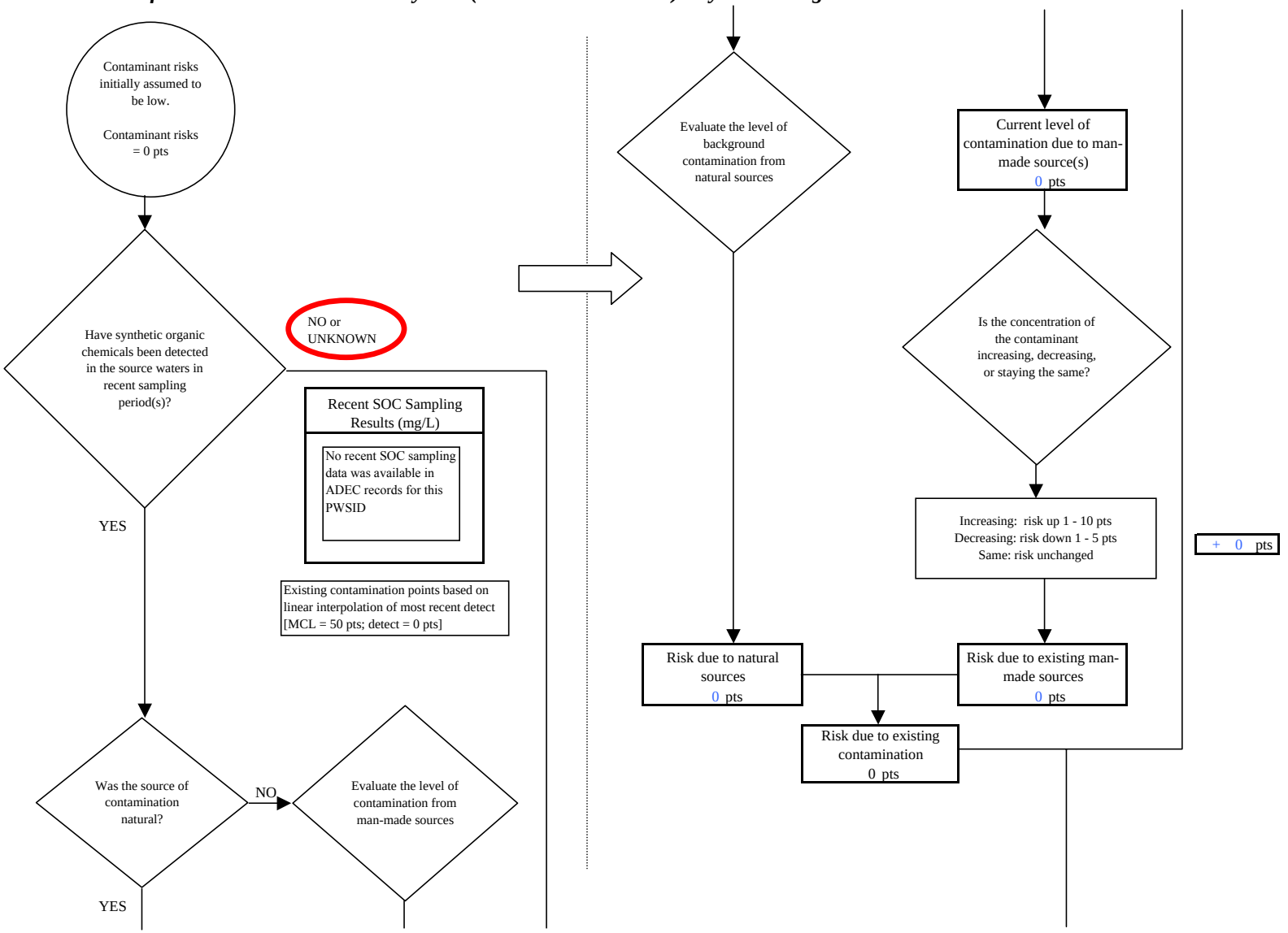
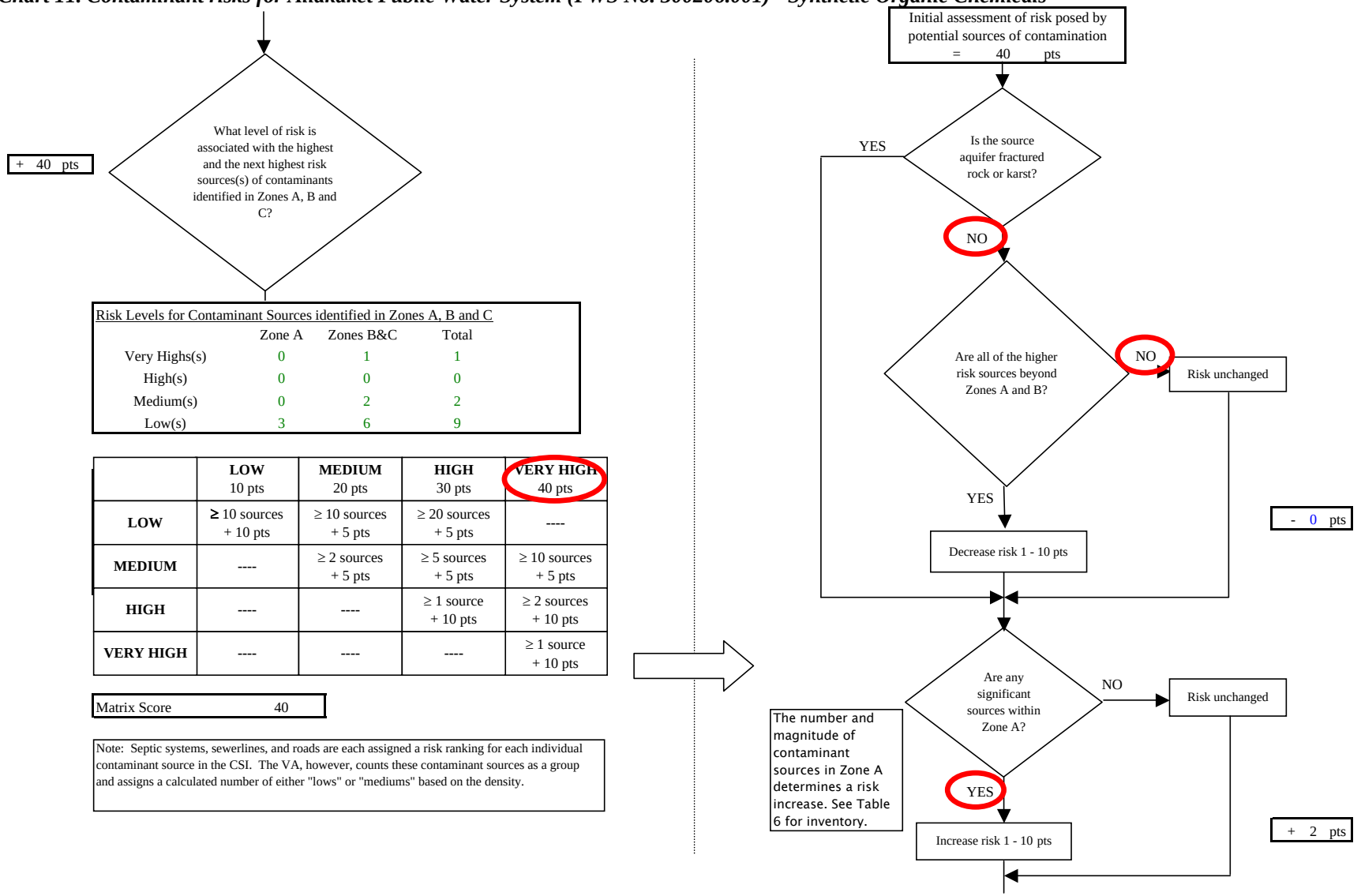


Chart 11. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Synthetic Organic Chemicals



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

	Zone A	Zones B&C	Total
Very Highs(s)	0	1	1
High(s)	0	0	0
Medium(s)	0	2	2
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 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 11. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Synthetic Organic Chemicals

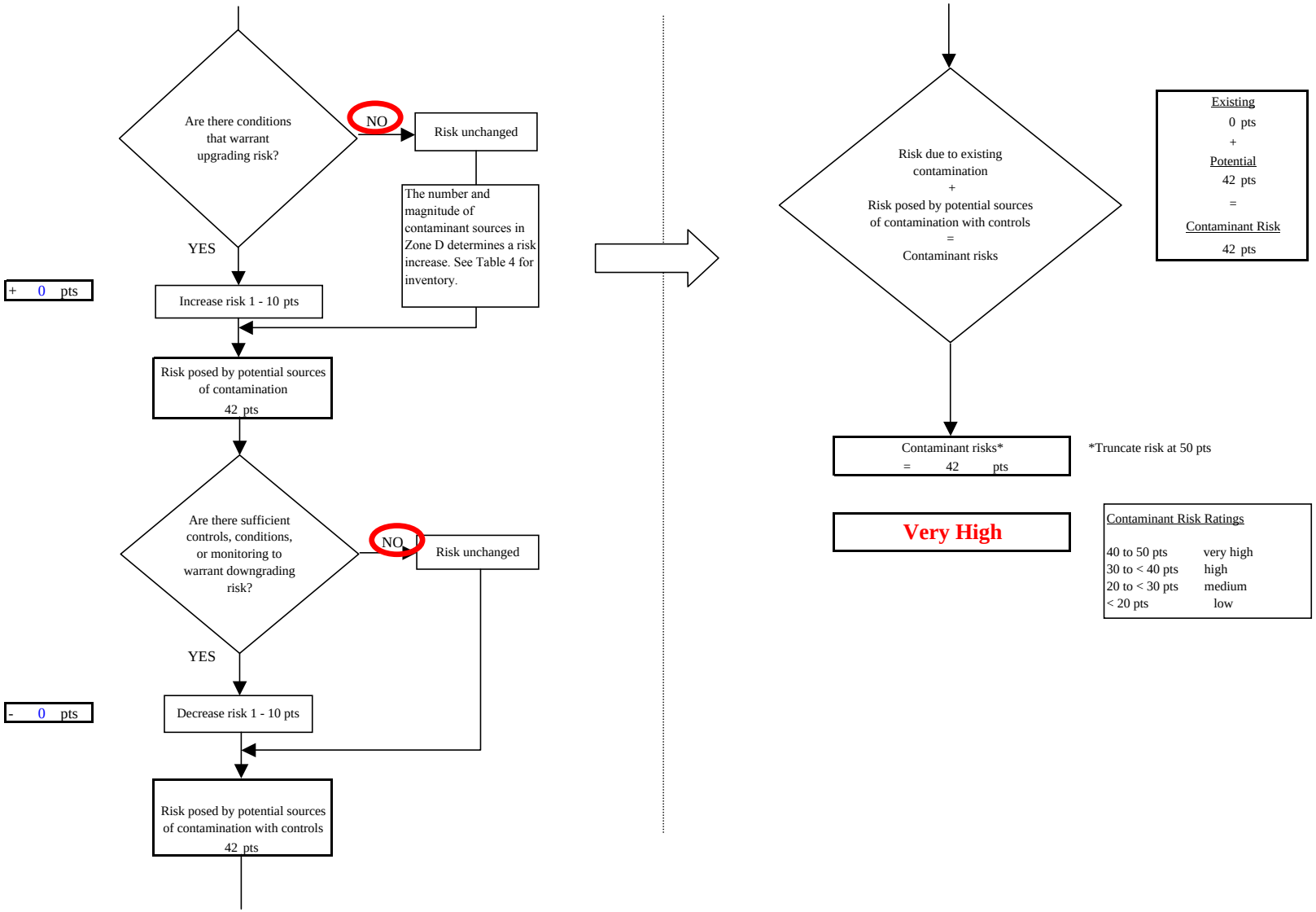


Chart 12. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Synthetic Organic Chemicals

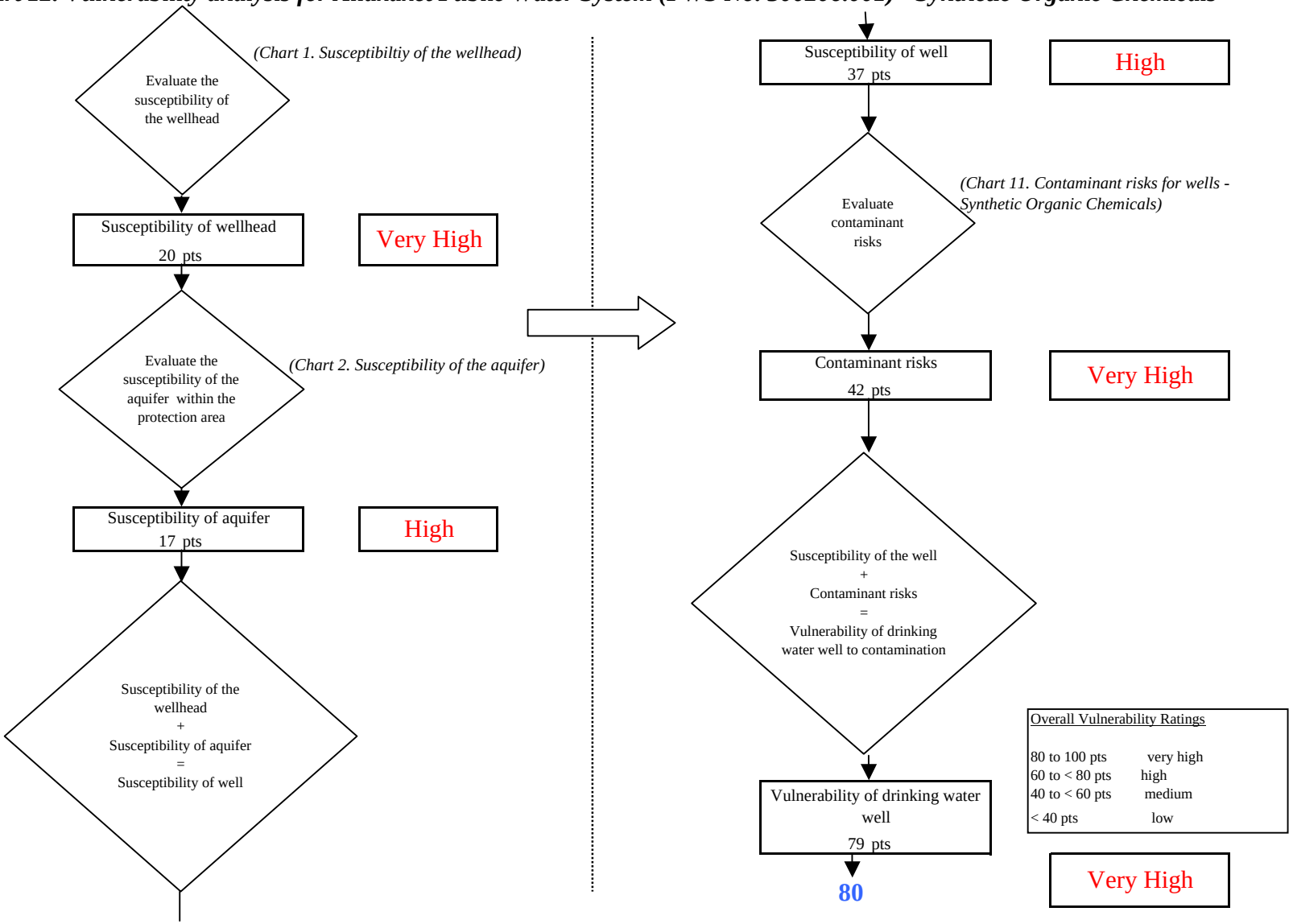


Chart 13. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Other Organic Chemicals

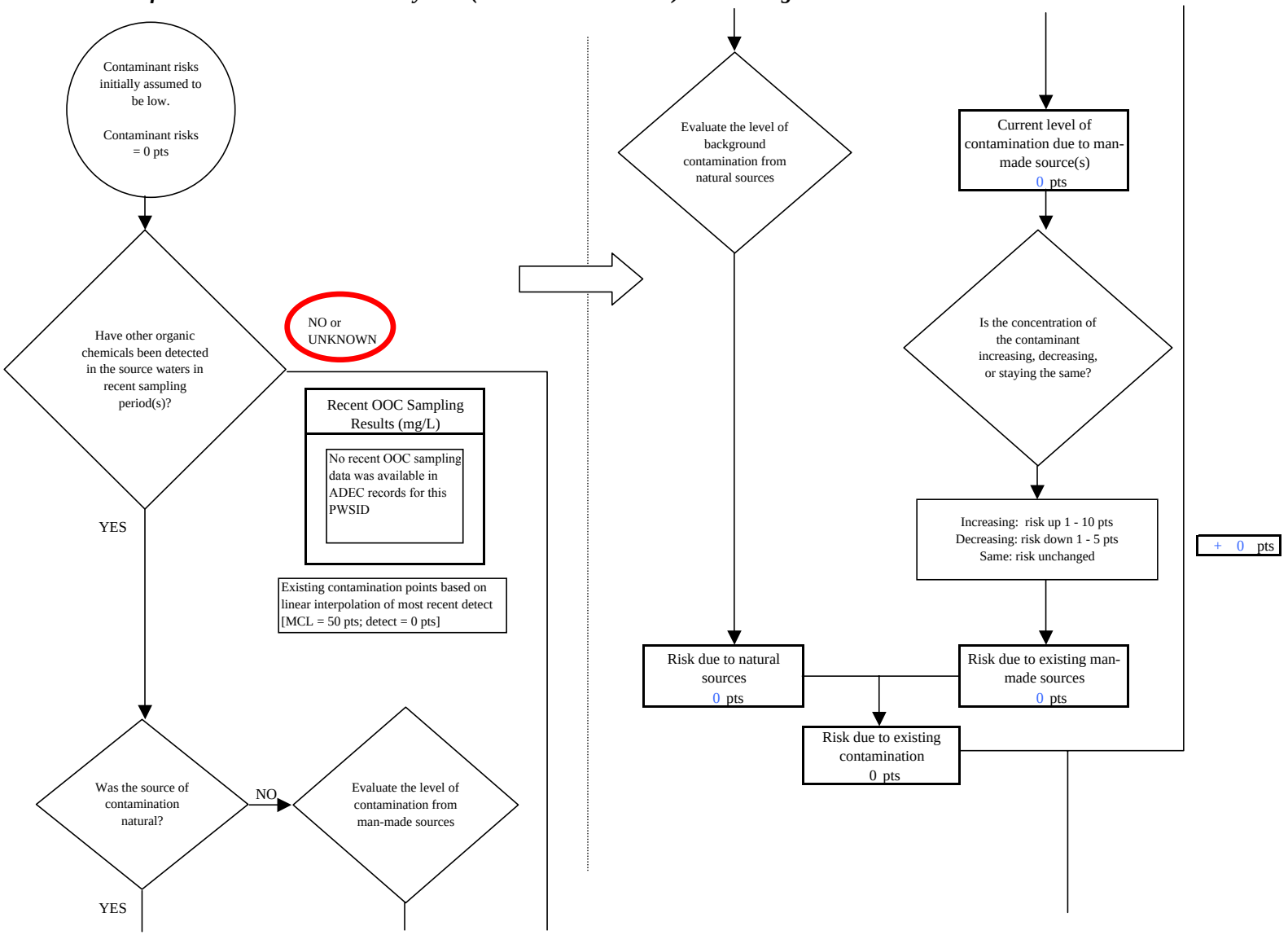
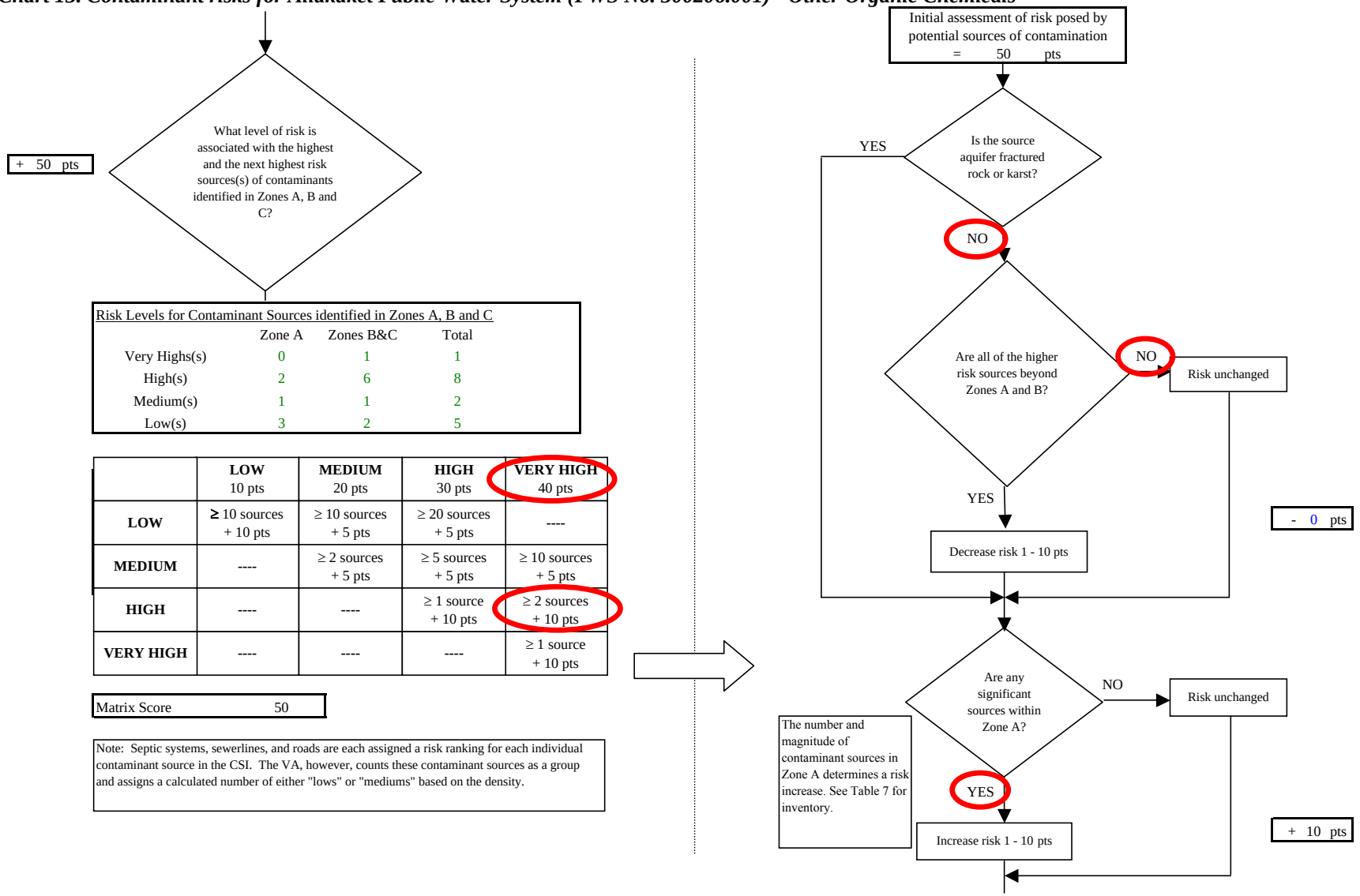


Chart 13. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Other Organic Chemicals



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

	Zone A	Zones B&C	Total
Very Highs(s)	0	1	1
High(s)	2	6	8
Medium(s)	1	1	2
Low(s)	3	2	5

	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.

Chart 13. Contaminant risks for Allakaket Public Water System (PWS No. 300206.001) - Other Organic Chemicals

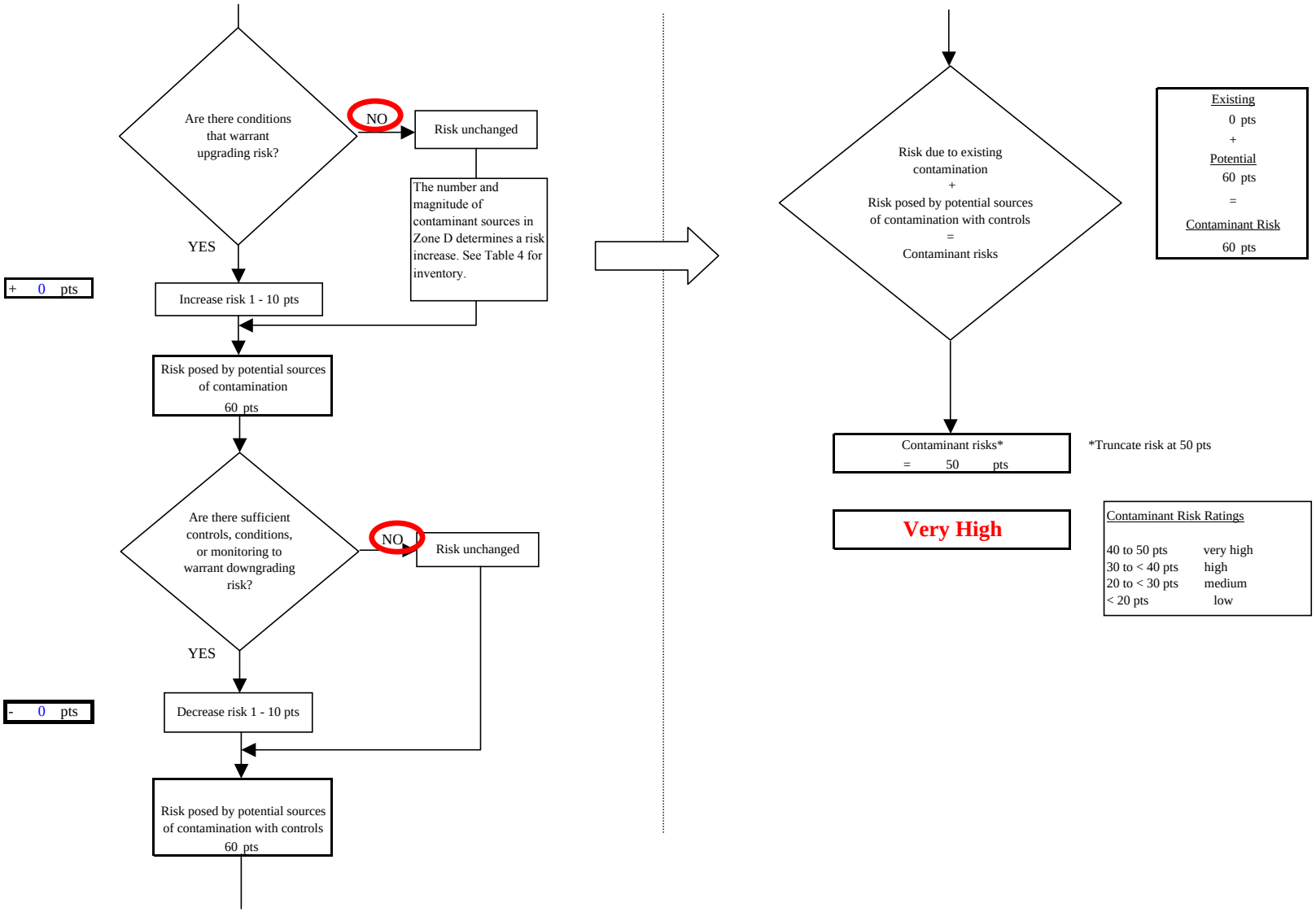


Chart 14. Vulnerability analysis for Allakaket Public Water System (PWS No. 300206.001) - Other Organic Chemicals