Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for Gulkana Village Council Drinking Water System, Gulkana, Alaska

PWSID # 380214.001

June 2004

DRINKING WATER PROTECTION PROGRAM REPORT 1389
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 Gulkana Village Council Source of Public Drinking Water, Gulkana, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Gulkana Village Council has one Public Water System (PWS) well. The well (PWS No. 380214.001) has been used as a drinking water source since it was drilled in 1983. ADEC records indicate this system is classified as groundwater under the influence of surface water.

The well is a Class A (community and non-transient non-community) water system located at Mile 127 of the Richardson Highway, in Gulkana, Alaska. Available records indicate that there is secondary storage of drinking water, with a capacity of 100,000-gallons, and that the drinking water is treated with calcium hypochlorite. This system operates year round and serves approximately 75 residents through twenty-eight 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 **Very High** rating for the natural susceptibility of the well.

Identified potential and current sources of contaminants for the public drinking water source include: domestic wastewater collection systems, an unregulated RV park, large capacity septic systems, nonresidential pit toilets, residential septic systems, aboveground fuel tanks, ADEC recognized contaminated sites and LUST sites, cemeteries, roads, medical/veterinary facilities, domestic wastewater sludge land application areas, quarries, parks, gasoline stations, placer mining, underground fuel tanks, an open dump, oil and gas extraction wells, airports, pipelines, and electric power generation. 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 **High** for synthetic organic chemicals and other organic chemicals, and a vulnerability rating of **Very High** for the bacteria and viruses, nitrates and nitrites, volatile organic chemicals, and heavy metals, cyanide and other inorganic chemicals contaminant categories.

PUBLIC DRINKING WATER SYSTEM

The Gulkana Village Council well is a Class A (community/non-transient/non-community) public water system. The system is at Mile 127 of the Richardson Highway, in Gulkana, Alaska (Sec. 27, T6N, R1W, Copper River Meridian; see Map A of Appendix A). Gulkana is located on the east bank of the Gulkana River, at its confluence with the Copper River. The community lies 14 miles north of Glennallen, and has a population of 98 (ADCED, 2003). Average annual precipitation in Gulkana is 11 inches, with 47 inches of snowfall. Temperature extremes range from -65 to 91°F.

The community of Gulkana obtains their water supply from a community source. A piped water and sewage system services the community (ADCED, 2003). Gulkana receives electrical power from Copper Valley Electric Association, a REA cooperative. Power generating facilities are hydroelectric with diesel backup. Community refuse, provided by the Copper River Native Association, is collected at a central location and transported to the landfill in Glennallen (ADCED, 2003).

According to information supplied by ADEC for the Gulkana Village Council PWS, the depth of the primary water well is 33.5 feet below the ground surface, and the well is screened in an unconfined aquifer. The well is located within a floodplain.

Information acquired from a July 1998 sanitary survey 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 does not indicate whether or not the well is grouted according to ADEC regulations. Given the date of well construction (1983), it is assumed that the well is not properly grouted. Proper grouting provides

added protection against contaminants traveling along the well casing annulus and into source waters.

The Glennallen area is in the southeastern portion of the Copper River basin, in southeastern Interior Alaska. The Copper River basin, ranging from 500 to over 4,000 feet above sea level, is an intermontane basin rimmed by peaks of the Chugach, Alaska, Talkeetna, and Wrangell mountains. The terrain of the basin can be divided into two physiographic sub-units: the rolling, hummocky Copper River basin piedmont surface, and the Copper River basin trough. The Copper River basin trough is generally flat and lacks the hummocky, rolling character of the piedmont surface.

The terrain, geology of the unconsolidated deposits, and foundation materials of the Copper River basin are related to Pleistocene and recent events. Glaciers from the Chugach, Wrangell, Talkeetna, and Alaska Ranges repeatedly invaded the basin, perhaps at times filling it and flowing across the divides to the north, west, east, and south. Such extensive glaciation has resulted in the deposition of large thicknesses of coarse glacial boulder clays (till) and coarse outwash gravel and sand on the piedmont surface, with finer till and outwash interbedded with lake deposits in the basin trough.

The Glennallen area is within the discontinuous permafrost zone.

Surface soils in the area generally consist of silt and clay with pebbles underlain by boulder clay with till, underlain by glacial outwash sand and gravel, underlain by boulder clay or till (Nichols, 1956).

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 Gulkana Village Council 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, as well as the three protection area zones for wells under the influence of surface water, 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
E	Areas within 1000-ft of lakes or streams
F	Areas within 1-mile of lakes or streams
G	The watershed boundary

The DWPA for the Gulkana Village Council's PWS was determined using an analytical calculation and includes Zones A, B, C, D, E, F, and G (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 Gulkana Village Council 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 4 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 Gulkana Village Council's water well is 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	25	Very High
Susceptibility of the Aquifer	18	High
Natural Susceptibility	43	Very 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	23	Medium

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	95	Very High
Nitrates and Nitrites	95	Very High
Volatile Organic Chemicals	95	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	95	Very High
Synthetic Organic Chemicals	70	High
Other Organic Chemicals	65	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 and domestic wastewater sludge land application areas located in Zones A, C, and G (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, 2003). 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, and domestic wastewater sludge land application areas located in Zones A, C, and G (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 not been detected in recent sampling events (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. 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 ADEC recognized contaminated sites and LUST sites, a gasoline station, underground fuel tanks, an open dump, and airports located in Zones A and G. Numerous other potential contaminant sources are also found within the protection area (see Table 4 – Appendix B).

Detectable concentrations of trihalomethanes were reported in sampling events for this public water system. The detectible concentrations of trihalomethanes reported in 2000, 2001, and 2002 were above the MCL of 0.08 mg/L. Trihalomethanes are generally considered byproducts of the water treatment process and are not from the source waters. Because the reported concentration of TTHM's in recent sampling events exceeded the applicable MCL, risk points were assigned (See Chart 7 – Contaminant Risks for Volatile Organic Chemicals in Appendix D).

Aside from being byproducts of the drinking water treatment process, possible sources of volatile organic chemicals include facilities with automobiles, residential areas, fuel tanks, roads, and airports.

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 an open dump and oil and gas extraction wells located in Zone G. 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 public water system, a high level of copper has been detected in recent sampling history, and has exceeded the MCL of 1.3 mg/L (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

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 the presence of cemeteries, an open dump, airports, and oil and gas extraction wells located in Zones A and G (see Table 6 – Appendix B).

No recent sampling data was available in ADEC records for the Gulkana Village Council (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 **Medium**. The risk is primarily attributed to the presence of pipelines and electric power generation located in Zone G. Numerous 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 Gulkana Village Council (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 **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 Gulkana 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

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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

Nichols, D.R. 1956, Permafrost and Groundwater Conditions in the Glennallen area, Alaska, U. S. Geological Survey Open File Report 56-91.

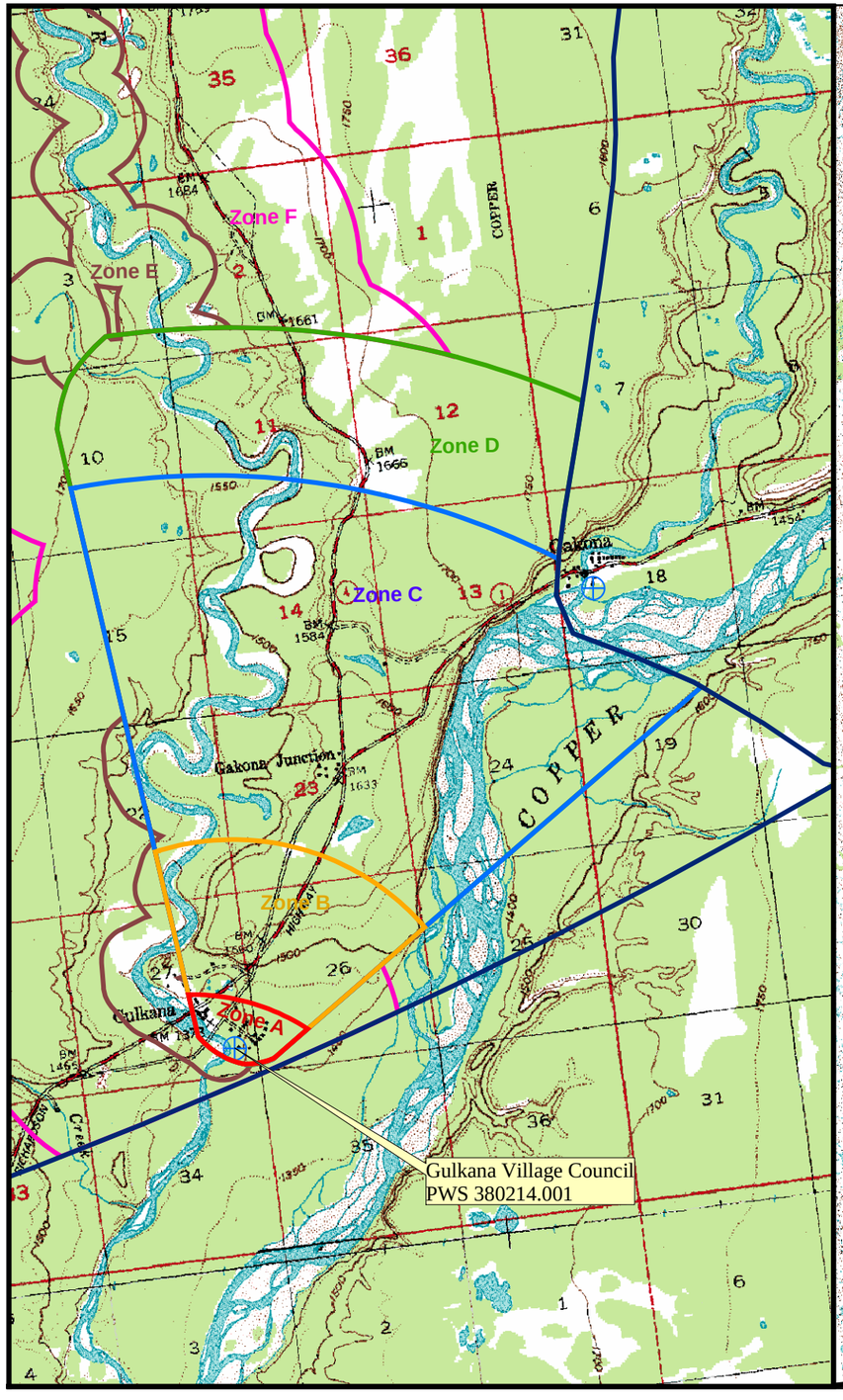
Freeze, R. A., and Cherry, J.A. 1979, Groundwater, Prentice-Hall, Englewood Cliffs, New Jersey

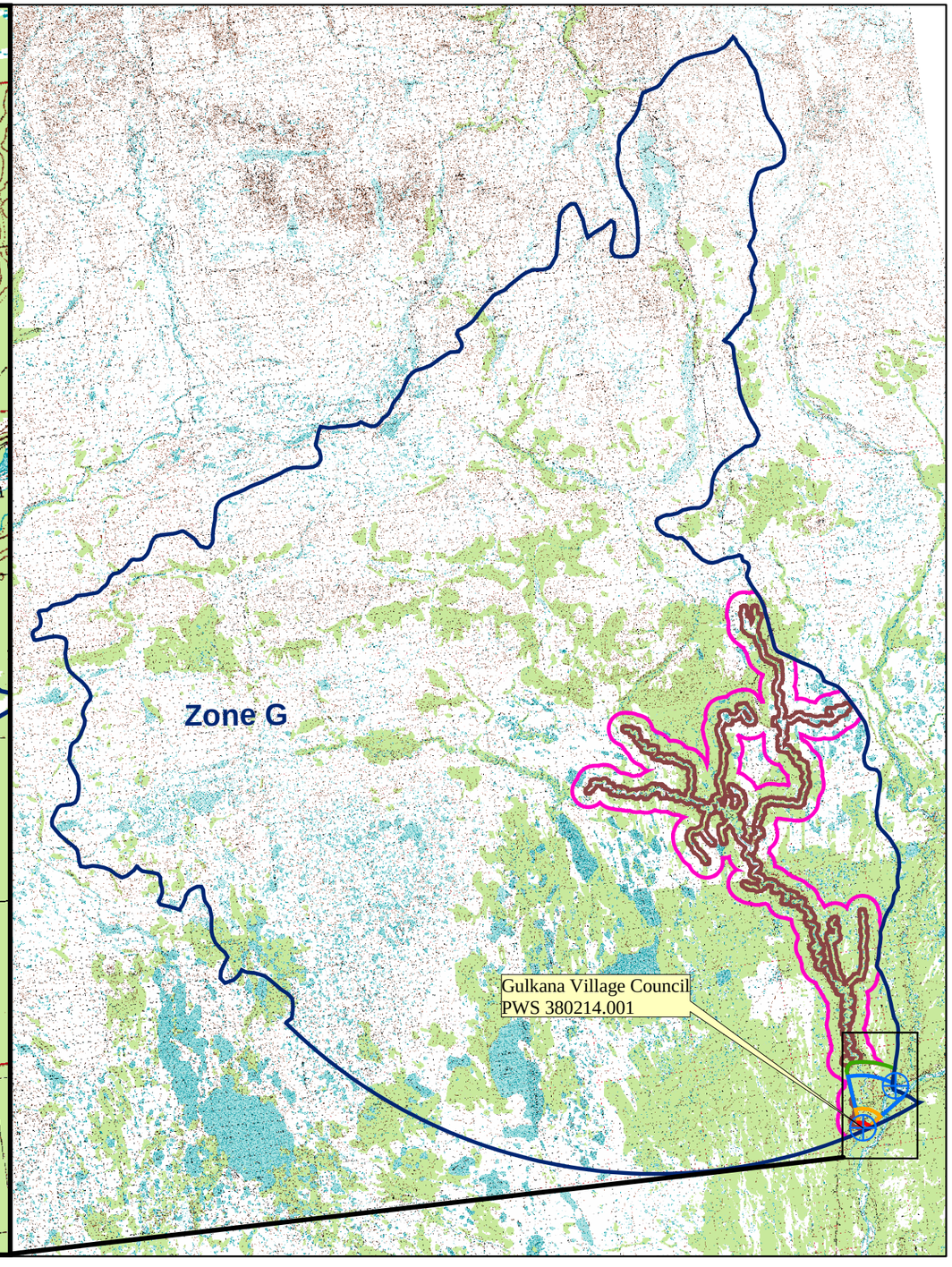
United States Environmental Protection Agency (EPA), 2002 [WWW document]. URL http://www.epa.gov/safewater/mcl.html.

APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

Public Water Well System for PWS #380214.001 Gulkana Village Council





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)

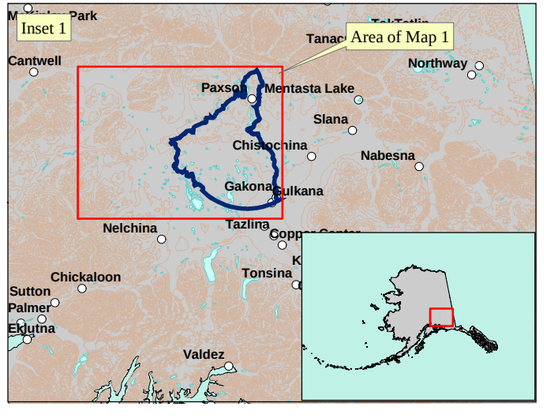
Protection Zones

- 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
- Zone E Protection Area– 1000 feet from Surface Water
- Zone F Protection Area– 1 Mile from Surface Water
- Zone G Protection Area– Entire Watershed

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 5 10 20 30 40 Miles

Gulkana Village Council
PWS 380214.001
Appendix A Map A

APPENDIX B

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

Table 1

Contaminant Source Inventory for ***Gulkana Village Council***

PWSID 380214.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Domestic wastewater collection systems (sewer lines or lift stations)	D01	D01-01	A	C	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	C	Gulkana
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	C	Assume 10 or less non-residential pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	C	Septic Systems
Tanks, heating oil, residential (above ground)	R08	R08-01	A	C	Assume 35 or less residential heating oil tanks in Zone A
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	C	Gulkana Radio Station, no further information available in the ADEC Contaminated Sites database.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Open Dumps	U17	U17-01	A	C	Open Dump - Gulkana Village Townsite
Cemeteries	X01	X01-01	A	C	
Cemeteries	X01	X01-02	A	C	
Highways and roads, dirt/gravel	X24	X24-01	A	C	Assume 1-20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	C	
Scrap, salvage, or junk yards	D59	D59-01	B	C	Scrap/Junk Yark - Wilder Construction

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	C	Assume 1-20 roads in Zone B
Gasoline stations (without repair shop)	C15	C15-02	C	C	Gas Station withoug Shop - Gakona Junction - Texaco
Domestic wastewater sludge land application areas	D04	D04-01	C	C	Gakona Roadhouse
Quarries (sand, gravel, rock, other?)	E10	E10-01	C	C	Material Site 23-1M
Municipal or city parks (with green areas)	X04	X04-01	C	C	Wrangell St. Elias National Park
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	C	Tok Cutoff Highway
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	C	Rihcardson Highway
Highways and roads, dirt/gravel	X24	X24-03	C	C	Assume 1-20 roads in Zone C
Campgrounds and RV Parks	X35	X35-01	C	C	Campground/RV Parks
Quarries (sand, gravel, rock, other?)	E10	E10-02	F	C	Hogan Hill Quarry
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	C	Richardson Highway
Gasoline stations (without repair shop)	C15	C15-01	G	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	C	BLM Paxson Lake C/G
Metals mining, placer (active or inactive?)	E04	E04-01	G	C	Dan Creek
Metals mining, placer (active or inactive?)	E04	E04-02	G	C	French Creek Discovery
Metals mining, placer (active or inactive?)	E04	E04-03	G	C	Gulkana R., Paxson
Metals mining, placer (active or inactive?)	E04	E04-04	G	C	Gunn Creek
Metals mining, placer (active or inactive?)	E04	E04-05	G	C	Richardson Monument Placer
Quarries (sand, gravel, rock, other?)	E10	E10-03	G	C	Amphi
Quarries (sand, gravel, rock, other?)	E10	E10-04	G	C	Chitti Stain

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-05	G	C	Hogan Hill
Quarries (sand, gravel, rock, other?)	E10	E10-06	G	C	Material Site 30-0
Quarries (sand, gravel, rock, other?)	E10	E10-07	G	C	Matieral Site 31-1.1
Quarries (sand, gravel, rock, other?)	E10	E10-08	G	C	North Star
Quarries (sand, gravel, rock, other?)	E10	E10-09	G	C	Paxson Mountain
Quarries (sand, gravel, rock, other?)	E10	E10-10	G	C	Paxson Pit
Quarries (sand, gravel, rock, other?)	E10	E10-11	G	C	Richardson Highway, Paxson
Quarries (sand, gravel, rock, other?)	E10	E10-12	G	C	Summit
Tanks, diesel (underground)	T08	T08-01	G	C	Paxson Inn & Lodge
Tanks, gasoline (underground)	T12	T12-01	G	C	Paxson Inn & Lodge
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	G	C	Slana Energy Inc.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	G	C	Mile 212.7 Richardson Highway, RecKey #1987330122901, Status: Inactive, 2,250-gallons of turbine fuel spilled in 1987 during truck roll over. Fuel contaminated groundwater. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	G	C	ADOT&PF Paxson Trimms Camp, RecKey #1988330129109, Status: Inactive, two spills in 1986, estimated 3,300 gallons of fuel percolated into ground. No fuel recovered. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	G	C	BLM MacLaren Glacier Mine Dump Site, RecKey #1992330934202, Status: Active, former copper mine, 35 drums of liquid on site, evidence of leakage observed, stained soils adjacent to drums, 100+ drums scattered near old copper mine site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	G	C	OMS 35-1.2, RecKey #1992720121603, Status: Inactive, oil spill in 1993, estimated 200-300 cubic yards of contaminated soils.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	G	C	Alyeska Isabel Pass Construction Camp, RecKey #1995720106001, Status: NFRAP, site utilized during construction of pipeline, obserced soil staining in various locations, suspected buried wastes.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	G	C	AT&T Alascom Annex Maintenance Facility, RecKey #1997330114006, Status: Closed, 40 cubic yards of waste oil contaminated soil, stocpile sent to incinerator in Fairbanks during 1998.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	G	C	Paxson Inn & Lodge, RecKey #1992330025801, Facility ID 1938, Event ID 33, 5,000-gallon gasoline UST failed tank tightness test. Approx. 800 cubic yards of contaminated soil removed during removal of UST and excavation.

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Open dumps	U09	U09-01	G	C	Paxon Lake Dumpsite
Oil and gas extraction wells	W07	W07-01	G	C	Ahtna Inc 1
Oil and gas extraction wells	W07	W07-02	G	C	Rainbow Fed. 1
Oil and gas extraction wells	W07	W07-03	G	C	Rainbow Fed. 2
Municipal or city parks (with green areas)	X04	X04-02	G	C	Wrangell St. Elias NP
Airports	X14	X14-01	G	C	Crosswind Lake Landing
Airports	X14	X14-02	G	C	Paxon Landing Strip
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	C	Denali Highway
Pipelines (oil and gas)	X28	X28-01	G	C	Trans-Alaska Pipeline
Electric power generation (fossil fuels)	X36	X36-01	G	C	Slana Energy Inc.

Table 2

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Bacteria and Viruses

PWSID 380214.001

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	Medium	C	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	High	C	Gulkana
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 10 or less non-residential pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	High	C	Septic Systems
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Medium	C	
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	Low	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	Low	C	Assume 1-20 roads in Zone B
Domestic wastewater sludge land application areas	D04	D04-01	C	High	C	Gakona Roadhouse
Municipal or city parks (with green areas)	X04	X04-01	C	Medium	C	Wrangell St. Elias National Park
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	Low	C	Tok Cutoff Highway
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Rihcardson Highway
Highways and roads, dirt/gravel	X24	X24-03	C	Low	C	Assume 1-20 roads in Zone C
Campgrounds and RV Parks	X35	X35-01	C	Low	C	Campground/RV Parks
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	Low	C	Richardson Highway

Table 2 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council
Sources of Bacteria and Viruses

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	High	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	High	C	BLM Paxson Lake C/G
Municipal or city parks (with green areas)	X04	X04-02	G	Medium	C	Wrangell St. Elias NP
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	Low	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	Low	C	Denali Highway

Table 3

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Nitrates/Nitrites

PWSID 380214.001

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	Medium	C	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	High	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	High	C	Gulkana
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Medium	C	Assume 10 or less non-residential pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	High	C	Septic Systems
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Cemeteries	X01	X01-01	A	Medium	C	
Cemeteries	X01	X01-02	A	Medium	C	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	Low	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	Low	C	Assume 1-20 roads in Zone B
Domestic wastewater sludge land application areas	D04	D04-01	C	High	C	Gakona Roadhouse
Quarries (sand, gravel, rock, other?)	E10	E10-01	C	Low	C	Material Site 23-1M
Municipal or city parks (with green areas)	X04	X04-01	C	Medium	C	Wrangell St. Elias National Park
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	Low	C	Tok Cutoff Highway
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Rihcardson Highway

Table 3 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Nitrates/Nitrites

PWSID 380214.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, dirt/gravel	X24	X24-03	C	Low	C	Assume 1-20 roads in Zone C
Campgrounds and RV Parks	X35	X35-01	C	Low	C	Campground/RV Parks
Quarries (sand, gravel, rock, other?)	E10	E10-02	F	Low	C	Hogan Hill Quarry
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	Low	C	Richardson Highway
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	High	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	High	C	BLM Paxson Lake C/G
Quarries (sand, gravel, rock, other?)	E10	E10-03	G	Low	C	Amphi
Quarries (sand, gravel, rock, other?)	E10	E10-04	G	Low	C	Chitti Stain
Quarries (sand, gravel, rock, other?)	E10	E10-05	G	Low	C	Hogan Hill
Quarries (sand, gravel, rock, other?)	E10	E10-06	G	Low	C	Material Site 30-0
Quarries (sand, gravel, rock, other?)	E10	E10-07	G	Low	C	Matieral Site 31-1.1
Quarries (sand, gravel, rock, other?)	E10	E10-08	G	Low	C	North Star
Quarries (sand, gravel, rock, other?)	E10	E10-09	G	Low	C	Paxson Mountain
Quarries (sand, gravel, rock, other?)	E10	E10-10	G	Low	C	Paxson Pit
Quarries (sand, gravel, rock, other?)	E10	E10-11	G	Low	C	Richardson Highway, Paxson
Quarries (sand, gravel, rock, other?)	E10	E10-12	G	Low	C	Summit
Municipal or city parks (with green areas)	X04	X04-02	G	Medium	C	Wrangell St. Elias NP
Airports	X14	X14-01	G	Low	C	Crosswind Lake Landing
Airports	X14	X14-02	G	Low	C	Paxon Landing Strip

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	Low	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	Low	C	Denali Highway

Table 4

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Volatile Organic Chemicals

PWSID 380214.001

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	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	Gulkana
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 10 or less non-residential pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	Medium	C	Septic Systems
Tanks, heating oil, residential (above ground)	R08	R08-01	A	Medium	C	Assume 35 or less residential heating oil tanks in Zone A
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	High	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	High	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	High	C	Gulkana Radio Station, no further information available in the ADEC Contaminated Sites database.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	High	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	High	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	
Scrap, salvage, or junk yards	D59	D59-01	B	Low	C	Scrap/Junk Yark - Wilder Construction
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	Low	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	Low	C	Assume 1-20 roads in Zone B

Table 4 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council
Sources of Volatile Organic Chemicals

PWSID 380214.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-02	C	High	C	Gas Station withoug Shop - Gakona Junction - Texaco
Domestic wastewater sludge land application areas	D04	D04-01	C	Low	C	Gakona Roadhouse
Quarries (sand, gravel, rock, other?)	E10	E10-01	C	Low	C	Material Site 23-1M
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	Low	C	Tok Cutoff Highway
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Rihcardson Highway
Highways and roads, dirt/gravel	X24	X24-03	C	Low	C	Assume 1-20 roads in Zone C
Campgrounds and RV Parks	X35	X35-01	C	Low	C	Campground/RV Parks
Quarries (sand, gravel, rock, other?)	E10	E10-02	F	Low	C	Hogan Hill Quarry
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	Low	C	Richardson Highway
Gasoline stations (without repair shop)	C15	C15-01	G	High	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	Low	C	BLM Paxson Lake C/G
Quarries (sand, gravel, rock, other?)	E10	E10-03	G	Low	C	Amphi
Quarries (sand, gravel, rock, other?)	E10	E10-04	G	Low	C	Chitti Stain
Quarries (sand, gravel, rock, other?)	E10	E10-05	G	Low	C	Hogan Hill
Quarries (sand, gravel, rock, other?)	E10	E10-06	G	Low	C	Material Site 30-0
Quarries (sand, gravel, rock, other?)	E10	E10-07	G	Low	C	Matieral Site 31-1.1
Quarries (sand, gravel, rock, other?)	E10	E10-08	G	Low	C	North Star
Quarries (sand, gravel, rock, other?)	E10	E10-09	G	Low	C	Paxson Mountain

Table 4 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council
Sources of Volatile Organic Chemicals

PWSID 380214.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Quarries (sand, gravel, rock, other?)	E10	E10-10	G	Low	C	Paxson Pit
Quarries (sand, gravel, rock, other?)	E10	E10-11	G	Low	C	Richardson Highway, Paxson
Quarries (sand, gravel, rock, other?)	E10	E10-12	G	Low	C	Summit
Tanks, diesel (underground)	T08	T08-01	G	High	C	Paxson Inn & Lodge
Tanks, gasoline (underground)	T12	T12-01	G	High	C	Paxson Inn & Lodge
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	G	Low	C	Slana Energy Inc.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	G	High	C	Mile 212.7 Richardson Highway, RecKey #1987330122901, Status: Inactive, 2,250-gallons of turbine fuel spilled in 1987 during truck roll over. Fuel contaminated groundwater. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	G	High	C	ADOT&PF Paxson Trimms Camp, RecKey #1988330129109, Status: Inactive, two spills in 1986, estimated 3,300 gallons of fuel percolated into ground. No fuel recovered. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	G	High	C	BLM MacLaren Glacier Mine Dump Site, RecKey #1992330934202, Status: Active, former copper mine, 35 drums of liquid on site, evidence of leakage observed, stained soils adjacent to drums, 100+ drums scattered near old copper mine site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	G	High	C	OMS 35-1.2, RecKey #1992720121603, Status: Inactive, oil spill in 1993, estimated 200-300 cubic yards of contaminated soils.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	G	High	C	Alyeska Isabel Pass Construction Camp, RecKey #1995720106001, Status: NFRAP, site utilized during construction of pipeline, obserced soil staining in various locations, suspected buried wastes.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	G	High	C	AT&T Alascom Annex Maintenance Facility, RecKey #1997330114006, Status: Closed, 40 cubic yards of waste oil contaminated soil, stocpile sent to incinerator in Fairbanks during 1998.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	G	High	C	Paxson Inn & Lodge, RecKey #1992330025801, Facility ID 1938, Event ID 33, 5,000-gallon gasoline UST failed tank tightness test. Approx. 800 cubic yards of contaminated soil removed during removal of UST and excavation.
Open dumps	U09	U09-01	G	High	C	Paxon Lake Dumpsite
Oil and gas extraction wells	W07	W07-01	G	Medium	C	Ahtna Inc 1

Contaminant Source Inventory and Risk Ranking for
Gulkana Village Council
Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Oil and gas extraction wells	W07	W07-02	G	Medium	C	Rainbow Fed. 1
Oil and gas extraction wells	W07	W07-03	G	Medium	C	Rainbow Fed. 2
Airports	X14	X14-01	G	High	C	Crosswind Lake Landing
Airports	X14	X14-02	G	High	C	Paxon Landing Strip
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	Low	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	Low	C	Denali Highway
Pipelines (oil and gas)	X28	X28-01	G	Medium	C	Trans-Alaska Pipeline
Electric power generation (fossil fuels)	X36	X36-01	G	Medium	C	Slana Energy Inc.

Table 5

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 380214.001

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	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	Gulkana
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	A	Low	C	Assume 10 or less non-residential pit toilets in Zone A
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	Low	C	Septic Systems
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Gulkana Radio Station, no further information available in the ADEC Contaminated Sites database.
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Cemeteries	X01	X01-01	A	Low	C	
Cemeteries	X01	X01-02	A	Low	C	
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	
Scrap, salvage, or junk yards	D59	D59-01	B	High	C	Scrap/Junk Yark - Wilder Construction
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	Low	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	Low	C	Assume 1-20 roads in Zone B

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council

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***
Gasoline stations (without repair shop)	C15	C15-02	C	Low	C	Gas Station withoug Shop - Gakona Junction - Texaco
Domestic wastewater sludge land application areas	D04	D04-01	C	Medium	C	Gakona Roadhouse
Municipal or city parks (with green areas)	X04	X04-01	C	Low	C	Wrangell St. Elias National Park
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	Low	C	Tok Cutoff Highway
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Rihcardson Highway
Highways and roads, dirt/gravel	X24	X24-03	C	Low	C	Assume 1-20 roads in Zone C
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	Low	C	Richardson Highway
Gasoline stations (without repair shop)	C15	C15-01	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	Low	C	BLM Paxson Lake C/G
Metals mining, placer (active or inactive?)	E04	E04-01	G	Low	C	Dan Creek
Metals mining, placer (active or inactive?)	E04	E04-02	G	Low	C	French Creek Discovery
Metals mining, placer (active or inactive?)	E04	E04-03	G	Low	C	Gulkana R., Paxson
Metals mining, placer (active or inactive?)	E04	E04-04	G	Low	C	Gunn Creek
Metals mining, placer (active or inactive?)	E04	E04-05	G	Low	C	Richardson Monument Placer
Tanks, gasoline (underground)	T12	T12-01	G	Medium	C	Paxson Inn & Lodge
Tanks, heating oil, nonresidential (aboveground)	T14	T14-01	G	Low	C	Slana Energy Inc.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	G	Low	C	Mile 212.7 Richardson Highway, RecKey #1987330122901, Status: Inactive, 2,250-gallons of turbine fuel spilled in 1987 during truck roll over. Fuel contaminated groundwater. Extent of contamination unknown.

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	G	Low	C	ADOT&PF Paxson Trimms Camp, RecKey #1988330129109, Status: Inactive, two spills in 1986, estimated 3,300 gallons of fuel percolated into ground. No fuel recovered. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	G	Low	C	BLM MacLaren Glacier Mine Dump Site, RecKey #1992330934202, Status: Active, former copper mine, 35 drums of liquid on site, evidence of leakage observed, stained soils adjacent to drums, 100+ drums scattered near old copper mine site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	G	Low	C	OMS 35-1.2, RecKey #1992720121603, Status: Inactive, oil spill in 1993, estimated 200-300 cubic yards of contaminated soils.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	G	Low	C	Alyeska Isabel Pass Construction Camp, RecKey #1995720106001, Status: NFRAP, site utilized during construction of pipeline, obserced soil staining in various locations, suspected buried wastes.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	G	Low	C	AT&T Alascom Annex Maintenance Facility, RecKey #1997330114006, Status: Closed, 40 cubic yards of waste oil contaminated soil, stocpile sent to incinerator in Fairbanks during 1998.
Open dumps	U09	U09-01	G	High	C	Paxon Lake Dumpsite
Oil and gas extraction wells	W07	W07-01	G	High	C	Ahtna Inc 1
Oil and gas extraction wells	W07	W07-02	G	High	C	Rainbow Fed. 1
Oil and gas extraction wells	W07	W07-03	G	High	C	Rainbow Fed. 2
Municipal or city parks (with green areas)	X04	X04-02	G	Low	C	Wrangell St. Elias NP
Airports	X14	X14-01	G	Low	C	Crosswind Lake Landing
Airports	X14	X14-02	G	Low	C	Paxon Landing Strip
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	Low	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	Low	C	Denali Highway
Pipelines (oil and gas)	X28	X28-01	G	Low	C	Trans-Alaska Pipeline
Electric power generation (fossil fuels)	X36	X36-01	G	Medium	C	Slana Energy Inc.

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*

Table 6

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Synthetic Organic Chemicals

PWSID 380214.001

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	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	Gulkana
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Septic Systems (serves a multi-family residence; less than 20 people)	R03	R03-01	A	Low	C	Septic Systems
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Gulkana Radio Station, no further information available in the ADEC Contaminated Sites database.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Cemeteries	X01	X01-01	A	Medium	C	
Cemeteries	X01	X01-02	A	Medium	C	
Medical/veterinary facilities (doctor or dentist offices, hospitals, nursing homes)	X40	X40-01	A	Low	C	
Scrap, salvage, or junk yards	D59	D59-01	B	Medium	C	Scrap/Junk Yark - Wilder Construction
Domestic wastewater sludge land application areas	D04	D04-01	C	Low	C	Gakona Roadhouse
Municipal or city parks (with green areas)	X04	X04-01	C	Low	C	Wrangell St. Elias National Park

Table 6 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council
Sources of Synthetic Organic Chemicals

PWSID 380214.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	Low	C	BLM Paxson Lake C/G
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	G	Low	C	Mile 212.7 Richardson Highway, RecKey #1987330122901, Status: Inactive, 2,250-gallons of turbine fuel spilled in 1987 during truck roll over. Fuel contaminated groundwater. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	G	Low	C	ADOT&PF Paxson Trimms Camp, RecKey #1988330129109, Status: Inactive, two spills in 1986, estimated 3,300 gallons of fuel percolated into ground. No fuel recovered. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	G	Low	C	BLM MacLaren Glacier Mine Dump Site, RecKey #1992330934202, Status: Active, former copper mine, 35 drums of liquid on site, evidence of leakage observed, stained soils adjacent to drums, 100+ drums scattered near old copper mine site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	G	Low	C	OMS 35-1.2, RecKey #1992720121603, Status: Inactive, oil spill in 1993, estimated 200-300 cubic yards of contaminated soils.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	G	Low	C	Alyeska Isabel Pass Construction Camp, RecKey #1995720106001, Status: NFRAP, site utilized during construction of pipeline, obserced soil staining in various locations, suspected buried wastes.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	G	Low	C	AT&T Alascom Annex Maintenance Facility, RecKey #1997330114006, Status: Closed, 40 cubic yards of waste oil contaminated soil, stocpile sent to incinerator in Fairbanks during 1998.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	G	Low	C	Paxson Inn & Lodge, RecKey #1992330025801, Facility ID 1938, Event ID 33, 5,000-gallon gasoline UST failed tank tightness test. Approx. 800 cubic yards of contaminated soil removed during removal of UST and excavation.
Open dumps	U09	U09-01	G	Medium	C	Paxon Lake Dumpsite
Oil and gas extraction wells	W07	W07-01	G	Medium	C	Ahtna Inc 1
Oil and gas extraction wells	W07	W07-02	G	Medium	C	Rainbow Fed. 1
Oil and gas extraction wells	W07	W07-03	G	Medium	C	Rainbow Fed. 2
Municipal or city parks (with green areas)	X04	X04-02	G	Low	C	Wrangell St. Elias NP

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Airports	X14	X14-01	G	Medium	C	Crosswind Lake Landing
Airports	X14	X14-02	G	Medium	C	Paxon Landing Strip

Table 7

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council Sources of Other Organic Chemicals

PWSID 380214.001

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	
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	A	Low	C	South Gulkana
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	A	Low	C	Gulkana
Septic systems (serves one single-family home)	R02	R02-01	A	Low	C	Assume 10 or less residential septic systems in Zone A
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	A	Low	C	Gulkana Airport, RecKey #1992330114902, Status: Inactive, aviation fuel line leak, reported loss of 12 to 20 gallons.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	A	Low	C	Gulkana Radio Station, no further information available in the ADEC Contaminated Sites database.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	A	Low	C	Gulkana Airport, RecKey #1992240014901, Facility ID 1931, Event ID 654, possible aviation fuel line leak.
Highways and roads, dirt/gravel	X24	X24-01	A	Low	C	Assume 1-20 roads in Zone A
Scrap, salvage, or junk yards	D59	D59-01	B	High	C	Scrap/Junk Yark - Wilder Construction
Highways and roads, paved (cement or asphalt)	X20	X20-01	B	Low	C	Richardson Highway
Highways and roads, dirt/gravel	X24	X24-02	B	Low	C	Assume 1-20 roads in Zone B
Gasoline stations (without repair shop)	C15	C15-02	C	Low	C	Gas Station withoug Shop - Gakona Junction - Texaco
Domestic wastewater sludge land application areas	D04	D04-01	C	Low	C	Gakona Roadhouse
Quarries (sand, gravel, rock, other?)	E10	E10-01	C	Low	C	Material Site 23-1M
Highways and roads, paved (cement or asphalt)	X20	X20-02	C	Low	C	Tok Cutoff Highway

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council

Sources of Other Organic Chemicals

Contaminant Source Type	***Contaminant Source ID***	***CS ID tag***	***Zone***	***Risk Ranking for Analysis***	***Map Number***	***Comments***
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Rihcardson Highway
Highways and roads, dirt/gravel	X24	X24-03	C	Low	C	Assume 1-20 roads in Zone C
Quarries (sand, gravel, rock, other?)	E10	E10-02	F	Low	C	Hogan Hill Quarry
Highways and roads, paved (cement or asphalt)	X20	X20-04	F	Low	C	Richardson Highway
Gasoline stations (without repair shop)	C15	C15-01	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	G	Low	C	Paxson Inn & Lodge
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-04	G	Low	C	BLM Paxson Lake C/G
Quarries (sand, gravel, rock, other?)	E10	E10-03	G	Low	C	Amphi
Quarries (sand, gravel, rock, other?)	E10	E10-04	G	Low	C	Chitti Stain
Quarries (sand, gravel, rock, other?)	E10	E10-05	G	Low	C	Hogan Hill
Quarries (sand, gravel, rock, other?)	E10	E10-06	G	Low	C	Material Site 30-0
Quarries (sand, gravel, rock, other?)	E10	E10-07	G	Low	C	Matieral Site 31-1.1
Quarries (sand, gravel, rock, other?)	E10	E10-08	G	Low	C	North Star
Quarries (sand, gravel, rock, other?)	E10	E10-09	G	Low	C	Paxson Mountain
Quarries (sand, gravel, rock, other?)	E10	E10-10	G	Low	C	Paxson Pit
Quarries (sand, gravel, rock, other?)	E10	E10-11	G	Low	C	Richardson Highway, Paxson
Quarries (sand, gravel, rock, other?)	E10	E10-12	G	Low	C	Summit
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	G	Low	C	Mile 212.7 Richardson Highway, RecKey #1987330122901, Status: Inactive, 2,250-gallons of turbine fuel spilled in 1987 during truck roll over. Fuel contaminated groundwater. Extent of contamination unknown.

Table 7 (continued)

Contaminant Source Inventory and Risk Ranking for Gulkana Village Council
Sources of Other Organic Chemicals

PWSID 380214.001

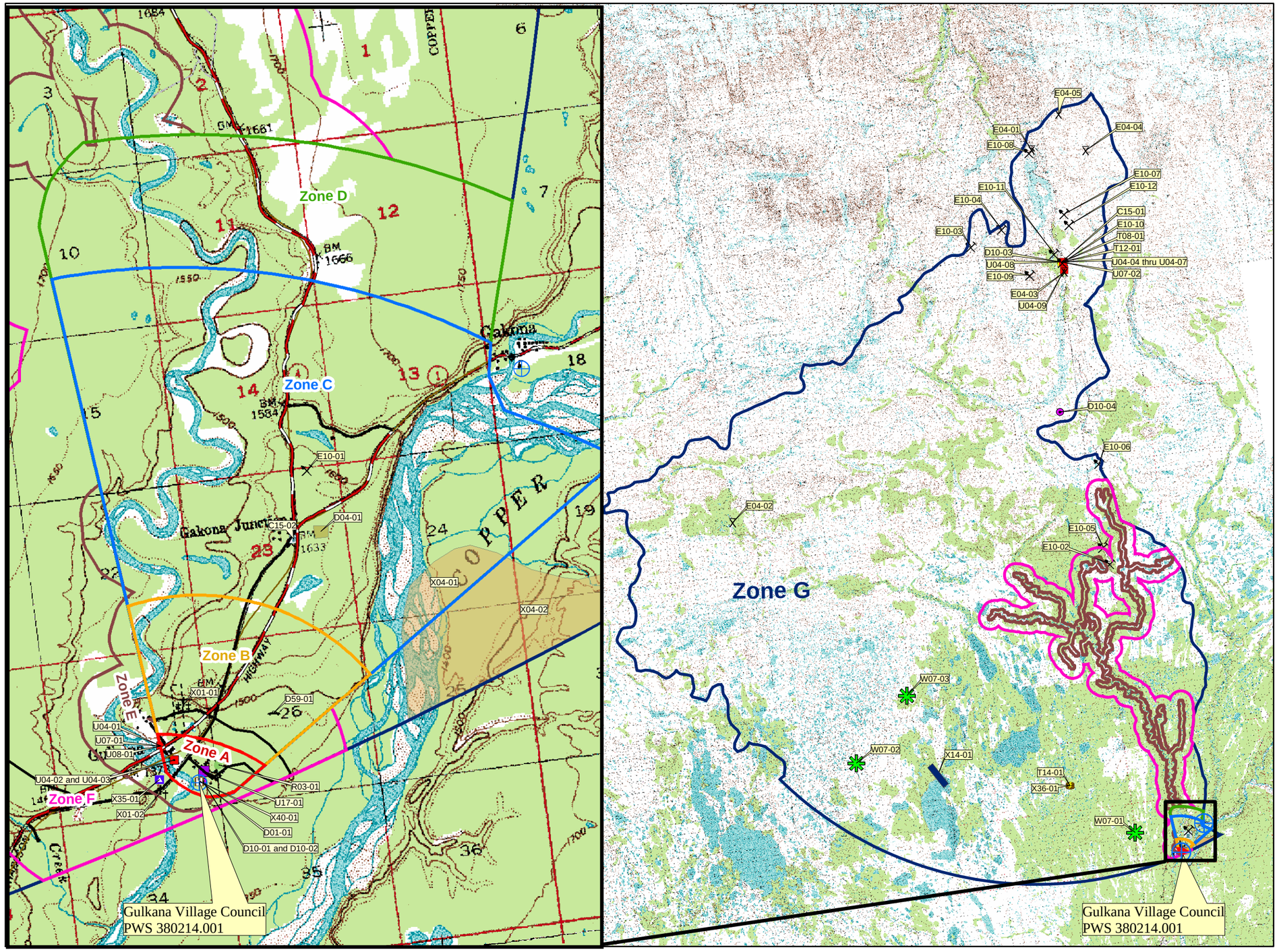
Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	G	Low	C	ADOT&PF Paxson Trimms Camp, RecKey #1988330129109, Status: Inactive, two spills in 1986, estimated 3,300 gallons of fuel percolated into ground. No fuel recovered. Extent of contamination unknown.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	G	Low	C	BLM MacLaren Glacier Mine Dump Site, RecKey #1992330934202, Status: Active, former copper mine, 35 drums of liquid on site, evidence of leakage observed, stained soils adjacent to drums, 100+ drums scattered near old copper mine site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	G	Low	C	OMS 35-1.2, RecKey #1992720121603, Status: Inactive, oil spill in 1993, estimated 200-300 cubic yards of contaminated soils.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	G	Low	C	Alyeska Isabel Pass Construction Camp, RecKey #1995720106001, Status: NFRAP, site utilized during construction of pipeline, obserced soil staining in various locations, suspected buried wastes.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	G	Low	C	AT&T Alascom Annex Maintenance Facility, RecKey #1997330114006, Status: Closed, 40 cubic yards of waste oil contaminated soil, stocpile sent to incinerator in Fairbanks during 1998.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	G	Low	C	Paxson Inn & Lodge, RecKey #1992330025801, Facility ID 1938, Event ID 33, 5,000-gallon gasoline UST failed tank tightness test. Approx. 800 cubic yards of contaminated soil removed during removal of UST and excavation.
Open dumps	U09	U09-01	G	Medium	C	Paxon Lake Dumpsite
Oil and gas extraction wells	W07	W07-01	G	Medium	C	Ahtna Inc 1
Oil and gas extraction wells	W07	W07-02	G	Medium	C	Rainbow Fed. 1
Oil and gas extraction wells	W07	W07-03	G	Medium	C	Rainbow Fed. 2
Airports	X14	X14-01	G	Medium	C	Crosswind Lake Landing
Airports	X14	X14-02	G	Medium	C	Paxon Landing Strip
Highways and roads, paved (cement or asphalt)	X20	X20-05	G	Low	C	Richardson Highway
Highways and roads, paved (cement or asphalt)	X20	X20-06	G	Low	C	Denali Highway
Pipelines (oil and gas)	X28	X28-01	G	High	C	Trans-Alaska Pipeline

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Electric power generation (fossil fuels)	X36	X36-01	G	High	C	Slana Energy Inc.

APPENDIX C

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

Public Water Well System for PWS #380214.001 Gulkana Village Council
Showing Potential and Existing Sources of 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)

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
- Zone E Protection Area- 1000 feet from Surface Water
- Zone F Protection Area- 1 Mile from Surface Water
- Zone G Protection Area- Entire Watershed

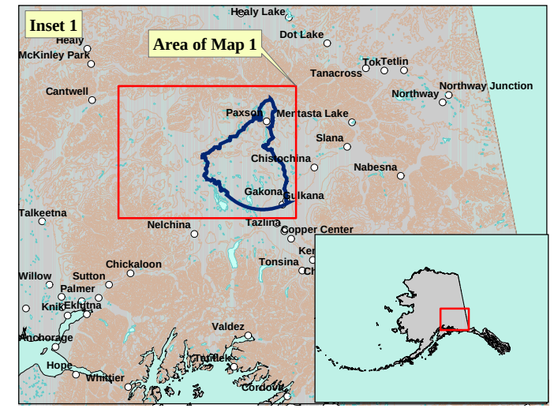
Existing or Potential Contaminant Sources

- Gasoline stations without repair shops (C15)
- Domestic wastewater collection systems (sewer lines or lift stations) (D01)
- Injection wells (Class V) Large-Capacity Septic System (D10)
- Scrap, salvage, or junk yards (D59)
- Placer Mines (E04)
- Other mines or Quarries (E10)
- Septic Systems (serves a multi-family residence; less than 20 people) (R03)
- Tanks, diesel (underground) (T08)
- Tanks, gasoline (underground) (T12)
- Tanks, heating oil, nonresidential (aboveground) (T14)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Open Leaking Underground Fuel Storage Tank (LUST) (U07)
- Closed Leaking Underground Fuel Storage Tank (LUST) (U08)
- Open Dumps (U17)
- Oil and gas extraction wells (W07)
- Cemetery (X01)
- Campgrounds and RV Parks (X35)
- Electric Power Generation (fossil fuels) (X36)
- Medical/veterinary facilities (X40)
- Domestic wastewater sludge land application areas (D04)
- Municipal or city parks (X04)
- Airport or landing strip (X14)

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.



Gulkana Village Council
PWS 380214.001
Appendix C Map C

APPENDIX D

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

Chart 1. Susceptibility of the wellhead - Gulkana Village Council (PWS No.380214.001)

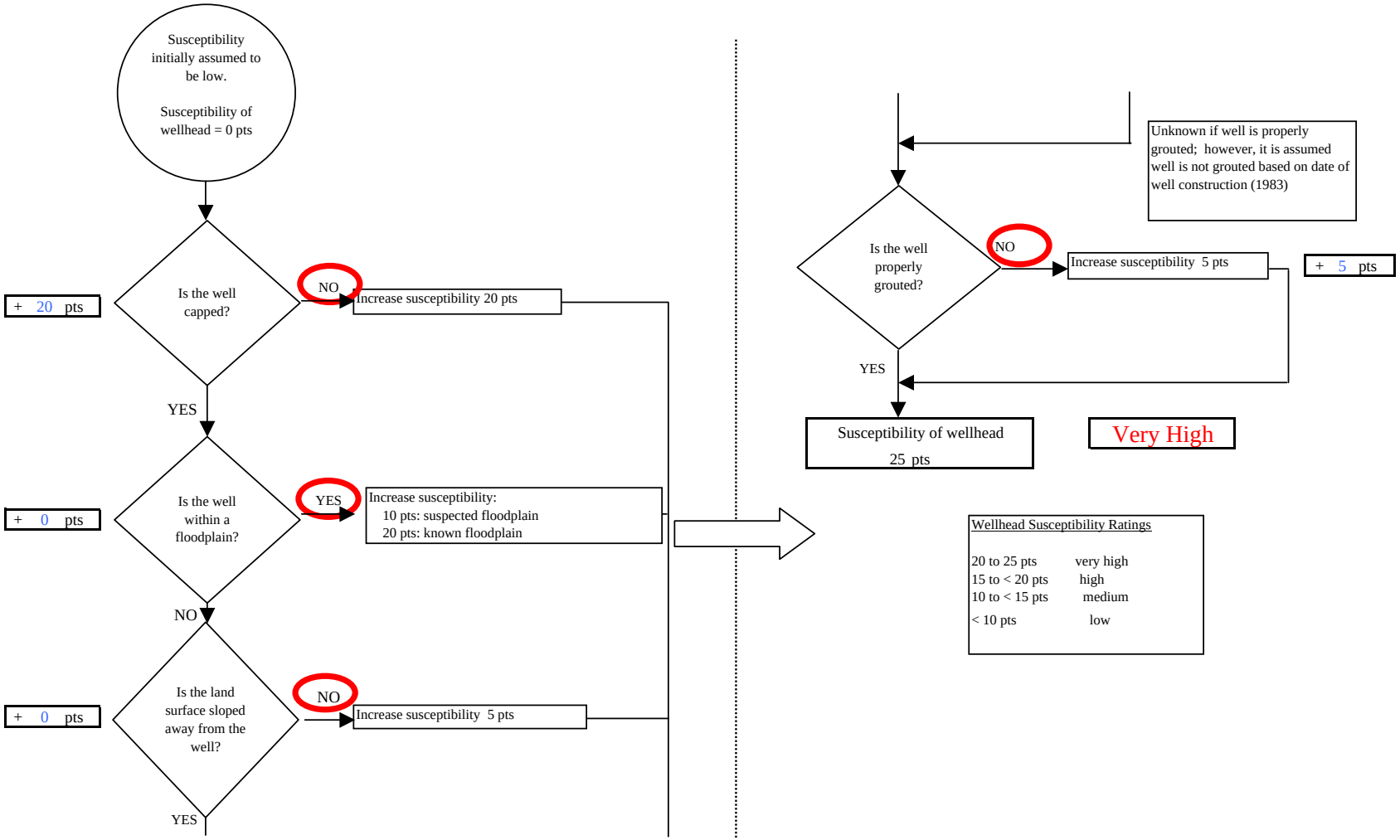


Chart 2. Susceptibility of the aquifer Gulkana Village Council (PWS No.380214.001)

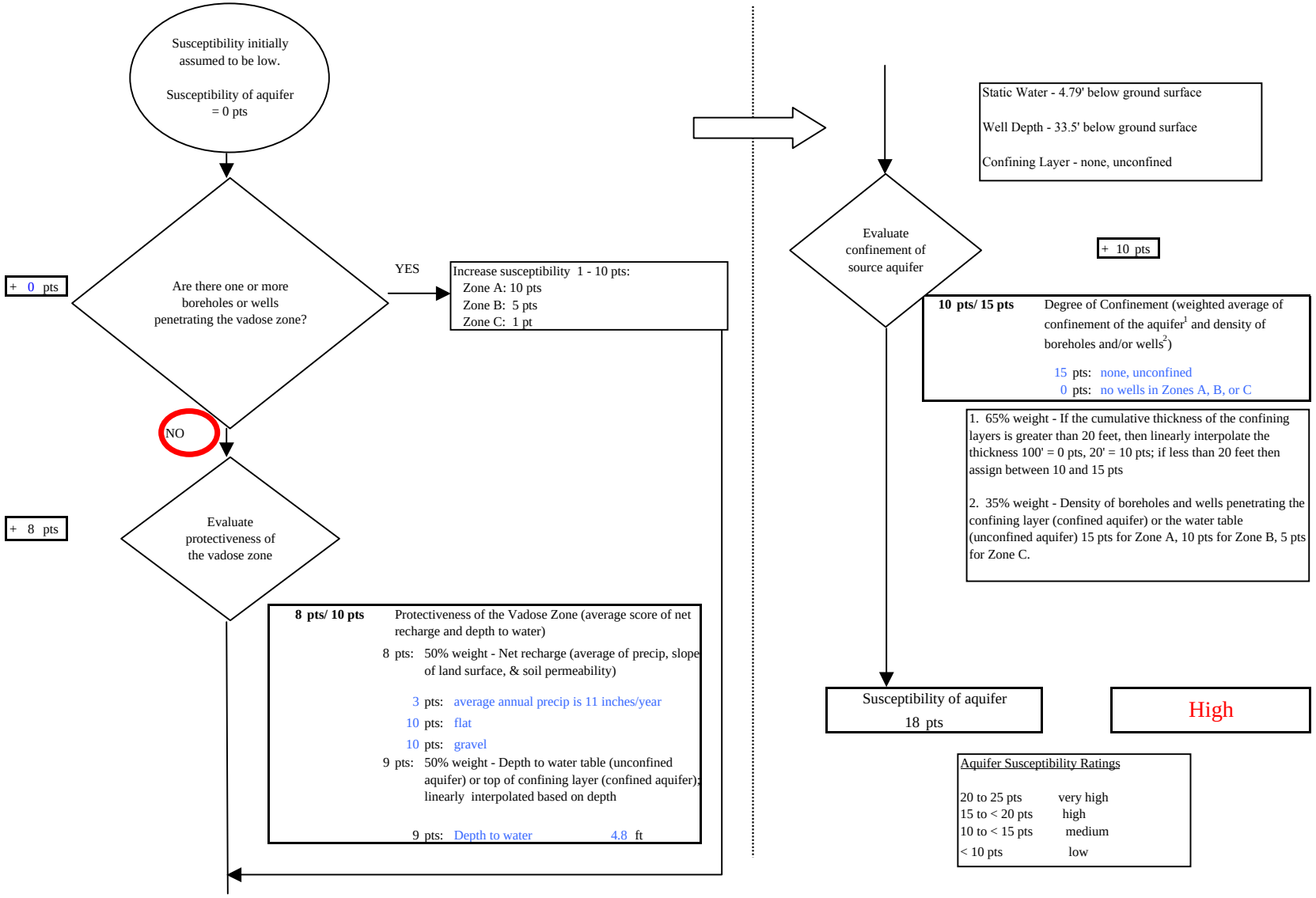
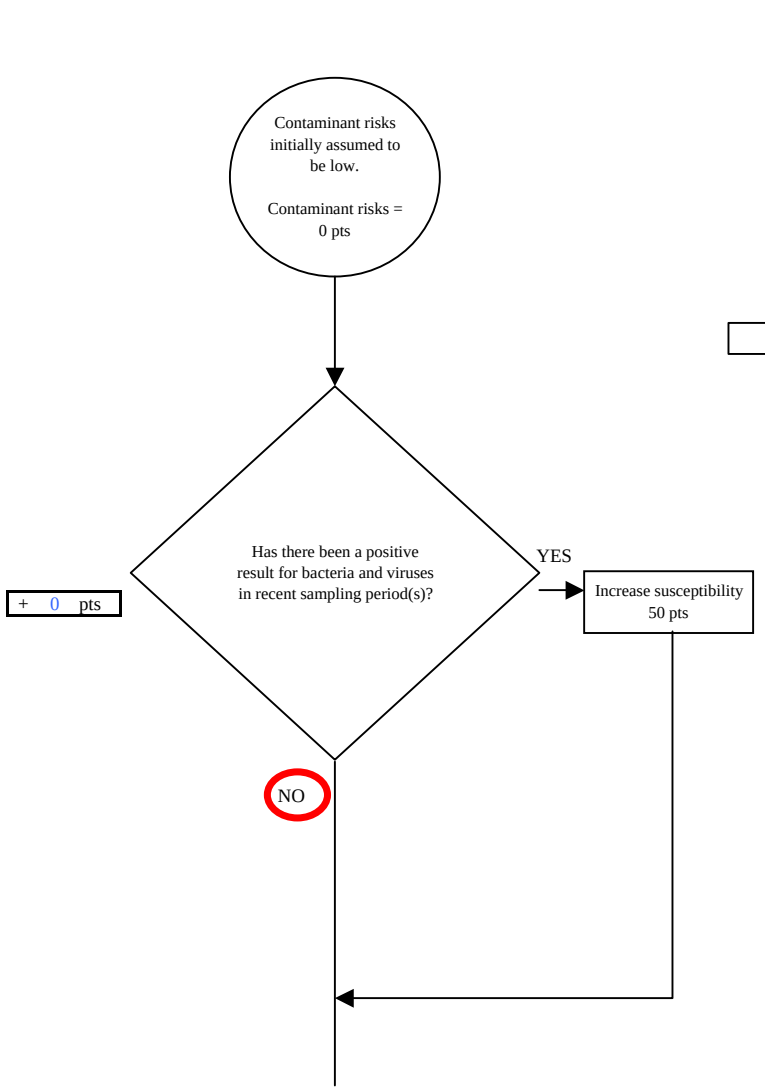
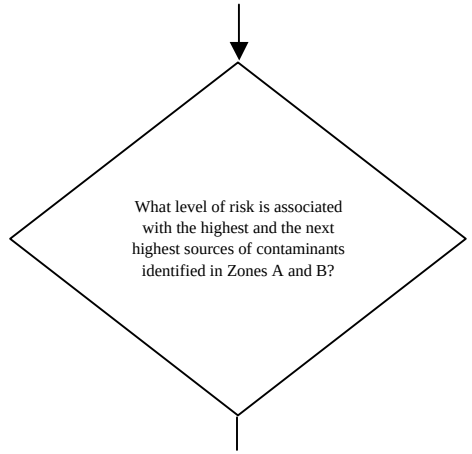


Chart 3. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Bacteria & Viruses





+ 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)	3	0	3
Medium(s)	12	0	12
Low(s)	11	1	12

	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 Gulkana Village Council (PWS No.380214.001) - Bacteria & Viruses

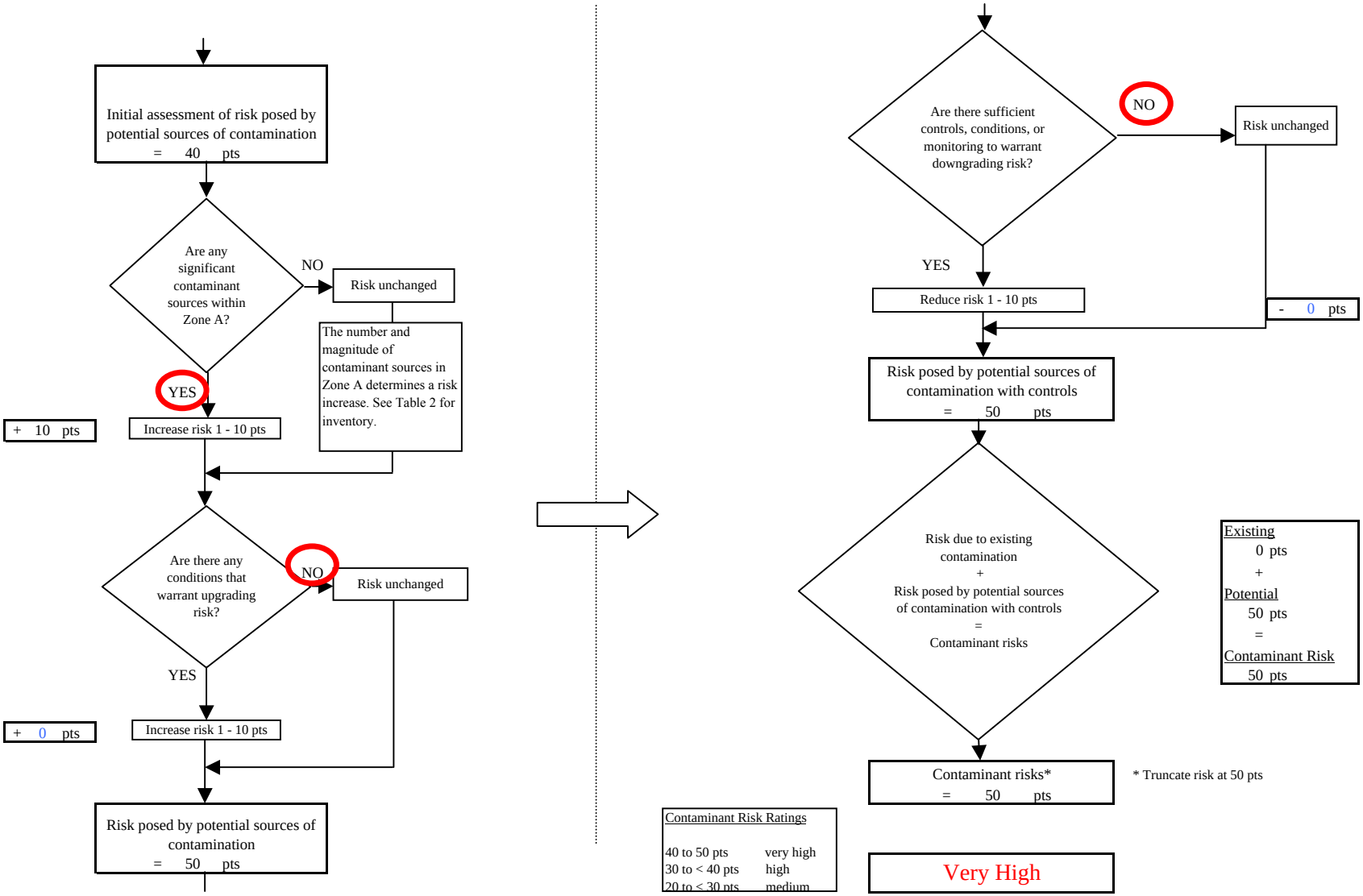


Chart 4. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Bacteria & Viruses

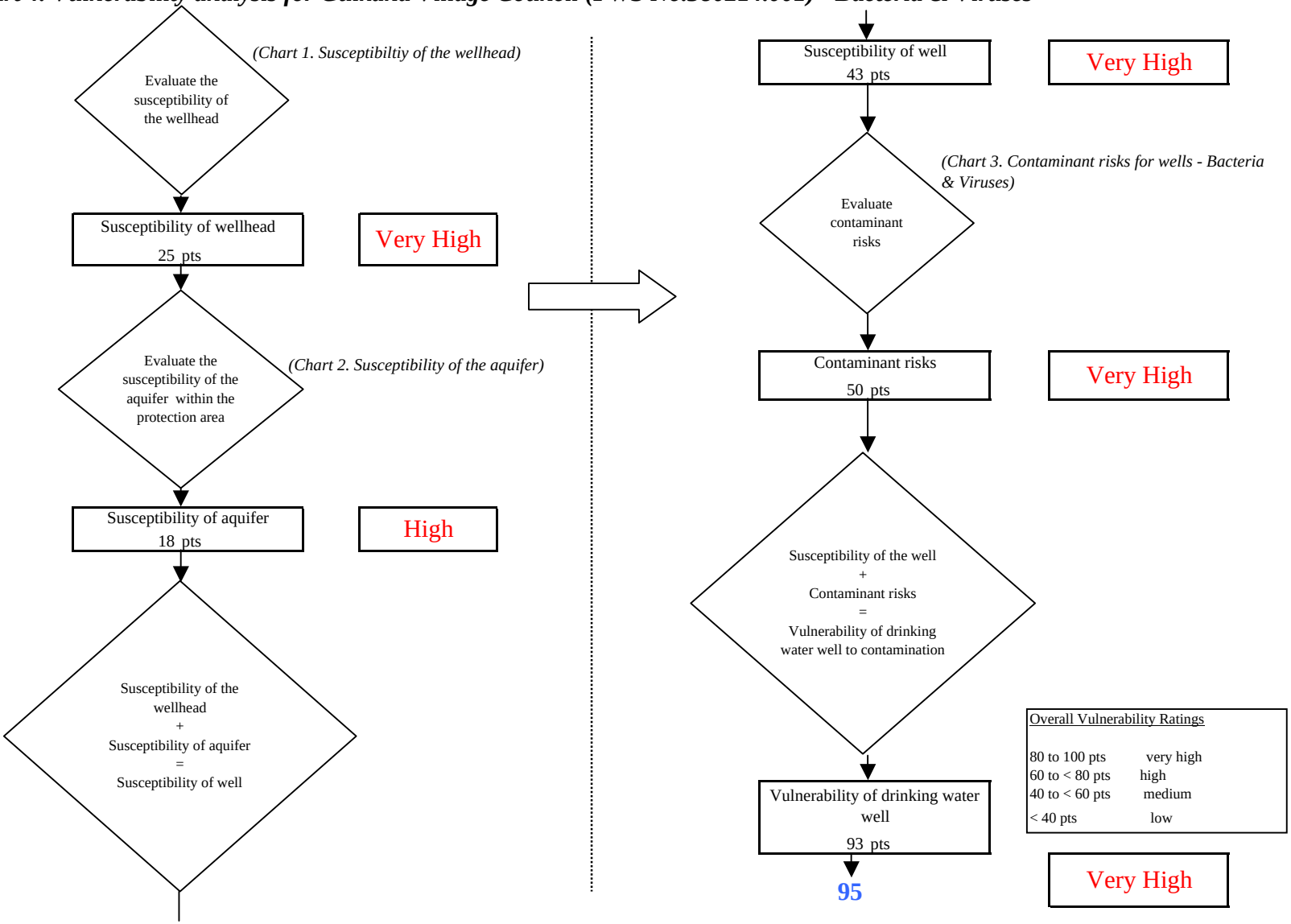


Chart 5. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Nitrates and Nitrites

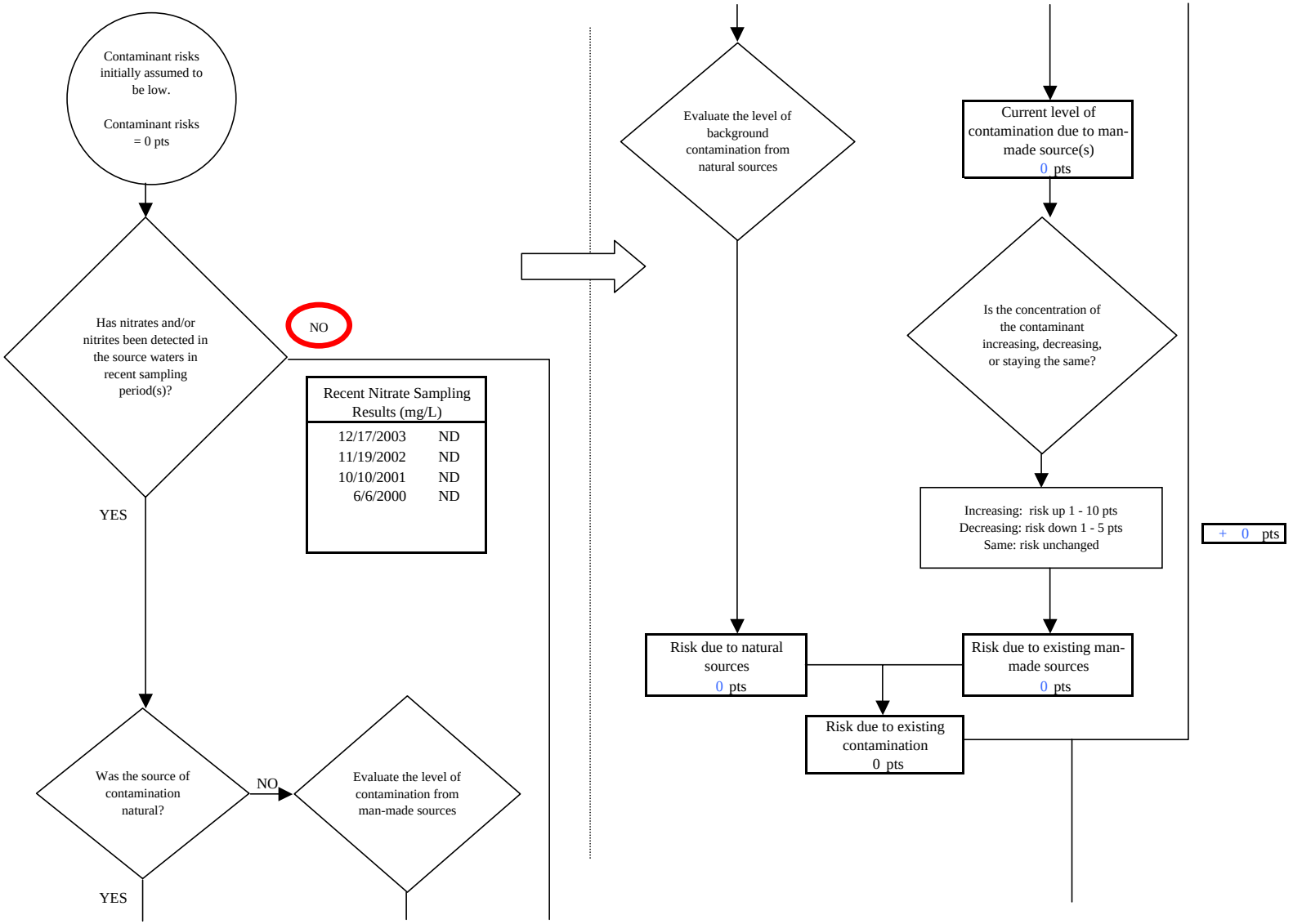
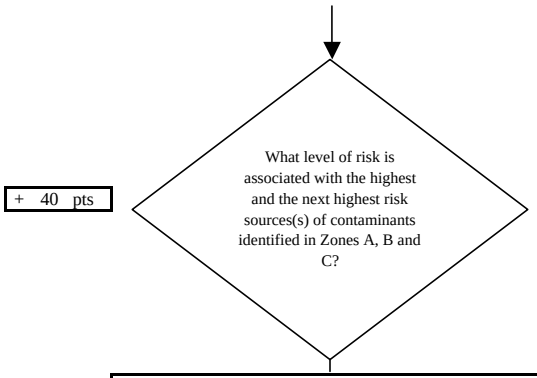


Chart 5. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Nitrates and Nitrites



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)	3	1	4
Medium(s)	13	1	14
Low(s)	12	3	15

	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.

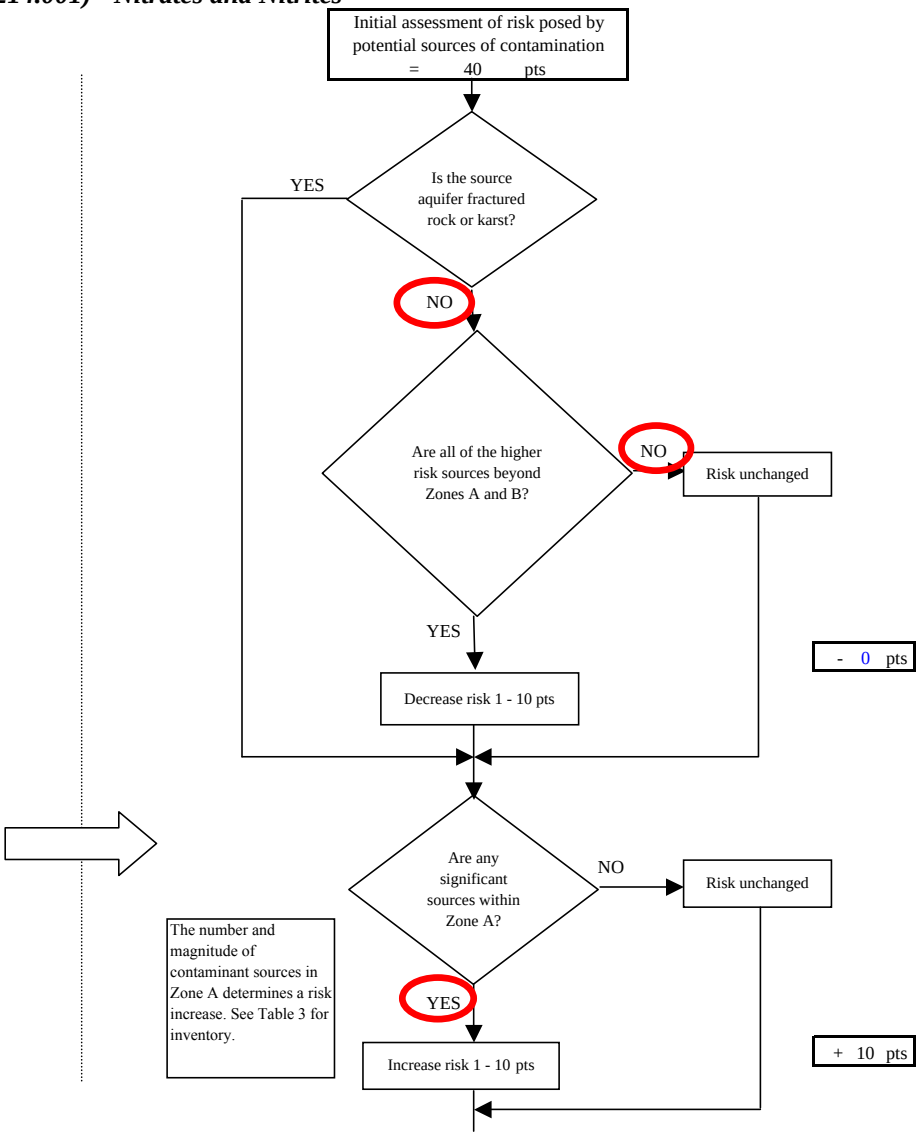


Chart 5. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Nitrates and Nitrites

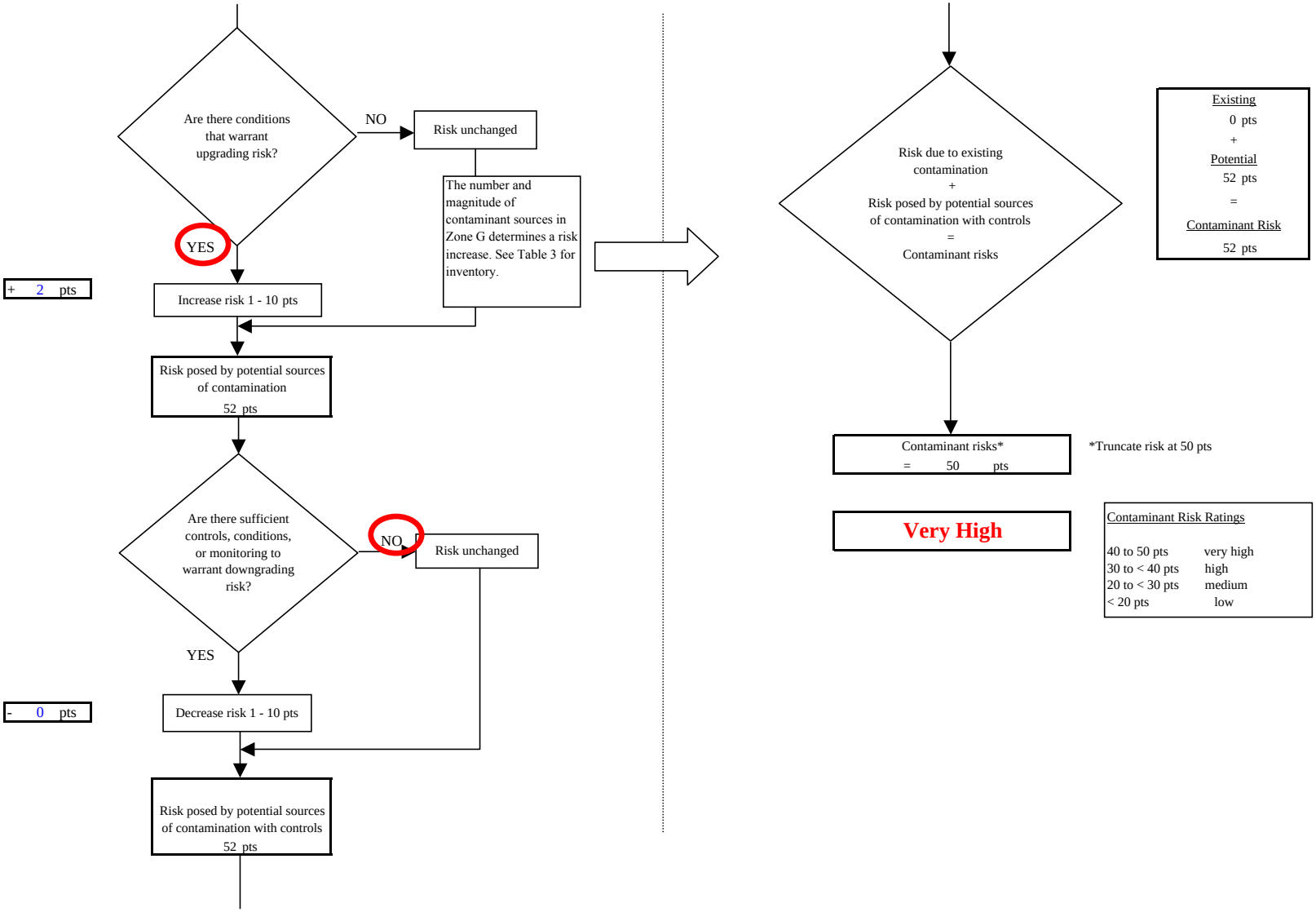


Chart 6. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Nitrates and Nitrites

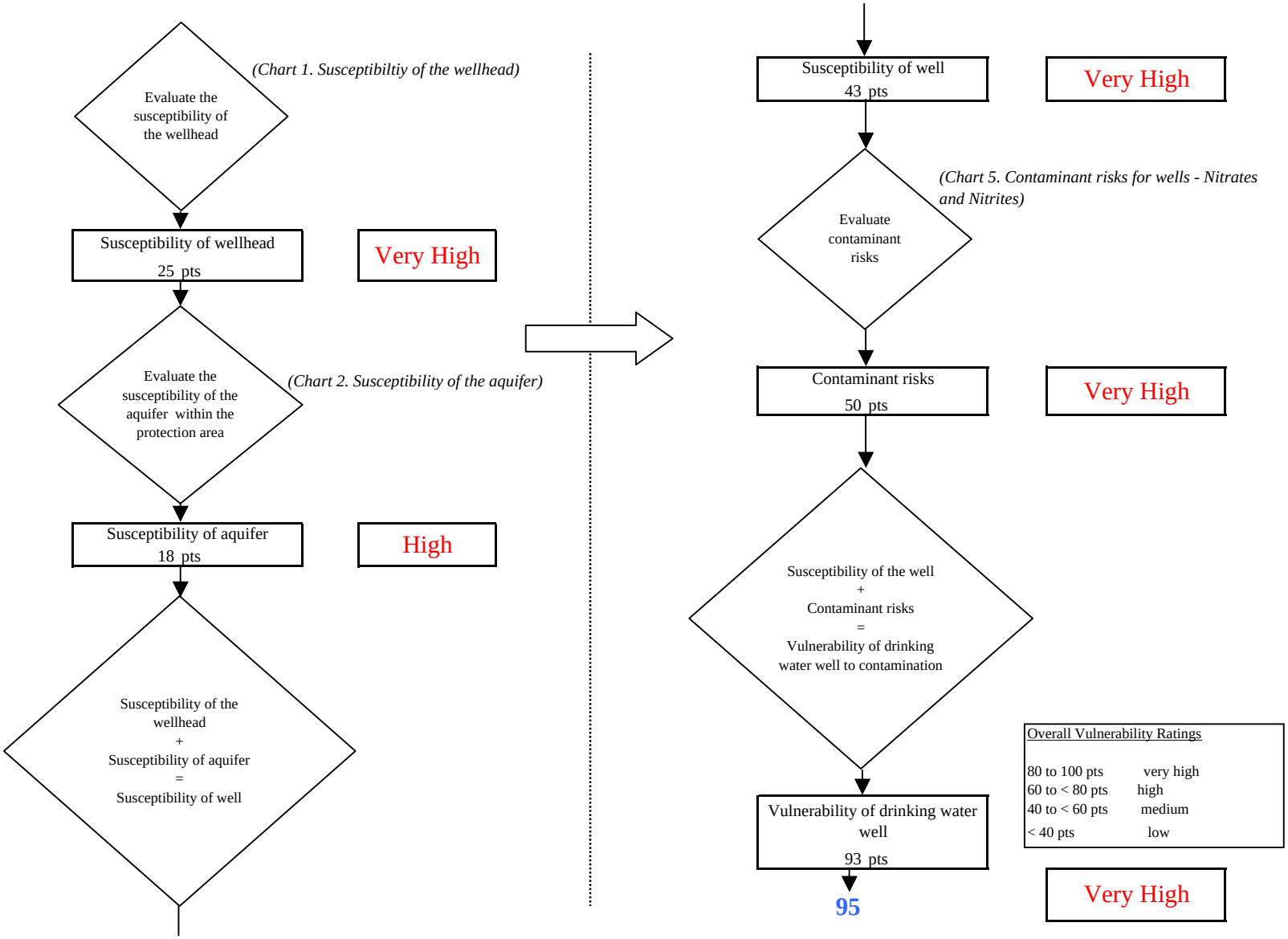


Chart 7. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Volatile Organic Chemicals

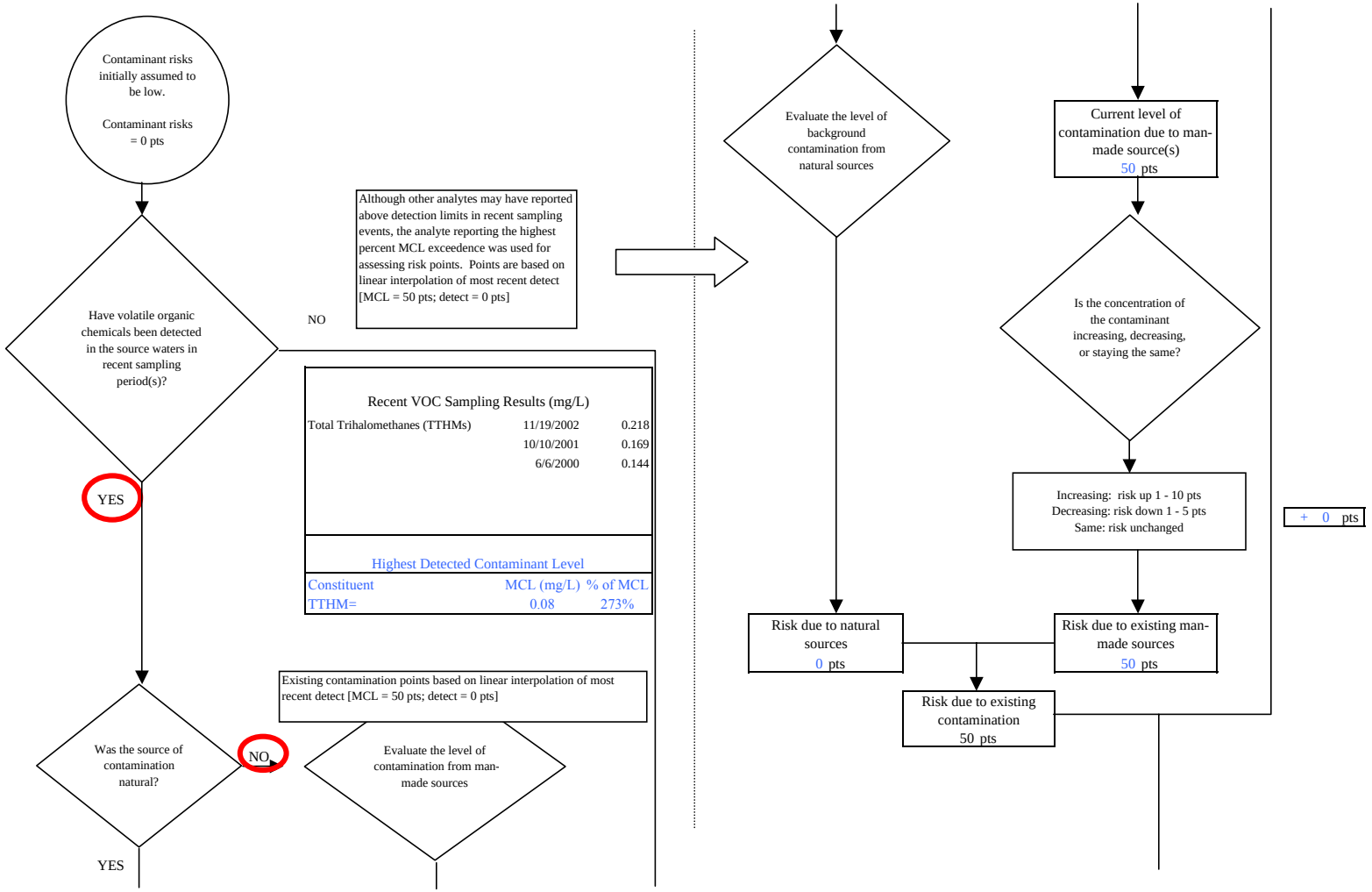
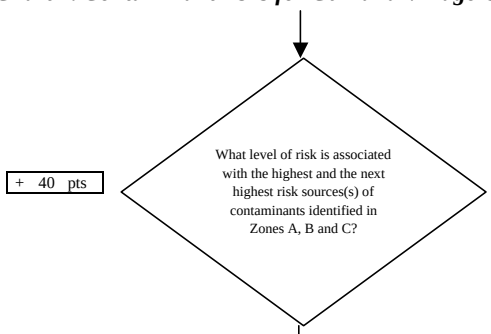


Chart 7. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Volatile Organic Chemicals



+ 40 pts

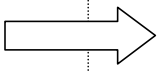
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	5	1	6
Medium(s)	36	0	36
Low(s)	16	5	21

	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.



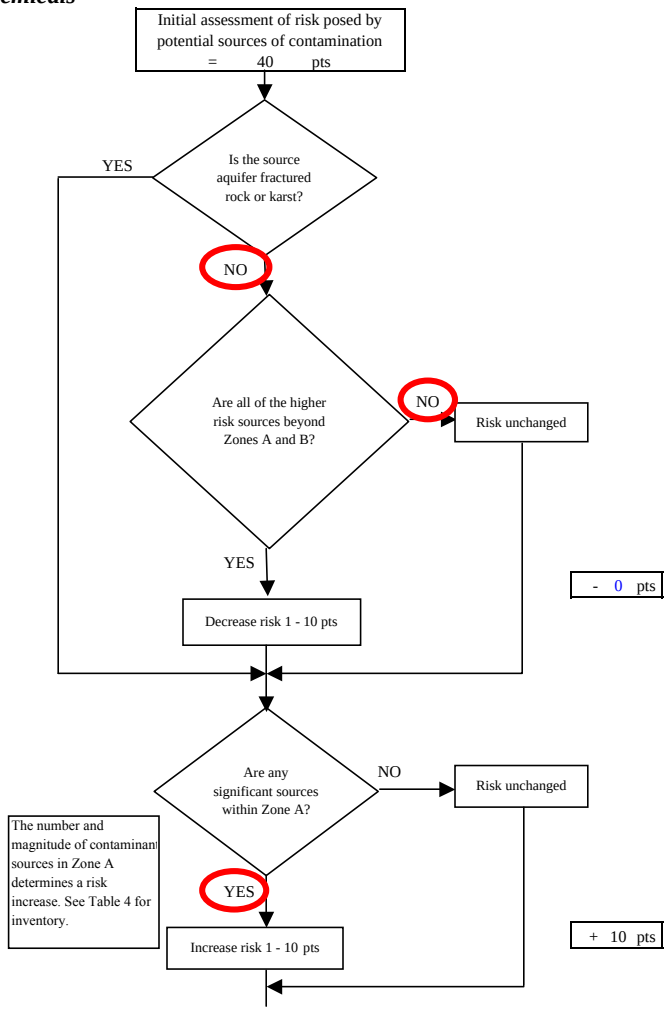


Chart 7. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Volatile Organic Chemicals

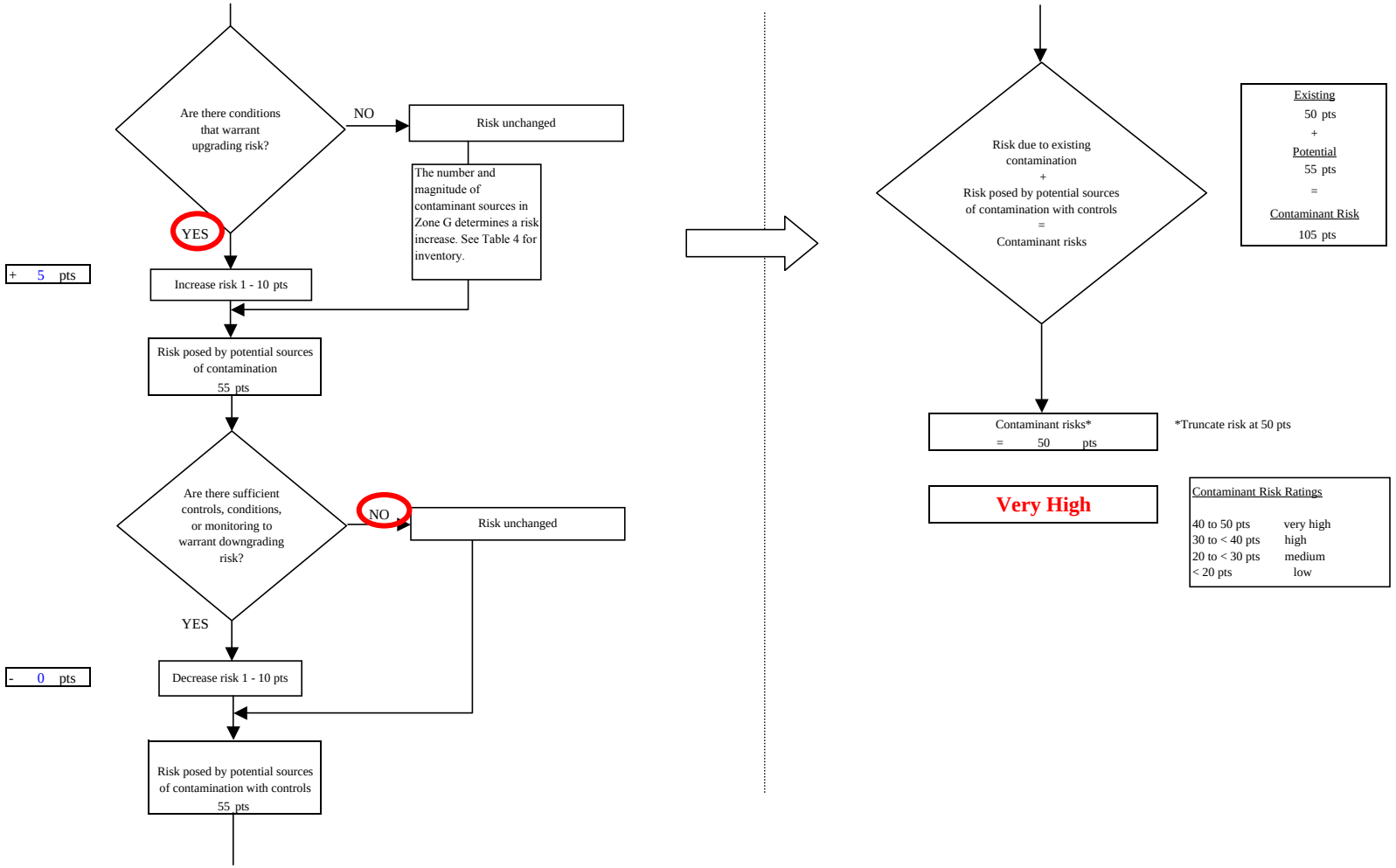


Chart 8. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Volatile Organic Chemicals

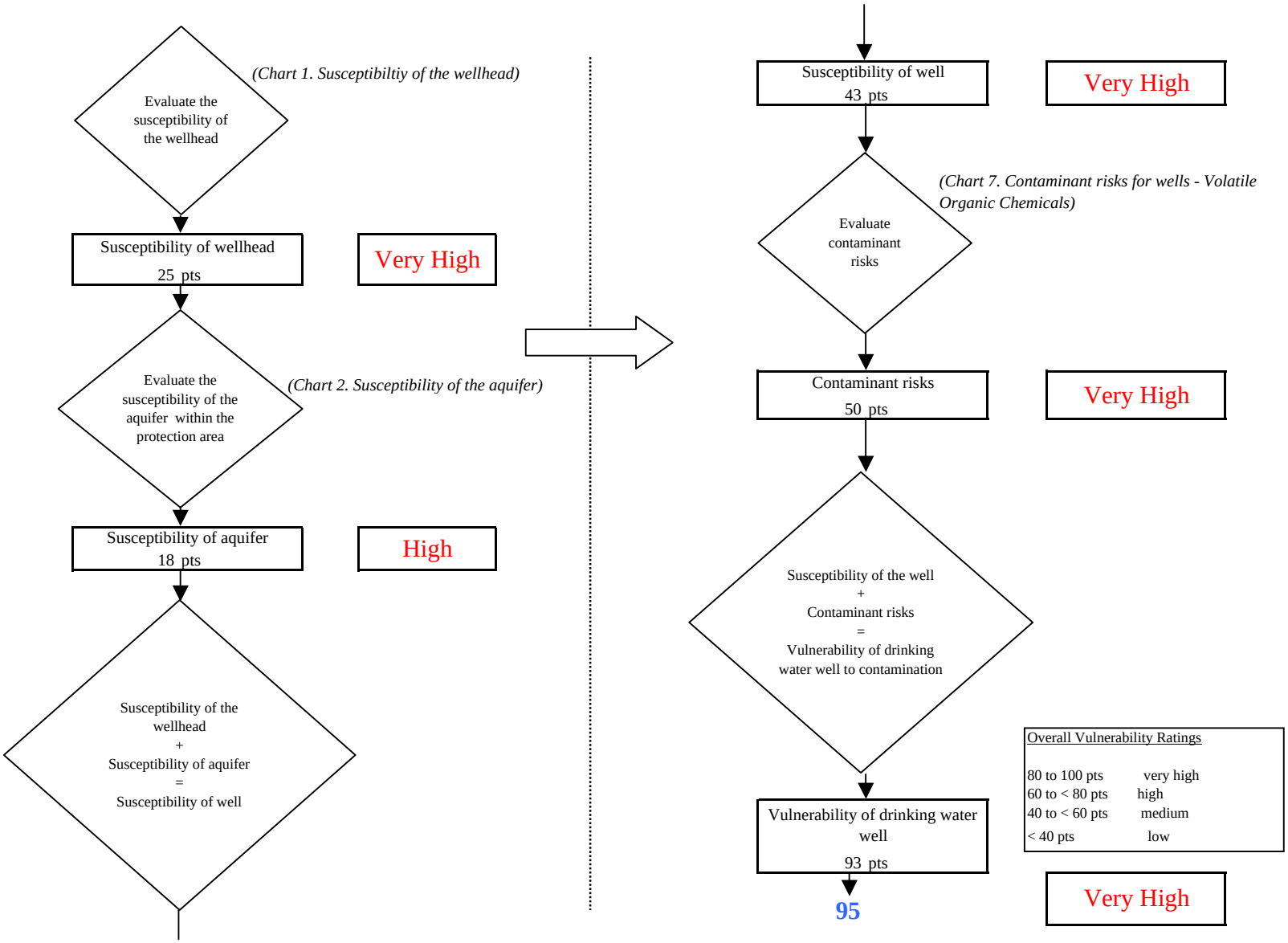


Chart 9. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

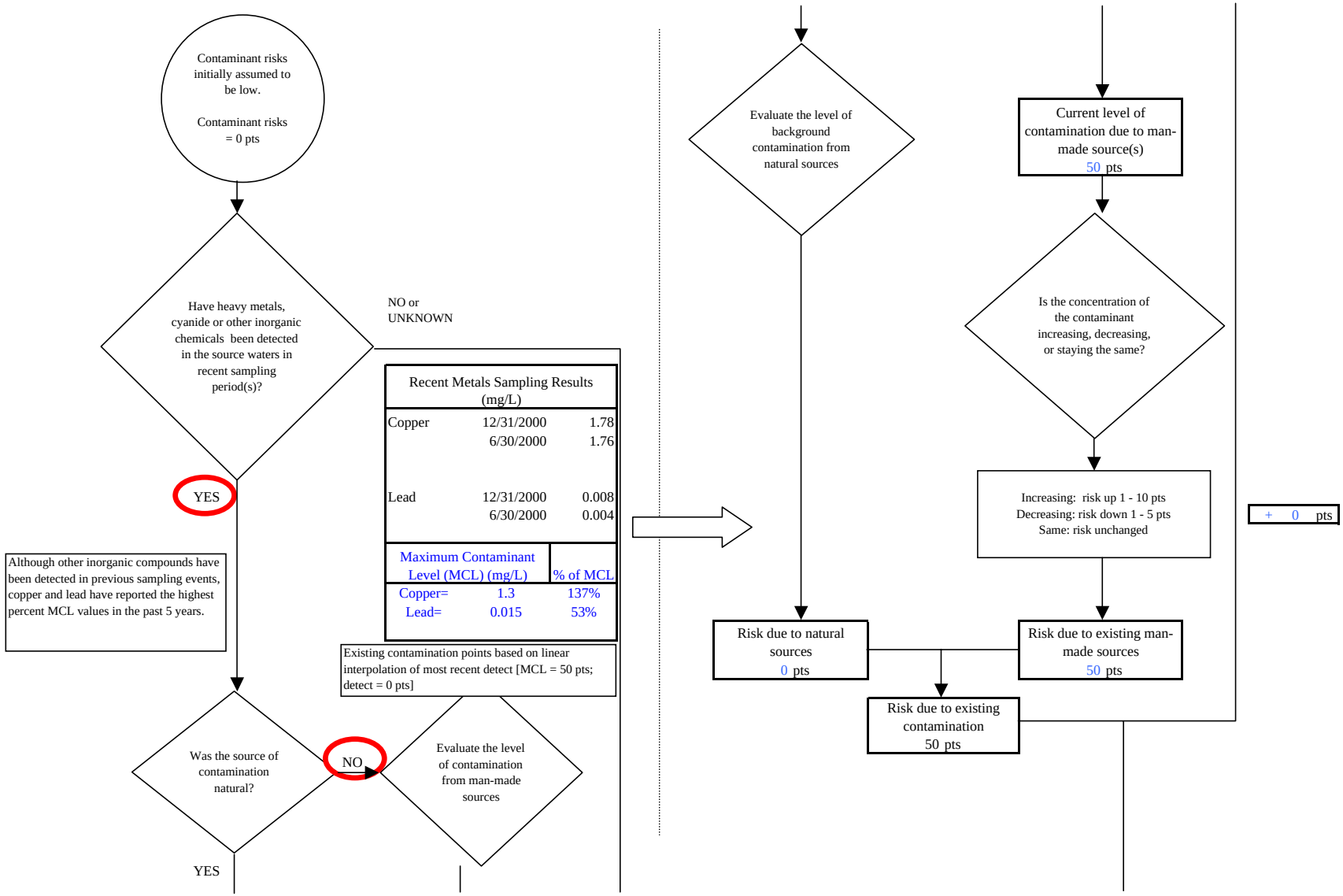
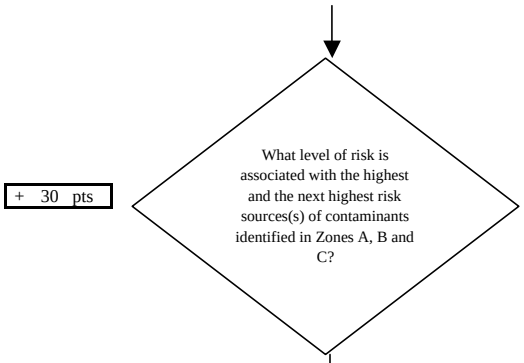


Chart 9. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals



+ 30 pts

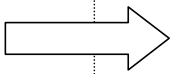
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	1	1
Medium(s)	0	1	1
Low(s)	23	3	26

	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.



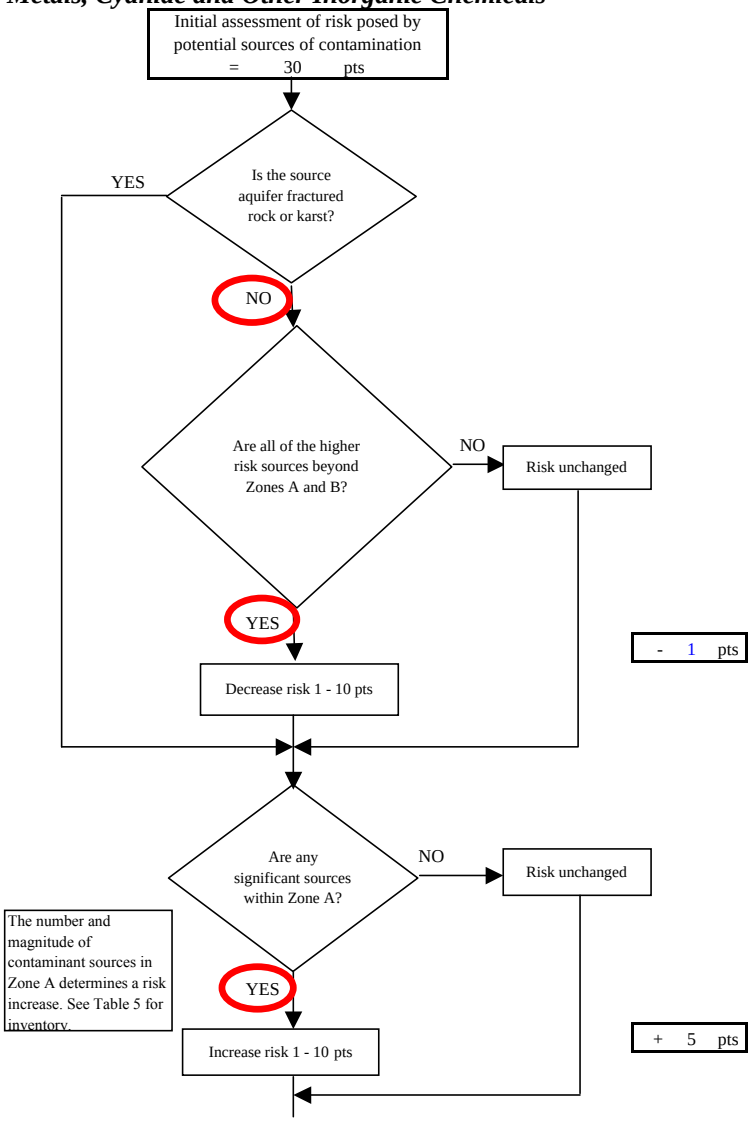


Chart 9. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

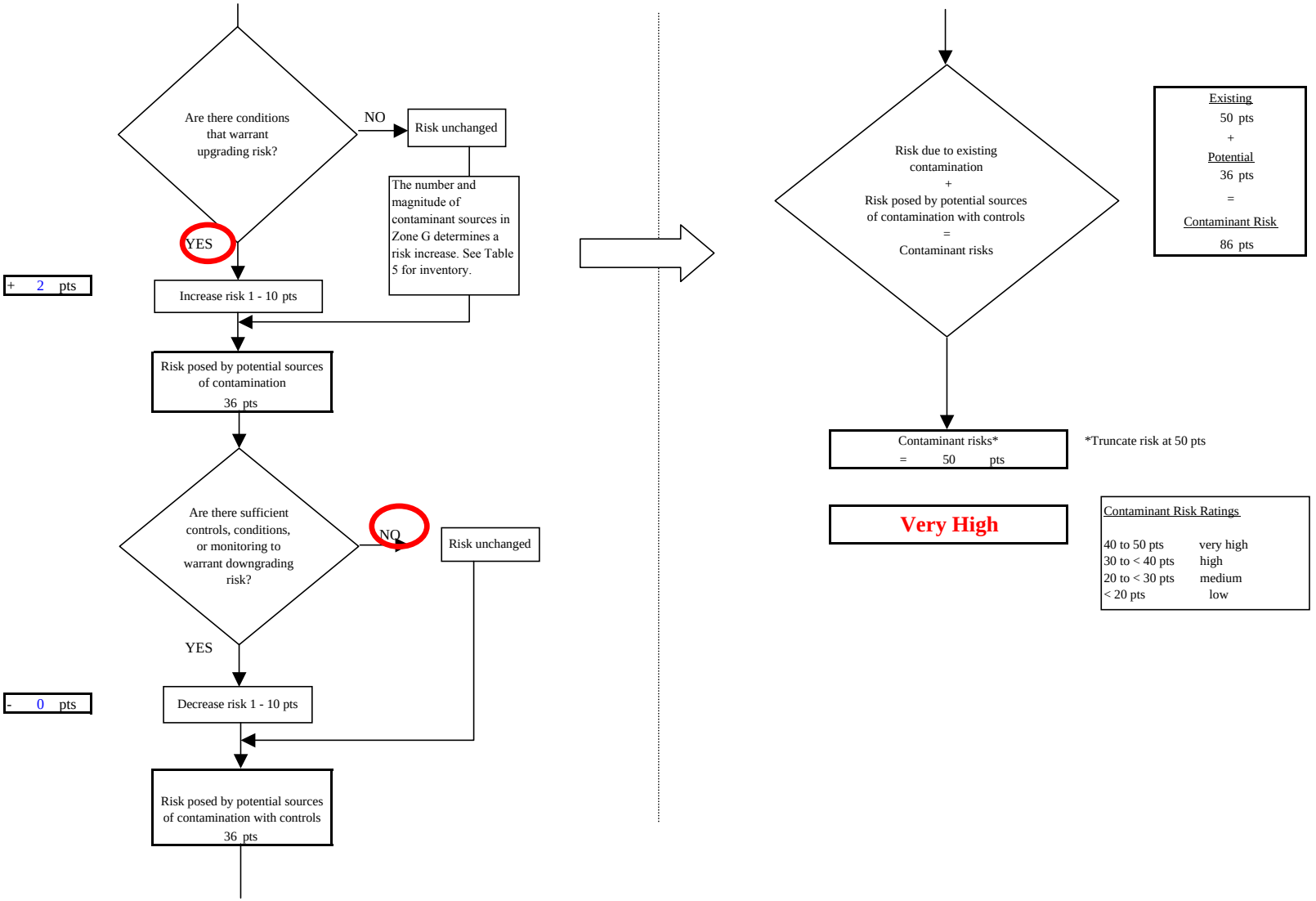


Chart 10. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

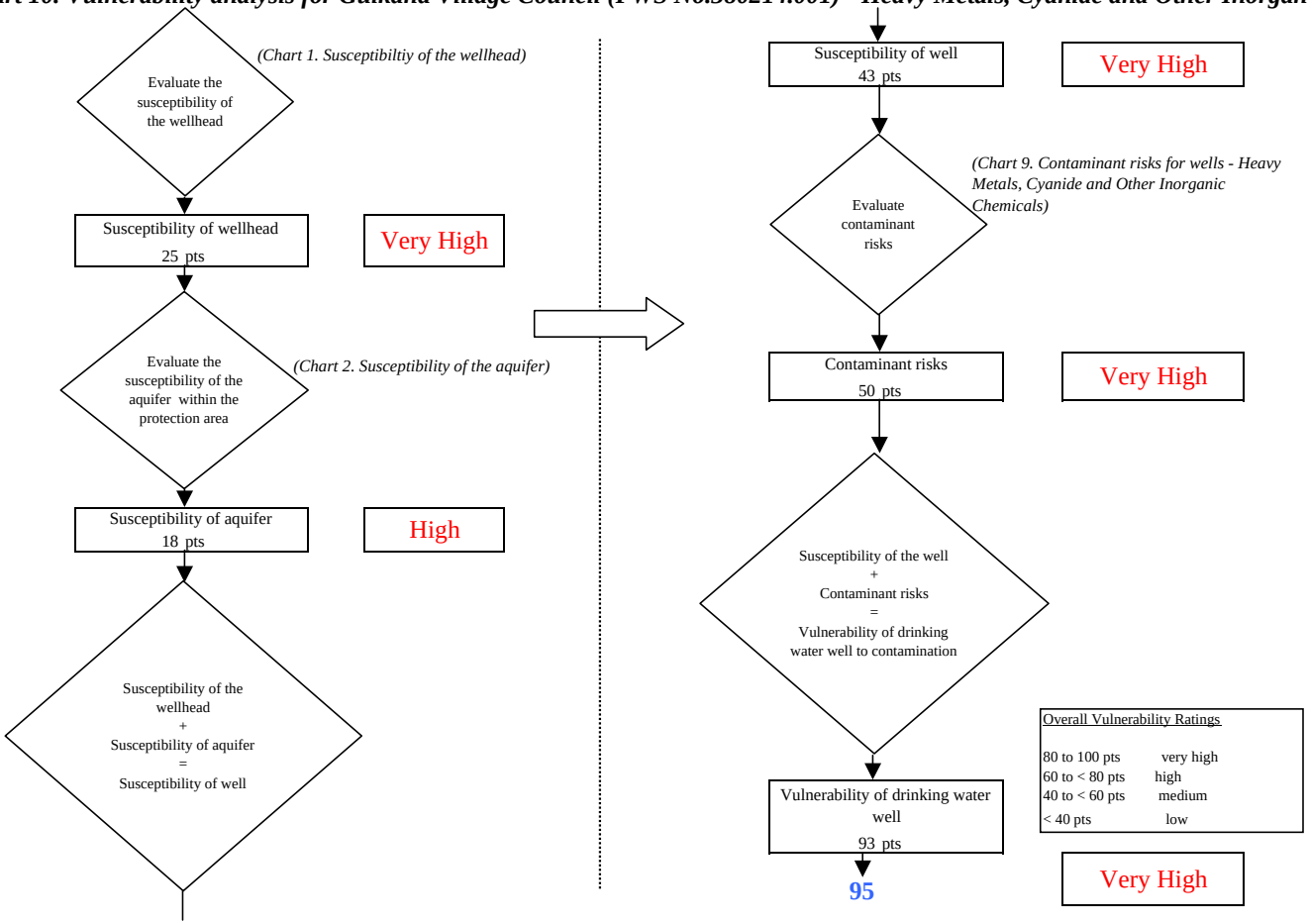


Chart 11. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Synthetic Organic Chemicals

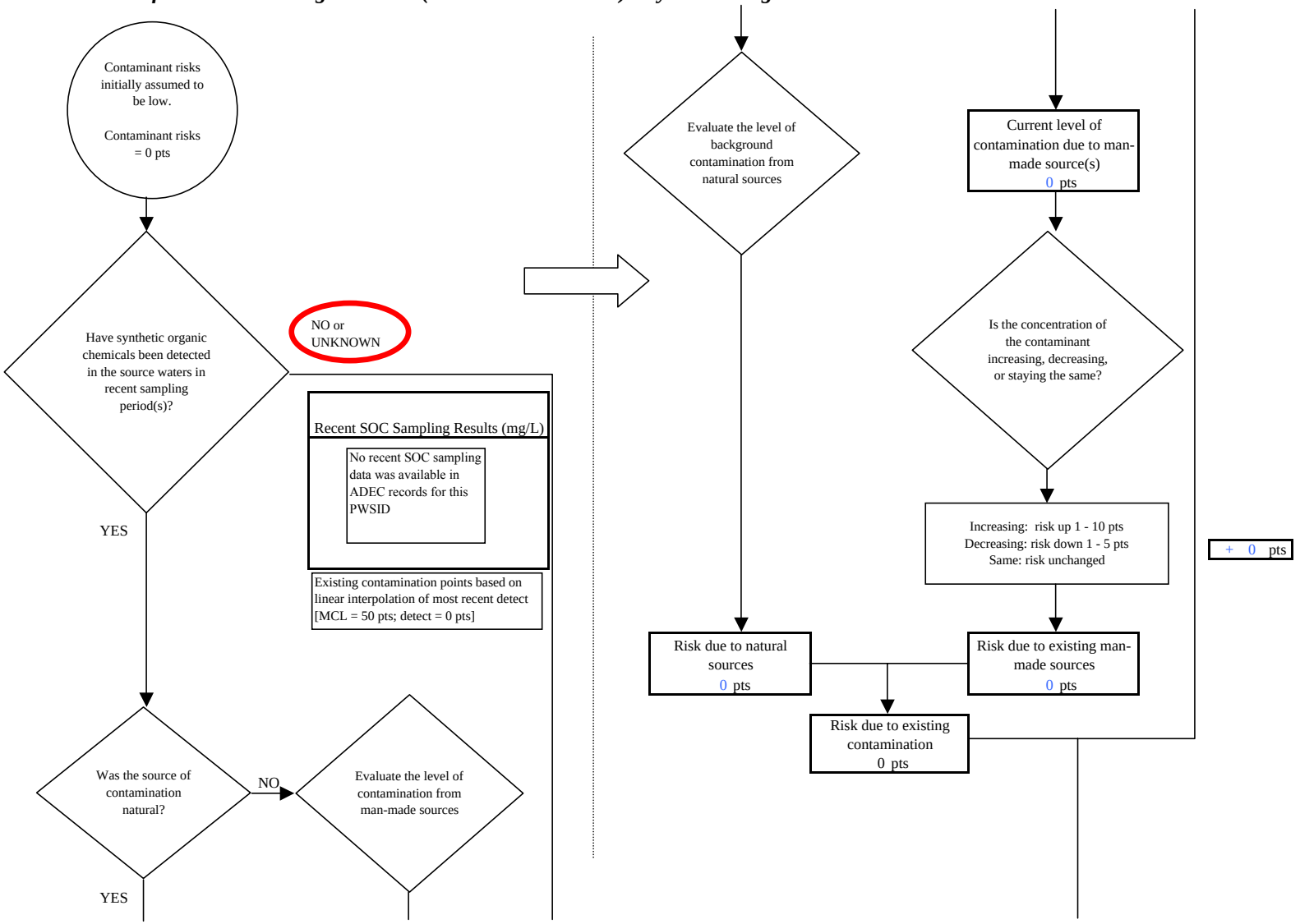
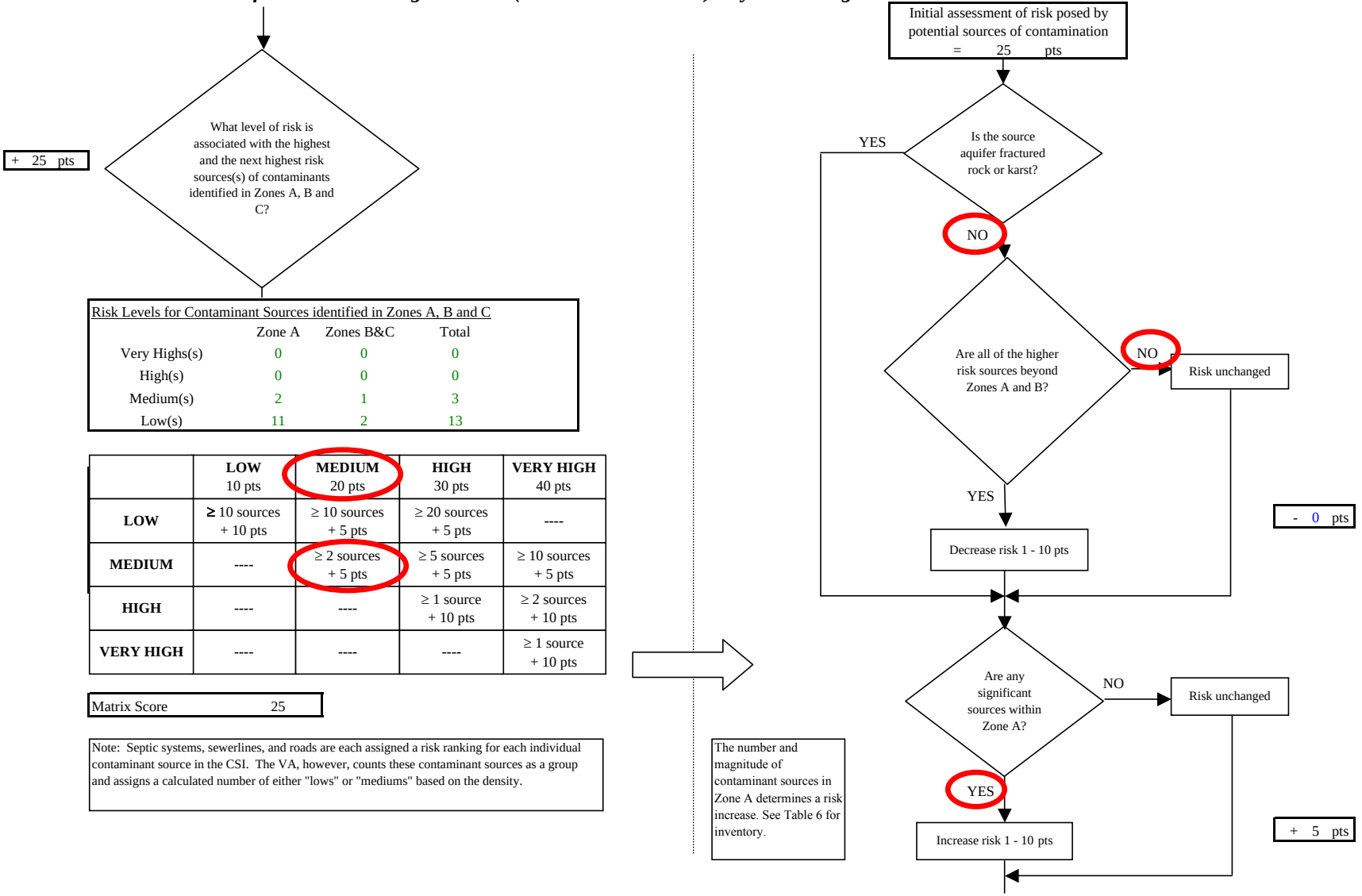


Chart 11. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Synthetic Organic Chemicals



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

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	2	1	3
Low(s)	11	2	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 25

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.

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

Chart 11. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Synthetic Organic Chemicals

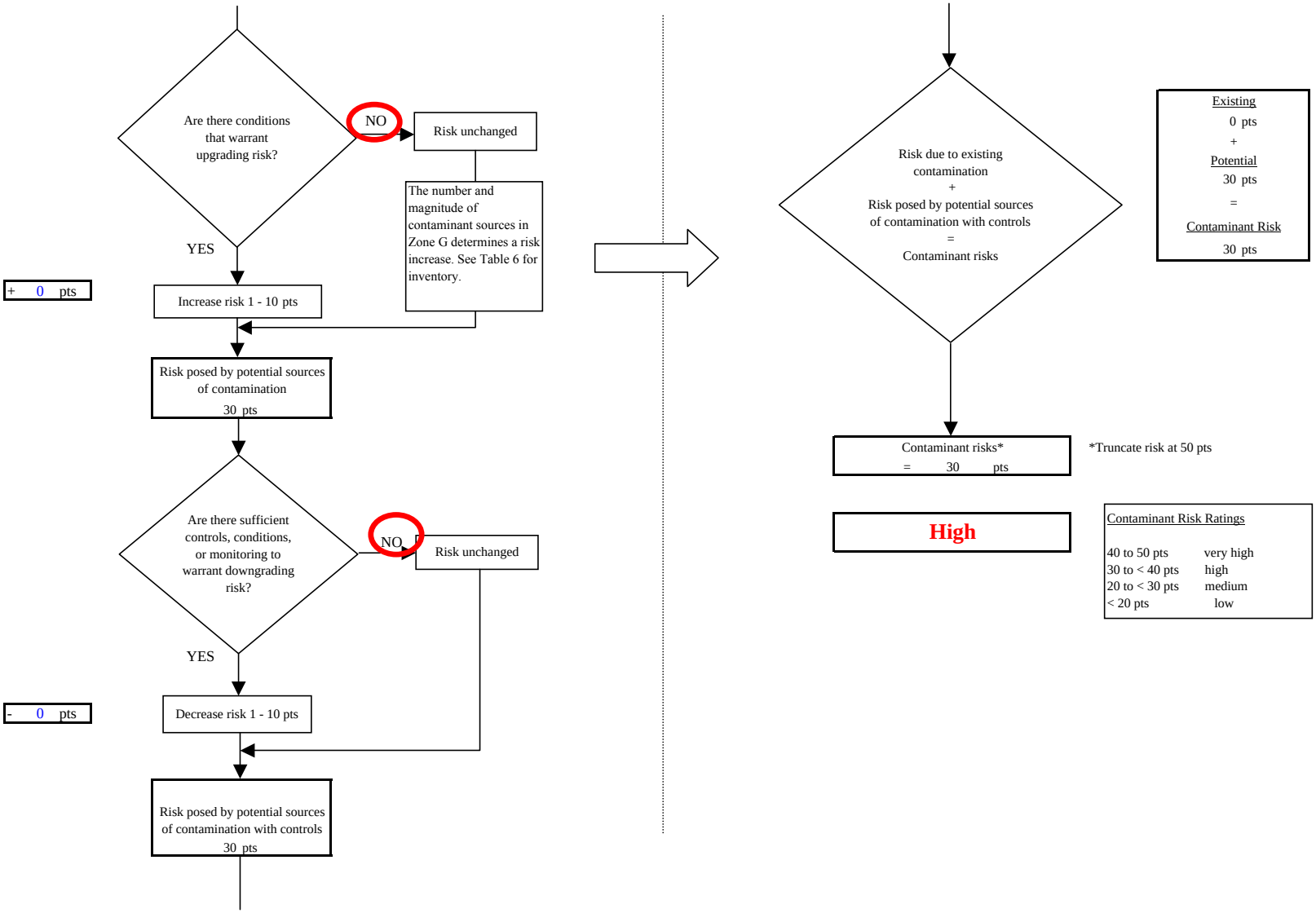


Chart 12. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Synthetic Organic Chemicals

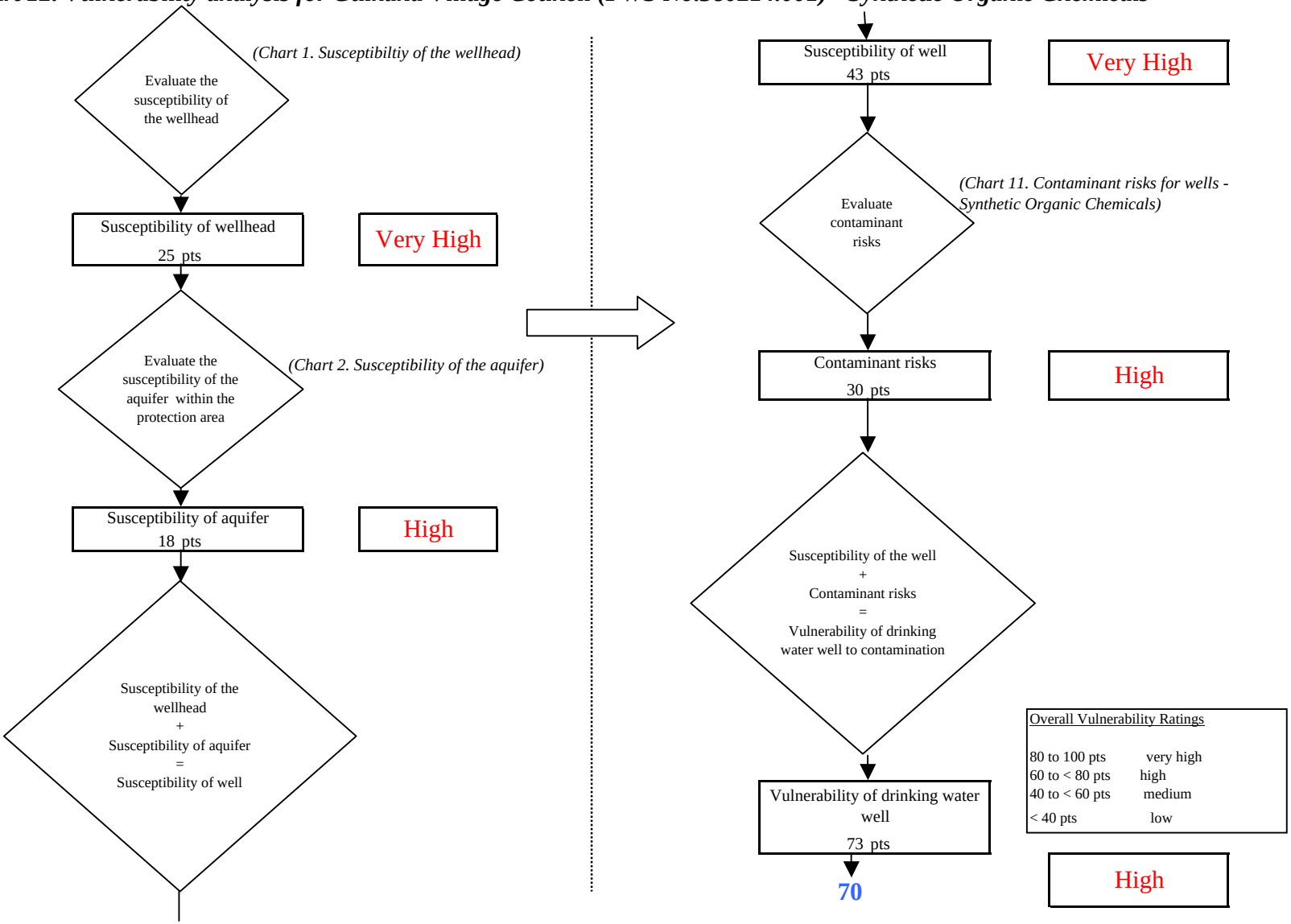


Chart 13. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Other Organic Chemicals

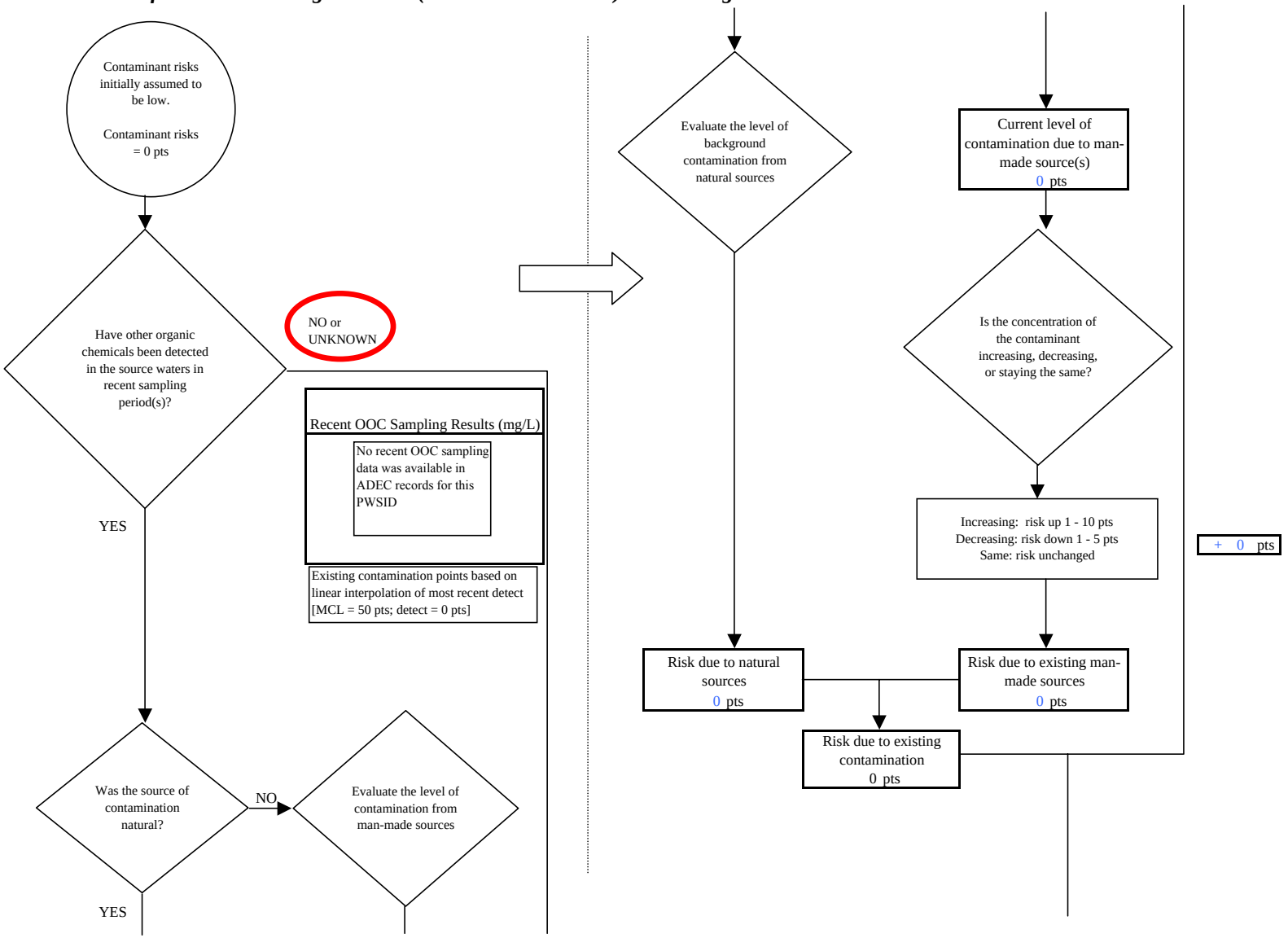
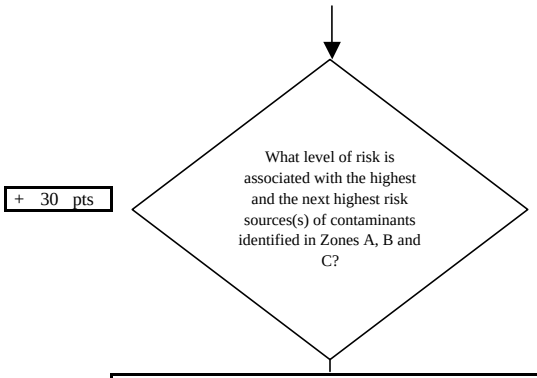


Chart 13. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Other Organic Chemicals



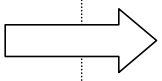
+ 30 pts

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	1	1
Medium(s)	0	0	0
Low(s)	10	4	14

	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.



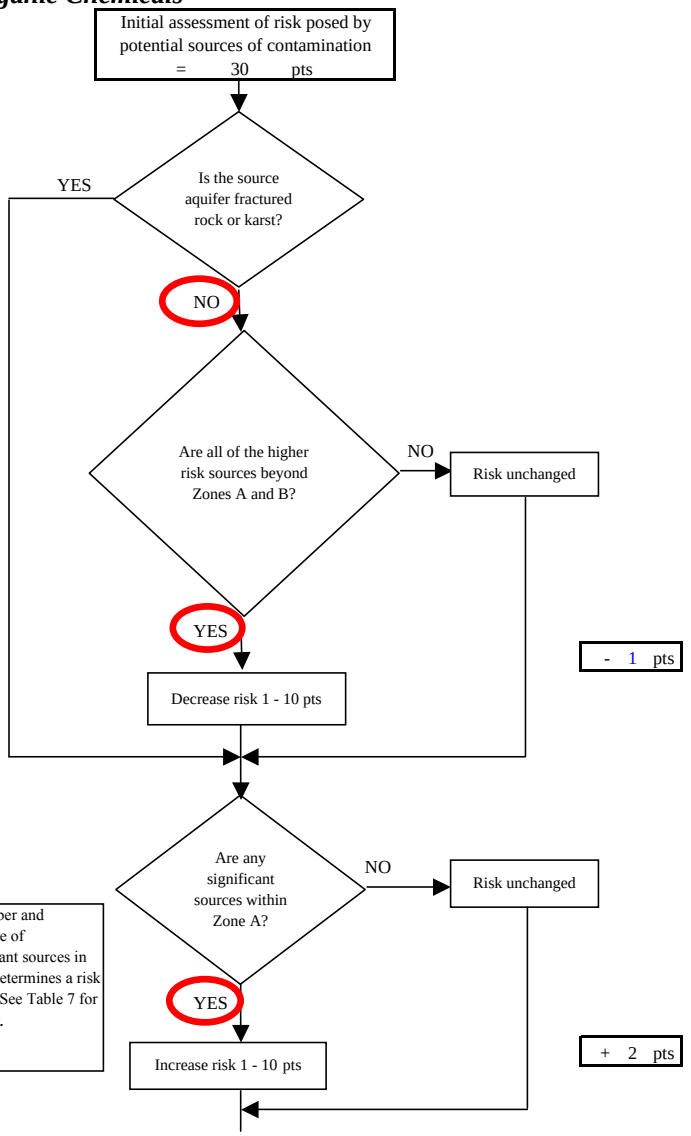


Chart 13. Contaminant risks for Gulkana Village Council (PWS No.380214.001) - Other Organic Chemicals

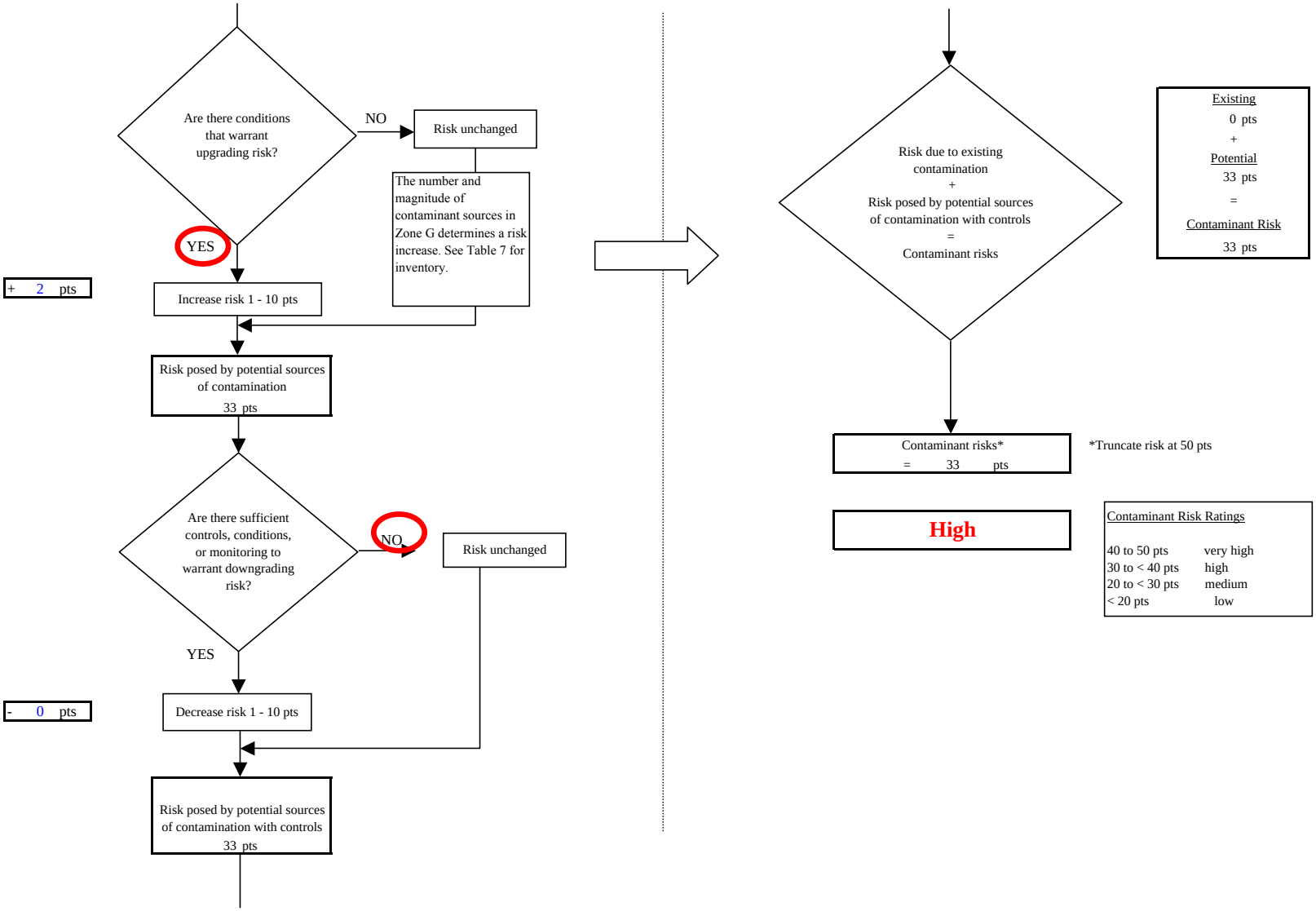


Chart 14. Vulnerability analysis for Gulkana Village Council (PWS No.380214.001) - Other Organic Chemicals