Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for the Tanana Safewater Facility Drinking Water System, Tanana, Alaska

PWSID # 360109.001

June 2004

DRINKING WATER PROTECTION PROGRAM REPORT 1336
Alaska Department of Environmental Conservation

Source Water Assessment for the Tanana Safewater Facility Drinking Water System Tanana, Alaska

PWSID # 360109.001

DRINKING WATER PROTECTION PROGRAM REPORT 1336

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.

CONTENTS

TABLES

APPENDICES

Source Water Assessment for the Tanana Safewater Facility Community Source of Public Drinking Water, Tanana, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Tanana Safewater Facility Public Water System (PWS) has one well. The well (PWS No. 360109.001) has been used as a drinking water source since it was drilled in 1998.

The well is a Class A (community and non-transient non-community) water system located south of the community within 50 feet of the north bank of the Yukon River in Tanana, Alaska. Available records indicate that the drinking water is filtered and treated with calcium hypochlorite. Records also indicate that secondary storage with a capacity of 212,000-gallons is available. This system operates year round and serves approximately 300 residents. The wellhead received a susceptibility rating of **Medium** and the aquifer received a susceptibility rating of **Very 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: gasoline stations, wastewater treatment facilities, large-capacity septic systems, fuel tanks, and ADEC recognized contaminated sites. A detailed inventory can be found in Table 1 of Appendix B. These identified potential and existing sources of contamination are considered 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 well received a vulnerability rating of **Very High** for bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, cyanide and other inorganic chemicals, and other organic chemicals and a vulnerability rating of **High** for the synthetic organic chemicals contaminant categories.

PUBLIC DRINKING WATER SYSTEM

The Tanana Safewater Facility PWS well is a Class A (community/non-transient/non-community) public water system. The system is located south of the community within 50 feet of the north bank of the Yukon River in Tanana, Alaska (Sec. 17, T004N, R022W, Fairbanks Meridian, see Map A of Appendix A). The community of Tanana is located about two miles west of the junction of the Tanana and Yukon Rivers, 130 air miles west of Fairbanks. The community has a population of 290 (ADCED, 2003). Average annual precipitation in Tanana is 13 inches, including approximately 50 inches of snowfall. Temperatures can be as extreme as -71 to 94°F.

The residents of Tanana haul most of their water supply from the community water system. Honeybuckets and pit privies are used for sewage disposal (ADCED, 2003). Tanana residents rely on the Tanana Power Company for electricity, which is powered by diesel and wind turbine. Residents dispose of refuse at the Class III landfill, which is operated by the City of Tanana.

According to information supplied by ADEC for the Tanana Safewater Facility PWS, the depth of the well is 43 feet below the ground surface. Based on available well construction details, the well is assumed to be screened in an unconfined aquifer. The well is suspected to be located within a floodplain.

Information acquired from a November 2002 sanitary survey for the PWS 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.

Soils in the Tanana area are generally described as organic near the surface, overlying a slit layer. The silt layer is found to be overlying sand and gravel, and the sand and gravel generally overlays bedrock. The soil/bedrock interface is not easily identifiable due to weathering of the uppermost bedrock.

Bedrock types encountered are sandstone, claystone, and schist (VSW, 1997).

DRINKING WATER PROTECTION AREA

In order to evaluate whether a drinking water source is at risk, we must first evaluate what are the most likely pathways for surface contamination to reach the groundwater. 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 Tanana Safewater Facility 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 Tanana Safewater Facility 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 Tanana Safewater Facility PWS 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, and
- 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, 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 Tanana Safewater Facility PWS's 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	10	Medium
Susceptibility of the Aquifer	25	Very High
Natural Susceptibility	35	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	50	Very High
Synthetic Organic Chemicals	25	Medium
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	85	Very High Synthetic
Organic Chemicals	60	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 large capacity septic systems located in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 2 – Appendix B).

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, 2002). Positive samples increase the overall vulnerability of the drinking water source, indicating that the source is susceptible to bacteria and virus contamination.

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 large capacity septic systems located in Zone A. Numerous other potential contaminant sources are also found within 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, but have not exceeded 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 is 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 Gasoline stations, ADEC recognized contaminated sites, and fuel tanks located in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 4 – Appendix B).

Recent sampling results indicate the presence benzene. Benzene is an aromatic hydrocarbon that is produced by the burning of natural products. It is a componenet of product derived from coal and petroleum and is found in gasoline and other fuels. Benzene is used in the manufacture of plastics, detergents, pesticides, and other chemicals. Research has shown benzene to be a carcinogen. The presense of benzene is likely indicative of source water conditions, and risk points were assigned (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Other possible sources of volatile organic chemicals include facilities with automobiles, residential areas, fuel tanks, and roads. See Table 4 in Appendix B for a comp lete 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 **Very High**. The risk is primarily attributed to the presence of barium in recent sampling results and motor vehicle waste injection wells located in Zone A. Numerous other potential contaminant sources are also found within the protection area (see Table 5 – Appendix B).

Based on review of recent sampling records for this PWS, barium, mercury and sodium have been detected. While the concentrations have not exceeded their respective MCL's of 2.0, 0.002, and 250 mg/L, the concentrations do represent a risk and points were assigned (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

While the source is unknown, the reported concentrations are likely attributed to man made sources (see Table 5 in Appendix B for list of potential contaminant sources).

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 **Very High**.

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is **Medium**. The risk is primarily attributed to an airport and a cemetery located in Zone A. Numerous other contaminant sources are also located within the protection area (see Table 6 – Appendix B).

No recent sampling data was available in ADEC records for the Tanana Safewater Facility 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 **High**.

Other Organic Chemicals

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

No recent sampling data was available in ADEC records for the Tanana Safewater Facility 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 Tanana 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.

REFERENCES

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

Alaska Department of Environmental Conservation, Contaminated Sites Database, 2003 [WWW database], URL http://www.state.ak.us/dec/dspar/csites/cs_search.htm

Alaska Department of Environmental Conservation, Leaking Underground Storage Tank Database, 2003 [WWW database], URL http://www.dec.state.ak.us/spar/stp/ust/search/fac_search.asp

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

Village Safe Water, 1997, Correspondence from ADEC file and Montgomery Watson Water Source Evaluation for Tanana, Alaska

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

APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

APPENDIX B

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

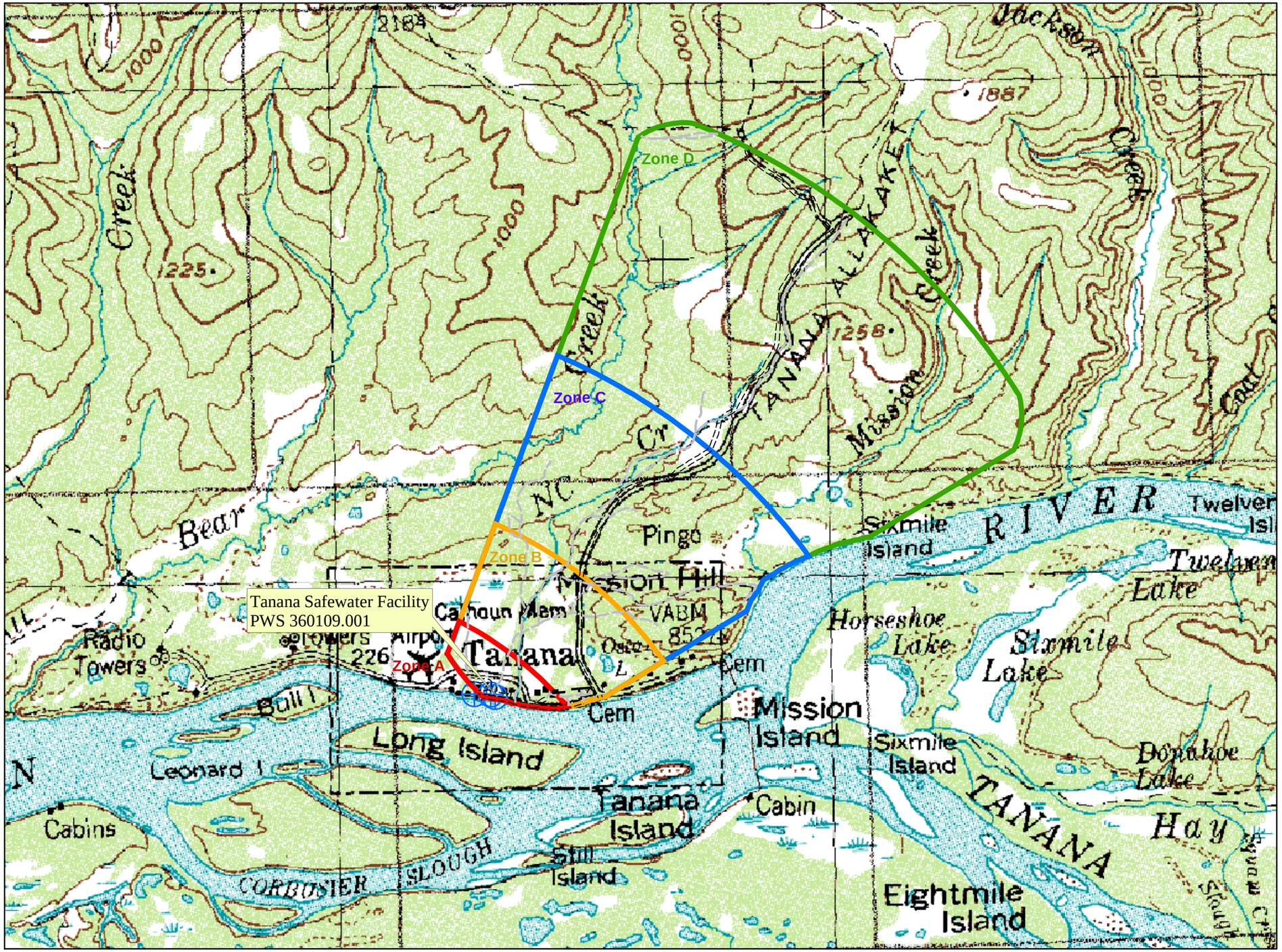
APPENDIX C

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 # 360109.001 Tanana Safewater Facility



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)

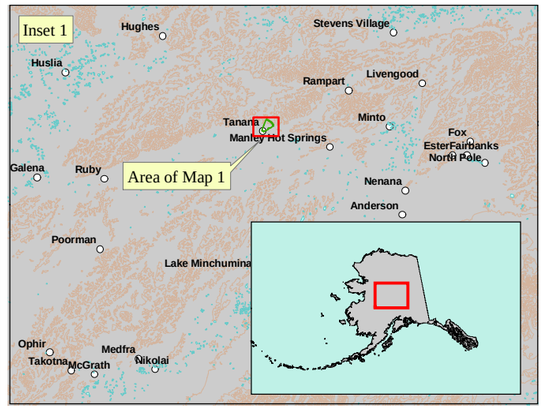
Groundwater Protection Zones

- 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

Data Sources:
- Contaminant Sources, Public Water System Wells, Contours
  Alaska Department of Environmental Conservation (ADEC)
- Critical Facilities, Federal Emergency Management Agency (FEMA)

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

Tanana Safewater Facility
PWS# 360109.001
Appendix A Map A

Table 1

Contaminant Source Inventory for ***Tanana Safewater Facility***

PWSID 360109.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-01	A	C	TANANA GAS COMPANY
Laundromats without dry cleaning	C22	C22-01	A	C	Washeteria and Water Treatment Plant
Laundromats without dry cleaning	C22	C22-02	A	C	
Motor /motor vehicle repair shops	C31	C31-01	A	C	City Garage
Motor /motor vehicle repair shops	C31	C31-02	A	C	Bear Creek RRS Vehicle Maint Shop
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	C	
Domestic wastewater treatment plants	D05	D05-01	A	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	C	TANANA-VSW
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	C	Assume 100 or less pit toilets/outhouses in Zone A
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	C	Assume 10 or less septic systems in Zone A
Tanks, heating oil, residential (above ground)	R08	R08-01	A	C	Assume 30 or less residential heating oil tanks in Zone A
Tanks, diesel (underground)	T08	T08-01	A	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-01	A	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-02	A	C	TANANA GAS COMPANY

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Tanks, gasoline (underground)	T12	T12-03	A	C	TANANA GAS COMPANY
Closed tanks, gasoline (underground)	T13	T13-01	A	C	Tanana Commercial
Closed tanks, gasoline (underground)	T13	T13-02	A	C	ADOTPF - TANANA AIRPORT
Closed tanks, gasoline (underground)	T13	T13-03	A	C	ADOTPF - TANANA AIRPORT
Closed tanks, gasoline (underground)	T13	T13-04	A	C	ADOTPF - TANANA AIRPORT
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	C	Tanana Power Company
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	C	Dons Video
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	C	Telephone Company
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	Tanana Volunteer Fire/EMS
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	C	
Tanks, heating oil, nonresidential (underground)	T16	T16-01	A	C	TANANA ZONE HEADQUARTER
Tanks, heating oil, nonresidential (underground)	T16	T16-02	A	C	FAA - TANANA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	C	Tanana City Drinking Water Well
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	C	Bear Creek RRS White Alice Site
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	C	Bear Creek RRS Vehicle Maint Shop

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	C	Tanana Health Center
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	A	C	FAA Tanana FABLM/AK Fire Serv.F.S.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	A	C	Bear Creek RRS POL Storage Area
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	A	C	Bear Creek Radio Relay Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	A	C	Bear Creek RRS Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	A	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	A	C	BLM/AK Fire Service Housing Complex
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	A	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	A	C	Tanana Lot 3 Former Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	A	C	Tanana Power Company
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	C	TANANA ZONE HEADQUARTER
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	A	C	FAA - TANANA
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	A	C	TANANA GAS COMPANY
Water supply wells	W09	W09-01	A	C	Tanana City Drinking Water Well
Cemeteries	X01	X01-01	A	C	
Municipal or city parks (with green areas)	X04	X04-01	A	C	
Petroleum product bulk station/terminals	X11	X11-01	A	C	Bulk Fuel Storage-City
Petroleum product bulk station/terminals	X11	X11-02	A	C	Bulk Fuel Storage-Tanana Power Company
Petroleum product bulk station/terminals	X11	X11-03	A	C	Bulk Fuel Storage-Tribal Council
Petroleum product bulk station/terminals	X11	X11-04	A	C	Dons Video
Petroleum product bulk station/terminals	X11	X11-05	A	C	Waheteria
Airports	X14	X14-01	A	C	TANANA LANDING STRIP
Boat yards and marinas	X15	X15-01	A	C	Dock

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 1-20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	C	Barge to Bulk Fuel Tanks
Pipelines (oil and gas)	X28	X28-02	A	C	Barge to Bulk Fuel Tanks
Electric power generation (fossil fuels)	X36	X36-01	A	C	Tanana Power Company
Firehouses	X38	X38-01	A	C	Tanana Volunteer Fire/EMS

Table 2

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility
Sources of Bacteria and Viruses

PWSID 360109.001

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	Washeteria and Water Treatment Plant
Laundromats without dry cleaning	C22	C22-02	A	Low	C	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Medium	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	
Domestic wastewater treatment plants	D05	D05-01	A	Medium	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	High	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	High	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	High	C	TANANA-VSW
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 100 or less pit toilets/outhouses in Zone A
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A

Table 3

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility Sources of Nitrates/Nitrites

PWSID 360109.001

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	Washeteria and Water Treatment Plant
Laundromats without dry cleaning	C22	C22-02	A	Low	C	
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Medium	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	High	C	
Domestic wastewater treatment plants	D05	D05-01	A	Medium	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	High	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	High	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	High	C	TANANA-VSW
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 100 or less pit toilets/outhouses in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Cemeteries	X01	X01-01	A	Medium	C	
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	
Airports	X14	X14-01	A	Low	C	TANANA LANDING STRIP
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A

Table 4

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility
Sources of Volatile Organic Chemicals

PWSID 360109.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-01	A	High	C	TANANA GAS COMPANY
Laundromats without dry cleaning	C22	C22-01	A	Low	C	Washeteria and Water Treatment Plant
Laundromats without dry cleaning	C22	C22-02	A	Low	C	
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	Bear Creek RRS Vehicle Maint Shop
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Low	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	Low	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	Low	C	TANANA-VSW
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 100 or less pit toilets/outhouses in Zone A
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	High	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 30 or less residential heating oil tanks in Zone A
Tanks, diesel (underground)	T08	T08-01	A	High	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-01	A	High	C	TANANA GAS COMPANY

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility

Sources of Volatile Organic Chemicals

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Map Number***	***Comments***
Tanks, gasoline (underground)	T12	T12-02	A	High	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-03	A	High	C	TANANA GAS COMPANY
Closed tanks, gasoline (underground)	T13	T13-01	A	Medium	C	Tanana Commercial
Closed tanks, gasoline (underground)	T13	T13-02	A	Medium	C	ADOTPF - TANANA AIRPORT
Closed tanks, gasoline (underground)	T13	T13-03	A	Medium	C	ADOTPF - TANANA AIRPORT
Closed tanks, gasoline (underground)	T13	T13-04	A	Medium	C	ADOTPF - TANANA AIRPORT
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	Tanana Power Company
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	Dons Video
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Telephone Company
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	Tanana Volunteer Fire/EMS
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	
Tanks, heating oil, nonresidential (underground)	T16	T16-01	A	Low	C	TANANA ZONE HEADQUARTER
Tanks, heating oil, nonresidential (underground)	T16	T16-02	A	Low	C	FAA - TANANA

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	A	High	C	Tanana City Drinking Water Well
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	High	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	High	C	Bear Creek RRS White Alice Site
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	High	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	High	C	Tanana Health Center
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	A	High	C	FAA Tanana FABLM/AK Fire Serv.F.S.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	A	High	C	Bear Creek RRS POL Storage Area
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	A	High	C	Bear Creek Radio Relay Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	A	High	C	Bear Creek RRS Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	A	High	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	A	High	C	BLM/AK Fire Service Housing Complex
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	A	High	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	A	High	C	Tanana Lot 3 Former Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	A	High	C	Tanana Power Company
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	High	C	TANANA ZONE HEADQUARTER

Table 4 (continued)

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility

Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	A	High	C	FAA - TANANA
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	A	High	C	TANANA GAS COMPANY
Petroleum product bulk station/terminals	X11	X11-01	A	Very High	C	Bulk Fuel Storage-City
Petroleum product bulk station/terminals	X11	X11-02	A	Very High	C	Bulk Fuel Storage-Tanana Power Company
Petroleum product bulk station/terminals	X11	X11-03	A	Very High	C	Bulk Fuel Storage-Tribal Council
Petroleum product bulk station/terminals	X11	X11-04	A	Very High	C	Dons Video
Petroleum product bulk station/terminals	X11	X11-05	A	Very High	C	Waheteria
Airports	X14	X14-01	A	High	C	TANANA LANDING STRIP
Boat yards and marinas	X15	X15-01	A	Low	C	Dock
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	Medium	C	Barge to Bulk Fuel Tanks
Pipelines (oil and gas)	X28	X28-02	A	Medium	C	Barge to Bulk Fuel Tanks
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	Tanana Power Company
Firehouses	X38	X38-01	A	Low	C	Tanana Volunteer Fire/EMS

Table 5

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 360109.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-01	A	Low	C	TANANA GAS COMPANY
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	Bear Creek RRS Vehicle Maint Shop
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Low	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	Low	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	Low	C	TANANA-VSW
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 100 or less pit toilets/outhouses in Zone A
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	High	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Tanks, gasoline (underground)	T12	T12-01	A	Medium	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-02	A	Medium	C	TANANA GAS COMPANY
Tanks, gasoline (underground)	T12	T12-03	A	Medium	C	TANANA GAS COMPANY
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	A	Low	C	Tanana Power Company
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	A	Low	C	Dons Video

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Tanks, heating oil, nonresidential (aboveground)	T14	T14-03	A	Low	C	Telephone Company
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	Tanana Volunteer Fire/EMS
Tanks, heating oil, nonresidential (aboveground)	T14	T14-09	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-10	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-11	A	Low	C	
Tanks, heating oil, nonresidential (aboveground)	T14	T14-12	A	Low	C	
Tanks, heating oil, nonresidential (underground)	T16	T16-01	A	Low	C	TANANA ZONE HEADQUARTER
Tanks, heating oil, nonresidential (underground)	T16	T16-02	A	Low	C	FAA - TANANA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Tanana City Drinking Water Well
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Bear Creek RRS White Alice Site
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Tanana Health Center
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	A	Low	C	FAA Tanana FABLM/AK Fire Serv.F.S.

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	U04-07	A	Low	C	Bear Creek RRS POL Storage Area
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	A	Low	C	Bear Creek Radio Relay Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	A	Low	C	Bear Creek RRS Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	A	Low	C	BLM/AK Fire Service Housing Complex
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	A	Low	C	Tanana Lot 3 Former Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	A	Low	C	Tanana Power Company
Cemeteries	X01	X01-01	A	Low	C	
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Bulk Fuel Storage-City
Petroleum product bulk station/terminals	X11	X11-02	A	Low	C	Bulk Fuel Storage-Tanana Power Company
Petroleum product bulk station/terminals	X11	X11-03	A	Low	C	Bulk Fuel Storage-Tribal Council
Petroleum product bulk station/terminals	X11	X11-04	A	Low	C	Dons Video
Petroleum product bulk station/terminals	X11	X11-05	A	Low	C	Waheteria
Airports	X14	X14-01	A	Low	C	TANANA LANDING STRIP
Boat yards and marinas	X15	X15-01	A	Low	C	Dock

Contaminant Source Inventory and Risk Ranking for
Tanana Safewater Facility
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*
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	Low	C	Barge to Bulk Fuel Tanks
Pipelines (oil and gas)	X28	X28-02	A	Low	C	Barge to Bulk Fuel Tanks
Electric power generation (fossil fuels)	X36	X36-01	A	Medium	C	Tanana Power Company
Firehouses	X38	X38-01	A	Low	C	Tanana Volunteer Fire/EMS

Table 6

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility
Sources of Synthetic Organic Chemicals

PWSID 360109.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Low	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	Low	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	Low	C	TANANA-VSW
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Tanana City Drinking Water Well
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Bear Creek RRS White Alice Site
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Tanana Health Center
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	A	Low	C	FAA Tanana FABLM/AK Fire Serv.F.S.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	A	Low	C	Bear Creek RRS POL Storage Area

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	U04-08	A	Low	C	Bear Creek Radio Relay Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	A	Low	C	Bear Creek RRS Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	A	Low	C	BLM/AK Fire Service Housing Complex
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	A	Low	C	Tanana Lot 3 Former Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	A	Low	C	Tanana Power Company
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	Low	C	TANANA ZONE HEADQUARTER
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	A	Low	C	FAA - TANANA
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	A	Low	C	TANANA GAS COMPANY
Cemeteries	X01	X01-01	A	Medium	C	
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	
Petroleum product bulk station/terminals	X11	X11-01	A	Low	C	Bulk Fuel Storage-City
Petroleum product bulk station/terminals	X11	X11-02	A	Low	C	Bulk Fuel Storage-Tanana Power Company
Petroleum product bulk station/terminals	X11	X11-03	A	Low	C	Bulk Fuel Storage-Tribal Council
Petroleum product bulk station/terminals	X11	X11-04	A	Low	C	Dons Video
Petroleum product bulk station/terminals	X11	X11-05	A	Low	C	Waheteria

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Airports	X14	X14-01	A	Medium	C	TANANA LANDING STRIP

Table 7

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility
Sources of Other Organic Chemicals

PWSID 360109.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-01	A	Low	C	TANANA GAS COMPANY
Motor /motor vehicle repair shops	C31	C31-01	A	Medium	C	City Garage
Motor /motor vehicle repair shops	C31	C31-02	A	Medium	C	Bear Creek RRS Vehicle Maint Shop
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	Low	C	Assume 10 or less sewer lines in Zone A
Domestic wastewater treatment plant disposal ponds/lagoons	D02	D02-01	A	Low	C	
Domestic wastewater treatment plants	D05	D05-01	A	Low	C	Sewage Lagoon
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	FAA - TANANA
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	A	Low	C	TANANA-AK NATIVE HEALTH CLINIC
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	A	Low	C	TANANA-VSW
Injection wells (Class V) Motor Vehicle Waste Disposal Well	D42	D42-01	A	Medium	C	Bear Creek RRS Vehicle Maint Shop
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less septic systems in Zone A
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Tanana City Drinking Water Well
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Bear Creek RRS White Alice Site
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	A	Low	C	Bear Creek RRS Vehicle Maint Shop

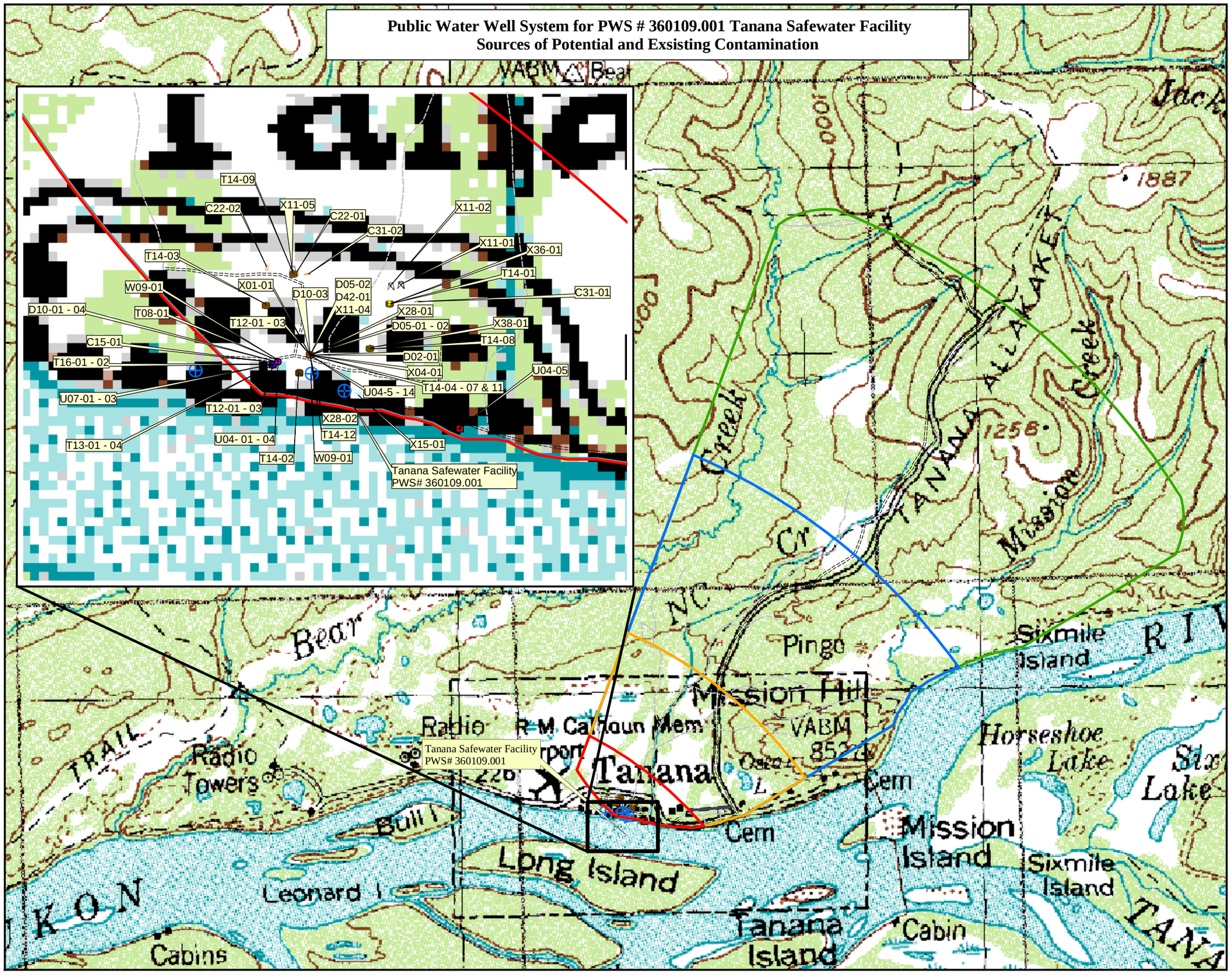
Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	A	Low	C	Tanana Health Center
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	A	Low	C	FAA Tanana FABLM/AK Fire Serv.F.S.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	A	Low	C	Bear Creek RRS POL Storage Area
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	A	Low	C	Bear Creek Radio Relay Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	A	Low	C	Bear Creek RRS Landfill
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	A	Low	C	Bear Creek RRS Vehicle Maint Shop
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	A	Low	C	BLM/AK Fire Service Housing Complex
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	A	Low	C	FAA Tanana Station
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	A	Low	C	Tanana Lot 3 Former Tank Farm
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	A	Low	C	Tanana Power Company
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	Low	C	TANANA ZONE HEADQUARTER
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	A	Low	C	FAA - TANANA
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	A	Low	C	TANANA GAS COMPANY
Petroleum product bulk station/terminals	X11	X11-01	A	High	C	Bulk Fuel Storage-City
Petroleum product bulk station/terminals	X11	X11-02	A	High	C	Bulk Fuel Storage-Tanana Power Company
Petroleum product bulk station/terminals	X11	X11-03	A	High	C	Bulk Fuel Storage-Tribal Council

Contaminant Source Inventory and Risk Ranking for Tanana Safewater Facility

Sources of Other Organic Chemicals

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Map Number***	***Comments***
Petroleum product bulk station/terminals	X11	X11-04	A	High	C	Dons Video
Petroleum product bulk station/terminals	X11	X11-05	A	High	C	Waheteria
Airports	X14	X14-01	A	Medium	C	TANANA LANDING STRIP
Boat yards and marinas	X15	X15-01	A	Low	C	Dock
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Pipelines (oil and gas)	X28	X28-01	A	High	C	Barge to Bulk Fuel Tanks
Pipelines (oil and gas)	X28	X28-02	A	High	C	Barge to Bulk Fuel Tanks
Electric power generation (fossil fuels)	X36	X36-01	A	High	C	Tanana Power Company

Public Water Well System for PWS # 360109.001 Tanana Safewater Facility
Sources of Potential and Exsisting 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

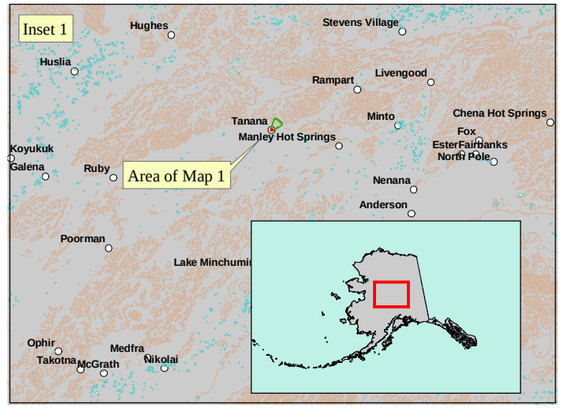
Existing or Potential Contaminant Source

- Gasoline Stations without repair shops (C15)
- Laundromats without dry cleaning (C22)
- Motor/motor vehicle repair shops (C31)
- Domestic wastewater treatment plant disposal pond (D02)
- Domestic wastewater treatment plants (D05)
- Injection Wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Injection wells (Class V) Motor Vehicle Waste Disposal Well (D42)
- Tanks, diesel (underground) (T08)
- Tanks, gasoline, underground (T12)
- Closed Tanks, gasoline (underground) (T13)
- Tanks, heating oil, non-residential, aboveground (T14)
- Tanks, heating oil nonresidential (underground) (T16)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Leaking Underground Storage Tank (LUST) (U07) (lubricants or other petroleum products)
- Water supply wells (W09)
- Cemetaries (X01)
- Municipal or city parks (X04)
- Petroleum product bulk station/terminal (X11)
- Boat yards and marinas (X15)
- Pipelines (oil and gas) (X28)
- Power Generation Facility (fossil fuel) (X36)
- Firehouses (X38)

Data Sources:
- Contaminant Sources, Public Water System Wells, Contours Alaska Department of Environmental Conservation (ADEC)
- Critical Facilities, Federal Emergency Management Agency (FEMA)

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 0.05 0.1 0.2 0.3 0.4 Miles

Tanana Safewater Facility
PWS# 360109.001
Appendix C Map C

Chart 1. Susceptibility of the wellhead - Tanana Safewater Facility (PWS No. 360109.001)

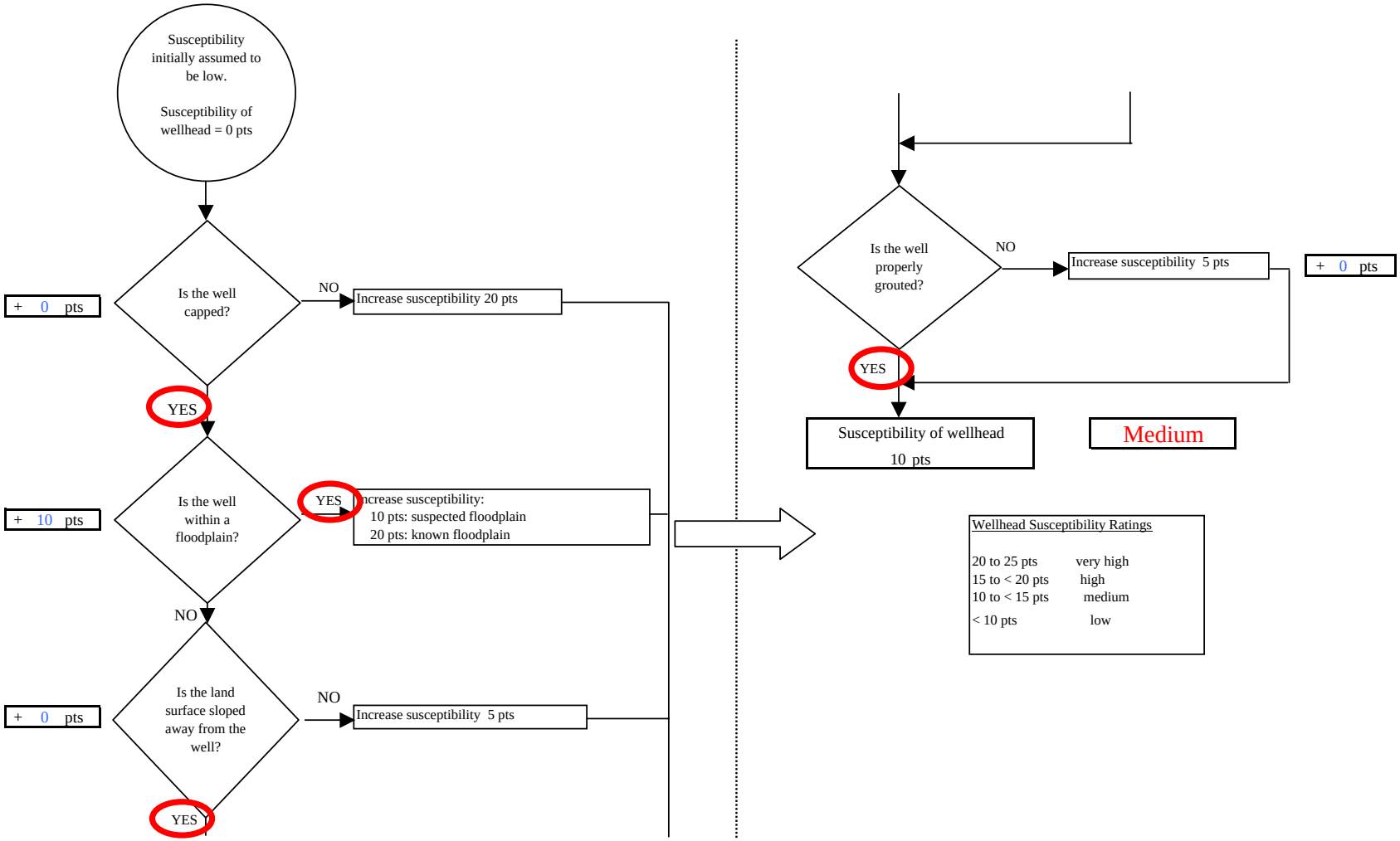


Chart 2. Susceptibility of the aquifer Tanana Safewater Facility (PWS No. 360109.001)

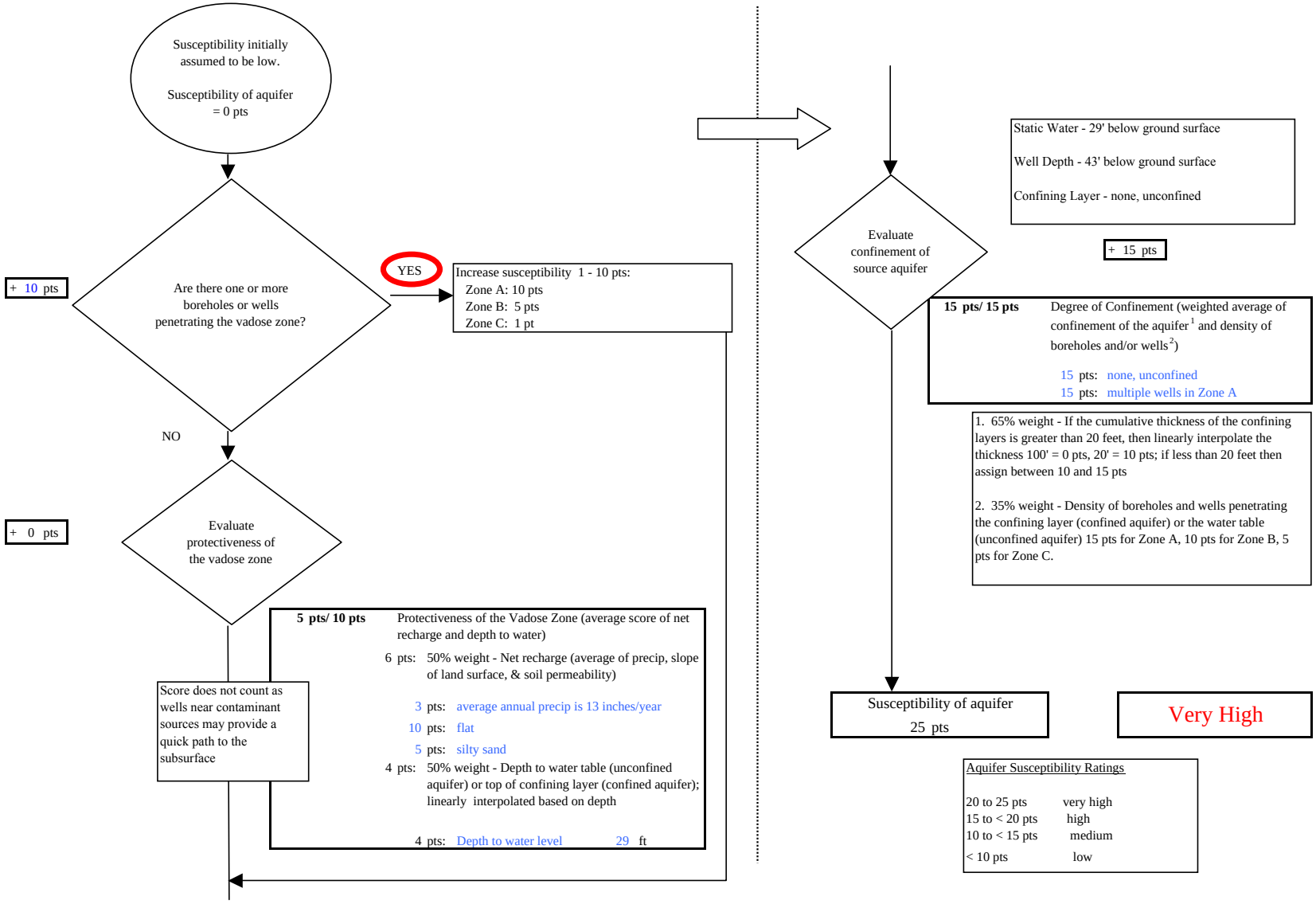
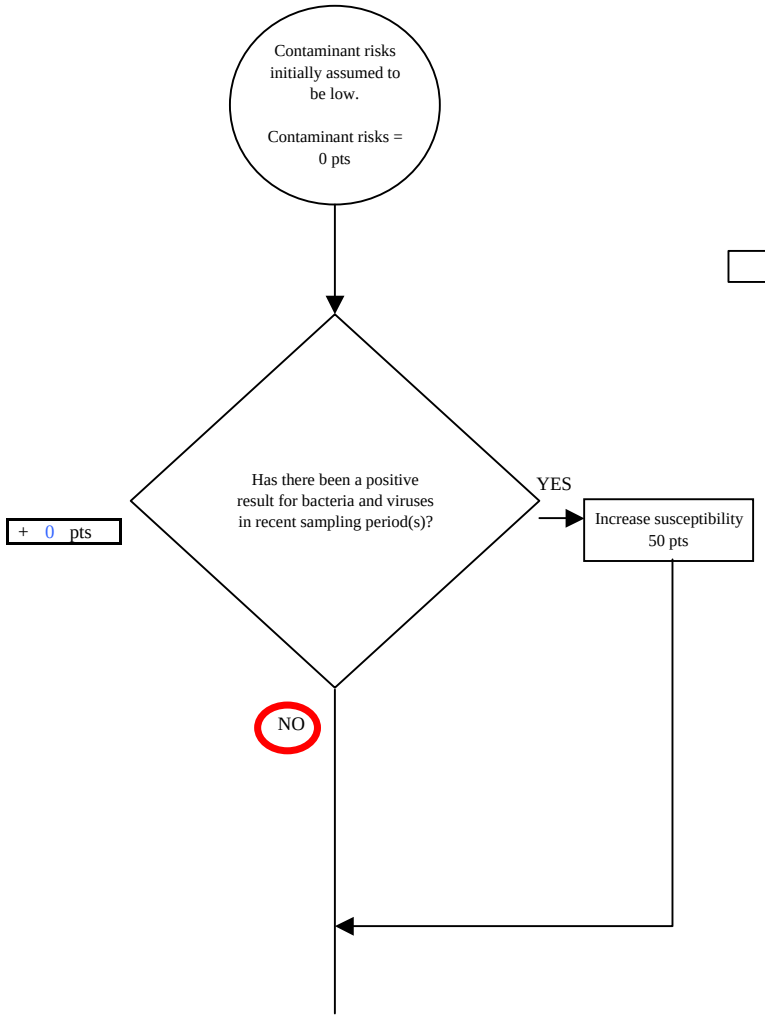
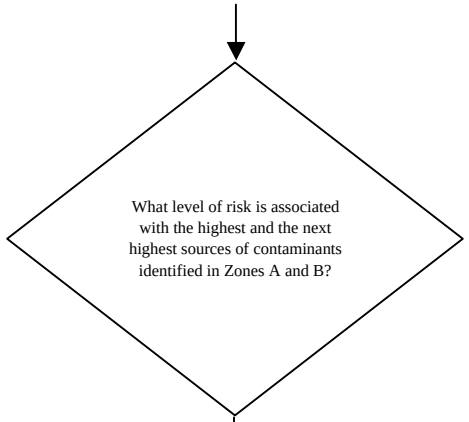


Chart 3. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Bacteria & Viruses





+ 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)	5	0	5
Medium(s)	103	0	103
Low(s)	13	0	13

	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 Tanana Safewater Facility (PWS No. 360109.001) - Bacteria & Viruses

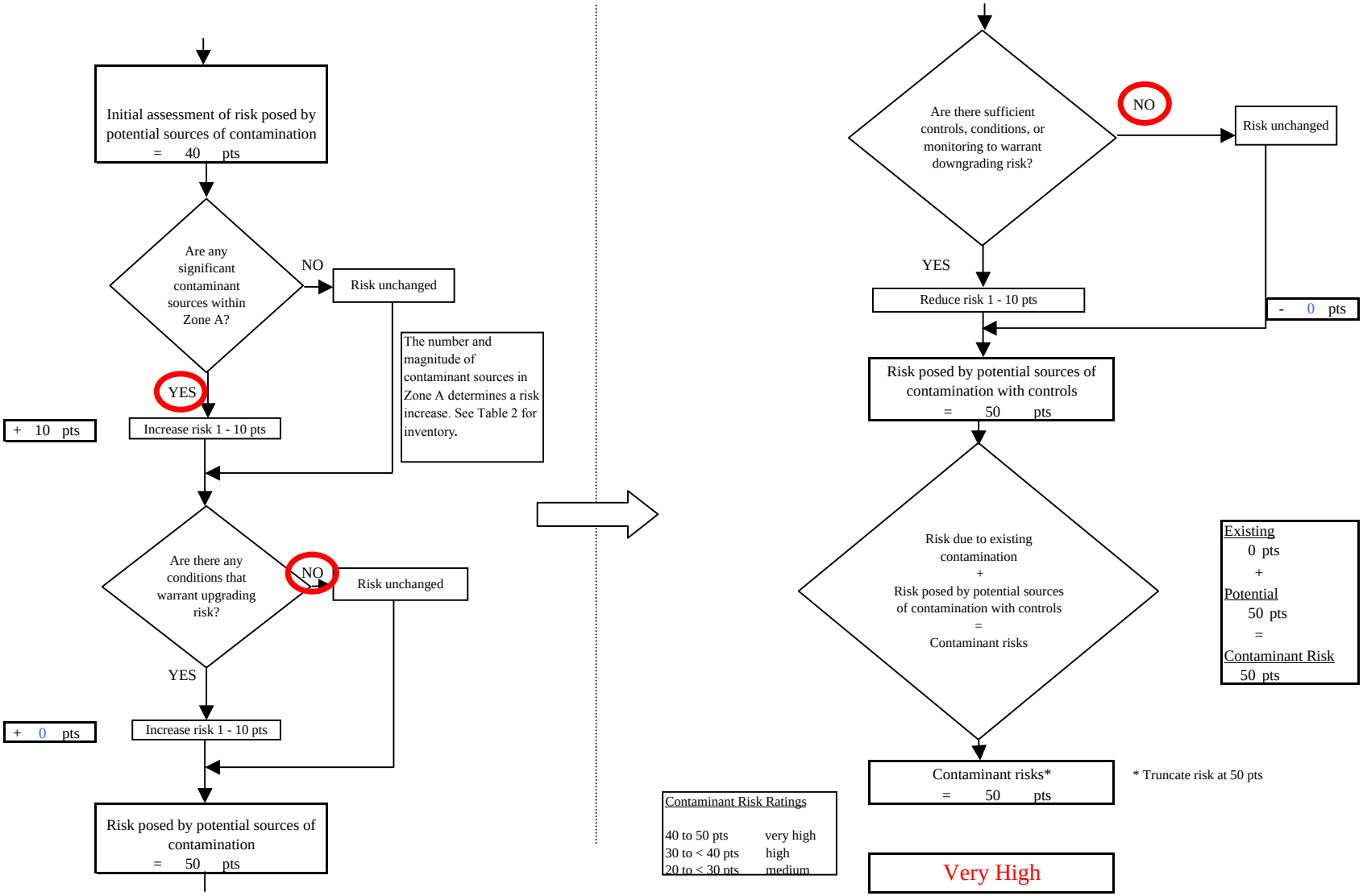


Chart 4. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Bacteria & Viruses

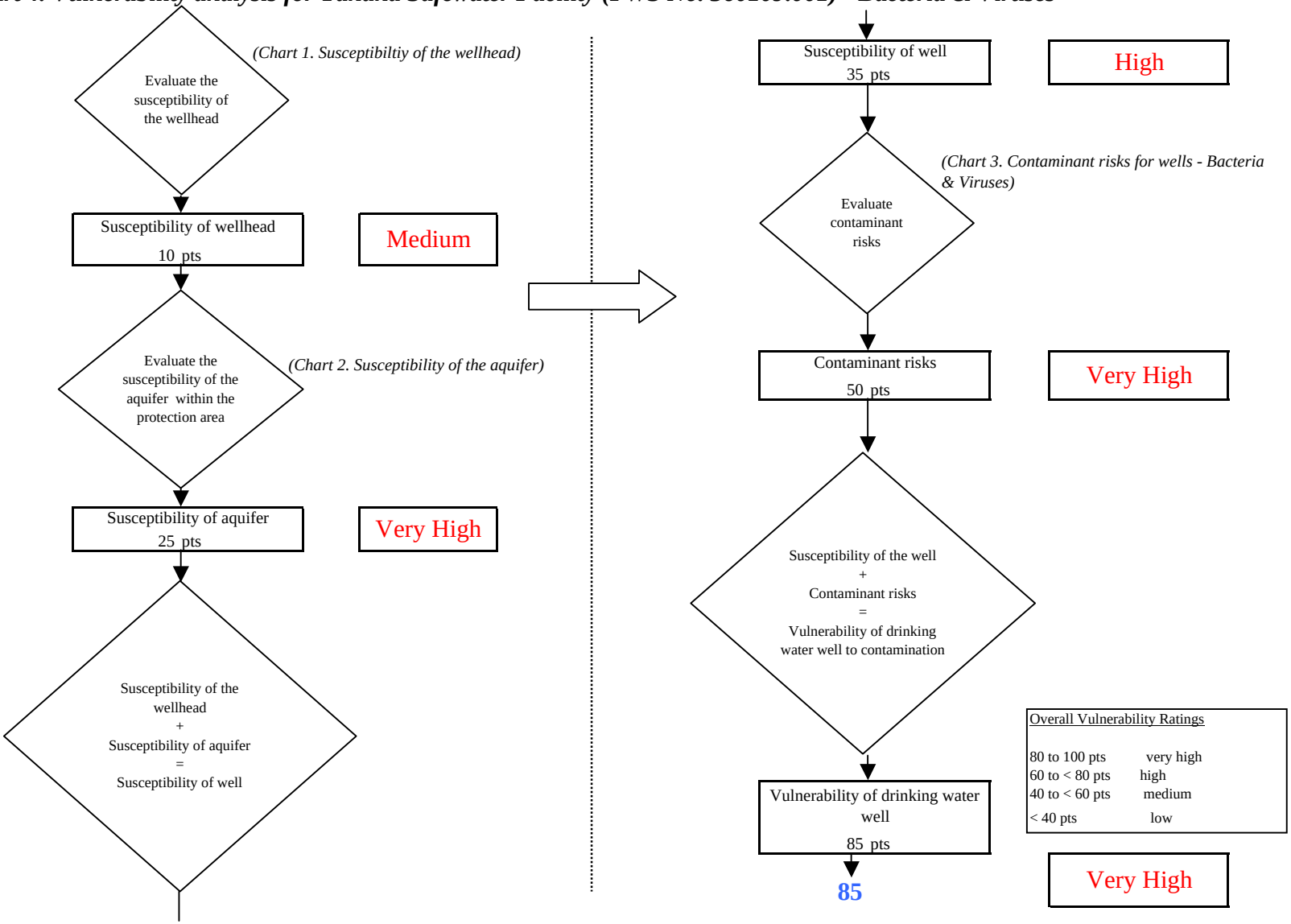


Chart 5. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Nitrates and Nitrites

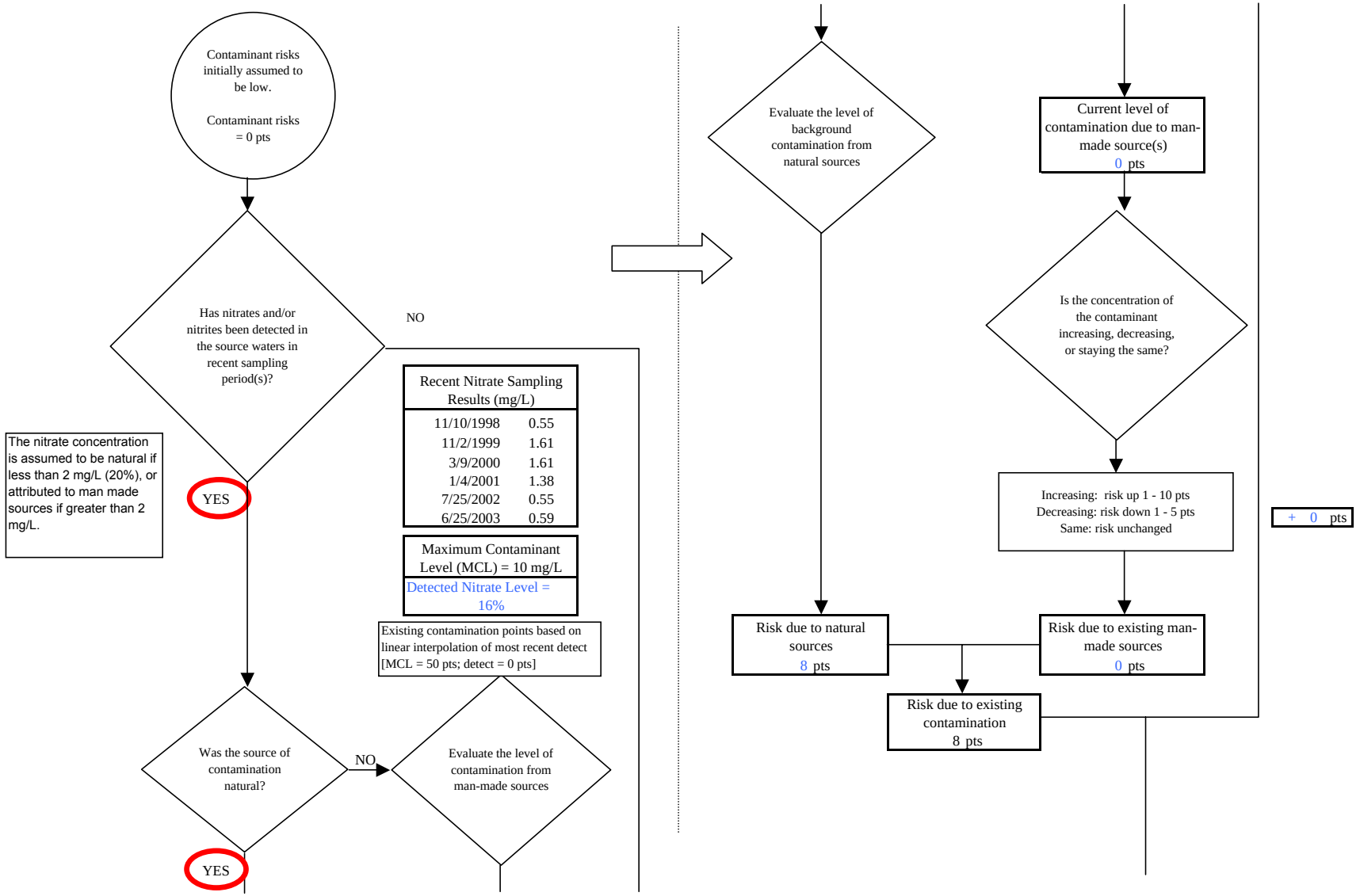


Chart 5. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Nitrates and Nitrites

+ 40 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)	5	0	5
Medium(s)	104	0	104
Low(s)	13	0	13

	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.

Initial assessment of risk posed by potential sources of contamination = 40 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

- 0 pts

Decrease risk 1 - 10 pts

Are any significant sources within Zone A?

NO → Risk unchanged

YES

+ 10 pts

Increase risk 1 - 10 pts

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 3 for inventory.

Chart 5. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Nitrates and Nitrites

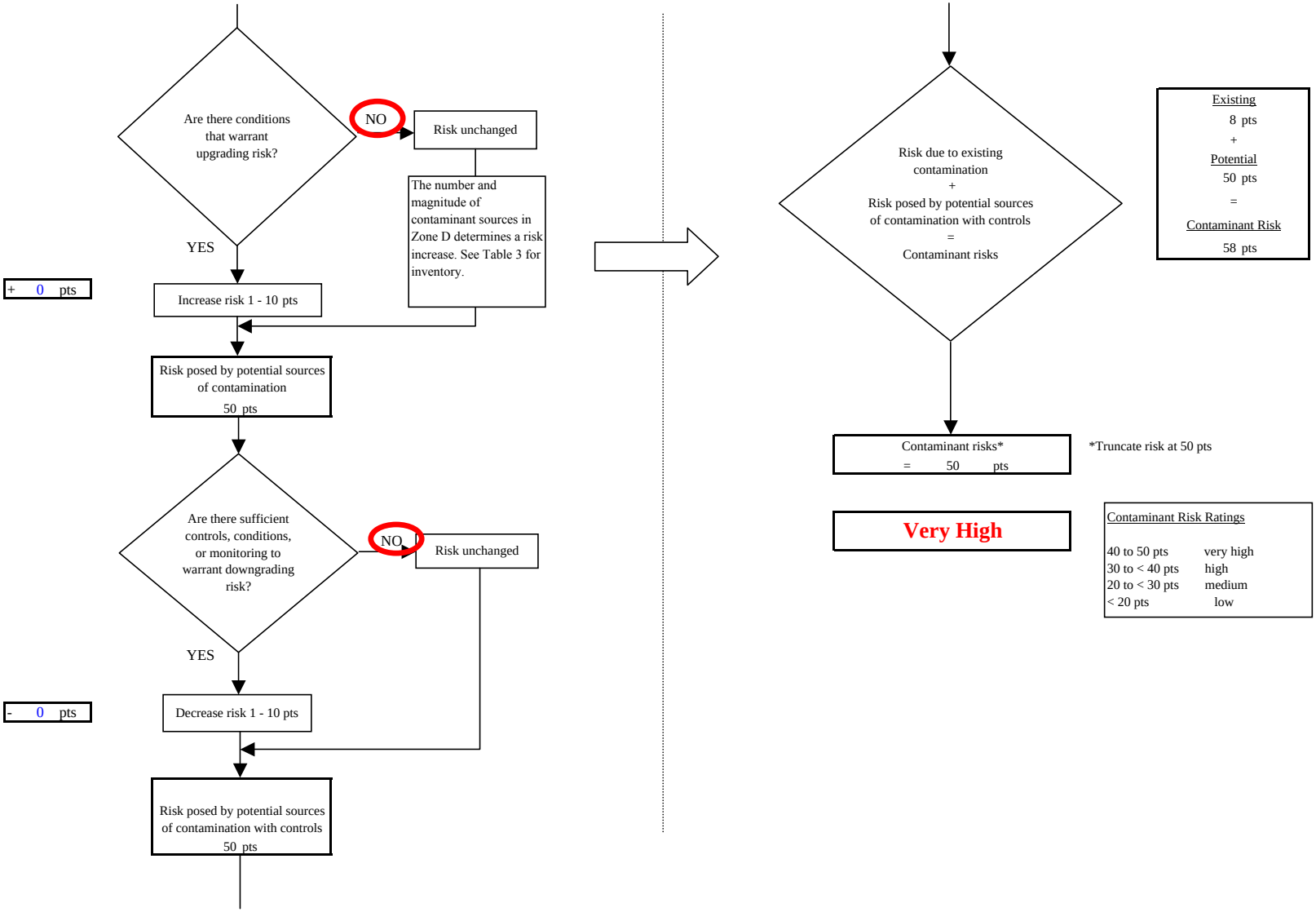


Chart 6. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Nitrates and Nitrites

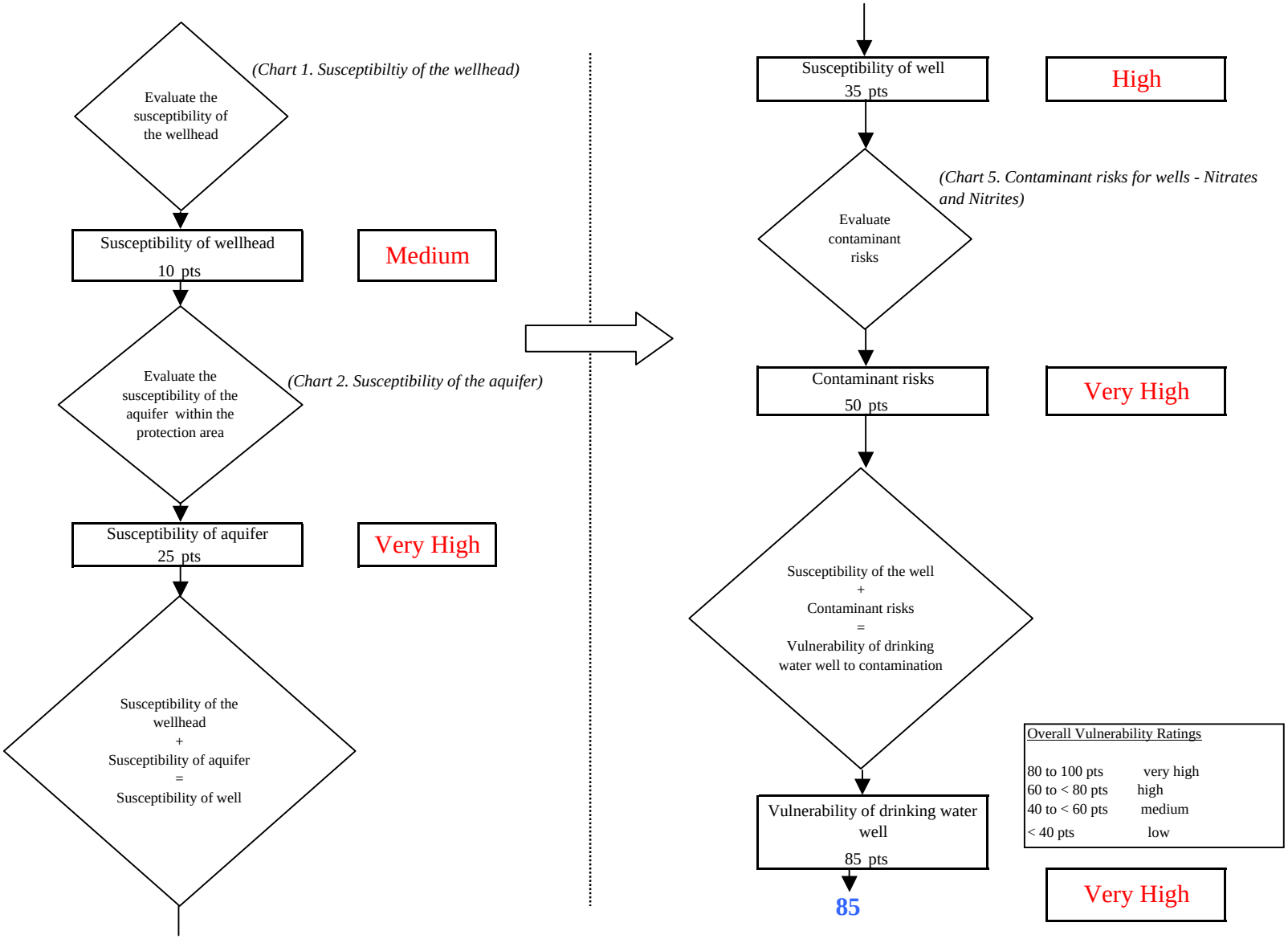


Chart 7. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Volatile Organic Chemicals

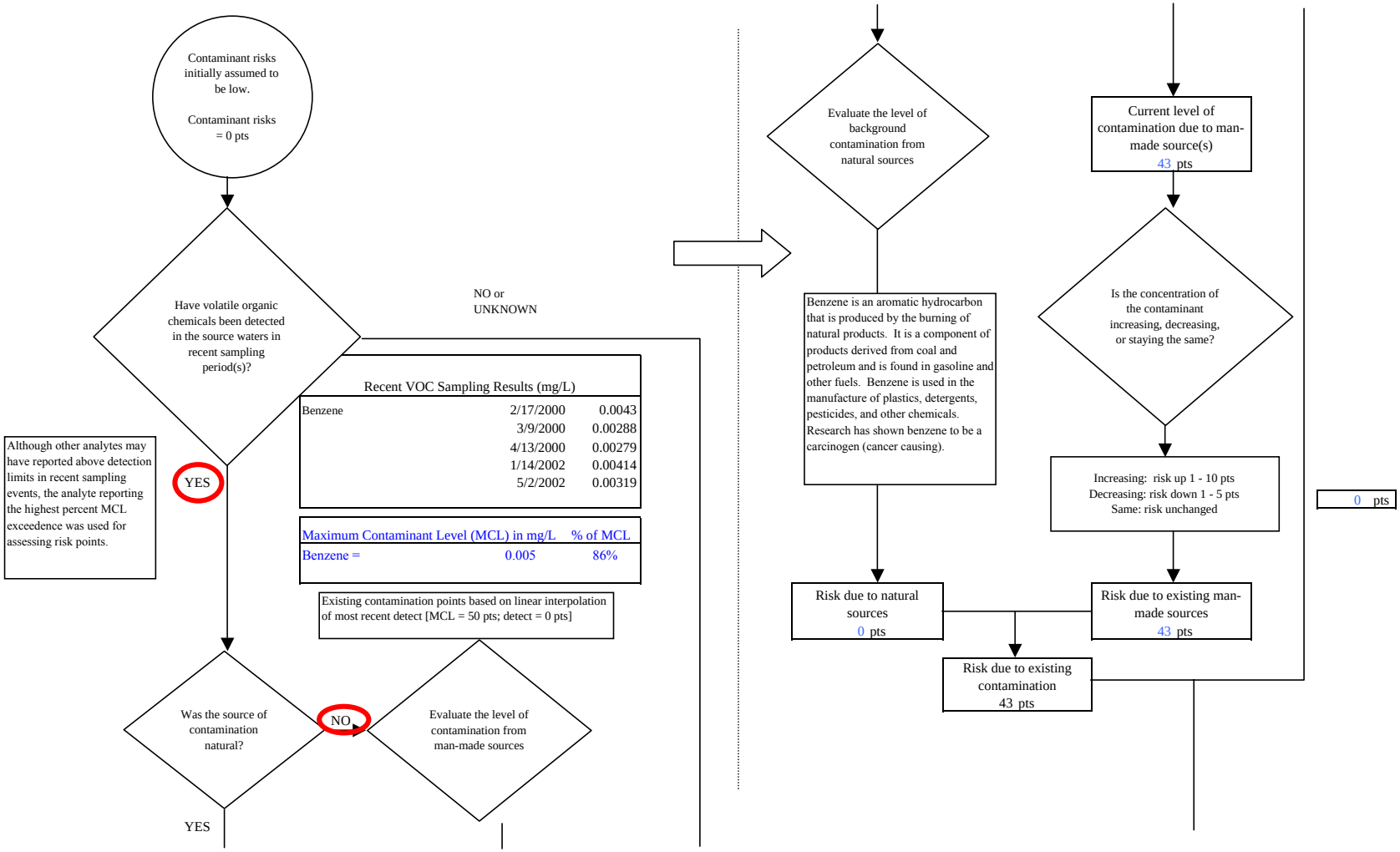


Chart 7. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Volatile Organic Chemicals

+ 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)	5	0	5
High(s)	24	0	24
Medium(s)	39	0	39
Low(s)	127	0	127

	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

Decrease risk 1 - 10 pts

- 1 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

Increase risk 1 - 10 pts

+ 10 pts

Chart 7. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Volatile Organic Chemicals

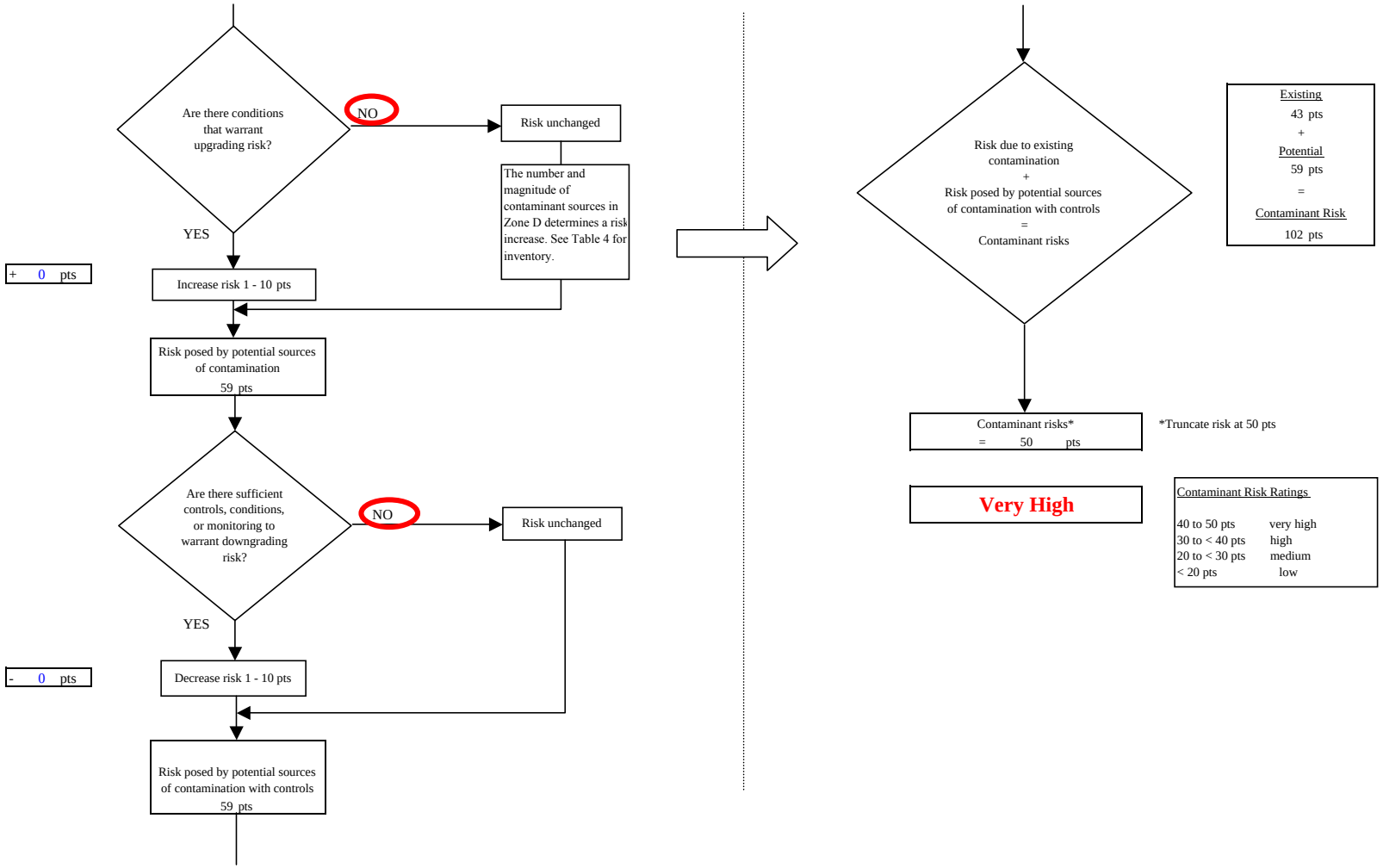


Chart 8. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Volatile Organic Chemicals

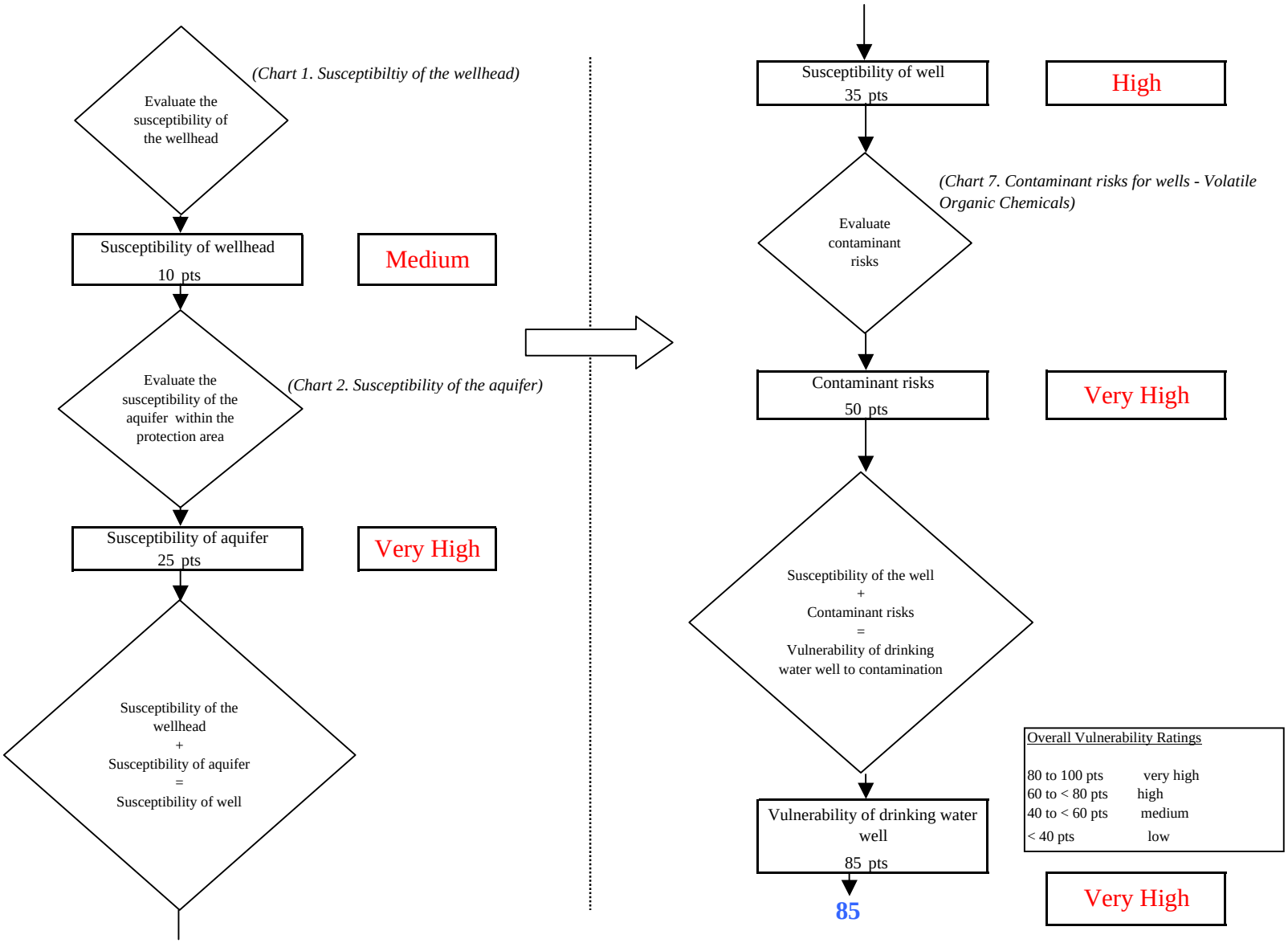


Chart 9. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

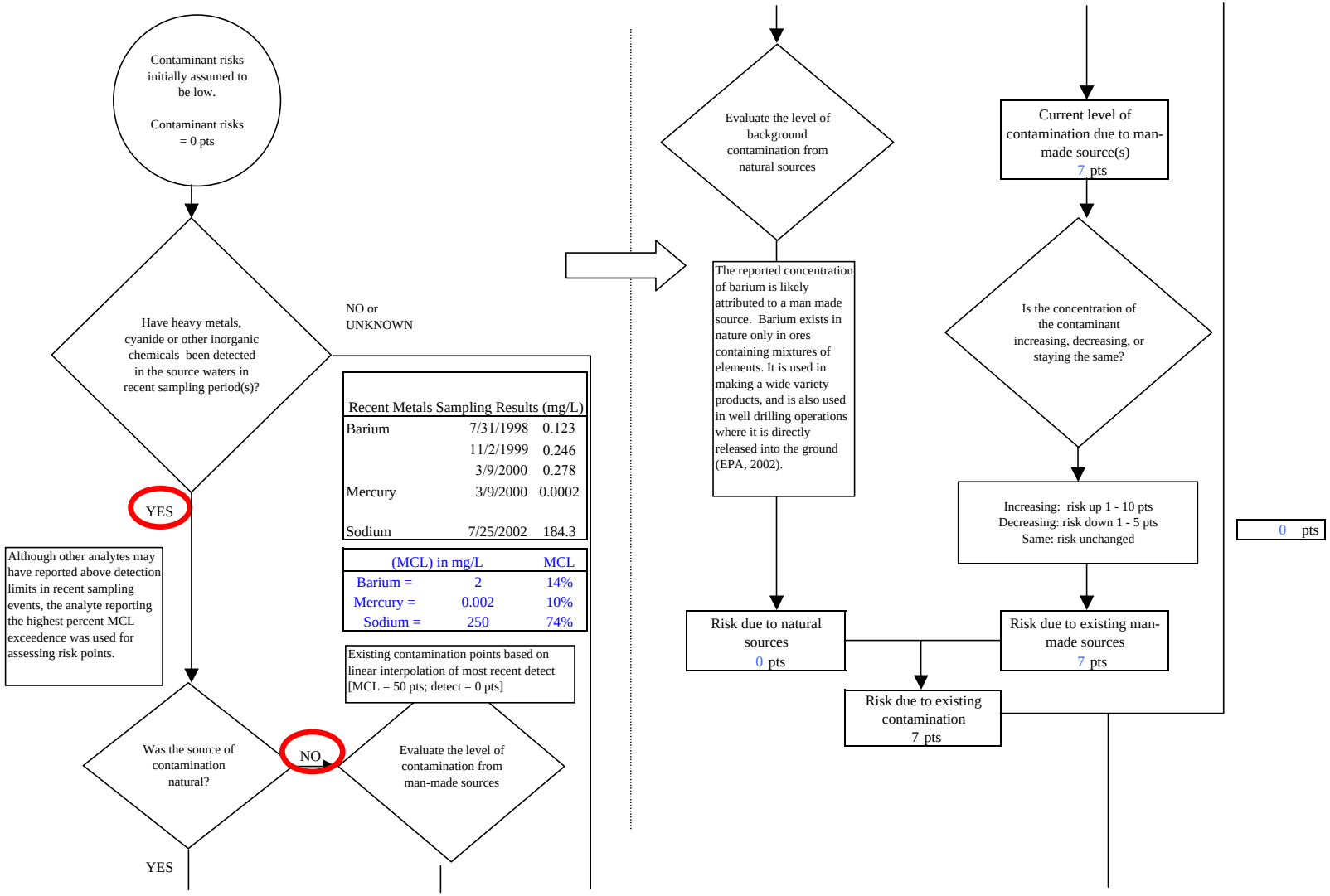


Chart 9. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

+ 35 pts

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

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

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	1	0	1
Medium(s)	6	0	6
Low(s)	150	0	150

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

Matrix Score 35

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

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

Is the source aquifer fractured rock or karst?

YES

NO

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

NO

Risk unchanged

YES

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

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

+ 10 pts

Chart 9. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

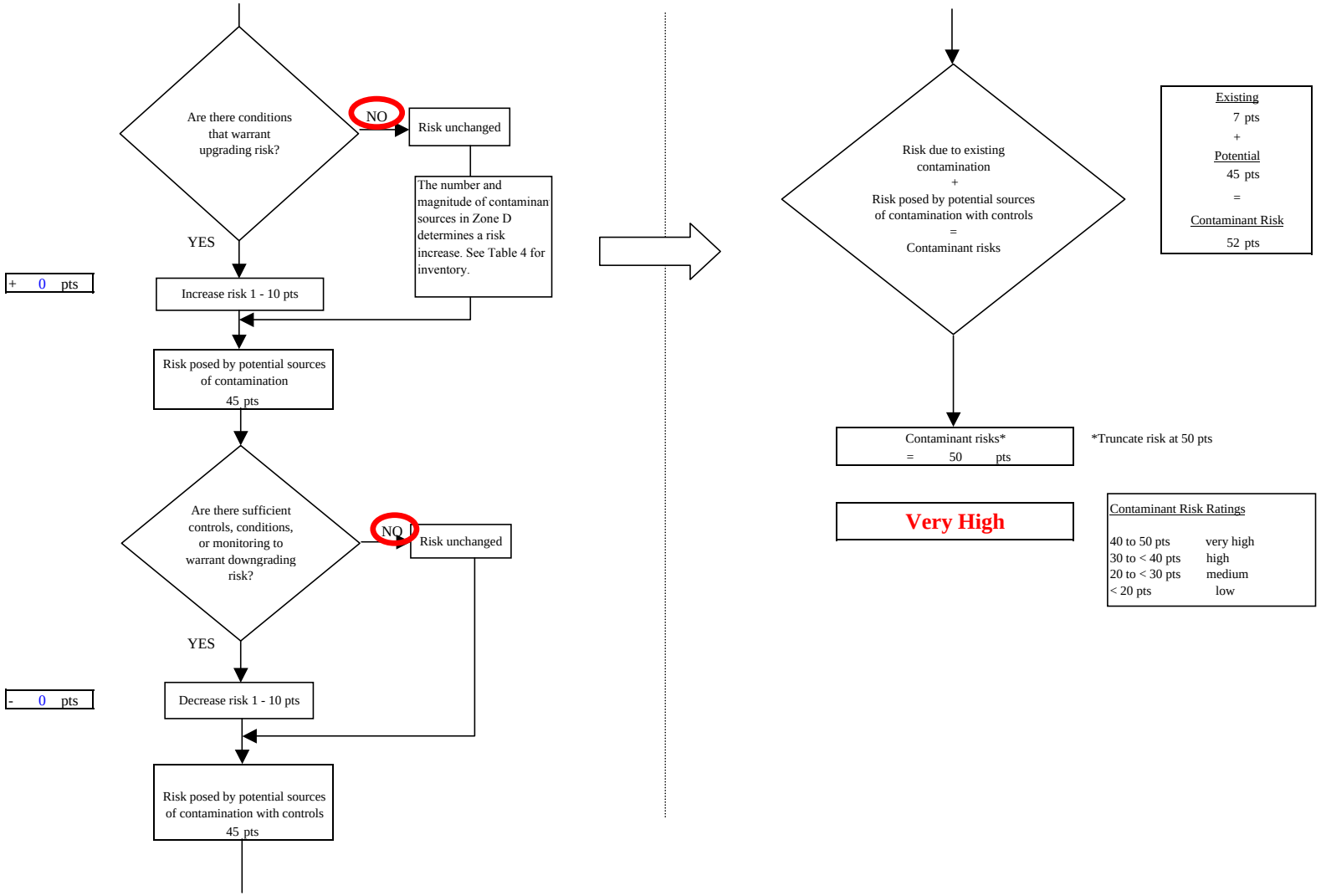


Chart 10. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Heavy Metals, Cyanide and Other Inorganic Chemical

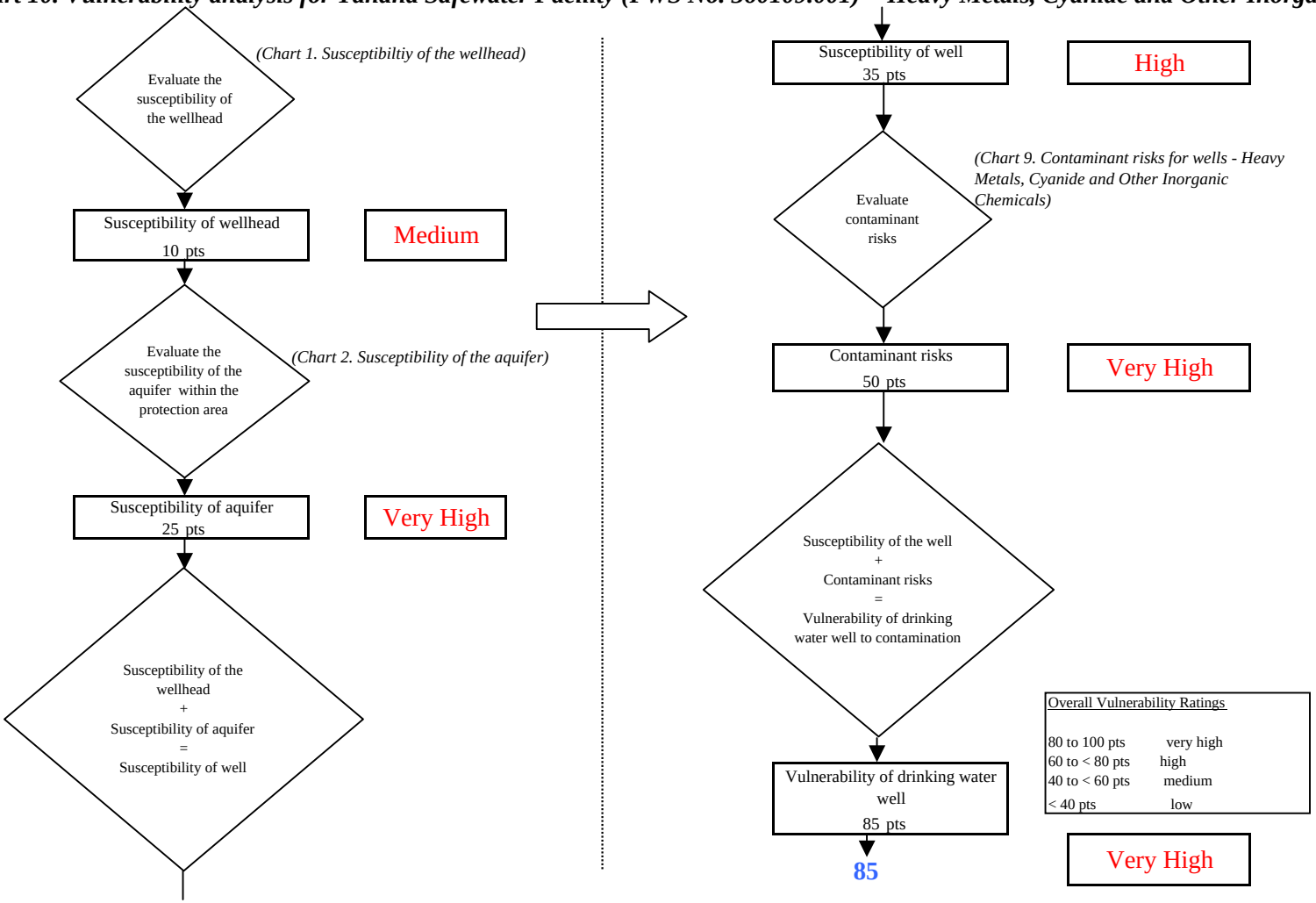


Chart 11. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Synthetic Organic Chemicals

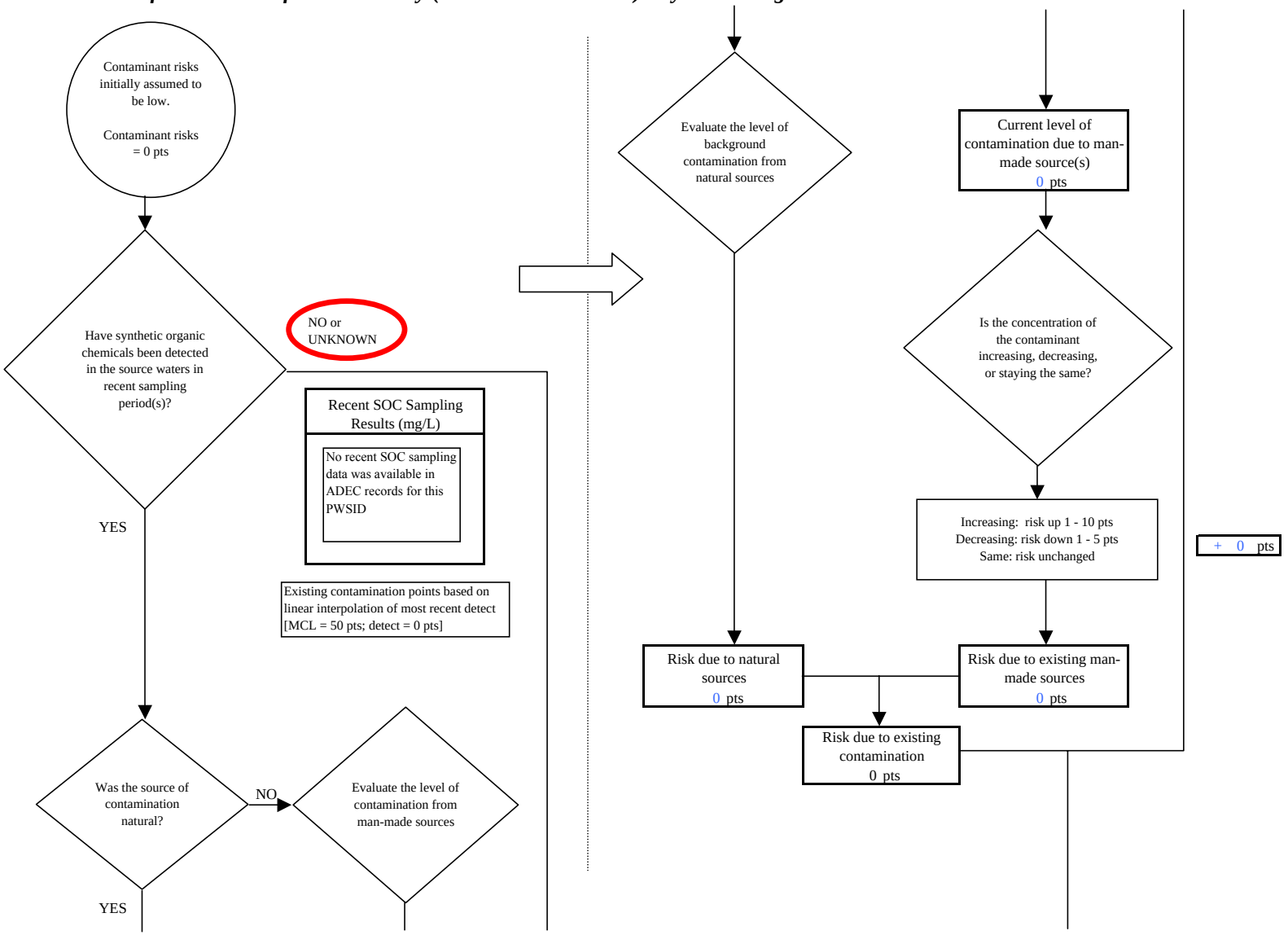
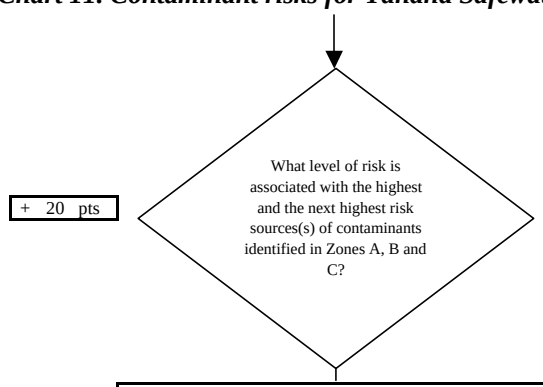


Chart 11. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Synthetic Organic Chemicals



+ 20 pts

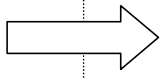
Risk Levels for Contaminant Sources identified in Zones A, B and C

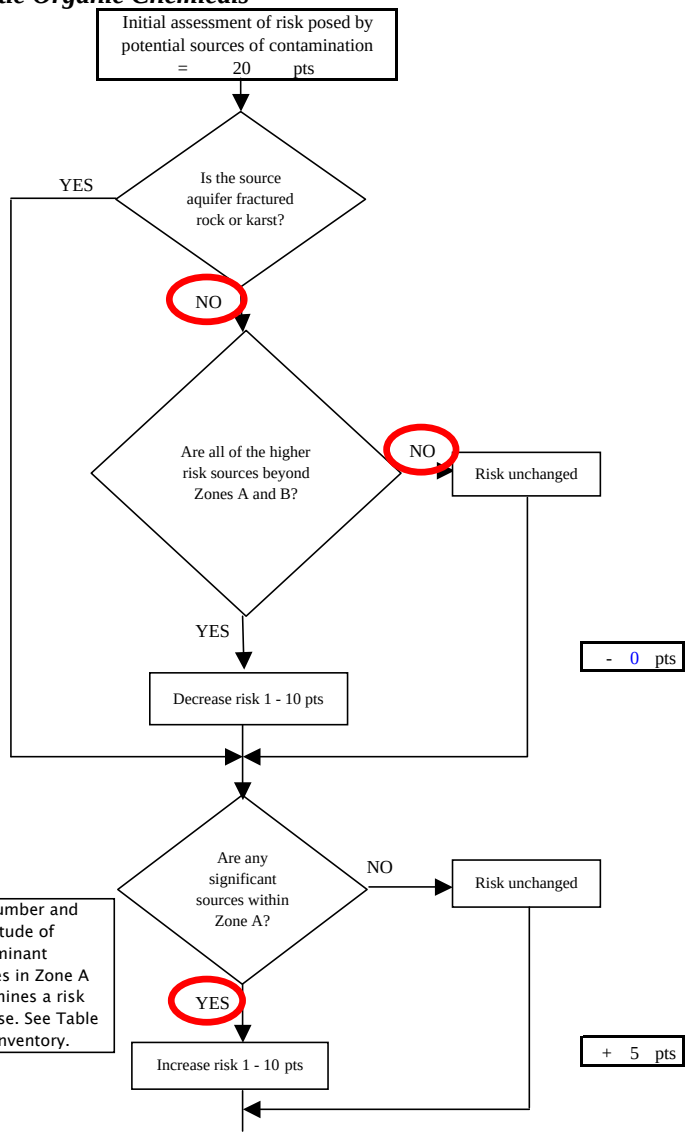
	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	2	0	2
Low(s)	32	0	32

	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 20

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





- 0 pts

+ 5 pts

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 6 for inventory.

Chart 11. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Synthetic Organic Chemicals

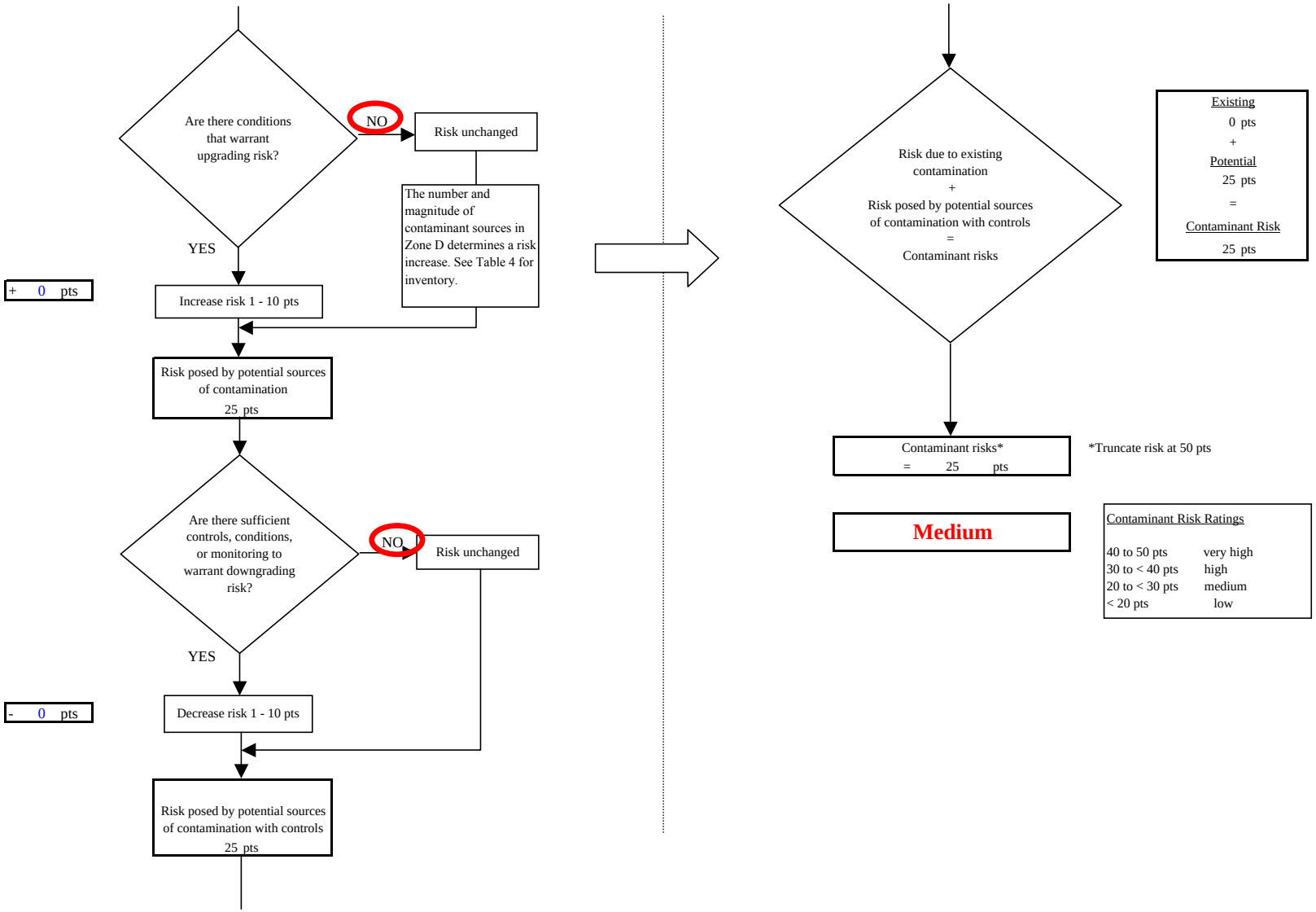


Chart 12. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Synthetic Organic Chemicals

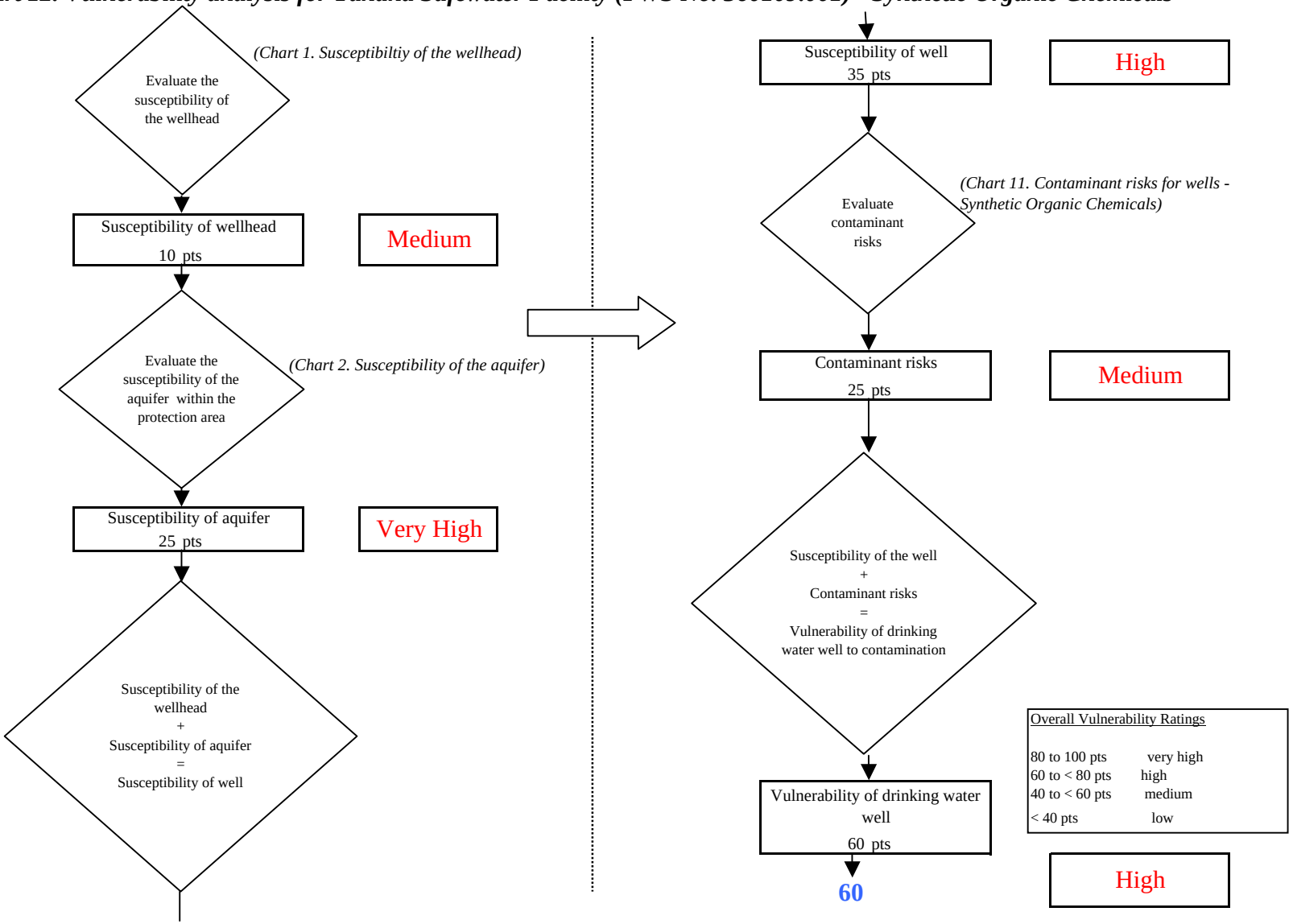


Chart 13. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Other Organic Chemicals

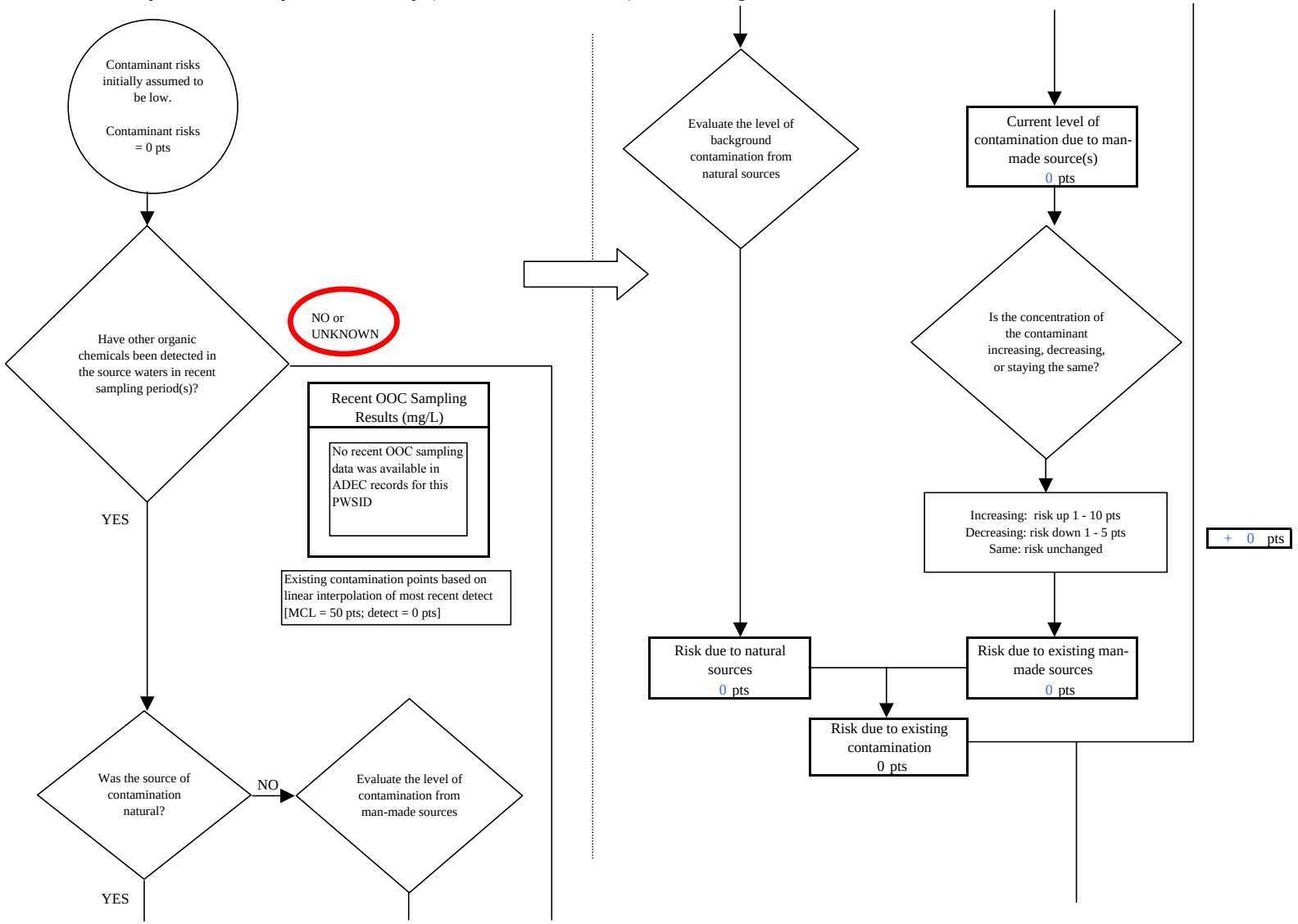


Chart 13. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Other Organic Chemicals

+ 40 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)	8	0	8
Medium(s)	4	0	4
Low(s)	28	0	28

	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.

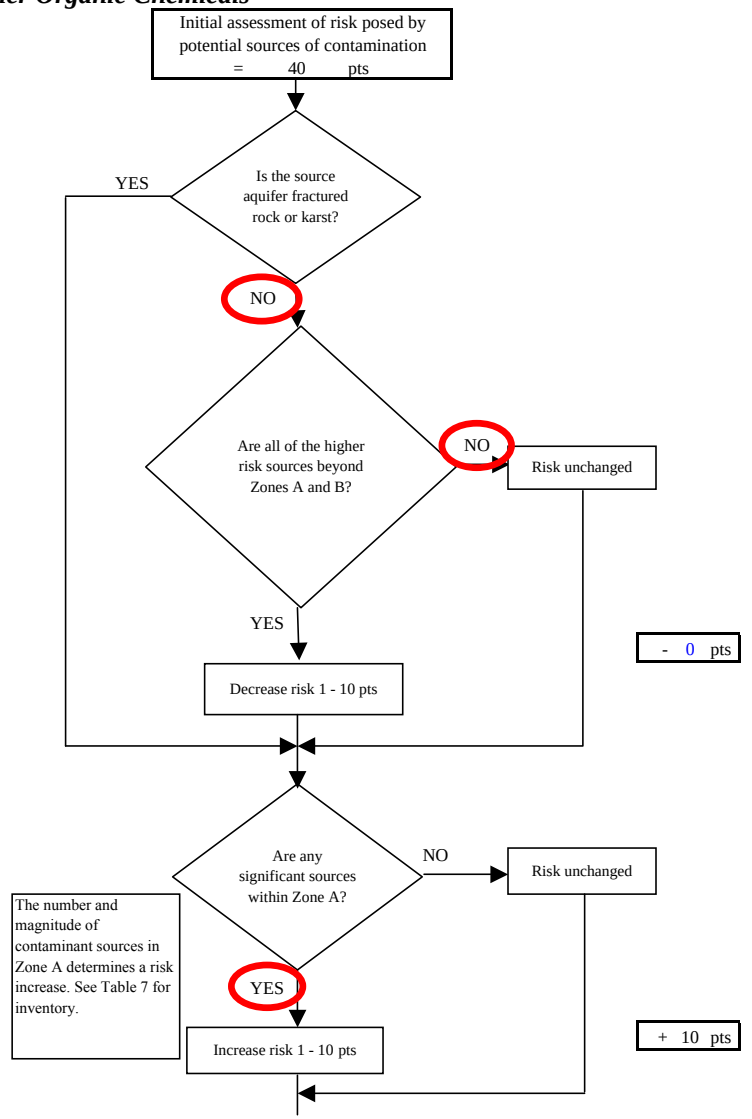


Chart 13. Contaminant risks for Tanana Safewater Facility (PWS No. 360109.001) - Other Organic Chemicals

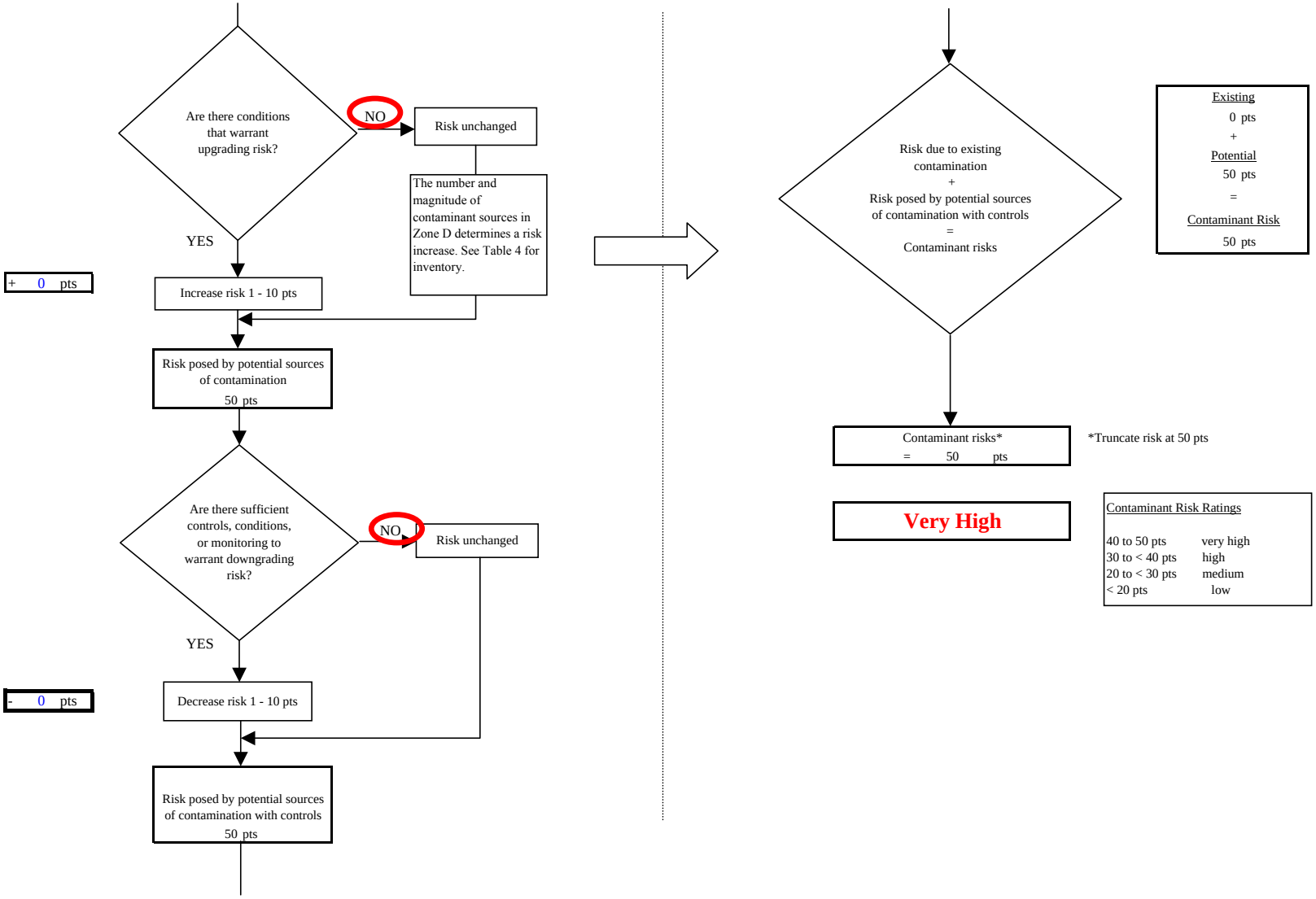


Chart 14. Vulnerability analysis for Tanana Safewater Facility (PWS No. 360109.001) - Other Organic Chemicals