Source Water Assessment

A Hydrogeologic Susceptibility and Vulnerability Assessment for The Tazlina River Mobile Home Park Drinking Water System Tazlina, Alaska

PWSID # 291279.001

June 2004

DRINKING WATER PROTECTION PROGRAM REPORT 1355
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 the Tazlina River Mobile Home Park Public Water System Source of Public Drinking Water, Tazlina, Alaska

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

The Tazlina River Mobile Home Park (MHP) Public Water System (PWS) has one well. Well construction details are unavailable however, it is assumed the well (PWS No. 291279.001) has been used as a drinking water source since it was drilled in 1982.

The well is a Class A (community and non-transient non-community) water system located on the north bank of the Tazlina River in Tazlina, Alaska. Available records indicate that the system has a 120 gallon storage capacity and that the drinking water source is not treated. This system operates year round and serves approximately 102 residents. The wellhead received a susceptibility rating of **High** and the aquifer received a susceptibility rating of **Medium**. Combining these two ratings produce a **Medium** rating for the natural susceptibility of the well.

Identified potential and current sources of contaminants for the public drinking water source include: fuel tanks, ADEC recognized contaminated sites, and pipelines. 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 **Medium** for bacteria and viruses, heavy metals, cyanide and other inorganic chemicals, and synthetic organic chemicals and **High** for nitrates and nitrites, volatile organic chemicals, and other organic chemicals.

PUBLIC DRINKING WATER SYSTEM

The Tazlina River MHP PWS well is a Class A (community/non-transient/non-community) public water system located on the north bank of the Tazlina River in Tazlina, Alaska (Sec. 21, T003N, R001W, Copper River Meridian, see Map A of Appendix A). The community of Tazlina is located 5 miles south of Glennallen on the Richardson Highway, at mile 110.5. The community has a population of 192 (ADCED, 2003). Total annual precipitation in Tazlina is 9 inches, including approximately 39 inches of snowfall. Temperatures can be as extreme as -74 to 97°F.

The community of Tazlina obtains most of their water supply from individual wells. Septic systems are used for sewage disposal (ADCED, 2003). Tazlina residents rely on the Copper Valley Electric Association for electricity, which uses hydropower and diesel as a backup. Refuse is collected by Copper Basin Sanitation from Glennallen.

Construction details were not available in ADEC records, and it is assumed based on a nearby well that the depth of the well is 131 feet below the ground surface. It is assumed that the well is screened in an unconfined aquifer. The well is suspected to be located within a floodplain.

Information acquired from a November 1996 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 it is unknown if the well is grouted according to ADEC regulations. It is assumed based on the date the system began operation (1982) that the well is not 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 Pliestocene 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 o 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 Tazlina River MHP 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 Tazlina River MHP 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 Tazlina River MHP 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, 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

It is assumed that the Tazlina River MHP 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	15	High
Susceptibility of the Aquifer	13	Medium
Natural Susceptibility	28	Medium

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	25	Medium
Nitrates and/or Nitrites	37	High
Volatile Organic Chemicals	50	Very High
Heavy Metals, Cyanide and Other Inorganic Chemicals	27	Medium
Synthetic Organic Chemicals	13	Low
Other Organic Chemicals	45	Very High

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

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

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

Again, rankings are assigned according to a point score:

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

Table 4 contains the overall vulnerability scores (0 – 100) and ratings for each of the 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	55	Medium
Nitrates and Nitrites	65	High
Volatile Organic Chemicals	75	High
Heavy Metals, Cyanide and Other Inorganic Chemicals	55	Medium
Synthetic Organic Chemicals	40	Medium
Other Organic Chemicals	75	High

Bacteria and Viruses

The contaminant risk for bacteria and viruses is **Medium**. The risk is primarily attributed to municipal parks located in Zones A and B. 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 **Medium**.

Nitrates and Nitrites

The contaminant risk for nitrates and nitrites is **High**. The risk to this source of public drinking water is primarily attributed to the presence of municipal parks located in Zones A and B. 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 low levels of nitrates have been detected in recent sampling events, however does not exceed its 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. Consequently, the presence of nitrates might be attributed to municipal parks located in Zones A and B.

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 **High.**

Volatile Organic Chemicals

The contaminant risk for volatile organic chemicals is **Very High**. The risk is primarily attributed to the presence of fuel tanks in Zone C and DEC recognized contaminated sites in Zones B and C. Numerous other potential contaminant sources are also found within the protection area (see Table 4 – Appendix B).

No recent sampling data was available in ADEC records for the Tazlina River (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 complete listing.

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

Heavy Metals, Cyanide and Other Inorganic Chemicals

The contaminant risk for heavy metals, cyanide and other inorganic chemicals is **Medium.** The risk is primarily attributed to the presence of arsenic in recent sampling events and the presence of underground fuel tanks in Zone C. 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, low levels of arsenic have been detected; however have not exceeded its MCL of .05 mg/L (see Chart 9 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D).

According to the EPA "Arsenic occurs naturally in rocks and soil, water, air, and plants and animals. It can be further released into the environment through natural activities such as volcanic action, erosion of rocks, and forest fires, or through human actions. Approximately 90 percent of industrial arsenic in the U.S. is currently used as a wood preservative, but arsenic is also used in paints, dyes, metals, drugs, soaps, and semi-conductors. Agricultural applications, mining, and smelting also contribute to arsenic releases in the environment." (EPA, 2001)

Studies have linked long-term exposure to arsenic in drinking water to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate. Non-cancer effects of ingesting arsenic include cardiovascular, pulmonary, immunological, neurological, and endocrine (e.g., diabetes) effects. Short-term exposure to high doses of arsenic can cause other adverse health effects, but such effects are unlikely to occur from U.S. public water supplies that are in compliance with the previous arsenic standard of 50 ppb. (EPA, 2001)

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 **Medium.**

Synthetic Organic Chemicals

The contaminant risk for synthetic organic chemicals is **Low**. The risk is primarily attributed to the presence of potential contaminants in all zones that only have low risk rankings (see Table 6 – Appendix B).

No recent sampling data was available in ADEC records for the Tazlina River MHP 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 **Medium**.

Other Organic Chemicals

The contaminant risk for other organic chemicals is **Very High**. The risk is primarily attributed to the presence of a pipeline Zone B. Several 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 Tazlina River MHP 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 **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 Tazlina to protect public health. It is anticipated that Source Water Assessments will be updated every five years to reflect any changes in the vulnerability and/or susceptibility of the drinking water source.

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APPENDIX A

Drinking Water Protection Area Location Map
(Map A)

APPENDIX B

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

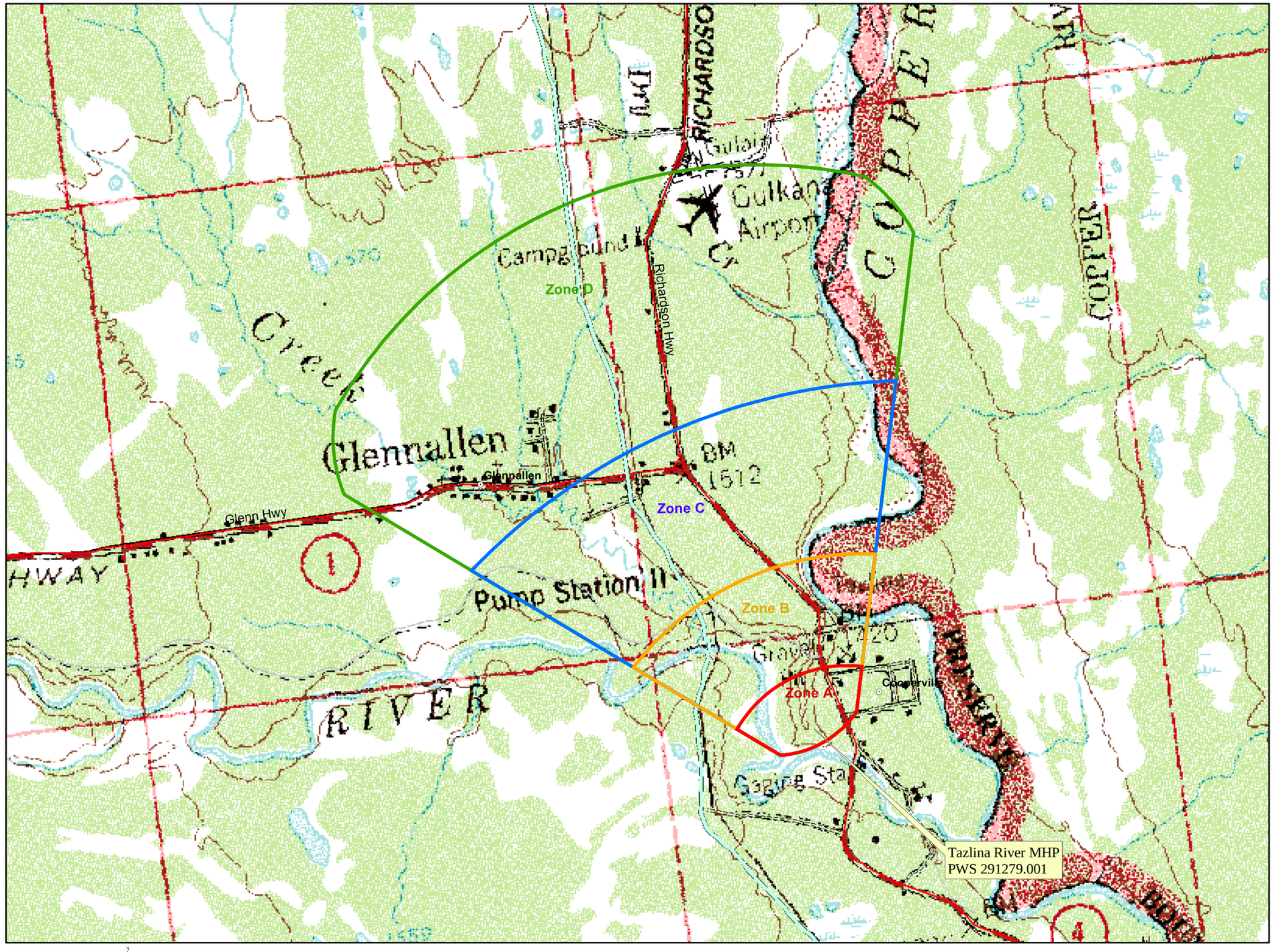
APPENDIX C

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

APPENDIX D

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

Public Water Well System for PWS #291279.001 Tazlina River MHP



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)

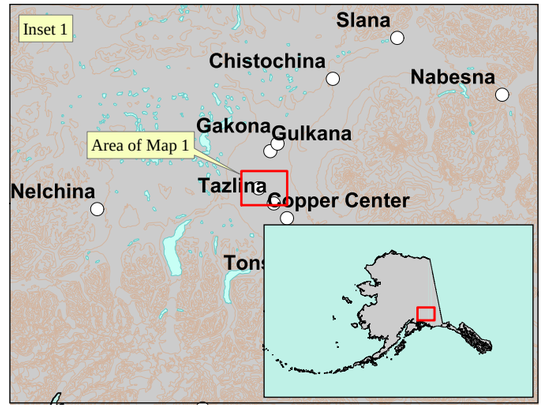
Groundwater Protection Zones

- 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

Tazlina River MHP
PWS 291279.001
Appendix A Map A

Table 1

Contaminant Source Inventory for ***Tazlina River MHP***

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-01	A	C	MATERIAL SITE 21-1.1
Municipal or city parks (with green areas)	X04	X04-01	A	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	C	Glenn Hwy and Richardson Hwy through all zones
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	C	Alyeska PS 11 Diesel Fuel Skid Reckey # - 1993720109701 Pump station was never constructed; A fuel shed was added and numerous nozzle spills and piping leaks occurred.
Municipal or city parks (with green areas)	X04	X04-02	B	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-01	B	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-01	C	C	HUB OF ALASKA
Tanks, diesel (underground)	T08	T08-01	C	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-01	C	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-02	C	C	HUB OF ALASKA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	C	C	Glennallen Quick Stop Reckey # - 1990240934901 Historical leaded gasoline spill; Contaminated snow and soil on site until spring.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	C	C	HUB OF ALASKA
Municipal or city parks (with green areas)	X04	X04-03	C	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-02	C	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-02	D	C	GLENNALLEN STATION
Gasoline stations (without repair shop)	C15	C15-03	D	C	TAZLINA RIVER TRADING POST

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Gasoline stations (without repair shop)	C15	C15-04	D	C	Bob's Fuel
Gasoline stations (with repair shop)	C16	C16-01	D	C	GLENNALLEN CHEVRON
Motor /motor vehicle repair shops	C31	C31-01	D	C	SEND MAINTENANCE SHOP
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	D	C	TAZLINA VILLAGE
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	D	C	GLENNALLEN WWDS
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	D	C	CARIBOU CAF
Pit toilets (open hole), nonresidential (one or more)	D16	D16-01	D	C	Assume 20 or less pit toilets/outhouses in Zone D
Quarries (sand, gravel, rock, other?)	E10	E10-02	D	C	COPPER VALLEY PORTABLE CRUSHER
Septic systems (serves one single-family home)	R02	R02-01	D	C	Assume 160 or less residential septic tanks in Zone D
Tanks, heating oil, residential (above ground)	R08	R08-01	D	C	Assume 160 or less residential heating oil tanks in Zone D
Tanks, diesel (underground)	T08	T08-02	D	C	GLENNALLEN STATION
Tanks, diesel (underground)	T08	T08-03	D	C	TOLSONA MICROWAVE REPEATER
Tanks, diesel (underground)	T08	T08-04	D	C	TAZLINA RIVER TRADING POST
Tanks, diesel (underground)	T08	T08-05	D	C	TAHNETA PASS MICROWAVE REPEATER
Tanks, diesel (underground)	T08	T08-06	D	C	GLENNALLEN CHEVRON
Tanks, diesel (underground)	T08	T08-07	D	C	SEND MAINTENANCE SHOP
Tanks, diesel (underground)	T08	T08-08	D	C	Bob's Fuel
Closed tanks, diesel (underground)	T09	T09-01	D	C	PUMP STATION #12
Tanks, gasoline (underground)	T12	T12-03	D	C	GLENNALLEN STATION
Tanks, gasoline (underground)	T12	T12-04	D	C	TAZLINA RIVER TRADING POST
Tanks, gasoline (underground)	T12	T12-05	D	C	GLENNALLEN CHEVRON
Tanks, gasoline (underground)	T12	T12-06	D	C	GLENNALLEN CHEVRON

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Tanks, gasoline (underground)	T12	T12-07	D	C	GLENNALLEN CHEVRON
Tanks, gasoline (underground)	T12	T12-08	D	C	SEND MAINTENANCE SHOP
Closed tanks, gasoline (underground)	T13	T13-01	D	C	KNOEBEL'S UNION
Closed tanks, gasoline (underground)	T13	T13-02	D	C	KNOEBEL'S UNION
Closed tanks, gasoline (underground)	T13	T13-03	D	C	PUMP STATION #12
Closed tanks, gasoline (underground)	T13	T13-04	D	C	GLENNALLEN STATION
Closed tanks, gasoline (underground)	T13	T13-05	D	C	COPPER BASIN DISTRIBUTORS
Closed tanks, gasoline (underground)	T13	T13-06	D	C	COPPER BASIN DISTRIBUTORS
Closed tanks, gasoline (underground)	T13	T13-07	D	C	COPPER BASIN DISTRIBUTORS
Tanks, heating oil, nonresidential (aboveground)	T14	T14-02	D	C	KCAM 790
Tanks, heating oil, nonresidential (aboveground)	T14	T14-04	D	C	COPPER VALLEY ELEC GLENNALLEN DIESEL PL
Closed tanks, lubricants or other petroleum products (underground)	T21	T21-01	D	C	KNOEBEL'S UNION
Closed tanks, lubricants or other petroleum products (underground)	T21	T21-02	D	C	KNOEBEL'S UNION
Closed tanks, lubricants or other petroleum products (underground)	T21	T21-03	D	C	KNOEBEL'S UNION
Closed tanks, lubricants or other petroleum products (underground)	T21	T21-04	D	C	KNOEBEL'S UNION
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	D	C	CVEA Glennallen Ethylene Glycol Reckey # - 1995240927901 500 gallon release of ethylene glycol from a subsurface concrete vault. Approximately 90 gallons of free product was recovered.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-04	D	C	CVEA Glennallen Tank Liner Reckey # - 1994240126901 Tank Farm EPH contamination exists in the shallow soil below the tank liner. Similar to Reckey 1981240130502 and 1991240030502.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	D	C	CVEA Glennallen Plant Mgr Residence Reckey # - 1994240931801 A release of approximately 200-300 gallons of antifreeze (ethylene glycol) occurred under the plant manager's house during the week of 11/7-14/94.

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	D	C	FAA Gulkana Station Reckey # - 1993240112002 Numerous tanks and releases associated with FAA facilities. 142 barrels of asphalt found in woods. Petroleum staining around barrels.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-07	D	C	CVEA Glennallen Power Plant GW Reckey # - 1991240130502 During removal of 1,000-gallon gasoline UST, contaminated soil and groundwater were discovered and 500-600 cubic yards of soil was stockpiled at the site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	D	C	Malispina Drilling Mud Site No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	D	C	CVEA Glennallen Power Plant GW Reckey # - 1991240130502 During removal of 1,000-gallon gasoline UST, contaminated soil and groundwater were discovered and 500-600 cubic yards of soil was stockpiled at the site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	D	C	FAA Gulkana Station Reckey # - 1993240112002 Numerous tanks and releases associated with FAA facilities. 142 barrels of asphalt found in woods. Petroleum staining around barrels.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	D	C	CVEA Glennallen Tank Liner Reckey # - 1994240126901 Tank Farm EPH contamination exists in the shallow soil below the tank liner. Similar to Reckey 1981240130502 and 1991240030502.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	D	C	CVEA Glennallen Plant Mgr Residence Reckey # - 1994240931801 A release of approximately 200-300 gallons of antifreeze (ethylene glycol) occurred under the plant manager's house during the week of 11/7-14/94.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	D	C	CVEA Glennallen Ethylene Glycol Reckey # - 1995240927901 500 gallon release of ethylene glycol from a subsurface concrete vault. Approximately 90 gallons of free product was recovered.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	D	C	AMOCO Ahtna Inc. #1 Reckey # - 1996330101901 Exploration drill site sampled during a reserve pit closure program. The reserve pit at this site has been sampled for closure under the Solid Waste program.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-15	D	C	AT&T Alascom Glennallen Repeater Reckey # - 1997240114005 10 cubic yards of DRO contaminated soil near incinerator - site may have TCE as a co-contaminant.

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-02	D	C	USNPS - WRANGELL ST. ELIAS NATL. PARK
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	D	C	ADOTPF - NELCHINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-04	D	C	ADOTPF - NELCHINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-05	D	C	ADOTPF - TAZLINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-06	D	C	ADOTPF - TAZLINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-07	D	C	GLENNALLEN FISH & GAME OFFICE
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-08	D	C	ADOTPF - PAXSON MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-09	D	C	GULKANA AIR SERVICE
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-10	D	C	TAZLINA RIVER TRADING POST
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-11	D	C	GLENNALLEN CHEVRON
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	D	C	COPPER VALLEY ELECTRIC ASSOCIATI
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-02	D	C	TOLSONA MICROWAVE REPEATER
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-03	D	C	GLENNALLEN REPEATER
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-04	D	C	EAGLE AIRMOTIVE
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-05	D	C	GLENNALLEN CHEVRON
Monitoring wells	W06	W06-01	D	C	CVEA Glennallen Ethylene Glycol
Oil and gas extraction wells	W07	W07-01	D	C	BILLY BUCK WATER 1
Oil and gas extraction wells	W07	W07-02	D	C	GLENN HWY WATER 1
Soil borings	W08	W08-01	D	C	CVEA Glennallen Tank Liner
Municipal or city parks (with green areas)	X04	X04-04	D	C	WRANGELL-SAINT ELIAS NP&P
Petroleum product bulk station/terminals	X11	X11-01	D	C	CVEA Glennallen Tank Liner
Airports	X14	X14-01	D	C	Gulkana Airport in Zone D
Government vehicle maintenance facilities	X19	X19-01	D	C	ADOTPF - NELCHINA MAINTENANCE STATION

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Map Number*	*Comments*
Government vehicle maintenance facilities	X19	X19-02	D	C	ADOTPF - TAZLINA MAINTENANCE STATION
Government vehicle maintenance facilities	X19	X19-03	D	C	ADOTPF - PAXSON MAINTENANCE STATION
Highways and roads, paved (cement or asphalt)	X20	X20-04	D	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-03	D	C	Trans-Alaska pipeline
Electric power generation (fossil fuels)	X36	X36-01	D	C	COPPER VALLEY ELECTRIC ASSOCIATI
Electric power generation (fossil fuels)	X36	X36-02	D	C	CVEA Glennallen Power Plant GW
Electric power generation (fossil fuels)	X36	X36-03	D	C	COPPER VALLEY ELEC GLENNALLEN DIESEL PL
Pump Stations (oil and gas)	X43	X43-01	D	C	PUMP STATION #12

Table 2

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP Sources of Bacteria and Viruses

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	Low	C	Glenn Hwy and Richardson Hwy through all zones
Municipal or city parks (with green areas)	X04	X04-02	B	Medium	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	Low	C	Richarson Highway
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	D	High	C	TAZLINA VILLAGE
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	D	High	C	GLENNALLEN WWDS
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	D	High	C	CARIBOU CAF

Table 3

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Nitrates/Nitrites

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-01	A	Low	C	MATERIAL SITE 21-1.1
Municipal or city parks (with green areas)	X04	X04-01	A	Medium	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	Low	C	Glenn Hwy and Richardson Hwy through all zones
Municipal or city parks (with green areas)	X04	X04-02	B	Medium	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	Low	C	Richarson Highway
Municipal or city parks (with green areas)	X04	X04-03	C	Medium	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Richarson Highway
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-01	D	High	C	TAZLINA VILLAGE
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-02	D	High	C	GLENNALLEN WWDS
Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method)	D10	D10-03	D	High	C	CARIBOU CAF

Table 4

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Volatile Organic Chemicals

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Quarries (sand, gravel, rock, other?)	E10	E10-01	A	Low	C	MATERIAL SITE 21-1.1
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	Low	C	Glenn Hwy and Richardson Hwy through all zones
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	High	C	Alyeska PS 11 Diesel Fuel Skid Reckey # - 1993720109701 Pump station was never constructed; A fuel shed was added and numerous nozzle spills and piping leaks occurred.
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-01	B	Medium	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-01	C	High	C	HUB OF ALASKA
Tanks, diesel (underground)	T08	T08-01	C	High	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-01	C	High	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-02	C	High	C	HUB OF ALASKA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	C	High	C	Glennallen Quick Stop Reckey # - 1990240934901 Historical leaded gasoline spill; Contaminated snow and soil on site until spring.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	C	High	C	HUB OF ALASKA
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-02	C	Medium	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-02	D	High	C	GLENNALLEN STATION
Gasoline stations (without repair shop)	C15	C15-03	D	High	C	TAZLINA RIVER TRADING POST
Gasoline stations (without repair shop)	C15	C15-04	D	High	C	Bob's Fuel
Gasoline stations (with repair shop)	C16	C16-01	D	High	C	GLENNALLEN CHEVRON
Tanks, diesel (underground)	T08	T08-02	D	High	C	GLENNALLEN STATION

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Volatile Organic Chemicals

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Tanks, diesel (underground)	T08	T08-03	D	High	C	TOLSONA MICROWAVE REPEATER
Tanks, diesel (underground)	T08	T08-04	D	High	C	TAZLINA RIVER TRADING POST
Tanks, diesel (underground)	T08	T08-05	D	High	C	TAHNETA PASS MICROWAVE REPEATER
Tanks, diesel (underground)	T08	T08-06	D	High	C	GLENNALLEN CHEVRON
Tanks, diesel (underground)	T08	T08-07	D	High	C	SEND MAINTENANCE SHOP
Tanks, diesel (underground)	T08	T08-08	D	High	C	Bob's Fuel
Tanks, gasoline (underground)	T12	T12-03	D	High	C	GLENNALLEN STATION
Tanks, gasoline (underground)	T12	T12-04	D	High	C	TAZLINA RIVER TRADING POST
Tanks, gasoline (underground)	T12	T12-05	D	High	C	GLENNALLEN CHEVRON
Tanks, gasoline (underground)	T12	T12-06	D	High	C	GLENNALLEN CHEVRON
Tanks, gasoline (underground)	T12	T12-07	D	High	C	GLENNALLEN CHEVRON
Tanks, gasoline (underground)	T12	T12-08	D	High	C	SEND MAINTENANCE SHOP
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-03	D	High	C	CVEA Glennallen Ethylene Glycol Reckey # - 1995240927901 500 gallon release of ethylene glycol from a subsurface concrete vault. Approximately 90 gallons of free product was recovered.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-05	D	High	C	CVEA Glennallen Plant Mgr Residence Reckey # - 1994240931801 A release of approximately 200-300 gallons of antifreeze (ethylene glycol) occurred under the plant manager's house during the week of 11/7-14/94.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-06	D	High	C	FAA Gulkana Station Reckey # - 1993240112002 Numerous tanks and releases associated with FAA facilities. 142 barrels of asphalt found in woods. Petroleum staining around barrels.

Table 4 (continued)

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Volatile Organic Chemicals

PWSID 291279.001

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	U04-07	D	High	C	CVEA Glennallen Power Plant GW Reckey # - 1991240130502 During removal of 1,000-gallon gasoline UST, contaminated soil and groundwater were discovered and 500-600 cubic yards of soil was stockpiled at the site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-08	D	High	C	Malispina Drilling Mud Site No Reckey number in database
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-09	D	High	C	CVEA Glennallen Power Plant GW Reckey # - 1991240130502 During removal of 1,000-gallon gasoline UST, contaminated soil and groundwater were discovered and 500-600 cubic yards of soil was stockpiled at the site.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-10	D	High	C	FAA Gulkana Station Reckey # - 1993240112002 Numerous tanks and releases associated with FAA facilities. 142 barrels of asphalt found in woods. Petroleum staining around barrels.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-11	D	High	C	CVEA Glennallen Tank Liner Reckey # - 1994240126901 Tank Farm EPH contamination exists in the shallow soil below the tank liner. Similar to Reckey 1981240130502 and 1991240030502.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-12	D	High	C	CVEA Glennallen Plant Mgr Residence Reckey # - 1994240931801 A release of approximately 200-300 gallons of antifreeze (ethylene glycol) occurred under the plant manager's house during the week of 11/7-14/94.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-13	D	High	C	CVEA Glennallen Ethylene Glycol Reckey # - 1995240927901 500 gallon release of ethylene glycol from a subsurface concrete vault. Approximately 90 gallons of free product was recovered.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-14	D	High	C	AMOCO Ahtna Inc. #1 Reckey # - 1996330101901 Exploration drill site sampled during a reserve pit closure program. The reserve pit at this site has been sampled for closure under the Solid Waste program.
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-15	D	High	C	AT&T Alascom Glennallen Repeater Reckey # - 1997240114005 10 cubic yards of DRO contaminated soil near incinerator - site may have TCE as a co-contaminant.

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

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	D	High	C	USNPS - WRANGELL ST. ELIAS NATL. PARK
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-03	D	High	C	ADOTPF - NELCHINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-04	D	High	C	ADOTPF - NELCHINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-05	D	High	C	ADOTPF - TAZLINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-06	D	High	C	ADOTPF - TAZLINA MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-07	D	High	C	GLENNALLEN FISH & GAME OFFICE
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-08	D	High	C	ADOTPF - PAXSON MAINTENANCE STATION
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-09	D	High	C	GULKANA AIR SERVICE
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-10	D	High	C	TAZLINA RIVER TRADING POST
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-11	D	High	C	GLENNALLEN CHEVRON
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-01	D	High	C	COPPER VALLEY ELECTRIC ASSOCIATI
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-02	D	High	C	TOLSONA MICROWAVE REPEATER
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-03	D	High	C	GLENNALLEN REPEATER
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-04	D	High	C	EAGLE AIRMOTIVE
Closed Leaking Underground Fuel Storage Tank (LUST) Sites	U08	U08-05	D	High	C	GLENNALLEN CHEVRON

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Volatile 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	X11-01	D	Very High	C	CVEA Glennallen Tank Liner
Airports	X14	X14-01	D	High	C	Gulkana Airport in Zone D
Airports	X14	X14-01	D	High	C	Gulkana Airport in Zone D

Table 5

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Heavy Metals, Cyanide and Other Inorganic Chemicals

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	Low	C	Glenn Hwy and Richardson Hwy through all zones
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Alyeska PS 11 Diesel Fuel Skid Reckey # - 1993720109701 Pump station was never constructed; A fuel shed was added and numerous nozzle spills and piping leaks occurred.
Municipal or city parks (with green areas)	X04	X04-02	B	Low	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-01	B	Low	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-01	C	Low	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-01	C	Medium	C	HUB OF ALASKA
Tanks, gasoline (underground)	T12	T12-02	C	Medium	C	HUB OF ALASKA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	C	Low	C	Glennallen Quick Stop Reckey # - 1990240934901 Historical leaded gasoline spill; Contaminated snow and soil on site until spring.
Municipal or city parks (with green areas)	X04	X04-03	C	Low	C	WRANGELL-SAINT ELIAS NP&P
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-02	C	Low	C	Trans-Alaska pipeline
Oil and gas extraction wells	W07	W07-01	D	High	C	BILLY BUCK WATER 1
Oil and gas extraction wells	W07	W07-02	D	High	C	GLENN HWY WATER 1

Table 6

Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Synthetic Organic Chemicals

PWSID 291279.001

Contaminant Source Type	*Contaminant Source ID*	*CS ID tag*	*Zone*	*Risk Ranking for Analysis*	*Map Number*	*Comments*
Municipal or city parks (with green areas)	X04	X04-01	A	Low	C	WRANGELL-SAINT ELIAS NP&P
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Alyeska PS 11 Diesel Fuel Skid Reckey # - 1993720109701 Pump station was never constructed; A fuel shed was added and numerous nozzle spills and piping leaks occurred.
Municipal or city parks (with green areas)	X04	X04-02	B	Low	C	WRANGELL-SAINT ELIAS NP&P
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	C	Low	C	Glennallen Quick Stop Reckey # - 1990240934901 Historical leaded gasoline spill; Contaminated snow and soil on site until spring.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	C	Low	C	HUB OF ALASKA
Municipal or city parks (with green areas)	X04	X04-03	C	Low	C	WRANGELL-SAINT ELIAS NP&P

Table 7

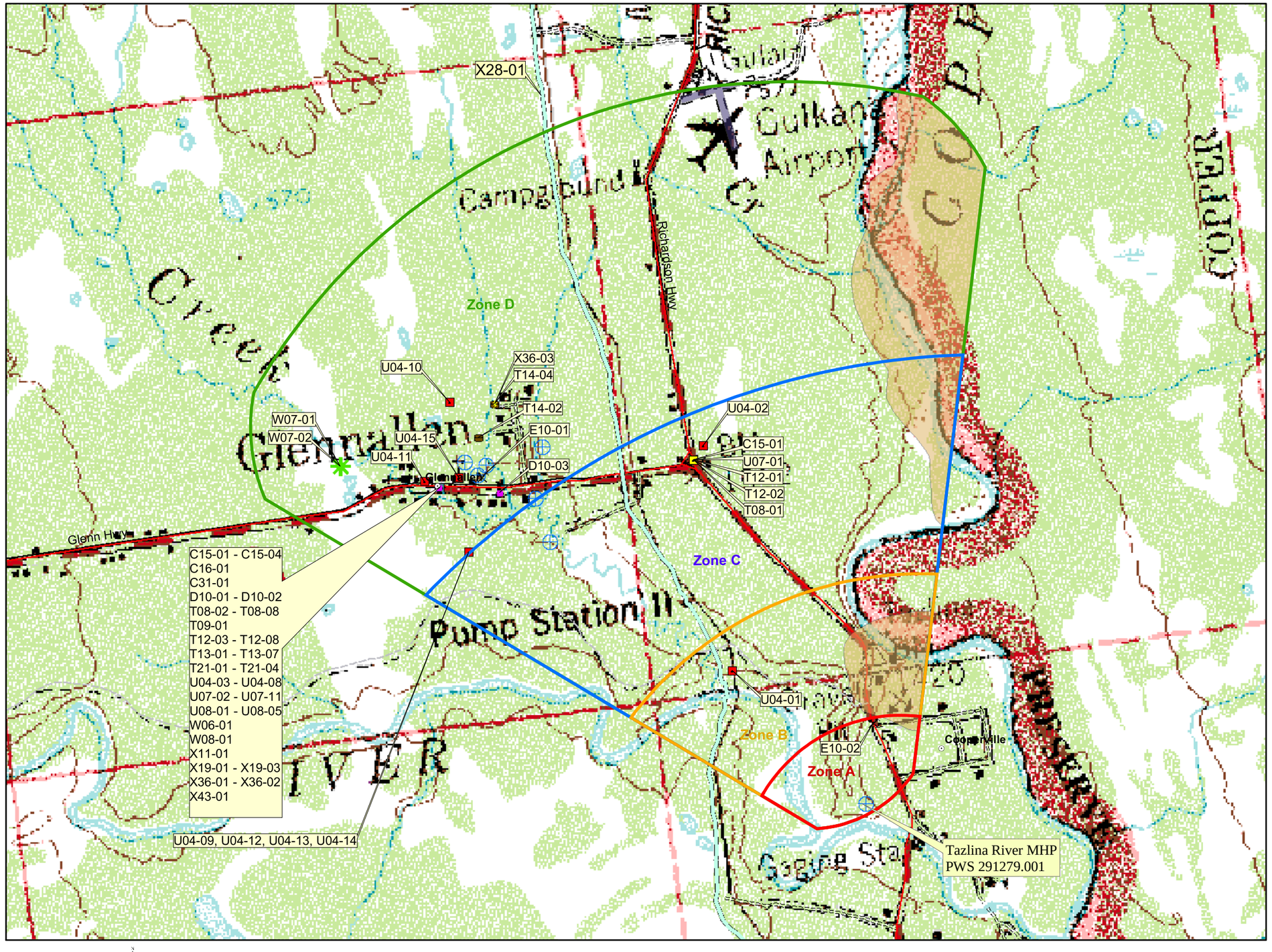
Contaminant Source Inventory and Risk Ranking for Tazlina River MHP

Sources of Other Organic Chemicals

PWSID 291279.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Map Number	Comments
Quarries (sand, gravel, rock, other?)	E10	E10-01	A	Low	C	MATERIAL SITE 21-1.1
Highways and roads, paved (cement or asphalt)	X20	X20-01	A	Low	C	Glenn Hwy and Richardson Hwy through all zones
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-01	B	Low	C	Alyeska PS 11 Diesel Fuel Skid Reckey # - 1993720109701 Pump station was never constructed; A fuel shed was added and numerous nozzle spills and piping leaks occurred.
Highways and roads, paved (cement or asphalt)	X20	X20-02	B	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-01	B	High	C	Trans-Alaska pipeline
Gasoline stations (without repair shop)	C15	C15-01	C	Low	C	HUB OF ALASKA
Contaminated sites, DEC recognized, non-Superfund, non-RCRA	U04	U04-02	C	Low	C	Glennallen Quick Stop Reckey # - 1990240934901 Historical leaded gasoline spill; Contaminated snow and soil on site until spring.
Open Leaking Underground Fuel Storage Tank (LUST) Sites	U07	U07-01	C	Low	C	HUB OF ALASKA
Highways and roads, paved (cement or asphalt)	X20	X20-03	C	Low	C	Richarson Highway
Pipelines (oil and gas)	X28	X28-02	C	High	C	Trans-Alaska pipeline
Petroleum product bulk station/terminals	X11	X11-01	D	High	C	CVEA Glennallen Tank Liner
Pipelines (oil and gas)	X28	X28-03	D	High	C	Trans-Alaska pipeline
Electric power generation (fossil fuels)	X36	X36-01	D	High	C	COPPER VALLEY ELECTRIC ASSOCIATI
Electric power generation (fossil fuels)	X36	X36-02	D	High	C	CVEA Glennallen Power Plant GW
Electric power generation (fossil fuels)	X36	X36-03	D	High	C	COPPER VALLEY ELEC GLENNALLEN DIESEL PL

Public Water Well System for PWS #291279.001 Tazlina River MHP
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)

Groundwater Protection Zones

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

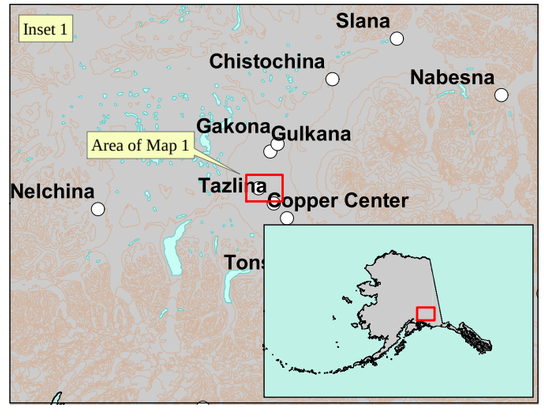
Existing or Potential Contaminant Sources

- Gasoline stations without repair shops (C15)
- Gasoline stations with repair shops (C16)
- Motor/motor vehicle repair facility (C31)
- Injection wells (Class V) Large-Capacity Septic System (Drainfield Disposal Method) (D10)
- Other mines or Quarries (E10)
- Tanks, diesel (underground) (T08)
- Closed Tanks, diesel (underground) (T09)
- Tanks, gasoline (underground) (T12)
- ClosedTanks, gasoline (underground) (T13)
- Tanks, heating oil, nonresidential (aboveground) (T14)
- Closed Tanks, lubricants or other petroleum products (underground) (T21)
- Contaminated sites, DEC recognized, non-Superfund, non-RCRA (U04)
- Open Leaking Underground Fuel Storage Tank (LUST) (lubricants or other petroleum products) (U07)
- Closed Leaking Underground Fuel Storage Tank (LUST) (lubricants or other petroleum products) (U08)
- Monitoring wells (W06)
- Oil and gas extraction wells (W07)
- Soil Borings (W08)
- Petroleum product bulk storage or terminal (X11)
- Government vehicle maintenance facilities (X19)
- Pipelines (oil and gas) (X28)
- Electric Power Generation (fossil fuels) (X36)
- Pump Stations (oil and gas) (X43)
- 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.



0 0.5 1 2 3 4 Miles

Tazlina River MHP
PWS 291279.001
Appendix C Map C

Chart 1. Susceptibility of the wellhead - Tazlina River MHP (PWS No. 291279.001)

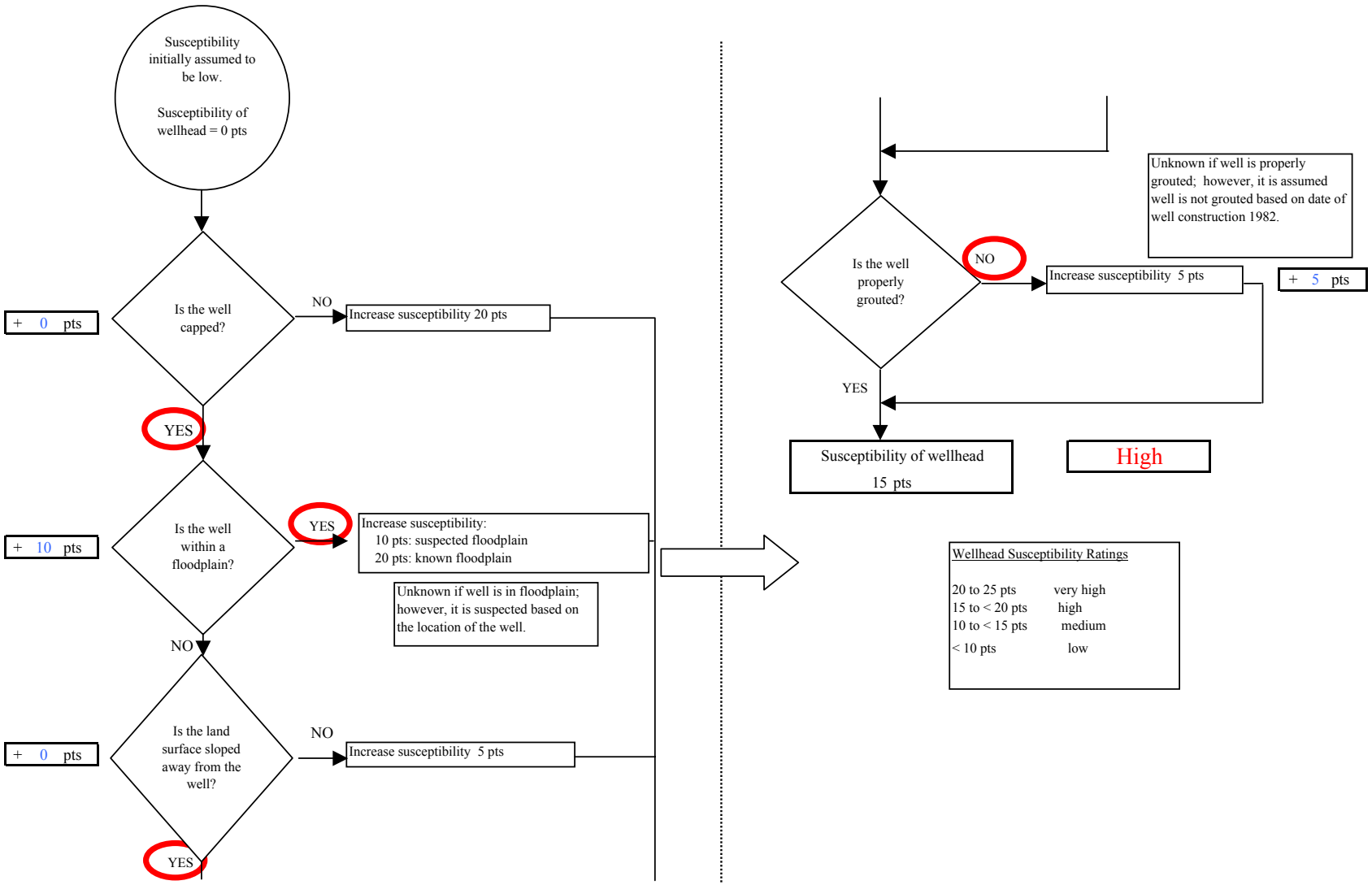


Chart 2. Susceptibility of the aquifer Tazlina River MHP (PWS No. 291279.001)

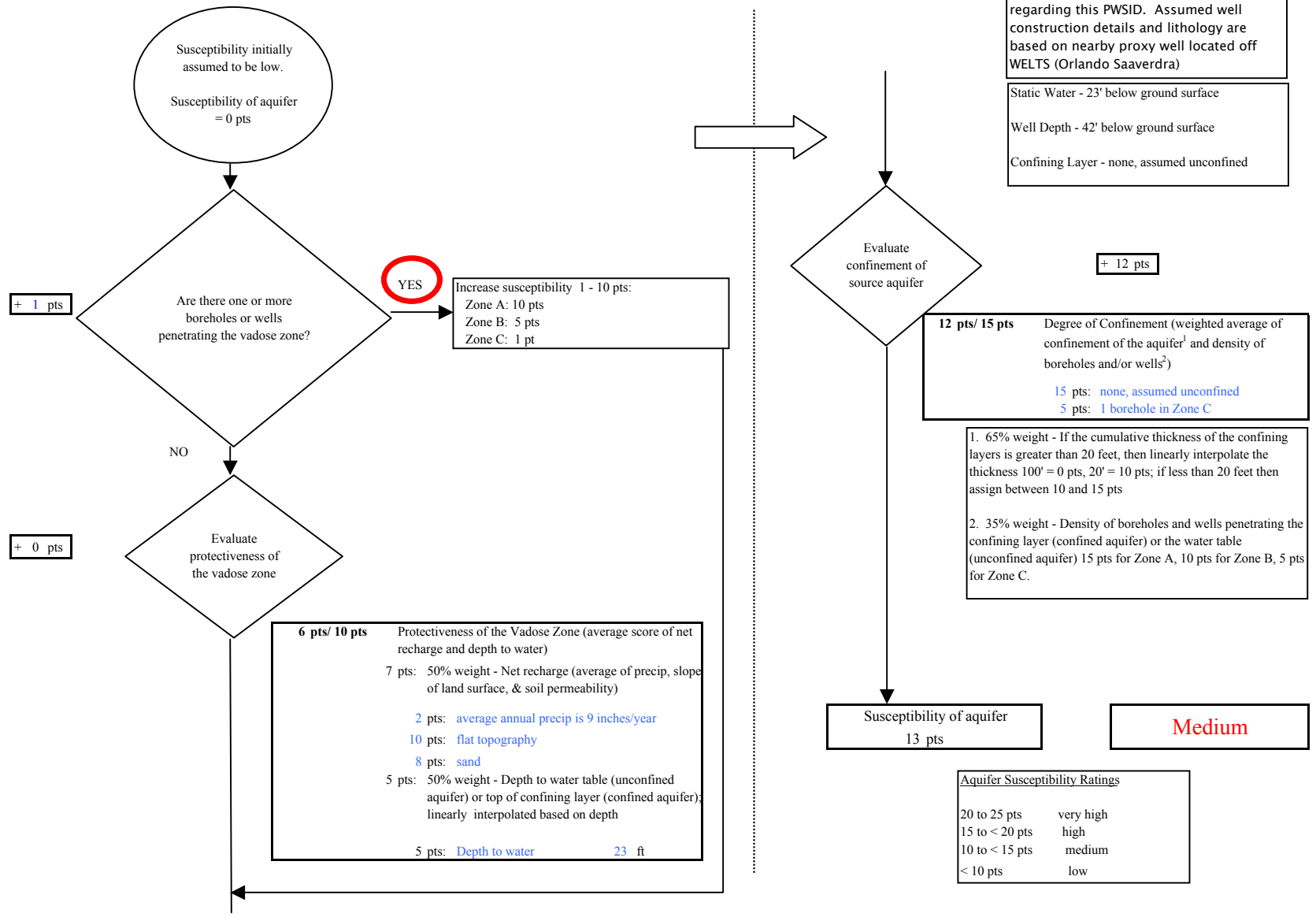
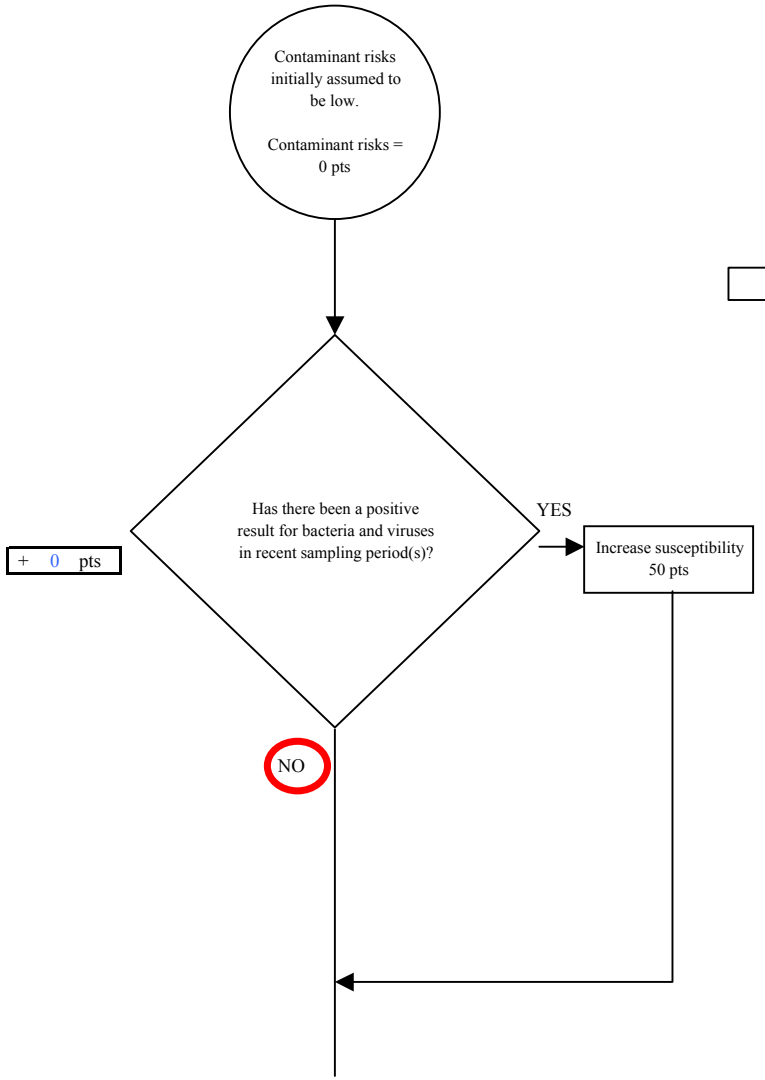
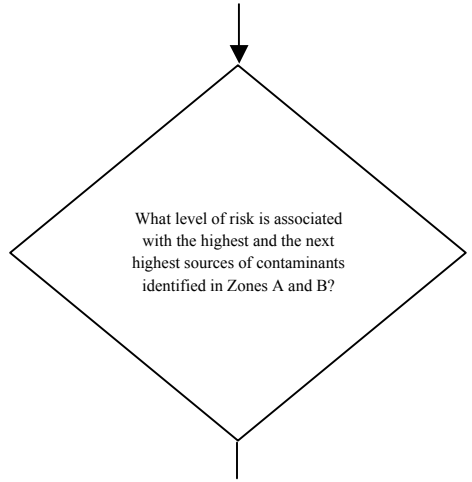


Chart 3. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Bacteria & Viruses





+ 20 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)	0	0	0
Medium(s)	1	1	2
Low(s)	1	1	2

	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.

Chart 3. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Bacteria & Viruses

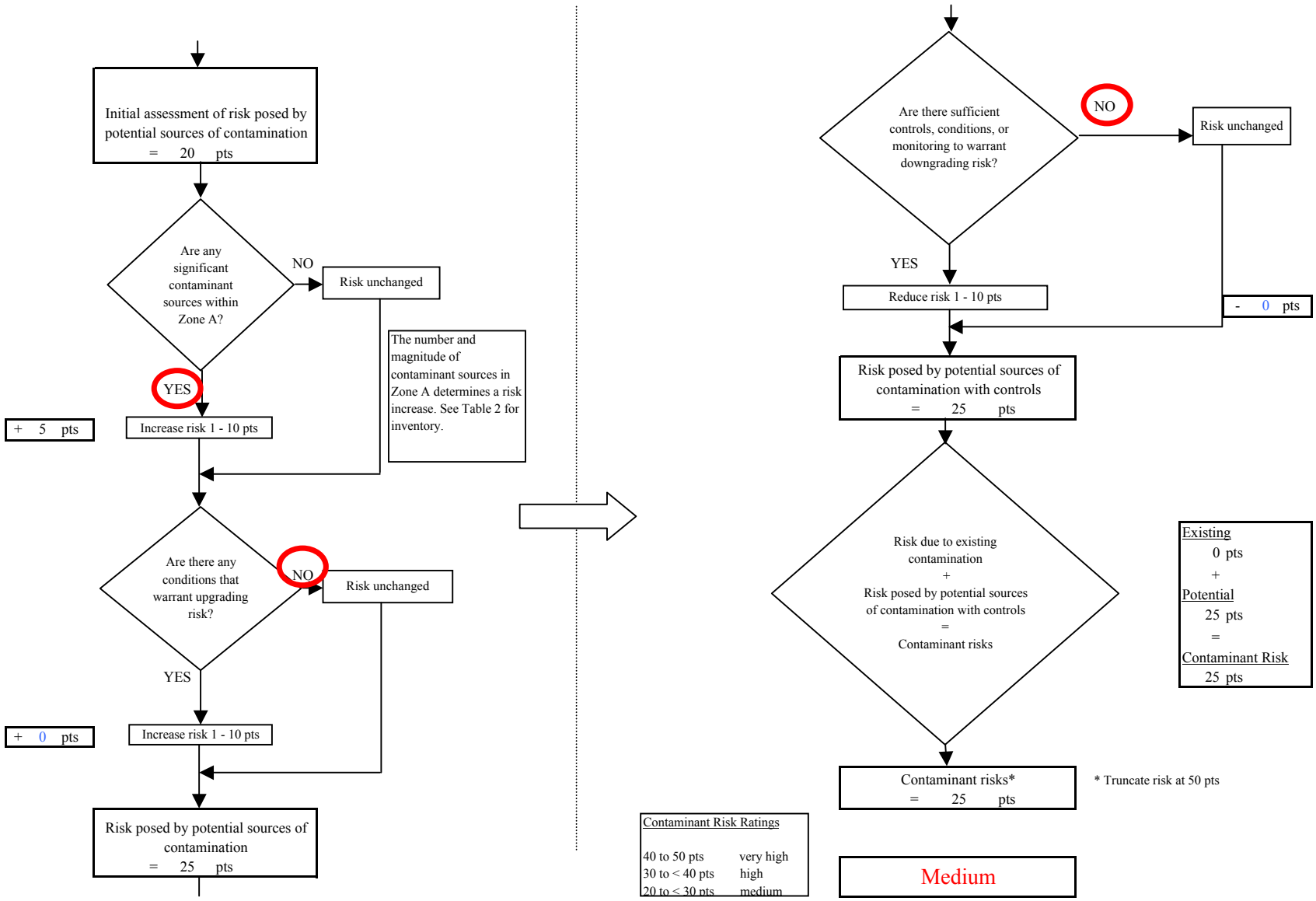


Chart 4. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Bacteria & Viruses

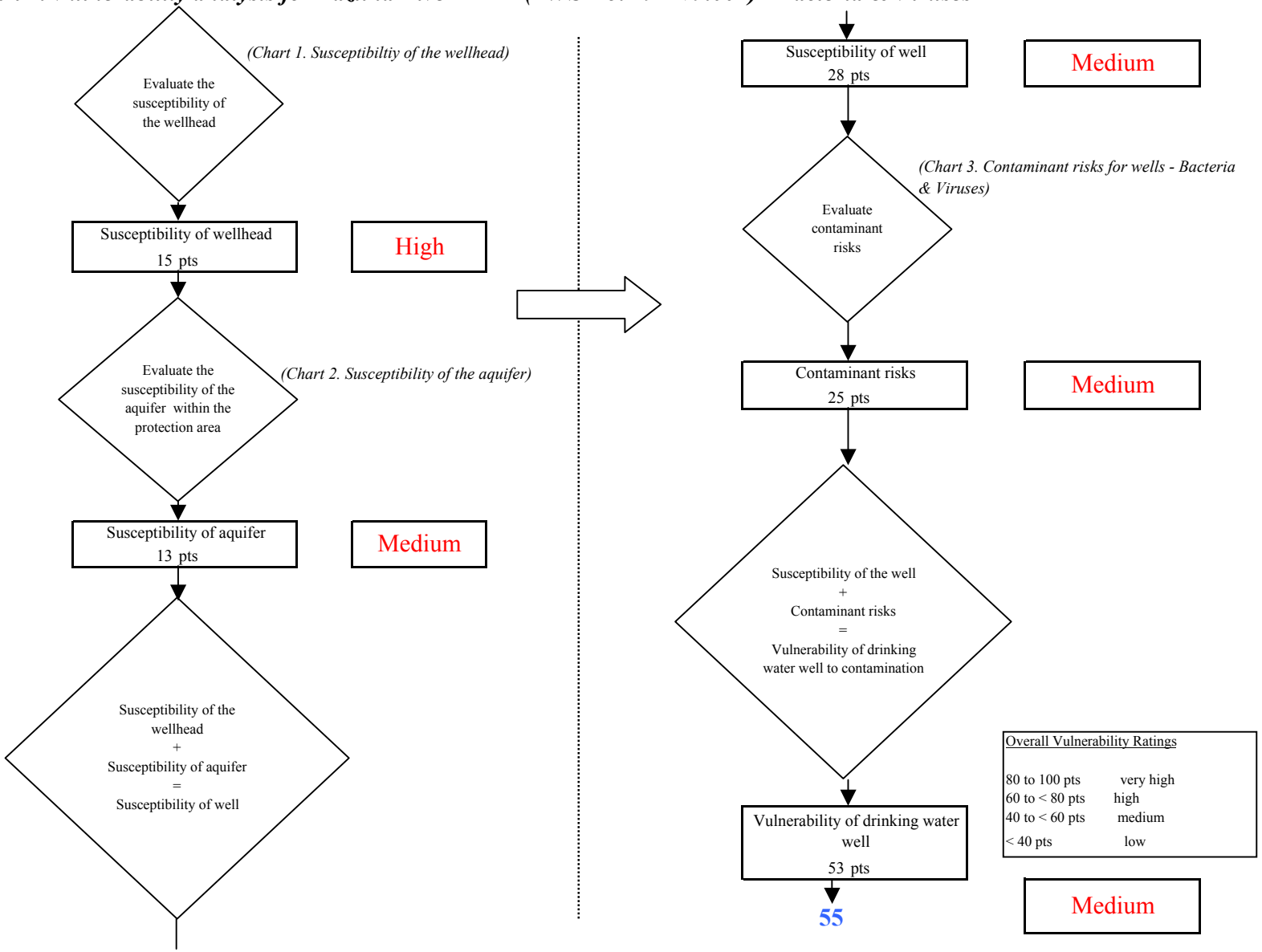


Chart 5. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Nitrates and Nitrites

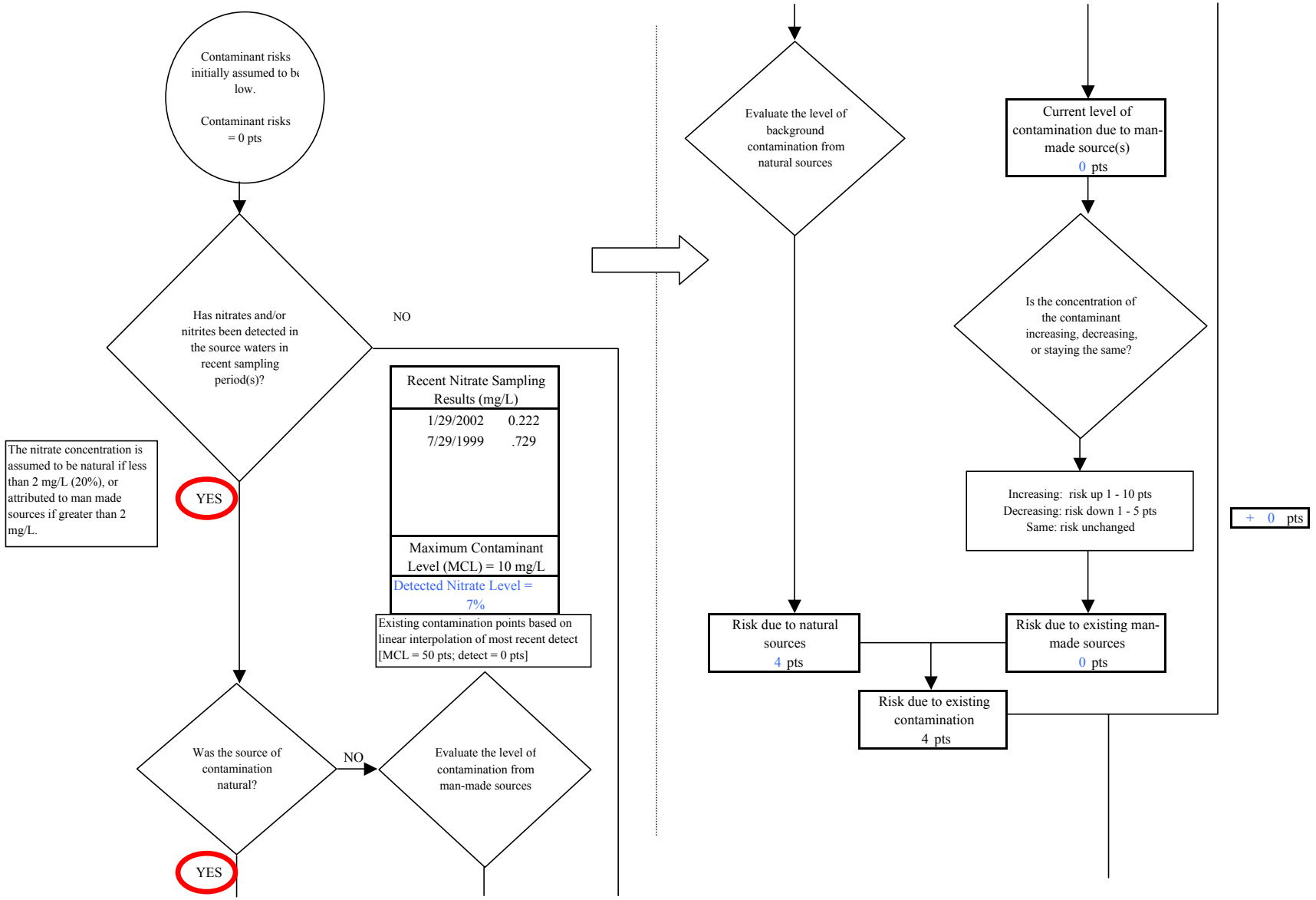


Chart 5. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Nitrates and Nitrites

+ 25 pts

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

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

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

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

Matrix Score 25

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individua 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 = 25 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

YES

Increase risk 1 - 10 pts

+ 5 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 Tazlina River MHP (PWS No. 291279.001) - Nitrates and Nitrites

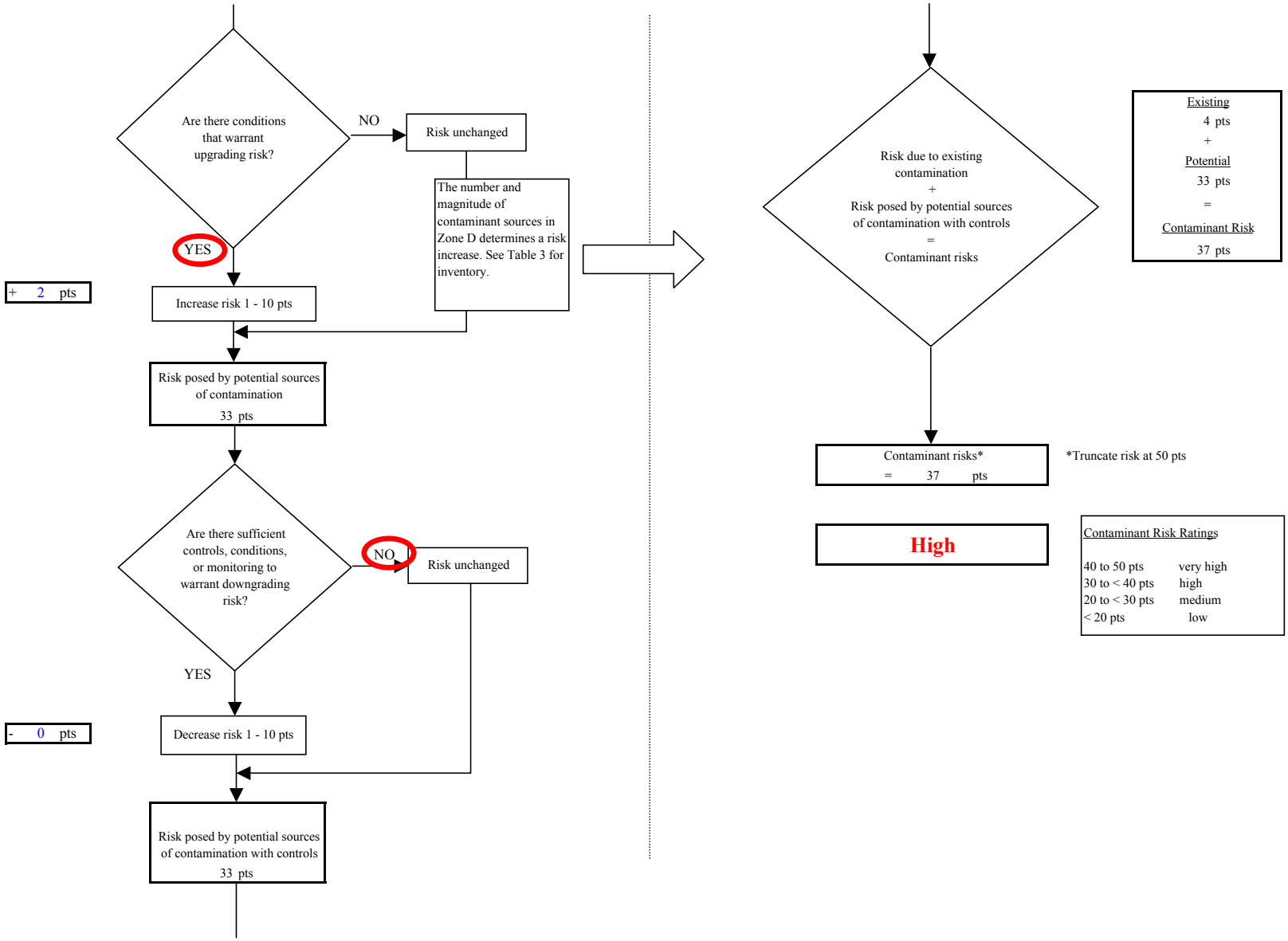


Chart 6. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Nitrates and Nitrites

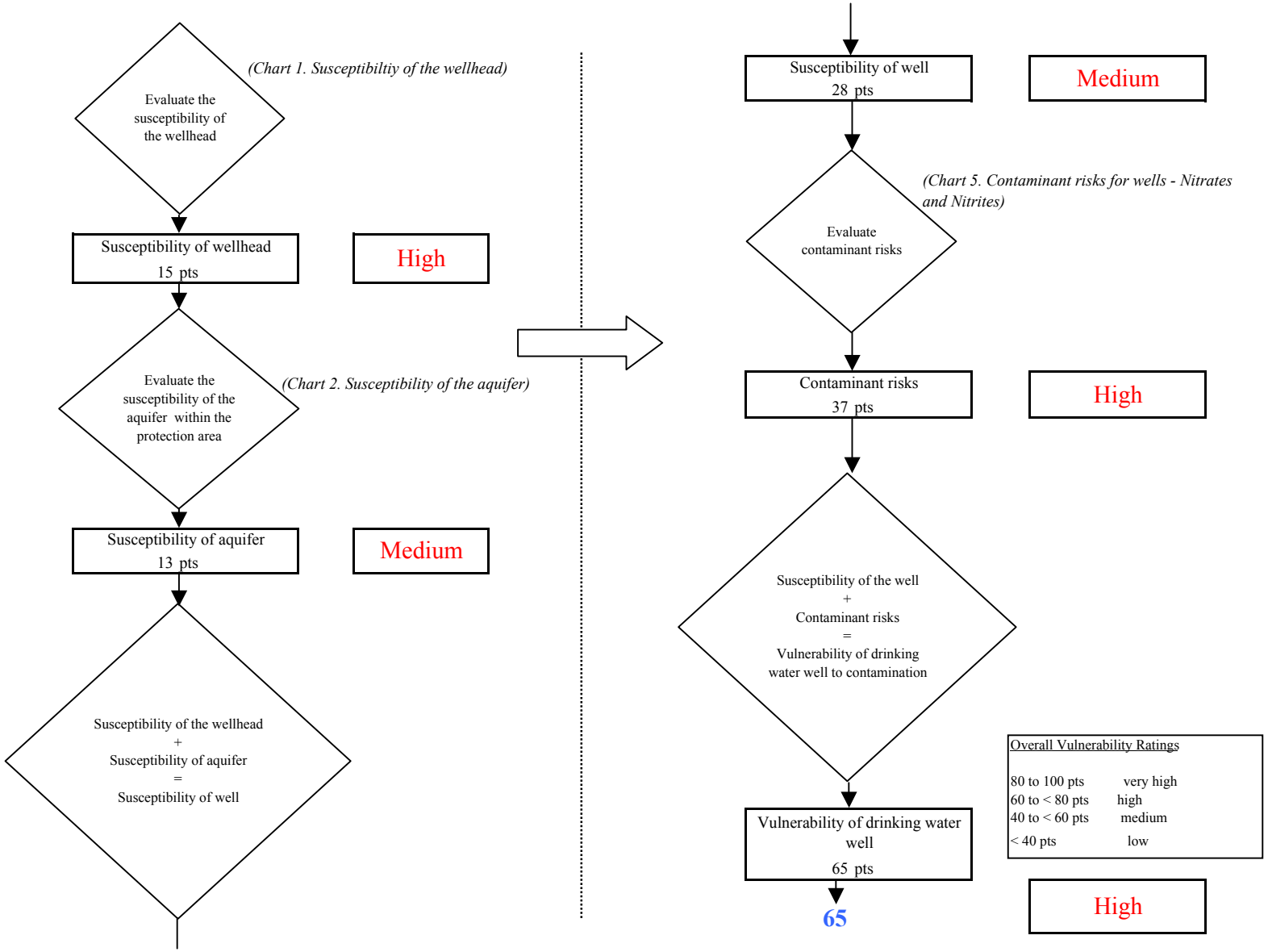


Chart 7. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Volatile Organic Chemicals

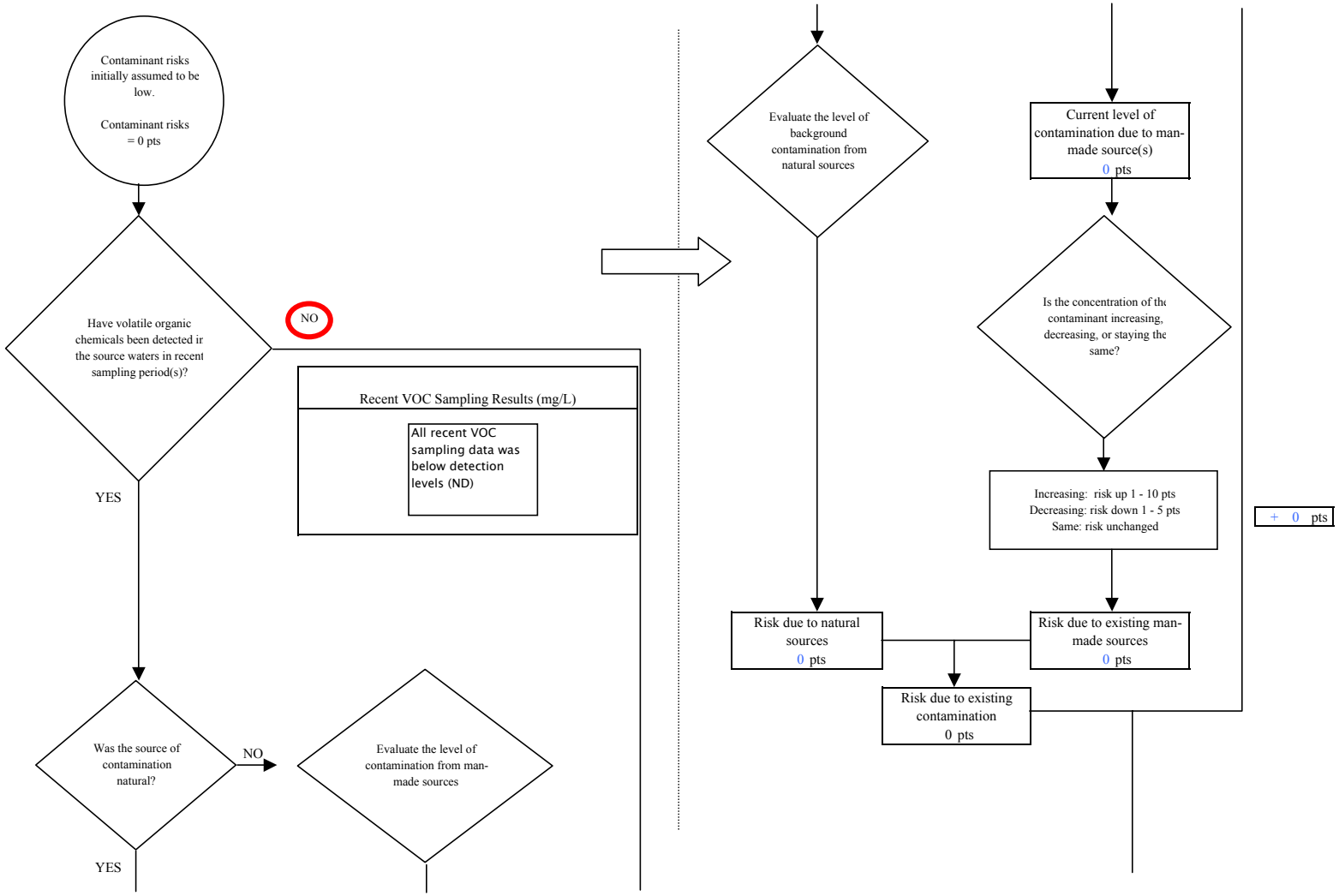


Chart 7. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Volatile Organic Chemicals

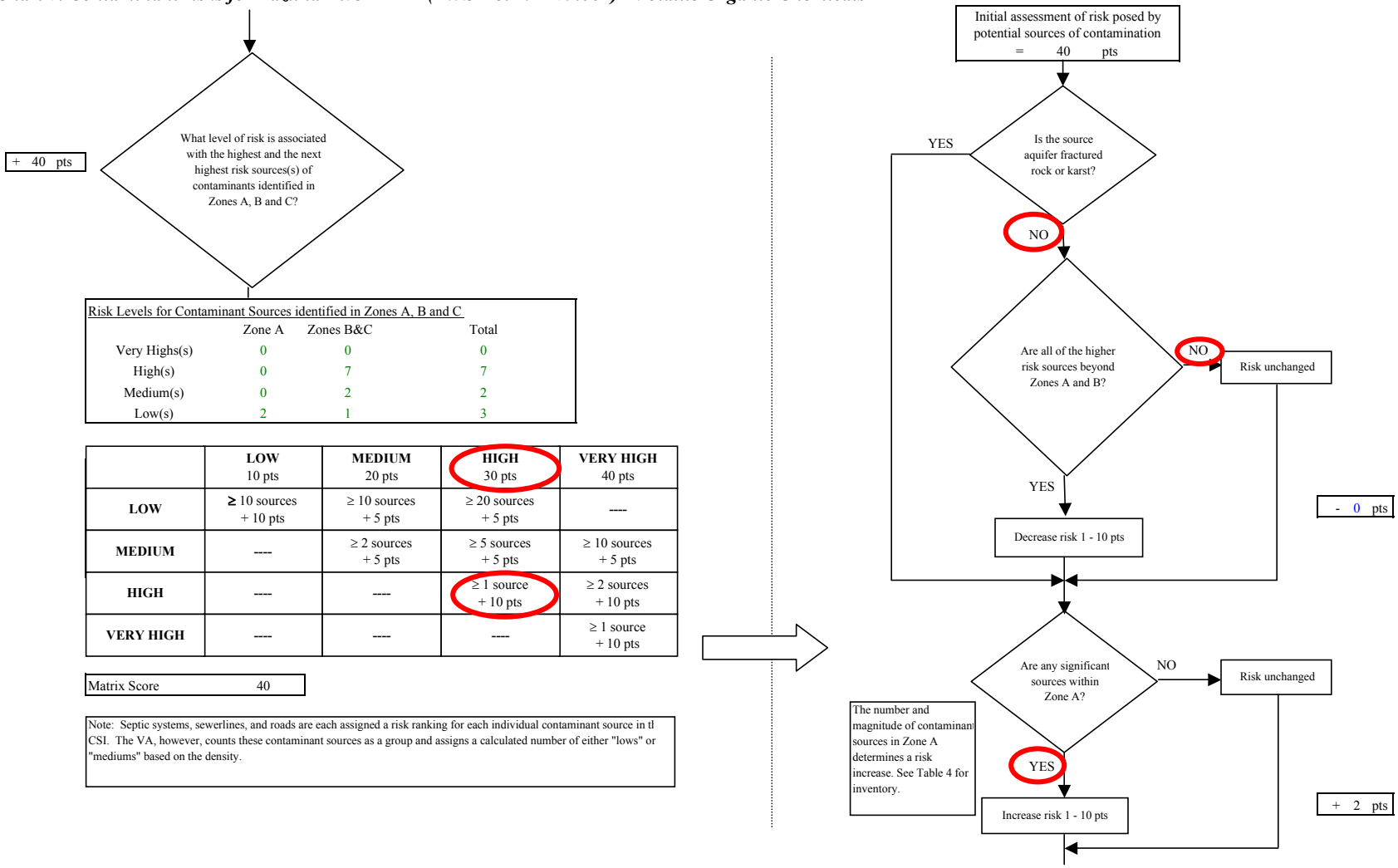


Chart 7. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Volatile Organic Chemicals

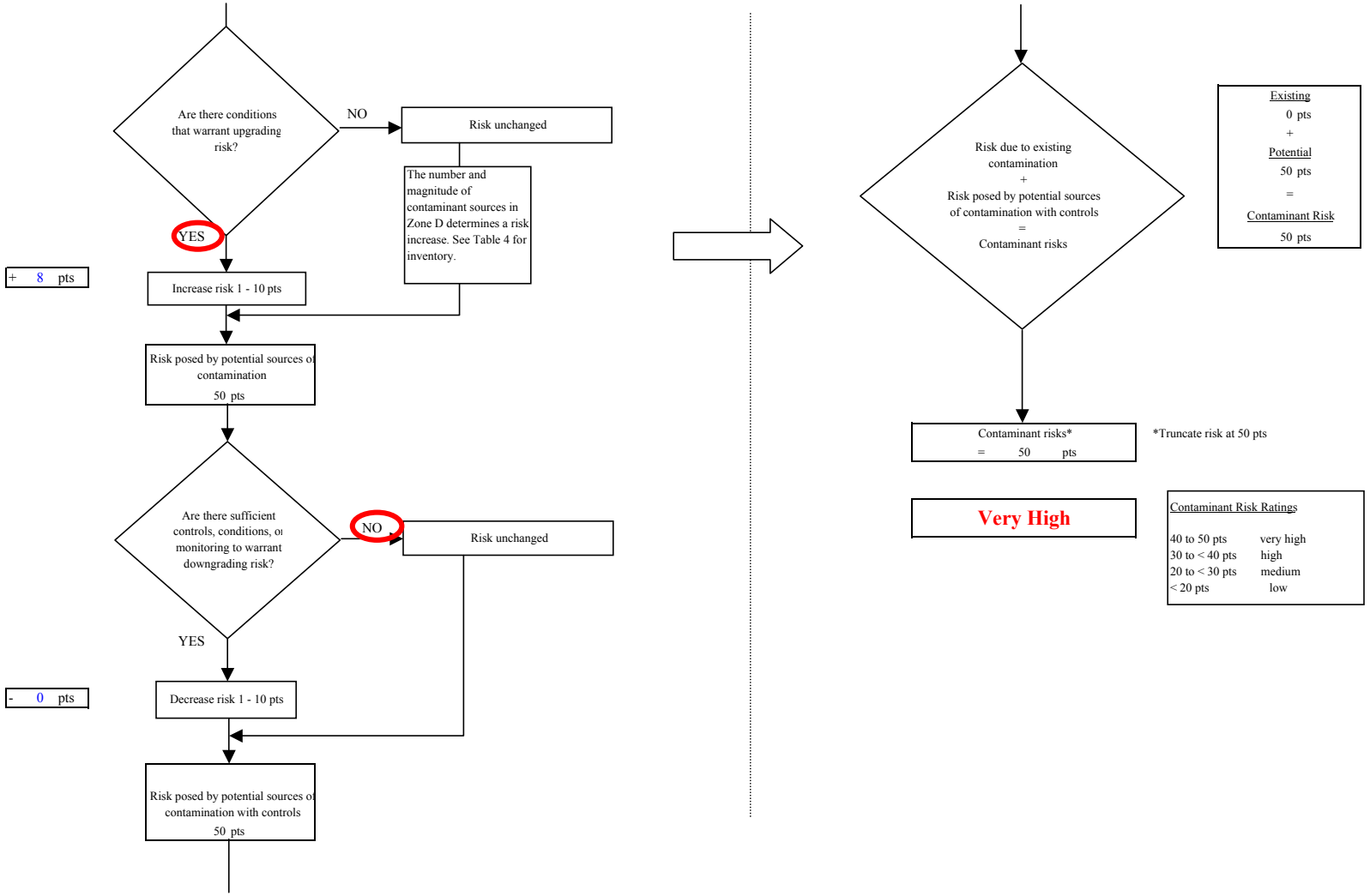


Chart 8. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Volatile Organic Chemicals

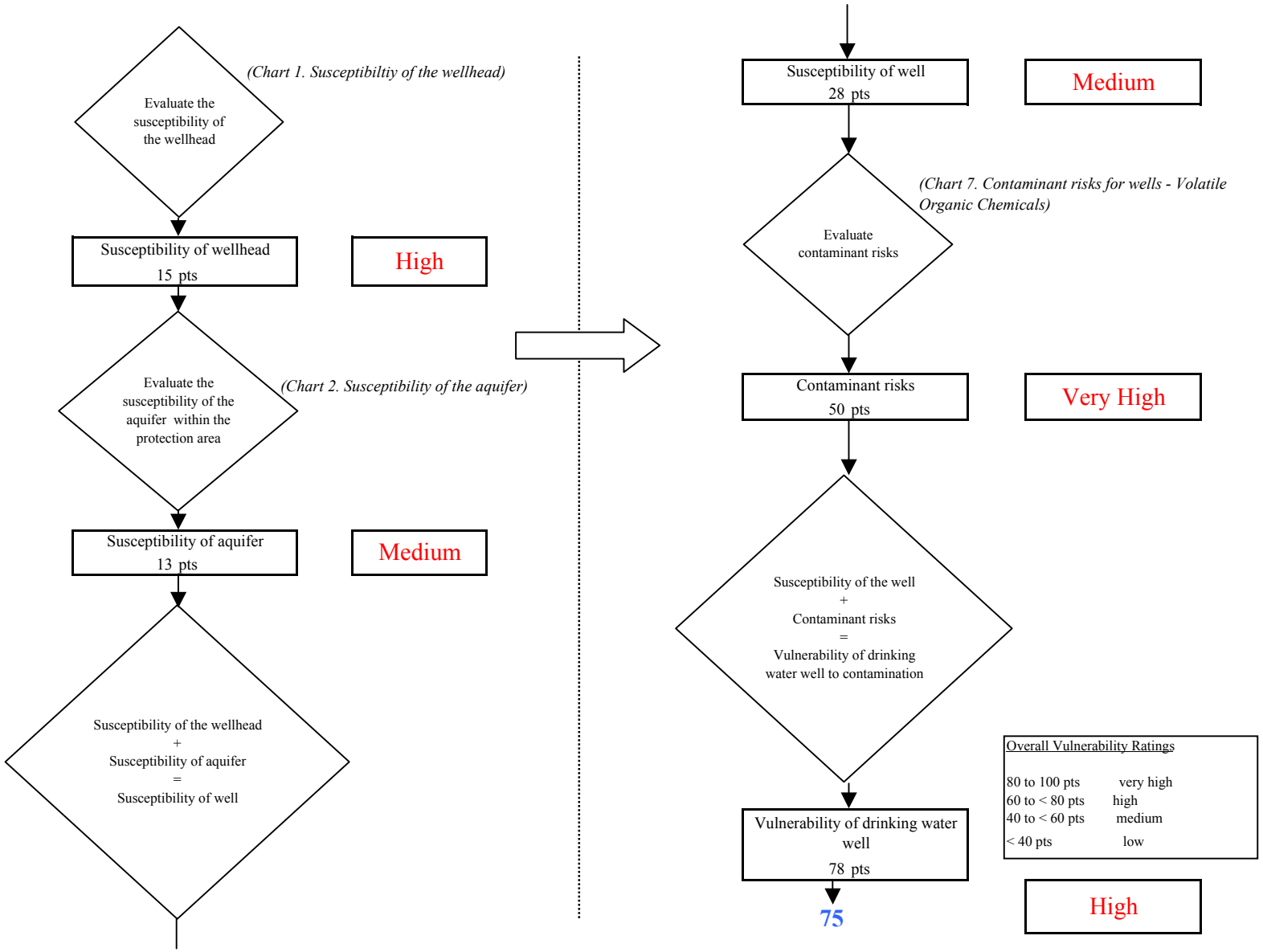


Chart 9. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

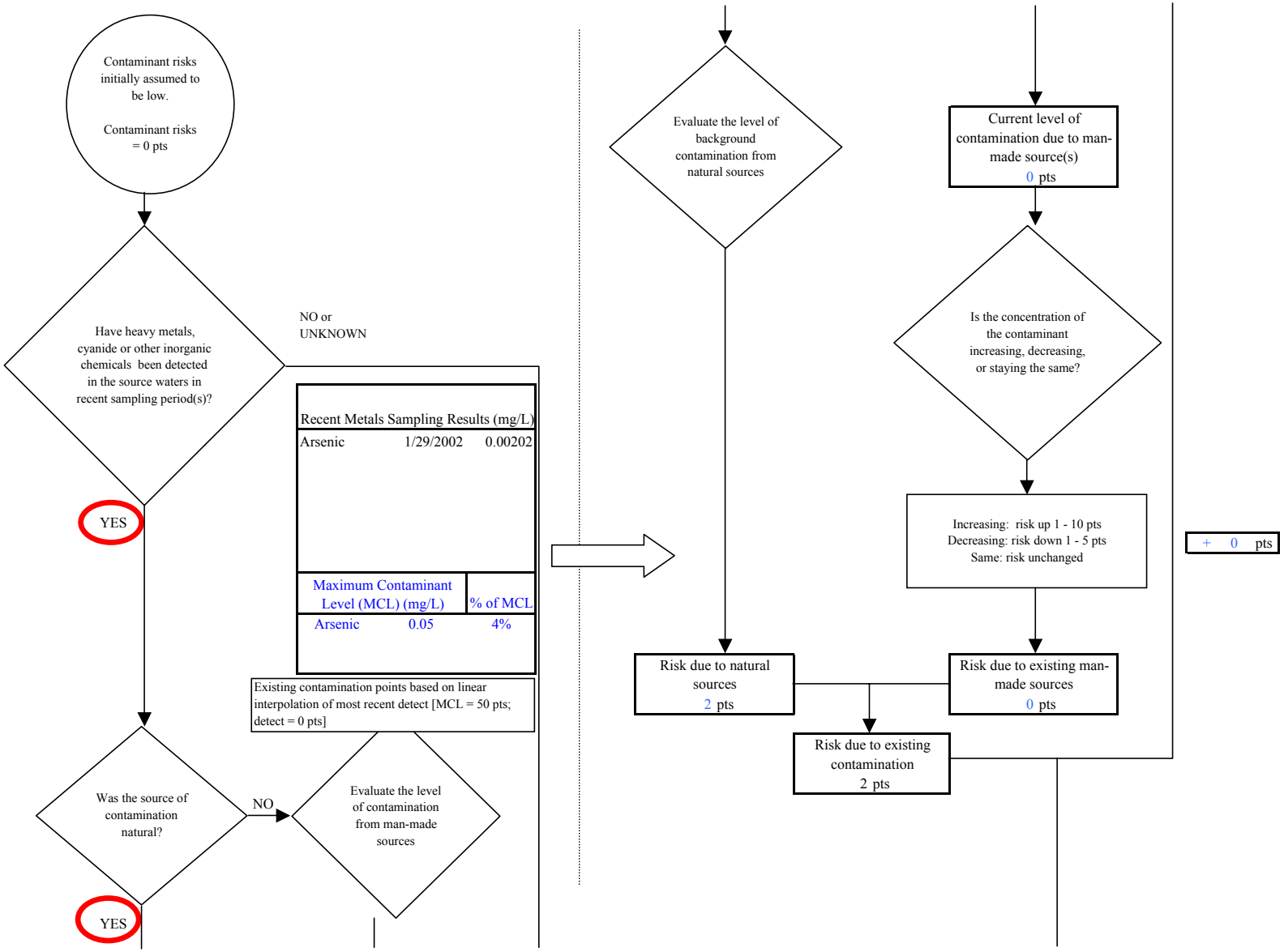
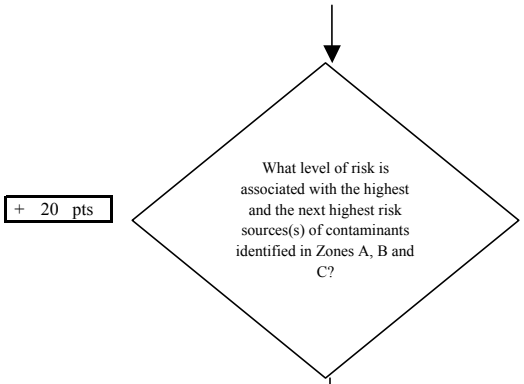


Chart 9. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals



+ 20 pts

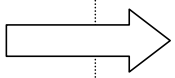
Risk Levels for Contaminant Sources identified in Zones A, B and C

	Zone A	Zones B&C	Total
Very Highs(s)	0	0	0
High(s)	0	0	0
Medium(s)	0	2	2
Low(s)	2	8	10

	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.



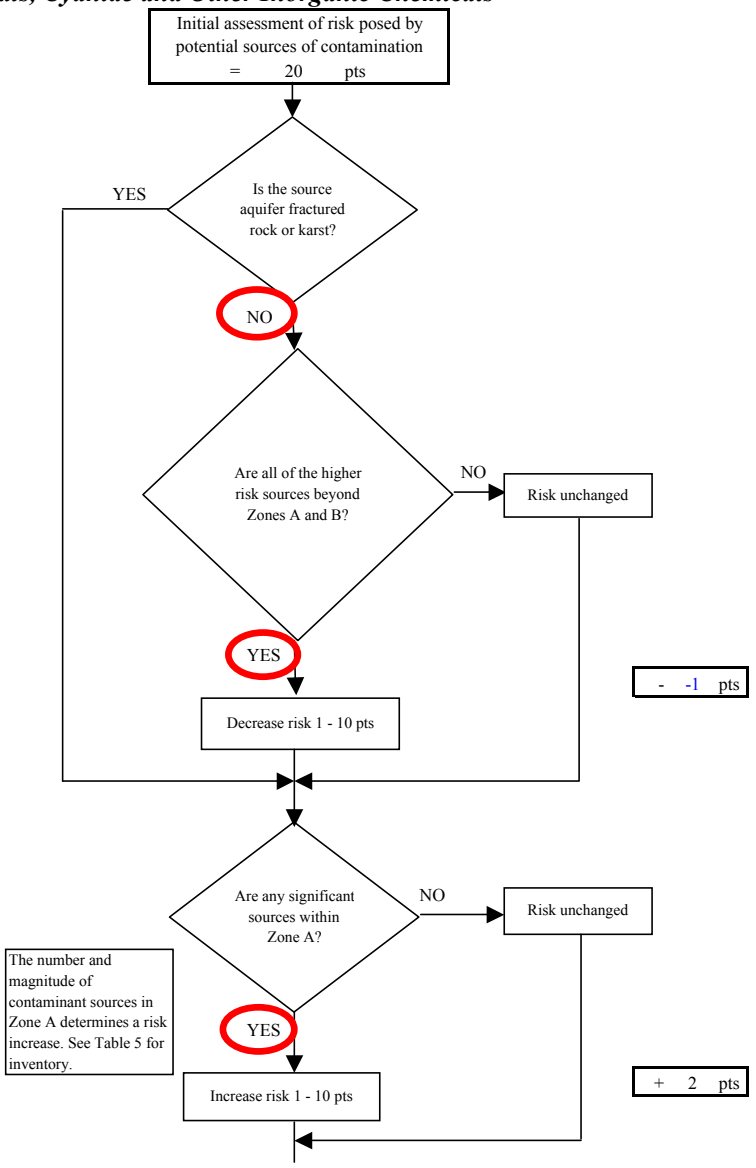


Chart 9. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

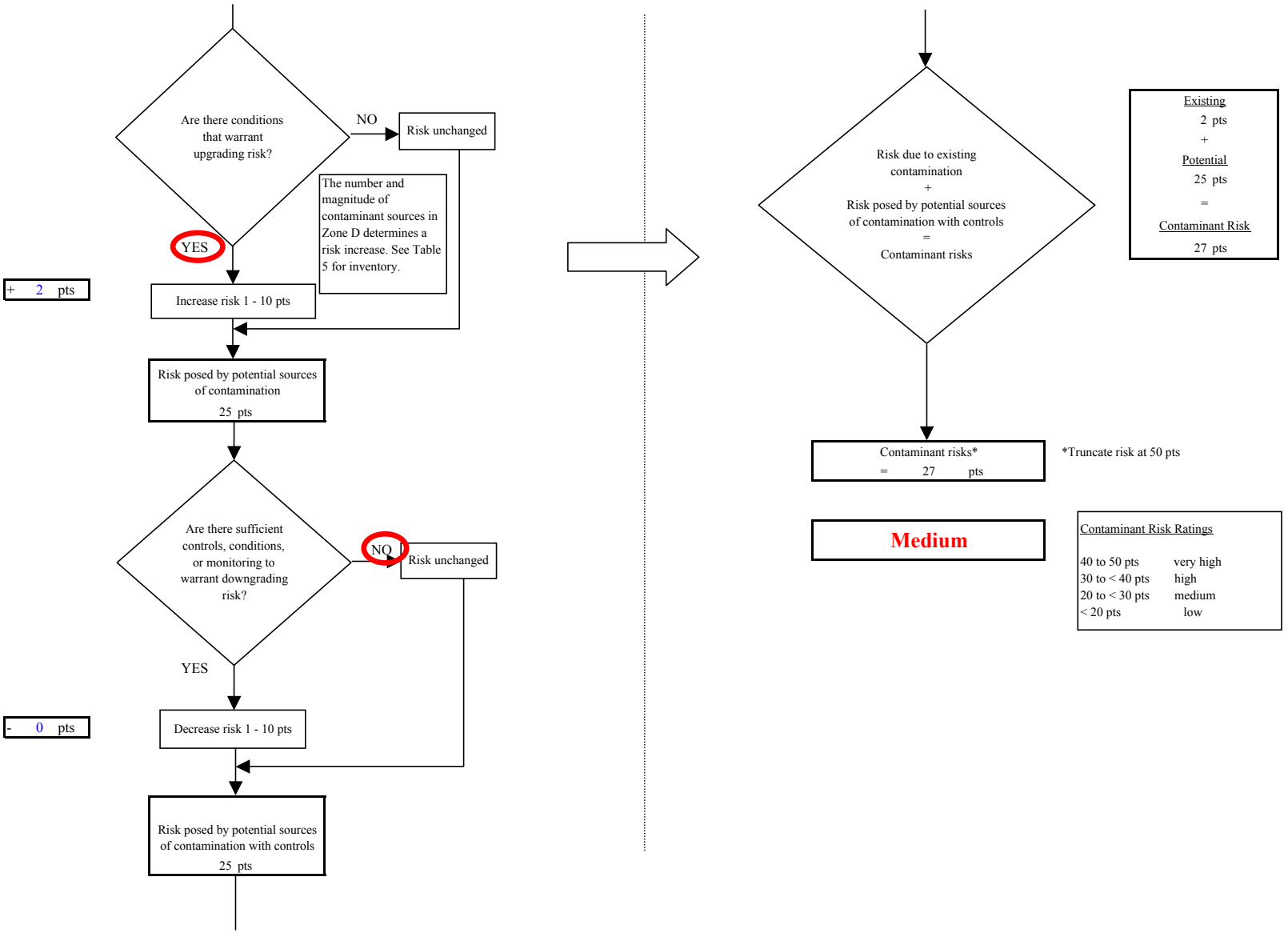


Chart 10. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Heavy Metals, Cyanide and Other Inorganic Chemicals

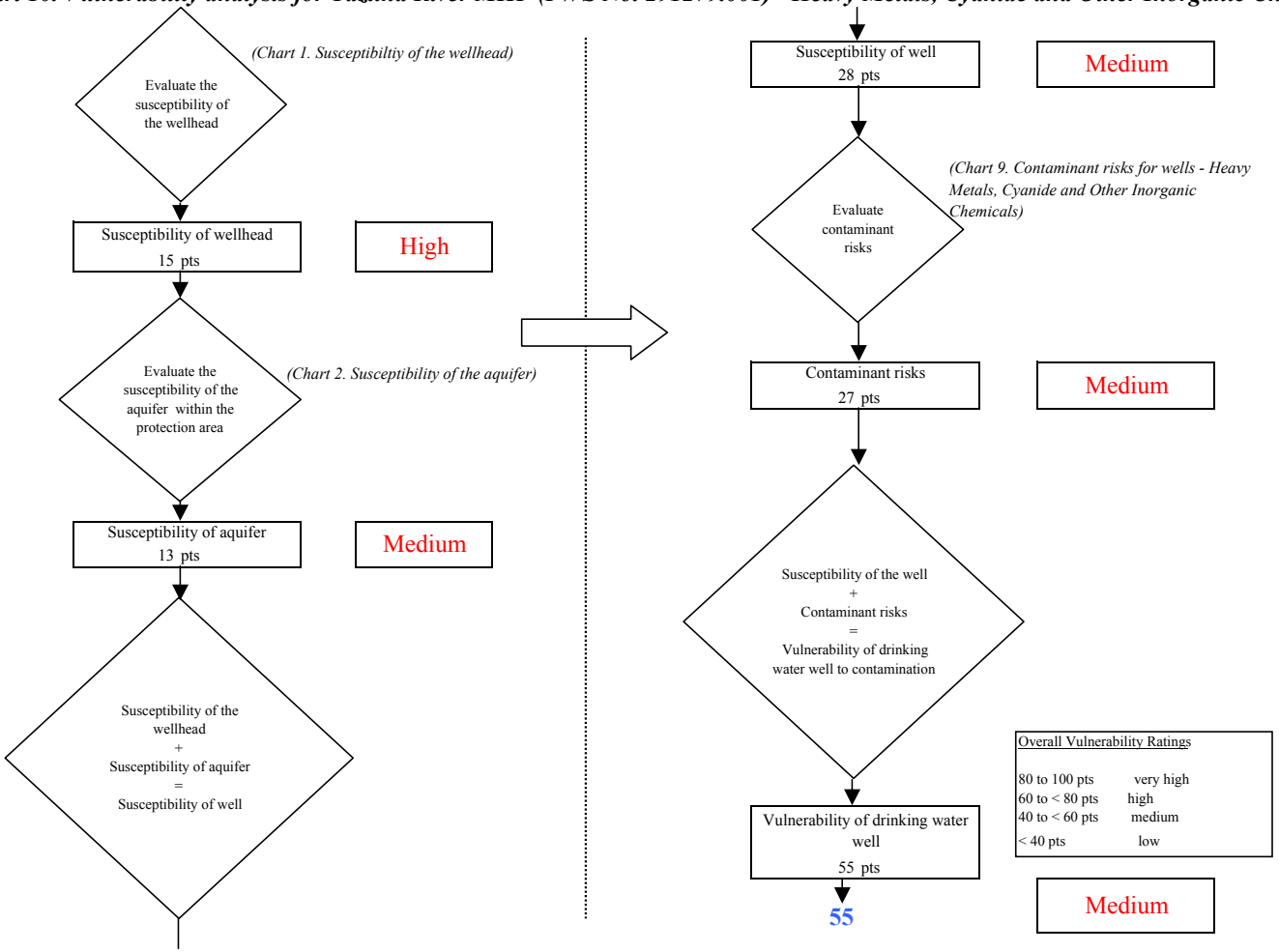


Chart 11. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Synthetic Organic Chemicals

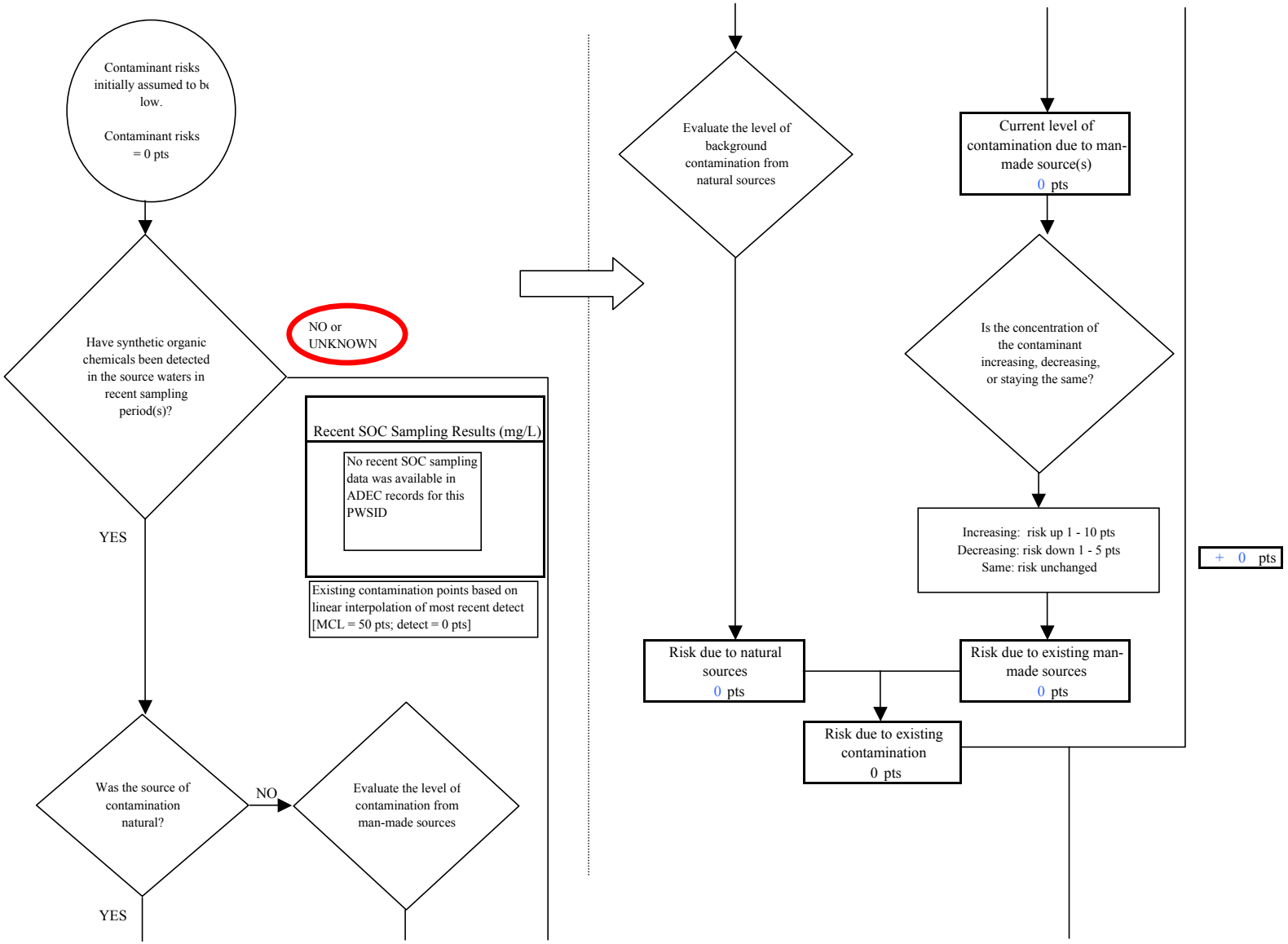
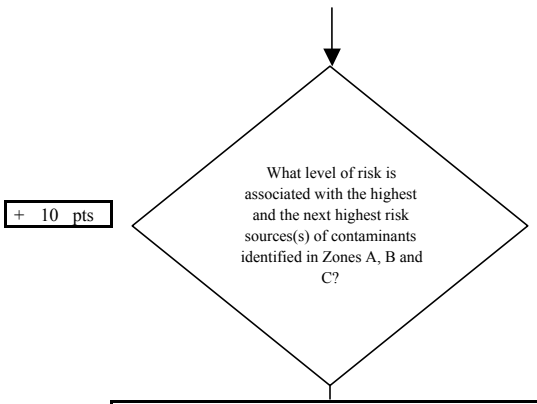


Chart 11. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Synthetic Organic Chemicals



+ 10 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)	0	0	0
Low(s)	1	5	6

	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 10

Note: Septic systems, sewerlines, and roads are each assigned a risk ranking for each individua 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.

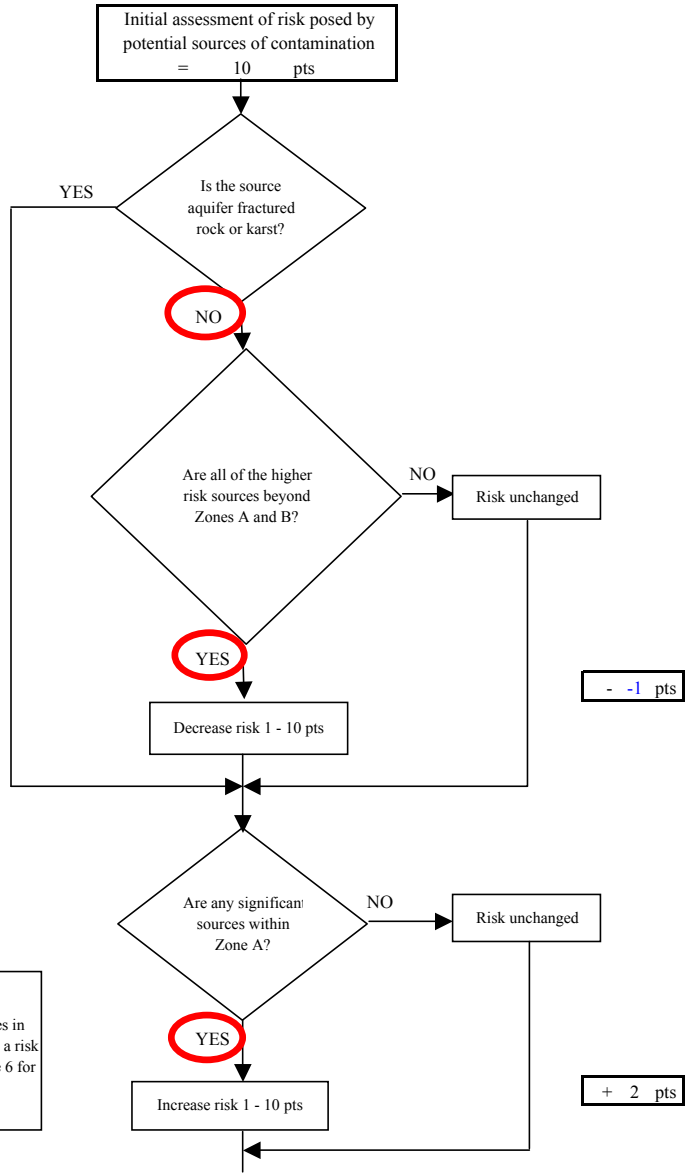


Chart 11. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Synthetic Organic Chemicals

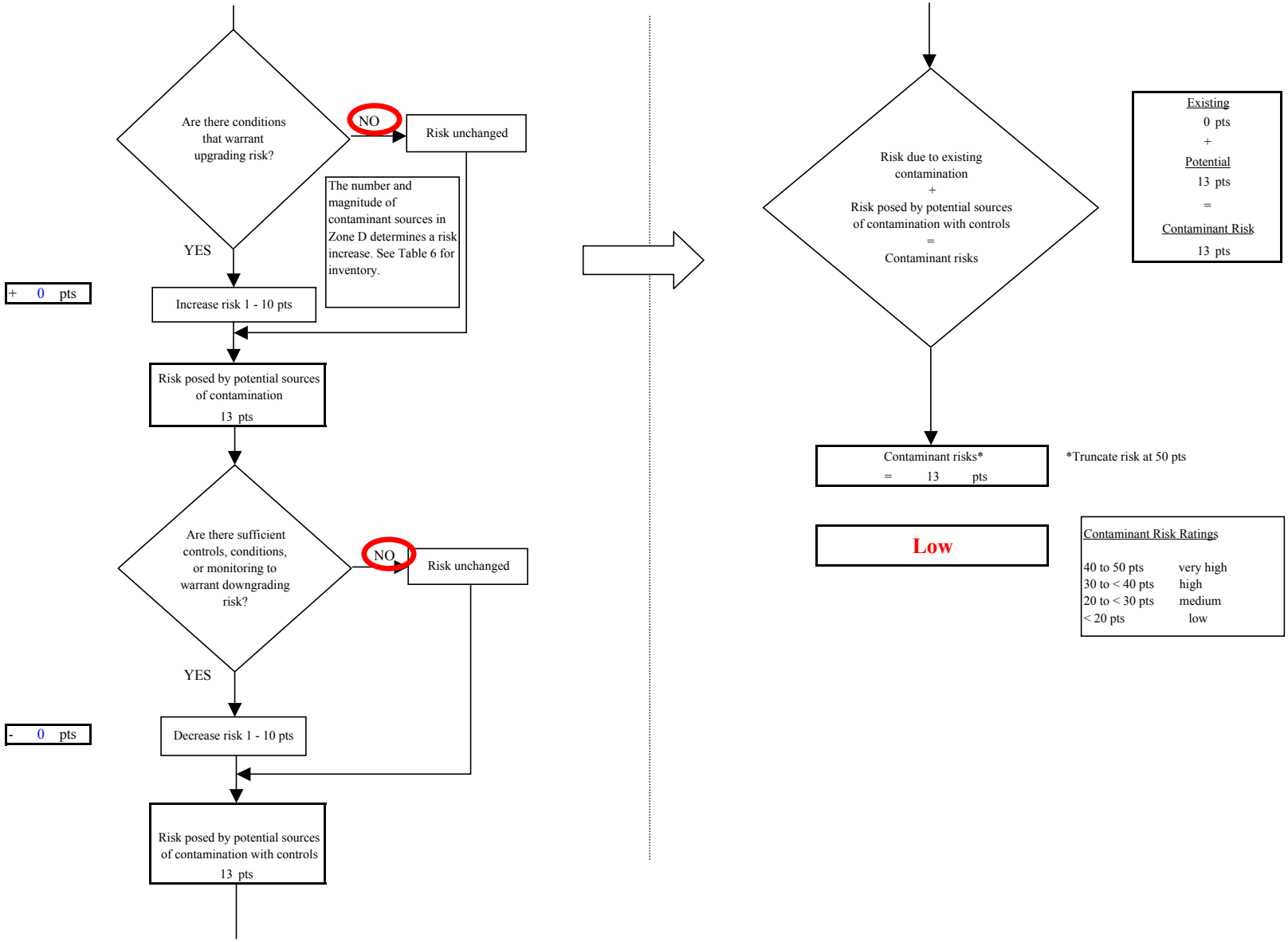


Chart 12. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Synthetic Organic Chemicals

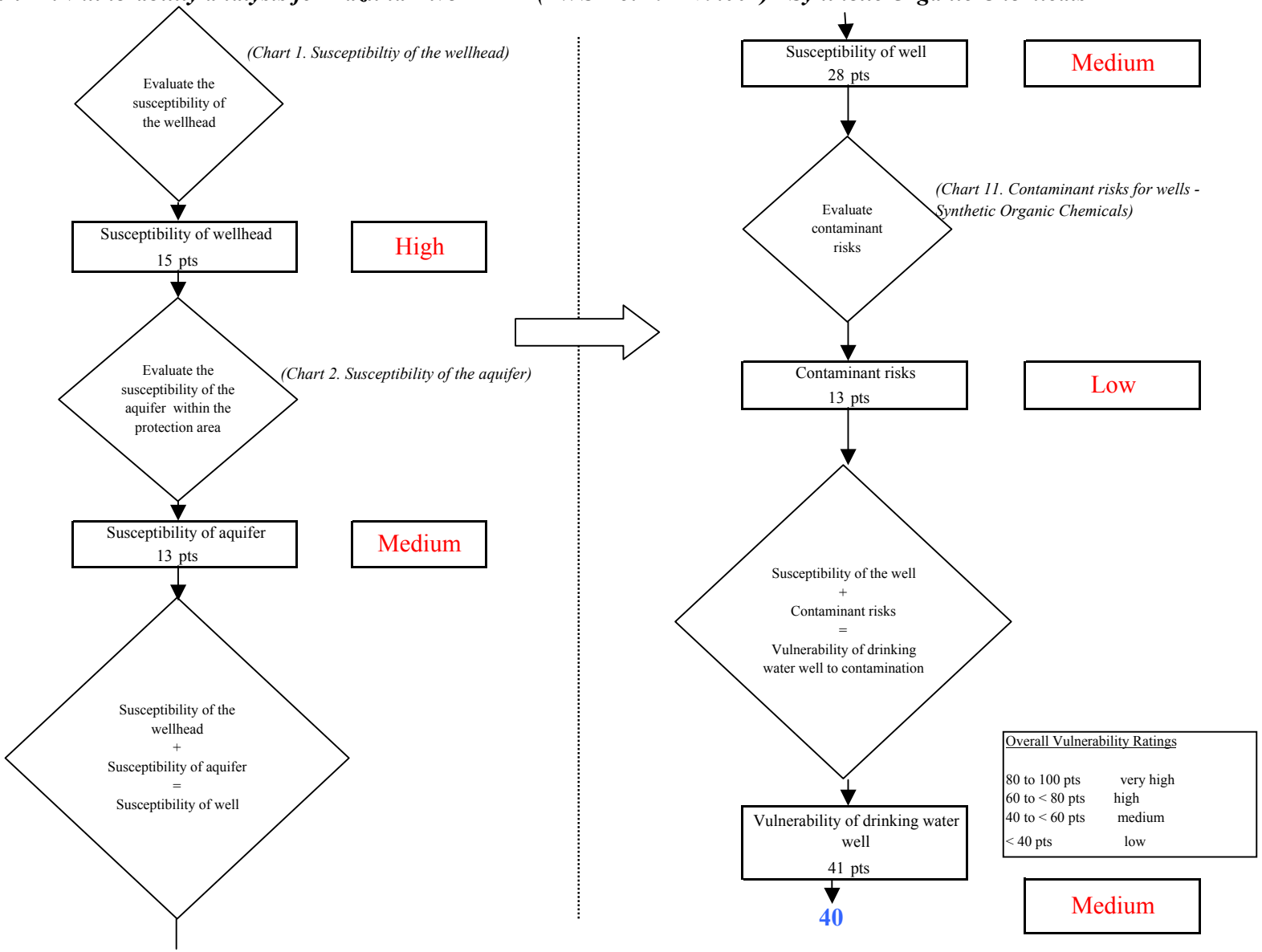


Chart 13. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Other Organic Chemicals

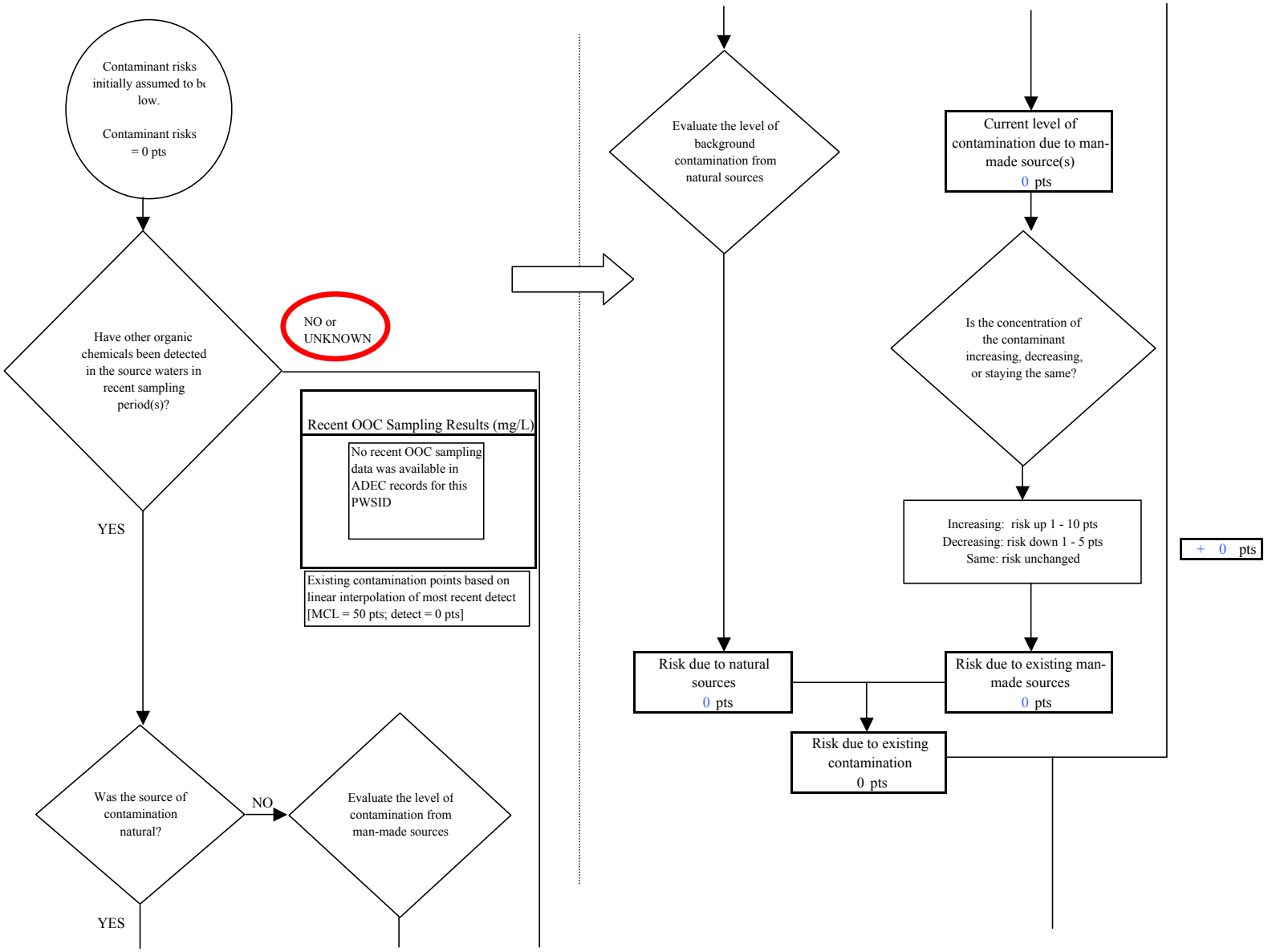


Chart 13. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Other Organic Chemicals

+ 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)	0	2	2
Medium(s)	0	0	0
Low(s)	2	5	7

	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 individua 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

Decrease risk 1 - 10 pts

- 0 pts

Are any significant sources within Zone A?

NO

Risk unchanged

YES

Increase risk 1 - 10 pts

+ 2 pts

The number and magnitude of contaminant sources in Zone A determines a risk increase. See Table 7 for inventory.

Chart 13. Contaminant risks for Tazlina River MHP (PWS No. 291279.001) - Other Organic Chemicals

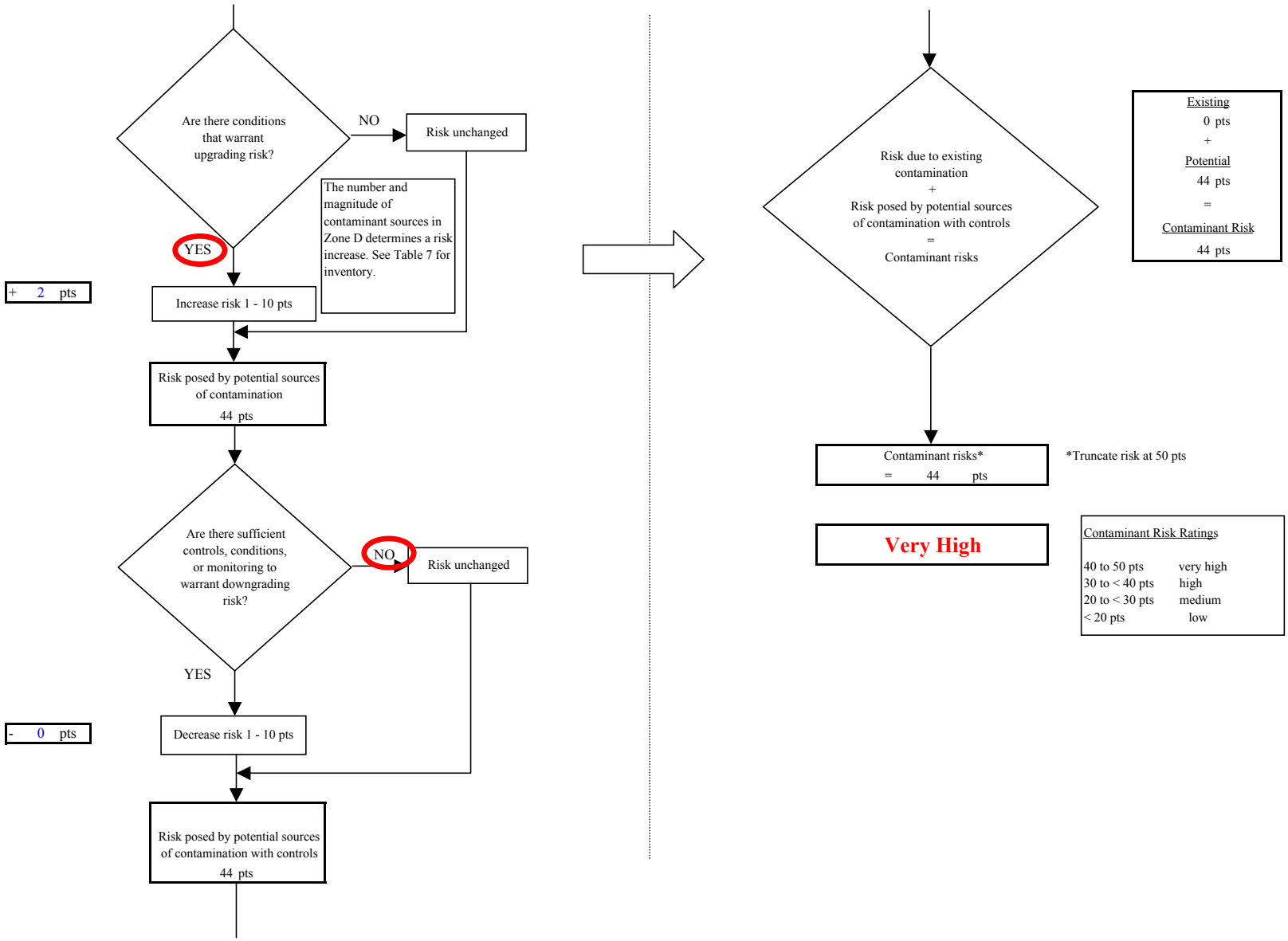


Chart 14. Vulnerability analysis for Tazlina River MHP (PWS No. 291279.001) - Other Organic Chemicals