Source Water Assessment -
Rangeview Trailer Court, Anchorage, Alaska

A Hydrogeologic Susceptibility and Vulnerability Analysis

DRINKING WATER PROTECTION PROGRAM REPORT 160

December 2001

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By MICHAEL J. CROTTEAU

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ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION: 2001

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By Michael J. Crotteau

Drinking Water Protection Program
Alaska Department of Environmental Conservation

EXECUTIVE SUMMARY

Rangeview Trailer Court is a Class A (community) drinking water source consisting of one well. Identified potential and current sources of contaminants for Rangeview Trailer Court include domestic wastewater sewerlines, gravel and paved roads, a municipal park, and approximately 36 acres of residential area. These identified potential and existing sources of contamination are considered sources of bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other synthetic organic chemicals. Overall, Rangeview Trailer Court public water source received a vulnerability rating of **Low** for bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other synthetic organic chemicals.

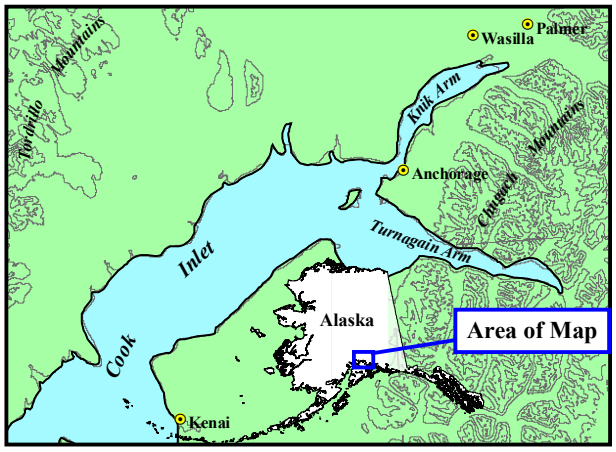


Figure 1. Index map showing the location of Anchorage, Alaska

INTRODUCTION

The purpose of this environmental assessment is to provide public water system owners/operators, communities, and local governments with information they can use to preserve the quality of Alaska's public drinking water supplies. This assessment was completed for the Rangeview Trailer Court's source of public drinking water. This source consists of one well in the Anchorage-area (see Figure 1). This assessment, known under the Alaska Drinking Water Protection Program as the *Source Water Assessment*, has combined a review of the natural hydrogeologic sensitivity with potential and existing contaminant risks to arrive at an overall vulnerability of the drinking water source to contamination. This assessment has been completed as a basis for local voluntary protection efforts and to assist agencies in their efforts to reduce risk to this public drinking water supply.

DESCRIPTION OF THE ANCHORAGE-AREA, ALASKA

Location

Anchorage, located in southcentral Alaska, encompasses 1,698 square miles of land and 264 square miles of water. The area containing a majority of the urban development, commonly referred to as the Anchorage Bowl, encompasses approximately 180 square miles (*Partick, Brabets, and Glass, 1989*) and envelopes the low lands of the area. This area is bounded on the east by the Chugach Mountains and the north, west, and south by the Knik and Turnagain Arms of Cook Inlet (Figure 1). In recent times, urban development has extended eastward along the flanks of the Chugach Mountains. This area, known locally as the Anchorage Hillside, contains development at elevations exceeding 3700 feet in elevation above sea level.

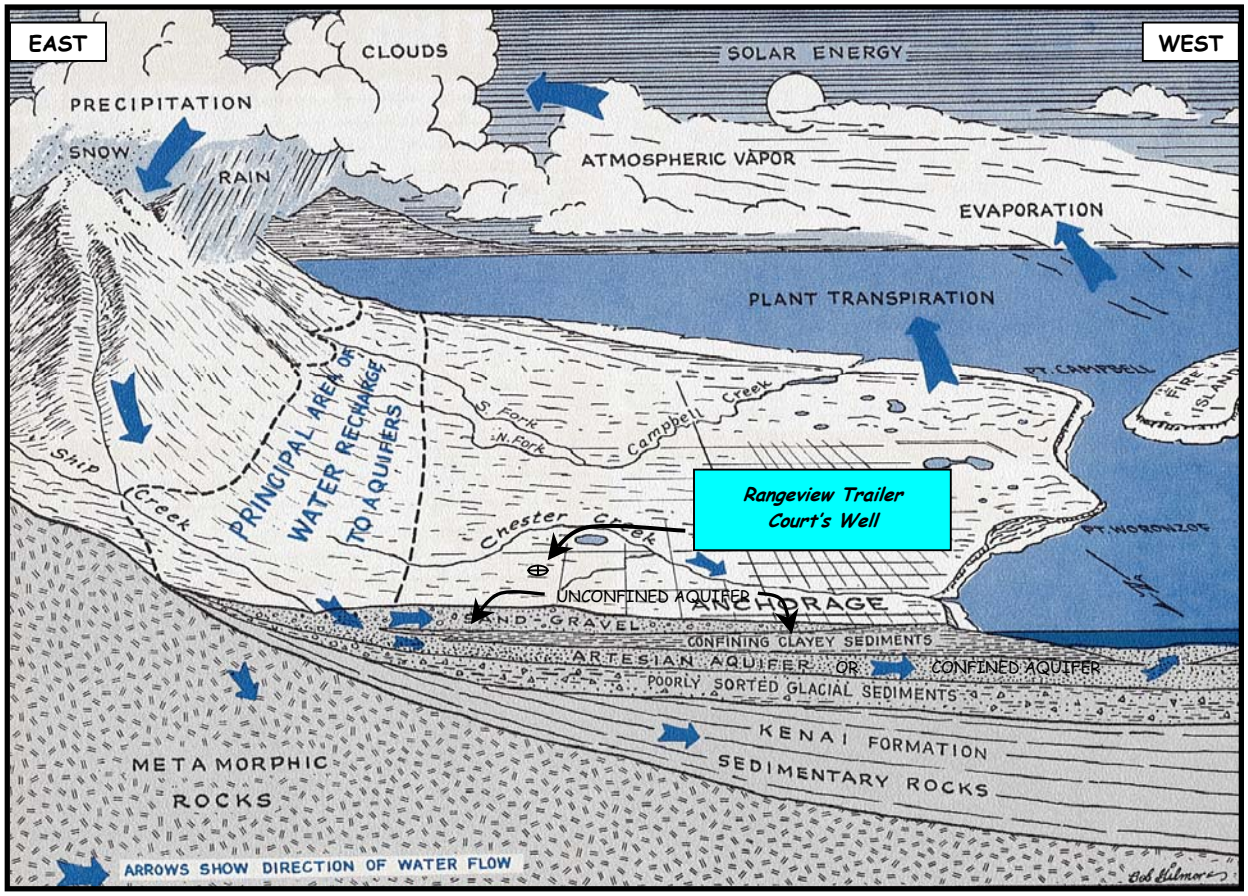


Figure 2. Generalized hydrologic cycle in the Anchorage-area [*Barnwell, George, Dearborn,Weeks, and Zenone*, 1972].

Climate

The Anchorage-area climate is somewhat transitional in that it does not experience large daily and annual temperature fluctuations like those experienced in the interior of Alaska nor does it experience high mounts of precipitation typified by gulf coast regions. Mean annual precipitation at the Anchorage International Airport is approximately 16 inches per year. On the average, Anchorage receives a total snow accumulation of 69 inches per year. Precipitation generally increased inland toward the Chugach Mountains where annual precipitation may exceed 160 inches per year [*Barnwell, George, Dearborn, Weeks, and Zenone*, 1972]. Mean daily temperature ranges from 65° F during July to 8° F in January [*Western Regional Climate Center*, 2000].

Physiography and Groundwater Conditions

Surface elevations in the Anchorage-area range from sea level at the Knik and Turnagain Arms to well over 5000 feet in the peaks that bound the area. Glacial moraine and outwash deposits primarily mantle the surface of the Anchorage Bowl.

The backbone of the Chugach Mountains is composed primarily of metamorphic marine and volcanic rocks (bedrock). These high peaks that bound Anchorage's east-side are flanked with colluvium or slope deposits. These slope deposits eventually grade into the glacial and stream deposits at lower elevations in the Anchorage Bowl.

In the Anchorage-area, two principal groundwater flow systems or aquifers exist (see Figure 2). The upper unconfined aquifer or water-table aquifer is separated from a lower confined aquifer system by layers of silty, clayey glacially derived sediments (confining layer) [*Ulery and Updike*, 1983]. The lower confined aquifer system consists of a series of hydrologically interconnected layers and lenses of gravel, sand and silt that, collectively, form the confined aquifer. The confining layer ranges from 0 to 270 feet thick throughout the Anchorage-area and generally thins with increasing distance from Cook Inlet, thus pinching out at the mountain front [*Patrick, Brabets, and Glass*, 1989].

Water enters or recharges these two aquifer systems in

several different ways. Along the front of the Chugach Mountains, groundwater seeps from fractures in bedrock into the sediments. At these higher elevations, rain and snowmelt also enters the sediments. This area along the mountain front is considered the principal recharge area for wells in the Anchorage-area. Precipitation in the low lands may also percolate directly into the ground. Lastly, aquifers may also be recharged by streams where surface water percolates into surrounding permeable sediments (losing reaches of streams). Groundwater flow in the confined aquifer is generally east to west from the mountain front toward Cook Inlet, except in areas where the direction of flow is influenced by large municipal or industrial production wells. The direction of groundwater flow in the upper unconfined aquifer is more variable due to the influence from surfacial topography as well as its close connection with surface water bodies.

RANGEVIEW TRAILER COURT PUBLIC WATER SOURCE

Rangeview Trailer Court public water source is a Class A (community) water source, which is owned by and operated by the Rangeview Trailer Court The source consists of one well near the base of the Chugach Mountains and is at an elevation of 260 feet above sea level. The well is located near the approximately 75 feet west of Valley Street (see Figure 2). According to the well log, Rangeview Trailer Court does not appear to be grouted and penetrates forty feet of clay and gravel, fifty-two feet of blue clay, and fourteen feet of gravel to a total depth of 106 feet below land surface. The well is screened in the gravel from 98 to 106 feet below land surface. Rangeview Trailer Court's well had a static water level of 21 feet below land surface at the time of drilling (September 27, 1968).

Approximately 350 residents are served by Rangeview Trailer Court's well through 318 service connections. This water source operates year round.

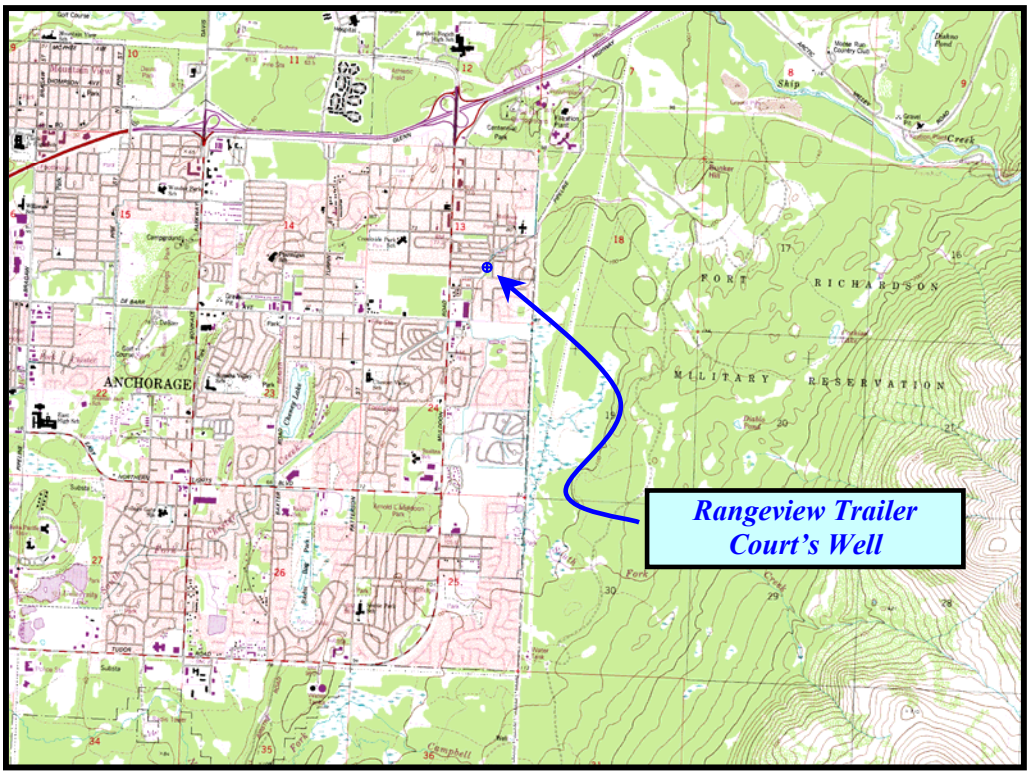


Figure 3. Map showing the location of the drinking water source for Rangeview Trailer Court [Basemap: USGS Anchorage A8 NE].

ASSESSMENT AND PROTECTION AREA FOR RANGEVIEW TRAILER COURT DRINKING WATER SOURCE

The Drinking Water Protection and Assessment Area that has been established for Rangeview Trailer Court's well is the area that is most sensitive to contamination. This area has served as a basis for assessing the risk of the drinking water source to contamination. This zone around the drinking water source is the most critical area for the preservation of the quality of the drinking water for this source. For simplicity, this area will be known as your Drinking Water Protection Area and will serve as the area of focus for voluntary protection efforts.

Conceptually, groundwater enters the aquifer systems along the front range of the Chugach Mountains (Figure 2) and flows toward Cook Inlet. An analytical calculation was used to calculate the size and shape of the area that contributes water to the well. The input parameters describing the attributes of the aquifer in this calculation were adopted from the U.S. Geological Survey (*Patrick, Brabets, and Glass, 1989*). This analytical calculation was used as a guide as the first step in establishing the protection area for Rangeview Trailer Court. Additional methods were further employed to take into account any uncertainties in groundwater flow and aquifer characteristics to arrive at a meaningful and conservative protection area with respect to public health (Please refer to the Guidance Manual for Class A Public Water Systems for additional information).

The Drinking Water Protection Areas established for wells by the Alaska Department of Environmental Conservation are separated into zones. These zones correspond to a time-of-travel. Time-of-travel is the time required for water to move in the saturated zone of the ground from a specific point to the well. The Drinking Water Protection Area for Rangeview Trailer Court contain four zones, Zone A through Zone D (See Map 1 in Appendix B). Zone A corresponds to the area between the well and the distance equal to ¼ of the distance of the 2-year time-of-travel. Depending on where a contaminant source is located within Zone A, travel time for a contaminant to the well may be on the order of several days to several hours. Zone A also extends downgradient from the well to take into account the area of the aquifer that is influenced by pumping of the well.

The Zone B protection area for Rangeview Trailer Court corresponds to a time-of-travel of less than two years and extends 1345 feet beyond Zone A toward the Chugach Mountains. Lastly, the Zone C and Zone D protection areas correspond to less than 5-years and 10-years time-of-travel, respectively. The 10-year time-of-travel isochrone (line of equal time) extends approximately 3.9 miles from the well to the top of the watershed divide in the front-range of the Chugach Mountains.

INVENTORY OF POTENTIAL AND EXISTING CONTAMINANT SOURCES

The Drinking Water Protection Program has completed an inventory of potential and existing sources of contamination within Rangeview Trailer Court Drinking Water Protection Area. This survey was completed through a search of agency records and other publicly available information, and verified by Rangeview Trailer Court.

Potential sources of contamination to drinking water supplies cover 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 this assessment and 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 synthetic organic chemicals.

Map 2 through Map 3 in Appendix C depict the Contaminant Source Inventory for Rangeview Trailer Court. Inventoried potential sources of contamination within Zones A through Zone C were associated with residential and recreational type activities (see Table 1 in Appendix A). Only high and very high potential and existing sources of contamination are inventoried within the Zone D protection area. No contaminant sources within the high or very high risk class were identified in the Zone D protection area for Rangeview Trailer Court. Below is a summary of the contaminant sources inventoried within the Rangeview Trailer Court protection area (Zones A – C):

- domestic wastewater sewer lines;
- approximately 36 acres of residential area;
- activities associated with paved and gravel roads; and
- a city park.

These potential contaminant sources present risk for all

six categories of drinking water contaminants for Rangeview Trailer Court drinking water source.

RANKING OF CONTAMINANT RISKS

Potential and existing sources of contamination have been identified, sorted, and ranked 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. Contaminant risks are further a function of the number and density of those types of contaminant sources as well as the proximity of those sources to the well.

VULNERABILITY OF RANGEVIEW TRAILER COURT DRINKING WATER SOURCE

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

- natural susceptibility; and
- contaminant risks.

Each of the six categories of drinking water contaminants has been analyzed and an overall vulnerability score of 0 to 100 is ultimately assigned:

Natural Susceptibility (0 – 50 points)

+

Contaminant Risks (0 – 50 points)

=

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

A score for the Natural Susceptibility is achieved by analyzing the properties of the well and the aquifer.

Susceptibility of the Wellhead (0 – 25 Points)
+
Susceptibility of the Aquifer (0 – 25 Points)

= Natural Susceptibility (Susceptibility of the Well)
(0 – 50 Points)

Rangeview Trailer Court is completed in a confined aquifer setting. In it's middle section, the well penetrates 52 feet of blue clay between 40 and 92 feet below land surface. These clay layers may provide a significant protective barrier for the movement of contaminants in the subsurface. However, near the base of the Chugach Mountains, the silt and clay layers tend to be discontinuous and thin toward the mountains. Therefore, contaminants that enter the subsurface near the base of the mountains may enter the confined aquifer uninhibited by the absence of any protective layer. The well does not appear to be properly grouted as indicated previously from information obtained from Department records. The absence of grouting can promote the transport of contaminants along the well casing. Combining the susceptibility of the wellhead and the aquifer to contamination leads to a score (0 – 50 points) and rating of overall Susceptibility (See Appendix D). Table 1 shows the overall Susceptibility score and rating for Rangeview Trailer Court.

Table 1. Natural Susceptibility - Susceptibility of the Wellhead and Aquifer to Contamination

	Score	Rating
Susceptibility of the Wellhead	5	Low
Susceptibility of the Aquifer	8	Low
Natural Susceptibility	13	Low

Contaminant risks to a drinking water source depend on the type, number or density, and distribution of contaminant sources. Domestic wastewater sewerlines, gravel and paved roads, a municipal park, and approximately 36 acres of residential area contribute the highest risk for potential contamination to the Rangeview Trailer Court's source of public drinking water.

A score (0 – 50 points) and rating of Contaminant Risks (See Appendix D) is assigned based on the findings of the Contaminant Source Inventory (Appendix B - Table 1 – Table 7). This portion of the analysis examines any existing or historical contamination that has been detected at the drinking water source through routine sampling. It also reviews contamination that has or may have occurred but has not arrived or been detected at the well. Table 2 summarizes the Contaminant Risks for each category of drinking water contaminants.

Table 2. Contaminant Risks

Contaminant Risks	Score	Rating
Bacteria and Viruses	25	Medium
Nitrates and/or Nitrites	26	Medium
Volatile Organic Chemicals	12	Low
Heavy Metals, Cyanide, and other Inorganic Chemicals	13	Low
Synthetic Organic Chemicals	12	Low
Other Synthetic Organic Chemicals	11	Low

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. Lastly, Chart 4 contains the 'Vulnerability Analysis for Bacteria and Viruses'. Charts 5 through 14 contain the Contaminant Risks and Vulnerability Analysis for nitrates and nitrites, volatile organic chemicals, heavy metals, synthetic organic chemicals, and other synthetic organic chemicals, respectively.

Vulnerability of the drinking water source to contamination is the combination of susceptibility of the aquifer and the well with contaminant risks. Table 3 contains the overall vulnerability scores (0 – 100) and ratings for each of the six categories of drinking water contaminants (See Appendix D). Note: scores are rounded off to the nearest five.

Table 3. Overall Vulnerability of Rangeview Trailer Court's Public Drinking Water Source to Contamination by Category

Category	Score	Rating
Bacteria and Viruses	35	Low
Nitrates and Nitrites	35	Low
Volatile Organic Chemicals	25	Low
Heavy Metals, Cyanide, and other Inorganic Chemicals	25	Low
Synthetic Organic Chemicals	25	Low
Other Synthetic Organic Chemicals	25	Low

Tables 2 through 7 in Appendix A contain the ranking of potential and existing sources of contamination with respect to bacteria and viruses, nitrates and/or nitrites, and volatile organic chemicals, heavy metals, synthetic organic chemicals, and other synthetic organic chemicals.

Nitrates and/or nitrites are found in natural background concentrations at the site, as elsewhere in the Alaska. Sampling history of Rangeview Trailer Court's source waters indicate low concentrations of nitrate (See Chart 6 – Contaminant Risks for Nitrates/Nitrites in Appendix D). Existing nitrate contamination is approximately 2 - 3% of the allowable limit (MCL) for this contaminant. The Maximum Contaminant Level or MCL is the maximum level of contaminant that is allowed to exist in drinking water and still be consumed by humans without harmful health effects. Due to the high solubility and weak retention by soil, nitrates are very mobile in soil, moving at approximately the same rate as water. Nevertheless, the current nitrate concentration in Rangeview Trailer Court's source waters remains at safe levels with respect to human health.

Domestic wastewater sewerlines run within 230 feet of Rangeview Trailer Court's well. The risk associated with a catastrophic failure of the sewerlines as well as their close proximity to this drinking water source contributes to a medium bacteria and virus as well as nitrate and nitrite contaminant risk for Rangeview Trailer Court.

Heavy metals are also found in natural background concentrations at the site. Sampling history of Rangeview Trailer Court source waters indicate low concentrations of barium and arsenic in past sampling periods (See Chart 7 – Contaminant Risks for Heavy Metals, Cyanide, and Other Inorganic Chemicals in Appendix D). Barium and arsenic levels are approximately 3 - 4% of the allowable limit (MCL) for

these contaminants. Regardless of this low detection of heavy metals, the current concentration in Rangeview Trailer Court's source waters remains at safe levels with respect to human health.

SUMMARY

A *Source Water Assessment* has been completed for the Rangeview Trailer Court source of public drinking water. The overall vulnerability of this source to contamination is **Low** for bacteria and viruses, nitrates and/or nitrites, volatile organic chemicals, heavy metals, for synthetic organic chemicals, and other synthetic organic chemicals. 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 Rangeview Trailer Court 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 public drinking water source.

REFERENCES CITED

Barnwell, W.W., George, R.S., Dearborn, L.L., Weeks, J.B., and Zenone, C., 1972, Water for Anchorage: an atlas of the water resources of the Anchorage area, Alaska: U.S. Geological Survey Open-File Report, 76 p.

Patrick, L.D., Brabets, T.P., and Glass, R.L., 1989, Simulation of ground-water flow at Anchorage, Alaska: U.S. Geological Survey Water-Resources Investigations Report 88-4139, 41p.

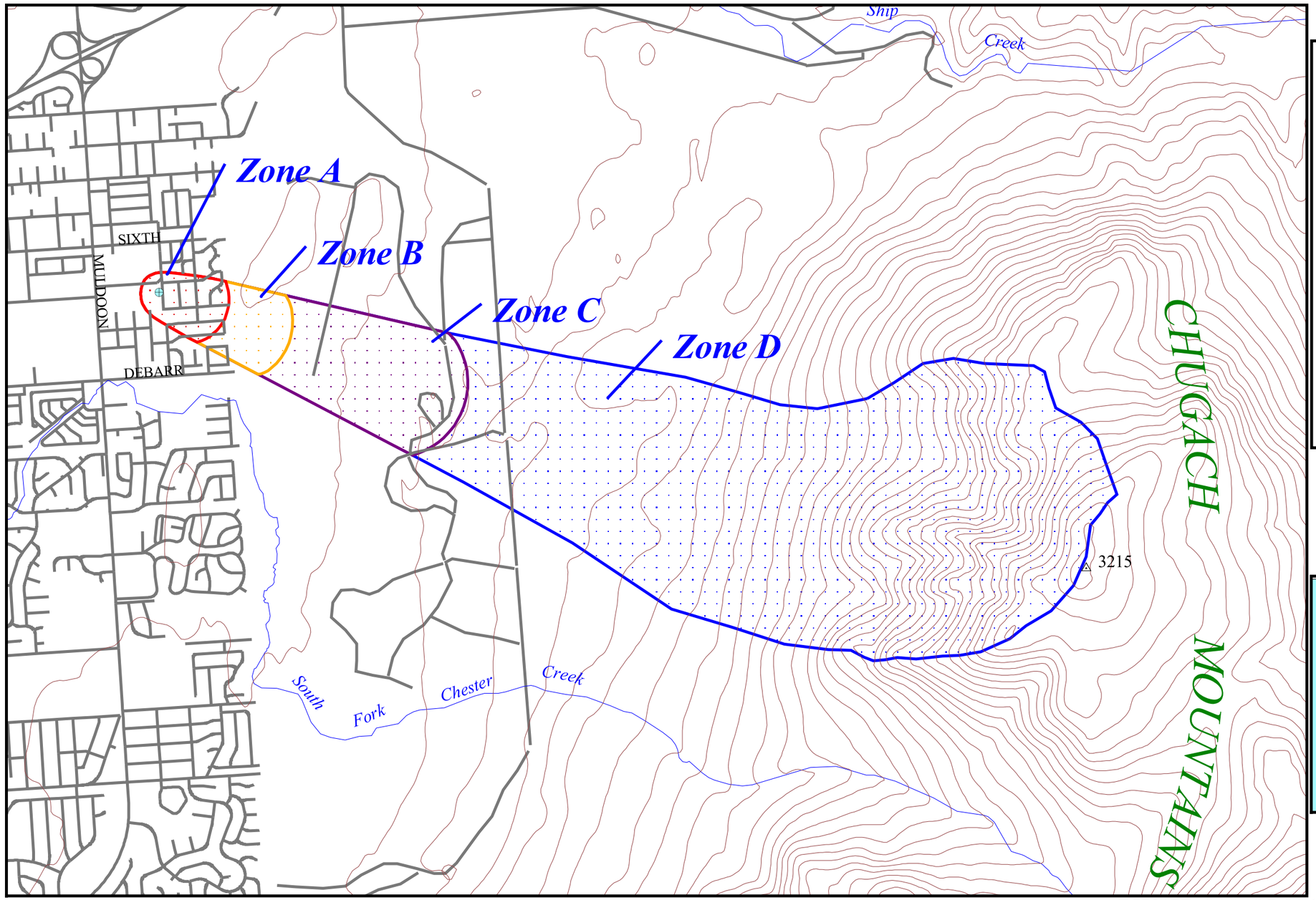
Ulery, C.A. and Updike, R.G, 1983, Subsurface structure of the cohesive facies of the Bootlegger Cove Formation, Sourthwest Anchorage, Alaska: Alaska Division of Geological and Geophysical Surveys Professional Report 84, 5 p.

Western Regional Climate Center, 2000, August 24, Web extension to the *Western Regional Climate Center* [WWW document]. URL http://www.wrcc.dri.edu/index.html

APPENDIX A

Rangeview Trailer Court
Drinking Water Protection Area

Rangeview Trailer Court Drinking Water Protection Area



Legend

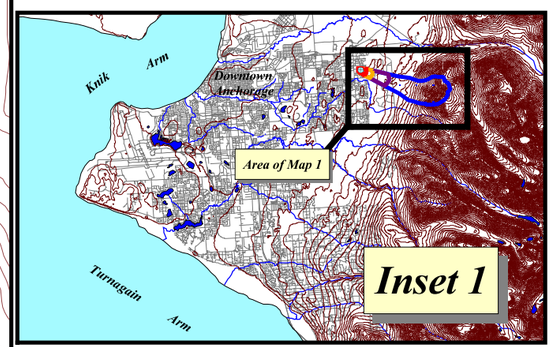
- Rangeview Trailer Court Well
- Elevation contours
- Sreams
- Roads

Zone A Protection Area
- Several Months Travel Time

Zone B Protection Area
- Less Than 2 Years Travel Time

Zone C Protection Area
- Less Than 5 Years Travel Time

Zone D Protection Area
- Less Than 10 Years Travel Time



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Map 1

APPENDIX B

Contaminant Source Inventory and Risk Ranking for Rangeview Trailer Court

Table 1

Contaminant Source Inventory for Rangeview Trailer Court

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	off Mason along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	along Cross Pointe	2	
Residential Area	R1	R1-1	A	entire subdivision	3	31 Aces
Residential Area	R1	R1-2	B	entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A		2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Friendly	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Valley	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Rangeview	2	

Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A		2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A		2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Elaine	2	
Municipal or city parks (with green areas)	X4	X4-1	A	Valley Street Park	3	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	On Fort Richardson Military Reservation	3	Electic transmission line

Table 2

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Bacteria and Viruses

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Medium	1	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Medium	2	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Medium	3	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Medium	4	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Medium	5	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Medium	6	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Medium	7	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Medium	8	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Medium	9	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Medium	10	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Medium		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Medium		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Medium		along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Medium		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Medium		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Medium		along Cross Pointe	2	
Residential Area	R1	R1-1	A	Low		entire subdivision	3	31 Aces
Residential Area	R1	R1-2	B	Low		entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	

Table 2

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Bacteria and Viruses

PWSID 210435.001

Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Municipal or city parks (with green areas)	X4	X4-1	A	Low		Valley Street Park	3	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Low		Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	Low		On Fort Richardson Military Reservation	3	Electic transmission line

Table 3

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Nitrates and Nitrites

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Medium	1	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Medium	2	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Medium	3	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Medium	4	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Medium	5	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Medium	6	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Medium	7	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Medium	8	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Medium	9	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Medium	10	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Medium		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Medium		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Medium		along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Medium		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Medium		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Medium		along Cross Pointe	2	
Residential Area	R1	R1-1	A	Low		entire subdivision	3	31 Aces
Residential Area	R1	R1-2	B	Low		entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	

Table 3

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Nitrates and Nitrites

PWSID 210435.001

Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Municipal or city parks (with green areas)	X4	X4-1	A	Low		Valley Street Park	3	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Low		Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	Low		On Fort Richardson Military Reservation	3	Electic transmission line

Table 4

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Volatile Organic Chemicals

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Low	1	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Low	2	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Low	3	between Tenth and Eleventh	2	
Residential Area	R1	R1-1	A	Low	4	entire subdivision	3	31 Aces
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Low	4	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Low	5	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Low	6	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Low	7	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Low	8	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Low	9	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Low	10	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Low		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Low		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Low		along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Low		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Low		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Low		along Cross Pointe	2	
Residential Area	R1	R1-2	B	Low		entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	

Table 4

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Volatile Organic Chemicals

PWSID 210435.001

Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Low		Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	Low		On Fort Richardson Military Reservation	3	Electic transmission line

Table 5 **PWSID 210435.001**

Potential and Existing Sources of Contamination for Rangeview Trailer Court
Sources of Heavy Metals, Cyanide, and other Inorganic Chemicals

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Low	1	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Low	2	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Low	3	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Low	4	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Low	5	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Low	6	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Low	7	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Low	8	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Low	9	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Low	10	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Low		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Low		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Low		along Elaine	2	
Municipal or city parks (with green areas)	X4	X4-1	A	Low		Valley Street Park	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Low		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Low		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Low		along Cross Pointe	2	
Residential Area	R1	R1-1	A	Low		entire subdivision	3	31 Aces
Residential Area	R1	R1-2	B	Low		entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	

Table 5 **PWSID 210435.001**

Potential and Existing Sources of Contamination for Rangeview Trailer Court
Sources of Heavy Metals, Cyanide, and other Inorganic Chemicals

Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Low		Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	Low		On Fort Richardson Military Reservation	3	Electic transmission line

Table 6

Potential and Existing Sources of Contamination for Rangeview Trailer Court Sources of Synthetic Organic Chemicals

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Residential Area	R1	R1-1	A	Low	1	entire subdivision	3	31 Aces
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Low	2	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Low	3	between Cherry and Kathy	2	
Municipal or city parks (with green areas)	X4	X4-1	A	Low	4	Valley Street Park	3	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Low	5	between Tenth and Eleventh	2	
Residential Area	R1	R1-2	B	Low	6	entire subdivision	3	5 Acres
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Low	7	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Low	8	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Low	9	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Low	10	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Low		between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Low		between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Low		between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Low		along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Low		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Low		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Low		along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Low		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Low		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Low		along Cross Pointe	2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	

Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	
Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	

Table 7

Potential and Existing Sources of Contamination for Rangeview Trailer Court
Sources of Other Synthetic Organic Chemicals

PWSID 210435.001

Contaminant Source Type	Contaminant Source ID	CS ID tag	Zone	Risk Ranking for Analysis	Overall Rank after Analysis	Location	Map	Comments
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-4	A	Low	1	off Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-11	A	Low	2	between Cherry and Kathy	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-5	A	Low	3	between Tenth and Eleventh	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-1	A	Low	4	off Mason	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-2	A	Low	5	along Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-3	A	Low	6	along Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-6	A	Low	7	between Friendly and Valley	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-7	A	Low	8	between Eleventh and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-8	A	Low	9	between Valley and Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-9	A, B	Low	10	along Twelfth	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-10	A	Low		between Mason and Rangeview	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-12	A	Low		between Cherry and Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-13	A	Low		along Elaine	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-14	B	Low		along Lalande	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-15	B	Low		along Cross Pointe	2	
Domestic wastewater collection systems (sewer lines or lift stations)	D1	D1-16	B	Low		along Cross Pointe	2	
Residential Area	R1	R1-1	A	Low		entire subdivision	3	31 Aces
Residential Area	R1	R1-2	B	Low		entire subdivision	3	5 Acres
Highways and roads, paved (cement or asphalt)	X20	X20-1	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-2	A	Low		Friendly	2	
Highways and roads, paved (cement or asphalt)	X20	X20-3	A	Low		Valley	2	

Table 7

Potential and Existing Sources of Contamination for Rangeview Trailer Court
Sources of Other Synthetic Organic Chemicals

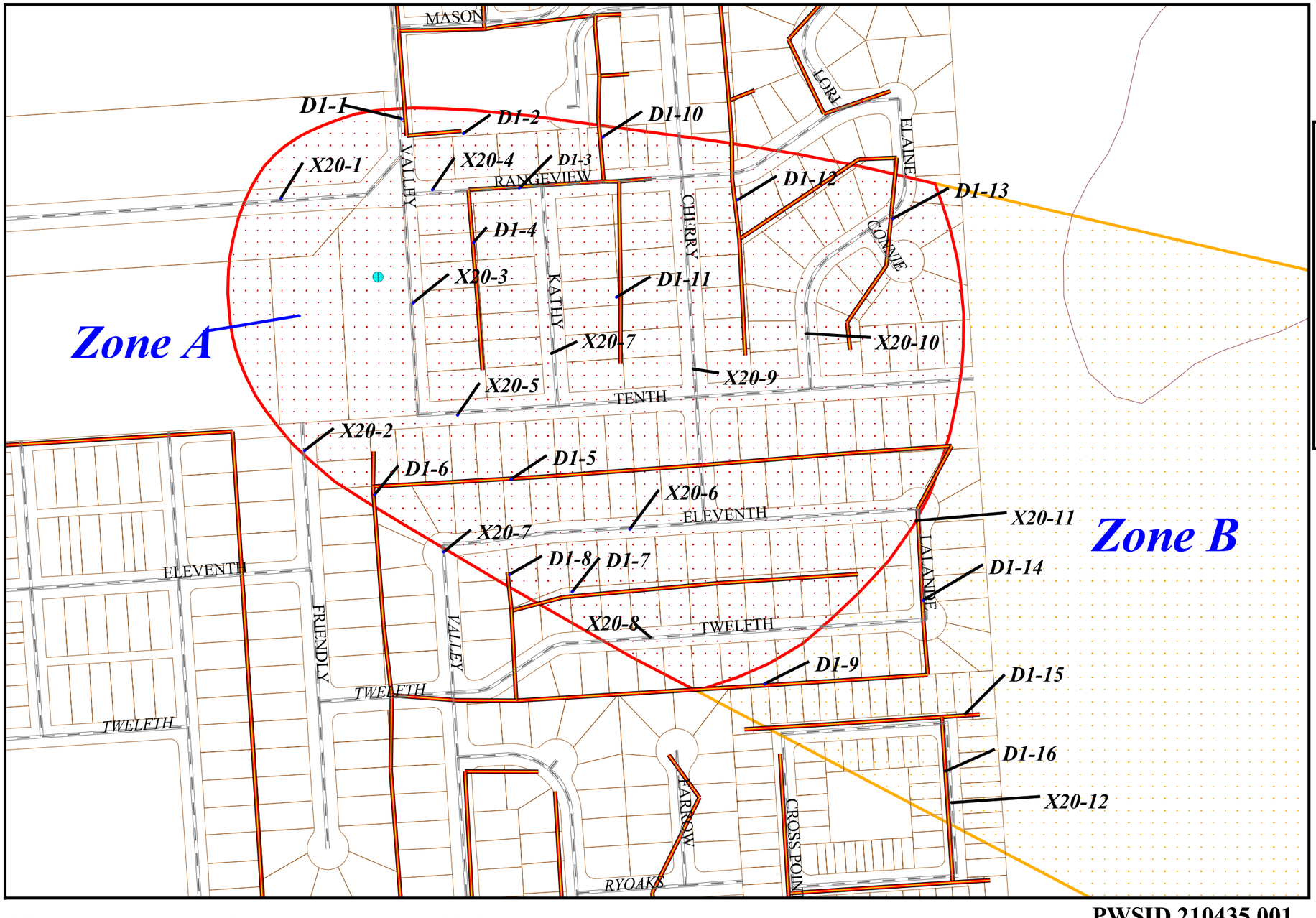
PWSID 210435.001

Highways and roads, paved (cement or asphalt)	X20	X20-4	A	Low		Rangeview	2	
Highways and roads, paved (cement or asphalt)	X20	X20-5	A	Low		Tenth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-6	A	Low		Eleventh	2	
Highways and roads, paved (cement or asphalt)	X20	X20-7	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-8	A	Low			2	
Highways and roads, paved (cement or asphalt)	X20	X20-9	A	Low		Kathy	2	
Highways and roads, paved (cement or asphalt)	X20	X20-10	A, B	Low		Twelfth	2	
Highways and roads, paved (cement or asphalt)	X20	X20-11	A	Low		Cherry	2	
Highways and roads, paved (cement or asphalt)	X20	X20-12	A	Low		Elaine	2	
Highways and roads, paved (cement or asphalt)	X20	X20-13	B	Low		Lalande	2	
Highways and roads, paved (cement or asphalt)	X20	X20-14	B	Low		Crosspointe	2	
Public utility easements/corridors	X42	X42-1	B	Low		Along eastern land parcels adjoining Fort Richardson Military Reservation	3	Two nautural gas pipelines
Public utility easements/corridors	X42	X42-2	B	Low		On Fort Richardson Military Reservation	3	Electic transmission line

APPENDIX C

Rangeview Trailer Court
Drinking Water Protection Area
and Potential & Existing Contaminant Sources

Rangeview Trailer Court Drinking Water Protection Area and Potential and Existing Sources of Contamination



Legend

- Rangeview Trailer Court Well
- Elevation contours
- Roads
- Sewers (D1)
- MOA Land Parcels

Zone A Protection Area

- Several Months Travel Time

Zone B Protection Area

- Less Than 2 Years Travel Time

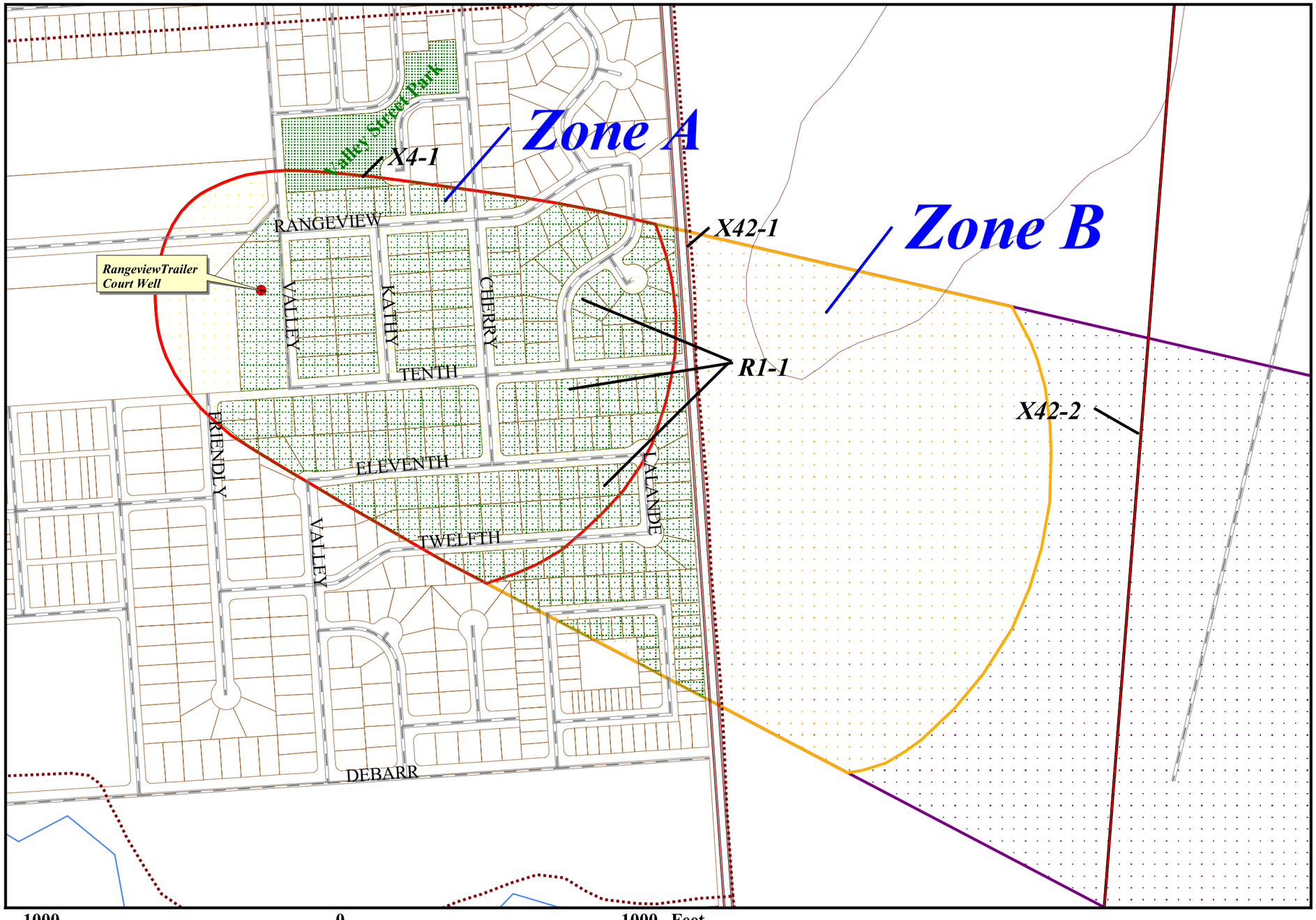
500 0 500 Feet

PWSID 210435.001

N W E S

Map 2

Rangeview Trailer CourtDrinking Water Protection Area and Potential and Existing Sources of Contamination



Legend

- Rangeview Trailer Court Well
- Elevation contours
- Streams
- Trails (X46)
- Public utility eastements/corridors (X42)
- MOA Land Parcels
- Residential lawns (R1)
- Parks (X4)

Zone A Protection Area
- Several Months Travel Time

Zone B Protection Area
- Less Than 2 Years Travel Time

Zone C Protection Area
- Less Than 5 Years Travel Time

PWSID 210435.001

Map 3

N W E S

APPENDIX D

Vulnerability Analysis for Rangeview Trailer Court Public Drinking Water Source

Chart 1. Susceptibility of the wellhead – Rangeview Trailer Court

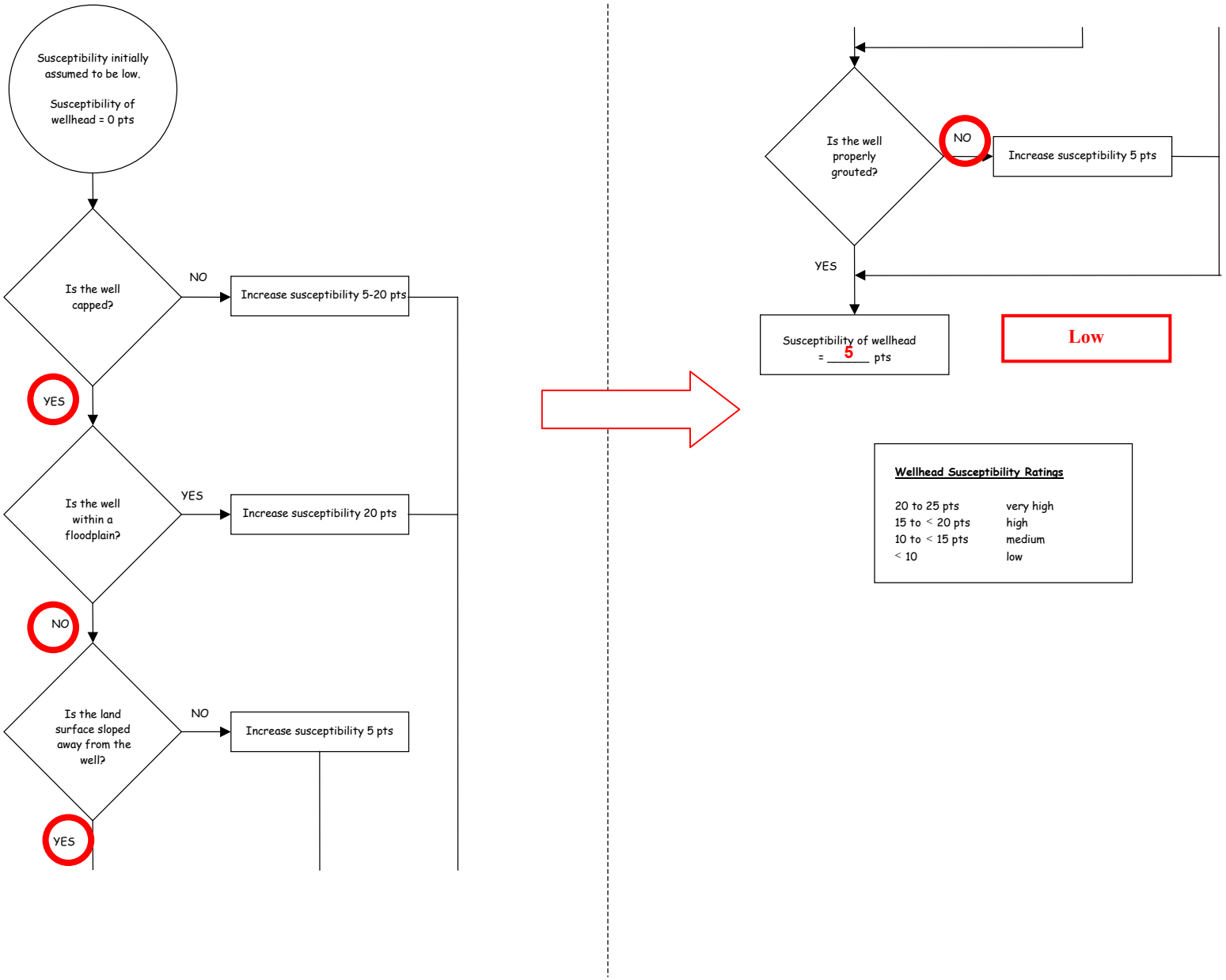
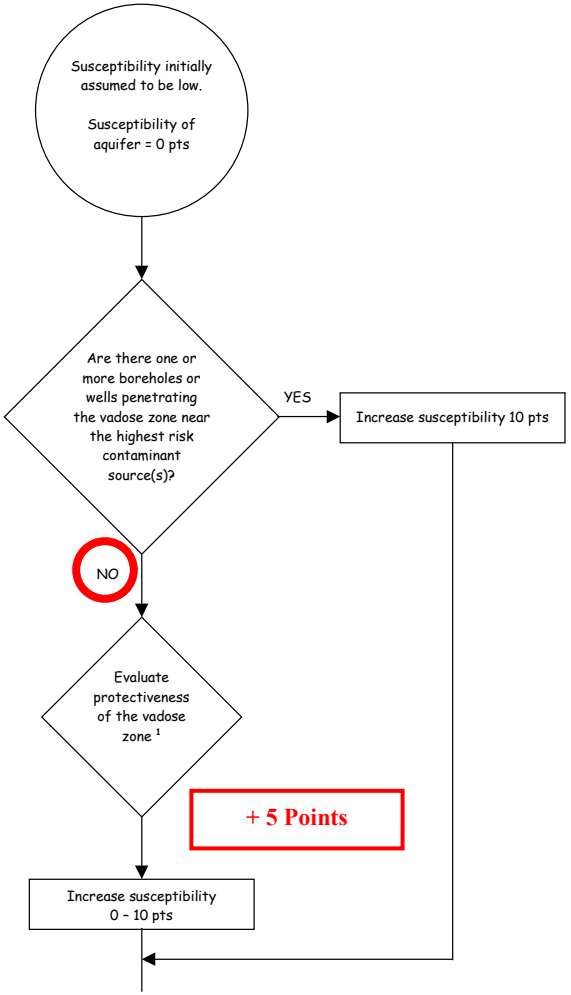
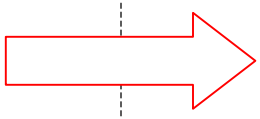
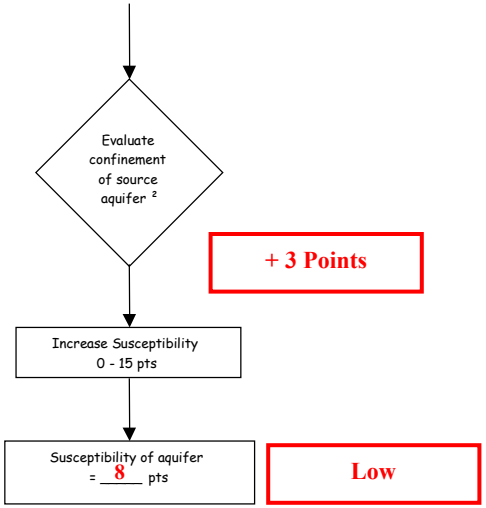


Chart 2. Susceptibility of the aquifer – Rangeview Trailer Court







1. **Protectiveness of the Vadose Zone**

- net recharge (function of precipitation, slope of land surface, & permeability of soils)
  [0 – 10 pts; 50% weight]
- depth to water table (unconfined aquifer) or top of confining layer (confined aquifer)
  [interpolate linearly: 100' – 20', 0 – 5 pts; 20' – 0', 5 – 10 pts; 50% weight]

Recharge (20-30 inches per year, base of Chugach Mountains, and silty and sandy gravel)
6/10 = 3 Points
Depth to top of confining unit (32 feet to gravelly clay)
4/10 = 2 Point

Protectiveness of the Vadose Zone Total = **5/10 Points**

2. **Degree of Confinement**

- confined verses unconfined aquifer
  [confined: K ≤ 10^{-6} cm/s, minimum thickness of at least one layer = 20 ft, interpolate linearly 100' – 20', 0 – 10 pts; unconfined = 15 pts; 65% weight]
- density of boreholes and wells penetrating the confining layer (confined aquifer) or the water table (unconfined aquifer)
  [confined: 0 – 15 pts; unconfined = 15 pts; 35% weight]

Confinement (57 feet of clay and gravelly clay) 5/15 = 3 Points
Density of boreholes/wells 0/15 = 0 Points

Degree of Confinement Total = **3/15 Points**

Aquifer Susceptibility Ratings

20 to 25 pts	very high
15 to < 20 pts	high
10 to < 15 pts	medium
< 10	low

Low

Chart 3. Contaminant risks for Rangeview Trailer Court – Bacteria & Viruses

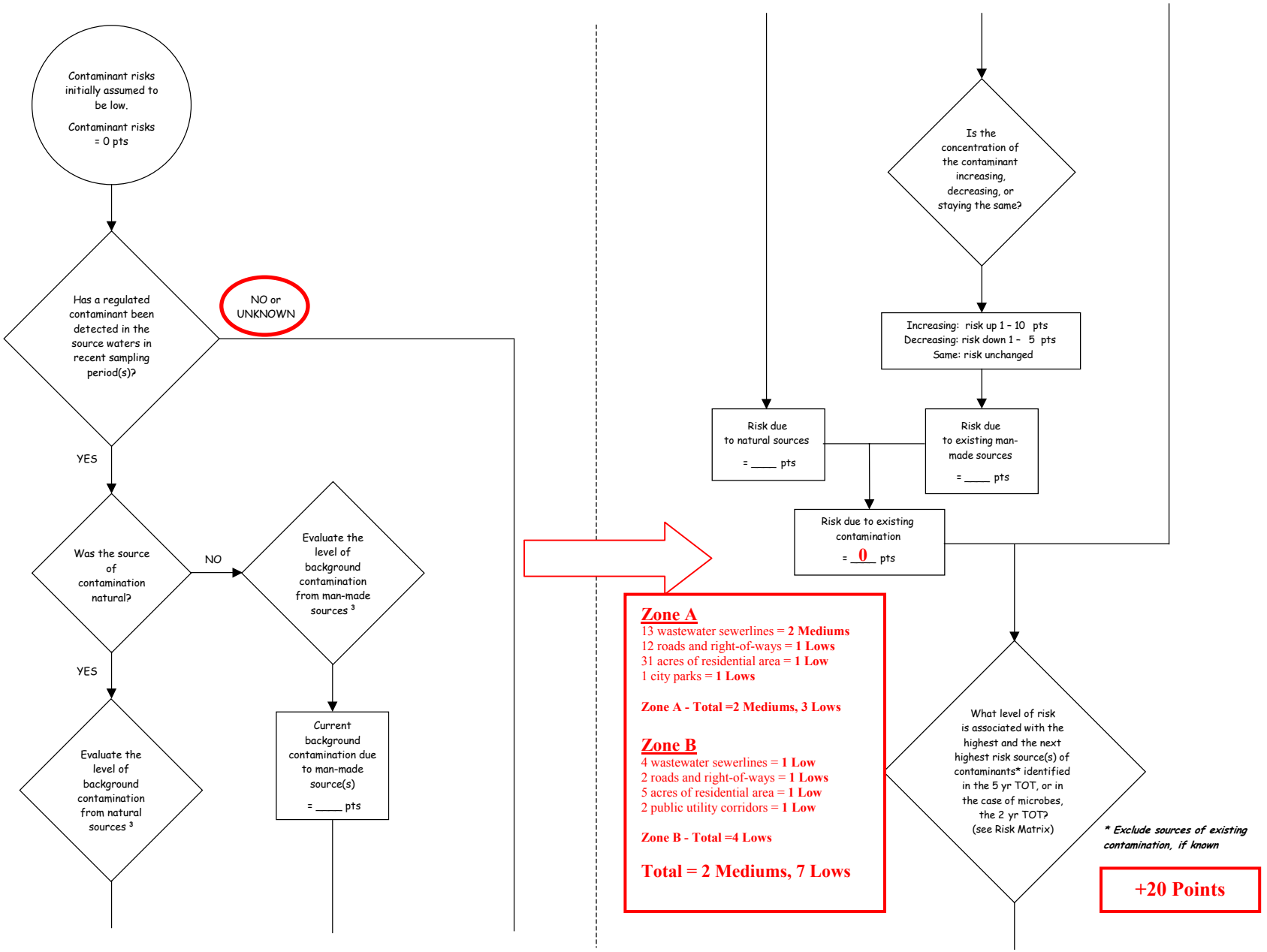


Chart 3. Contaminant risks for Rangeview Trailer Court – Bacteria & Viruses (Continued)

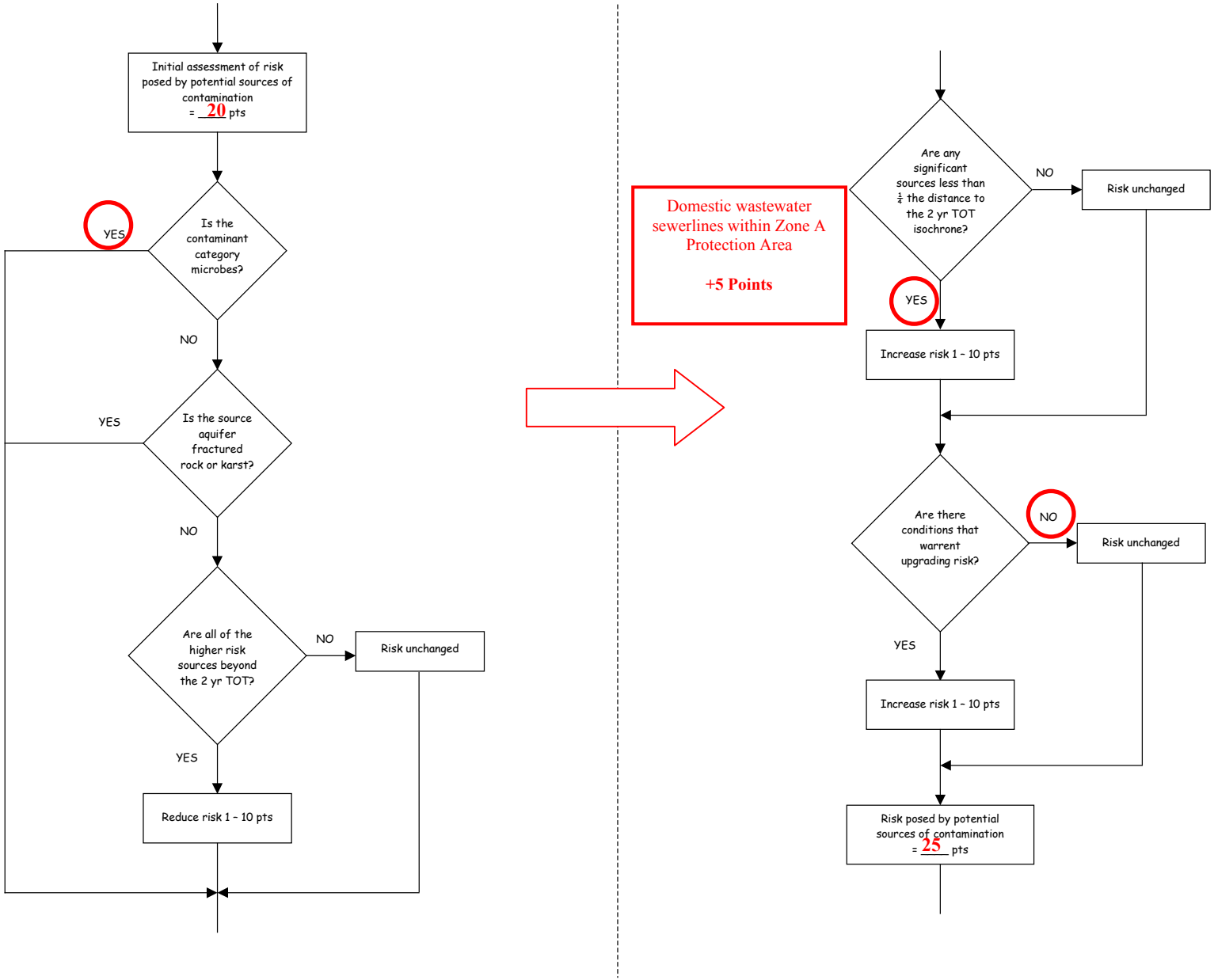
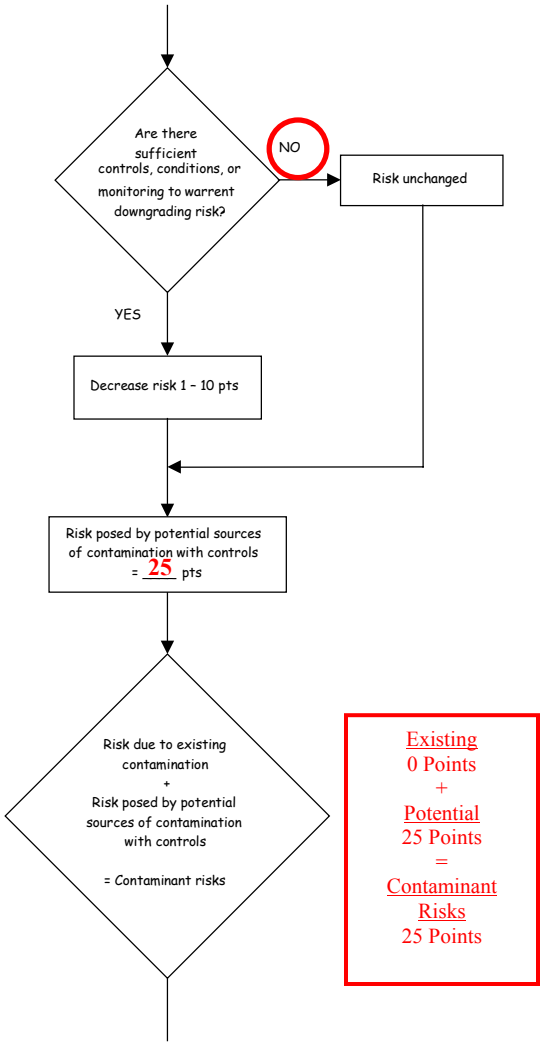


Chart 3. Contaminant risks for Rangeview Trailer Court – Bacteria & Viruses (Continued)



Existing
0 Points
+
Potential
25 Points
=
Contaminant
Risks
25 Points

* *Truncate risk at 50 pts*

Contaminant risks*
= 25 pts

Medium

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Table 1. Risk Matrix for Contaminant Sources for Rangeview Trailer Court – Bacteria & Viruses

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	2 Mediums, 7 Lows	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

Chart 4. Vulnerability analysis for Rangeview Trailer Court– Bacteria & Viruses

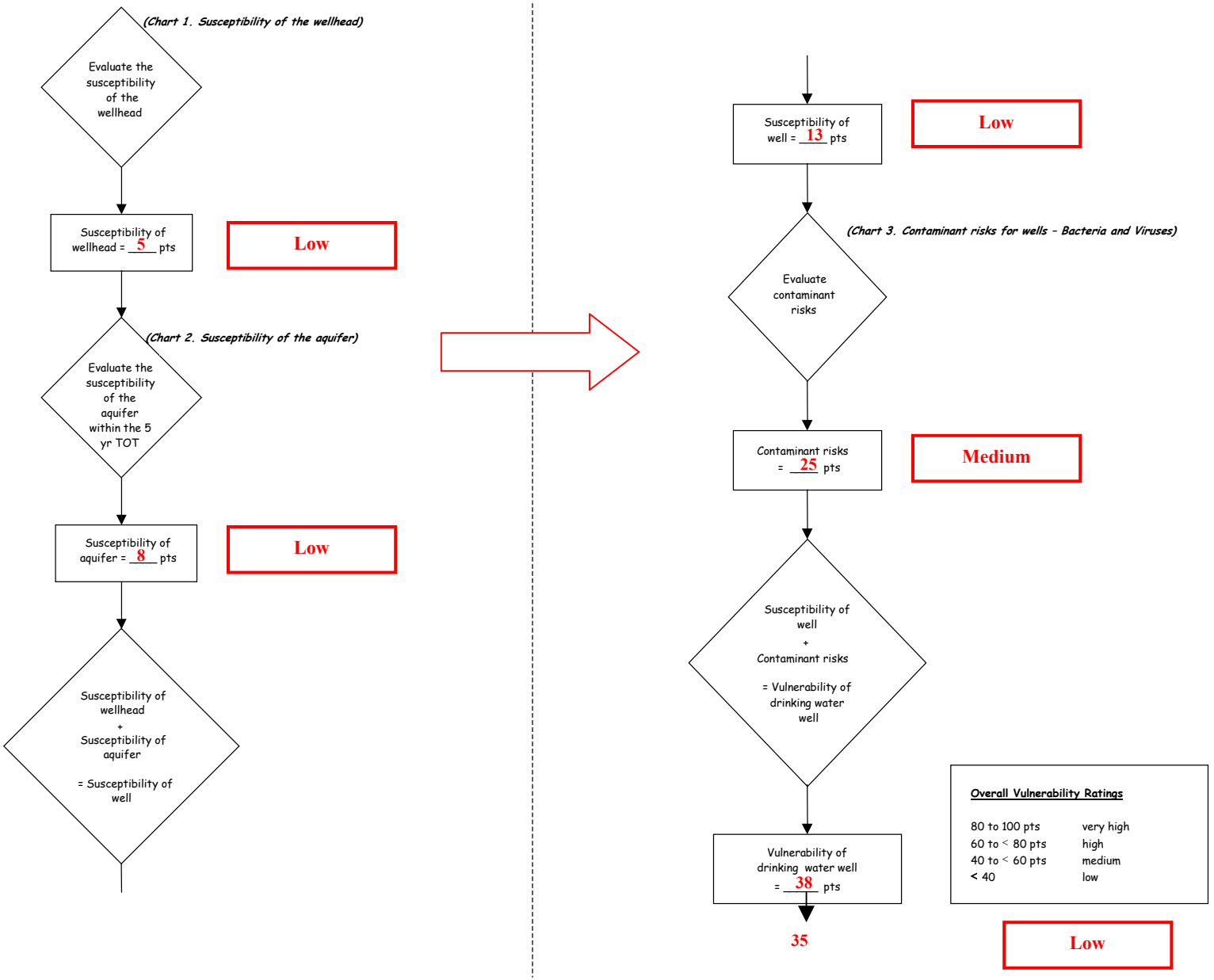


Chart 5. Contaminant risks for Rangeview Trailer Court – Nitrates & Nitrites

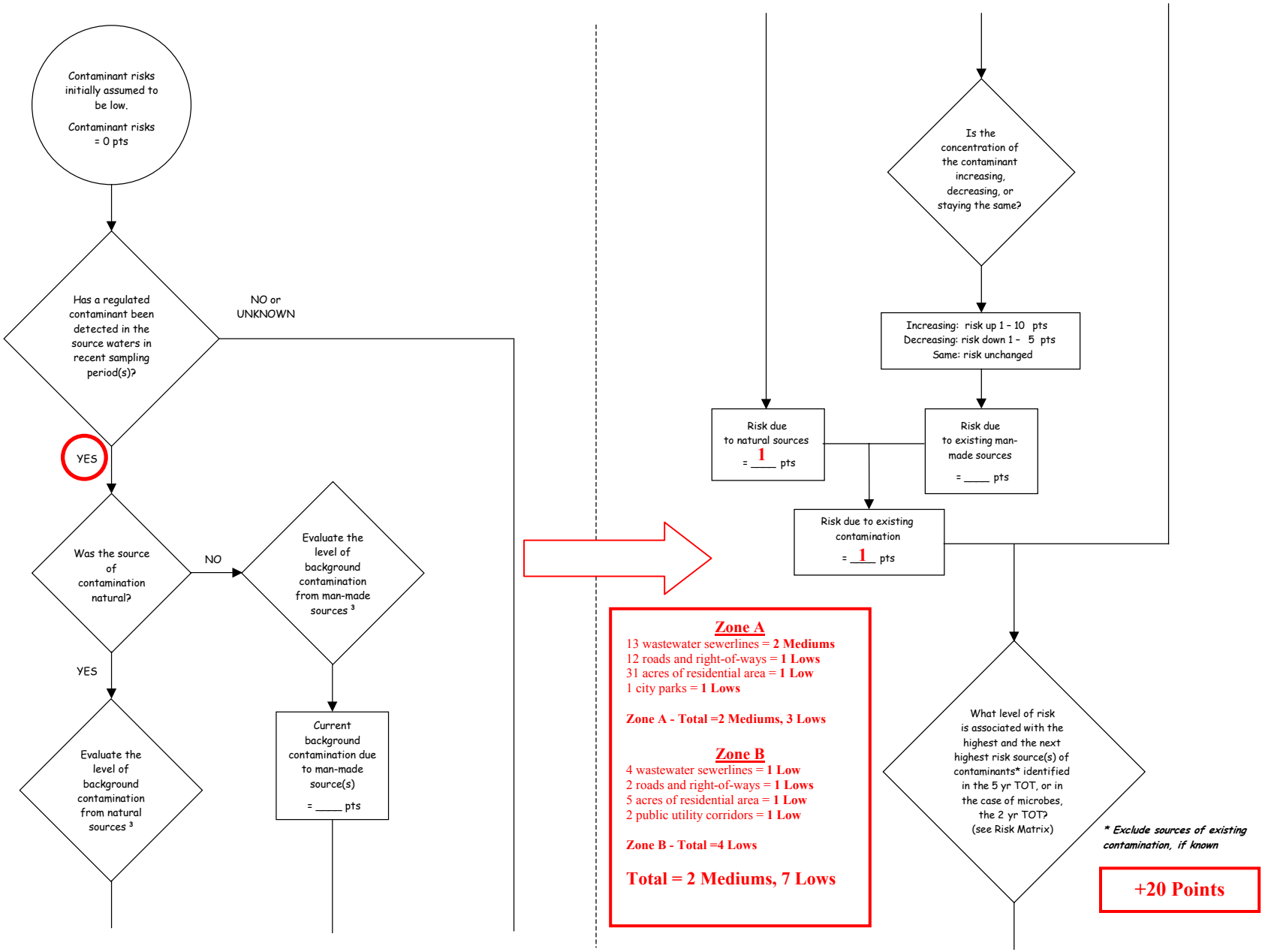


Chart 5. Contaminant risks for Rangeview Trailer Court – Nitrates & Nitrites (Continued)

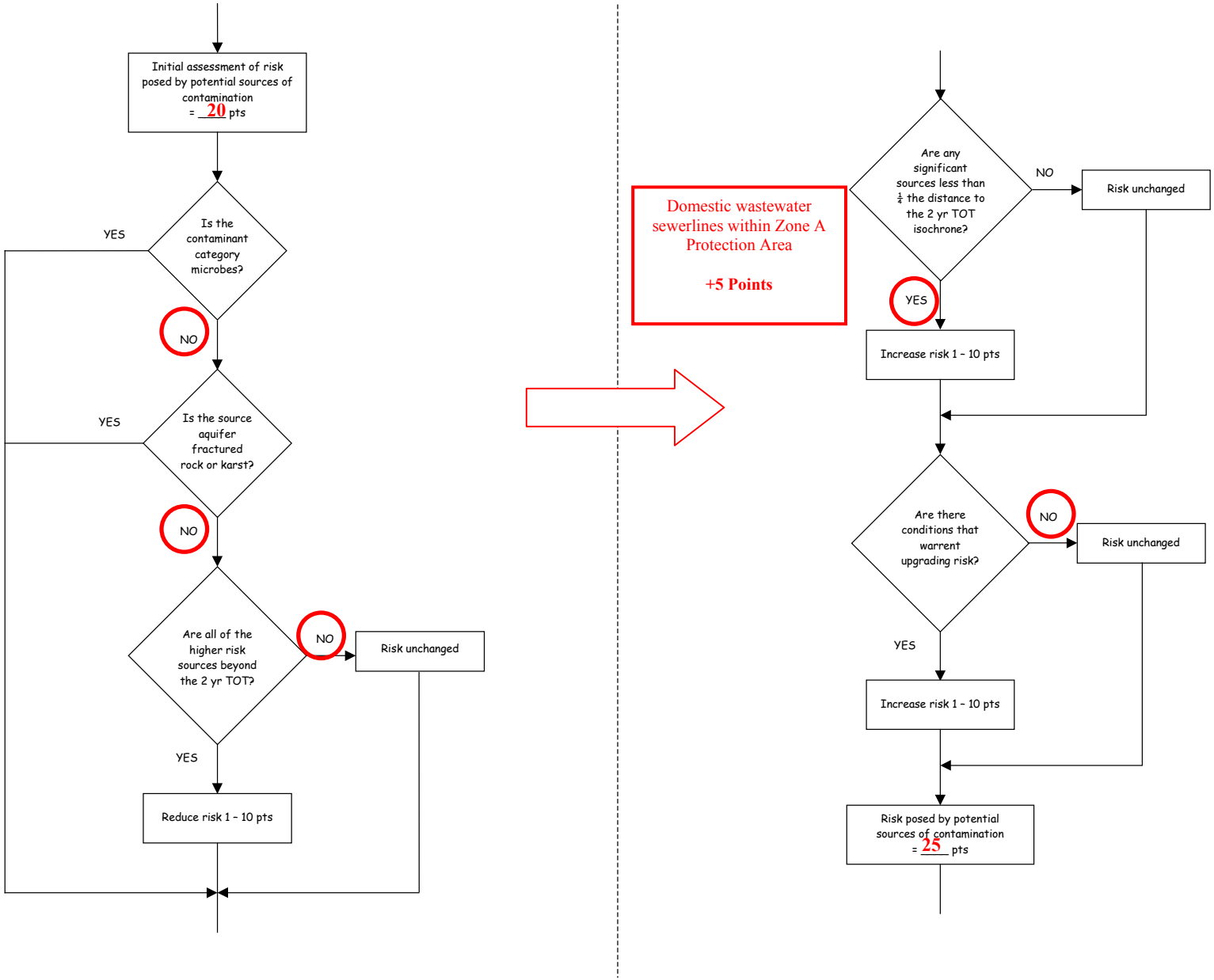
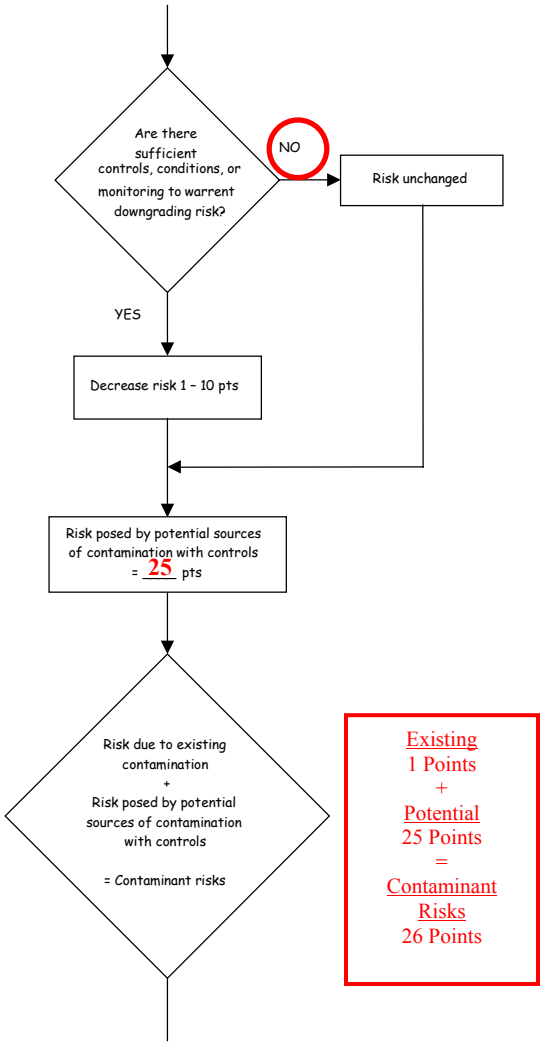
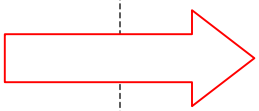
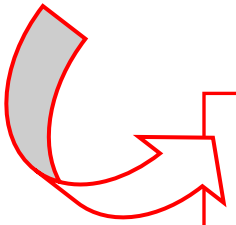


Chart 5. Contaminant risks for Rangeview Trailer Court – Nitrates & Nitrites (Continued)



Existing
1 Points
+
Potential
25 Points
=
Contaminant
Risks
26 Points

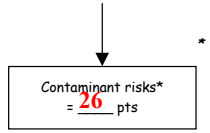




Nitrate
No Detect on 12/22/00
➔ 0.230 mg/L on 7/31/00
No Detect on 11/17/99
No Detect mg/L on 12/18/98

Maximum Contaminant Level (MCL)
= 10mg/L
0.230/10
= 0.023 or 2.3% of MCL

+1 Point



** Truncate risk at 50 pts*

Medium

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Table 2. Risk Matrix for Contaminant Sources for Rangeview Trailer Court – Nitrates & Nitrites

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	**4 Mediums, 10 Lows**	**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

Chart 6. Vulnerability analysis for Rangeview Trailer Court – Nitrates and Nitrites

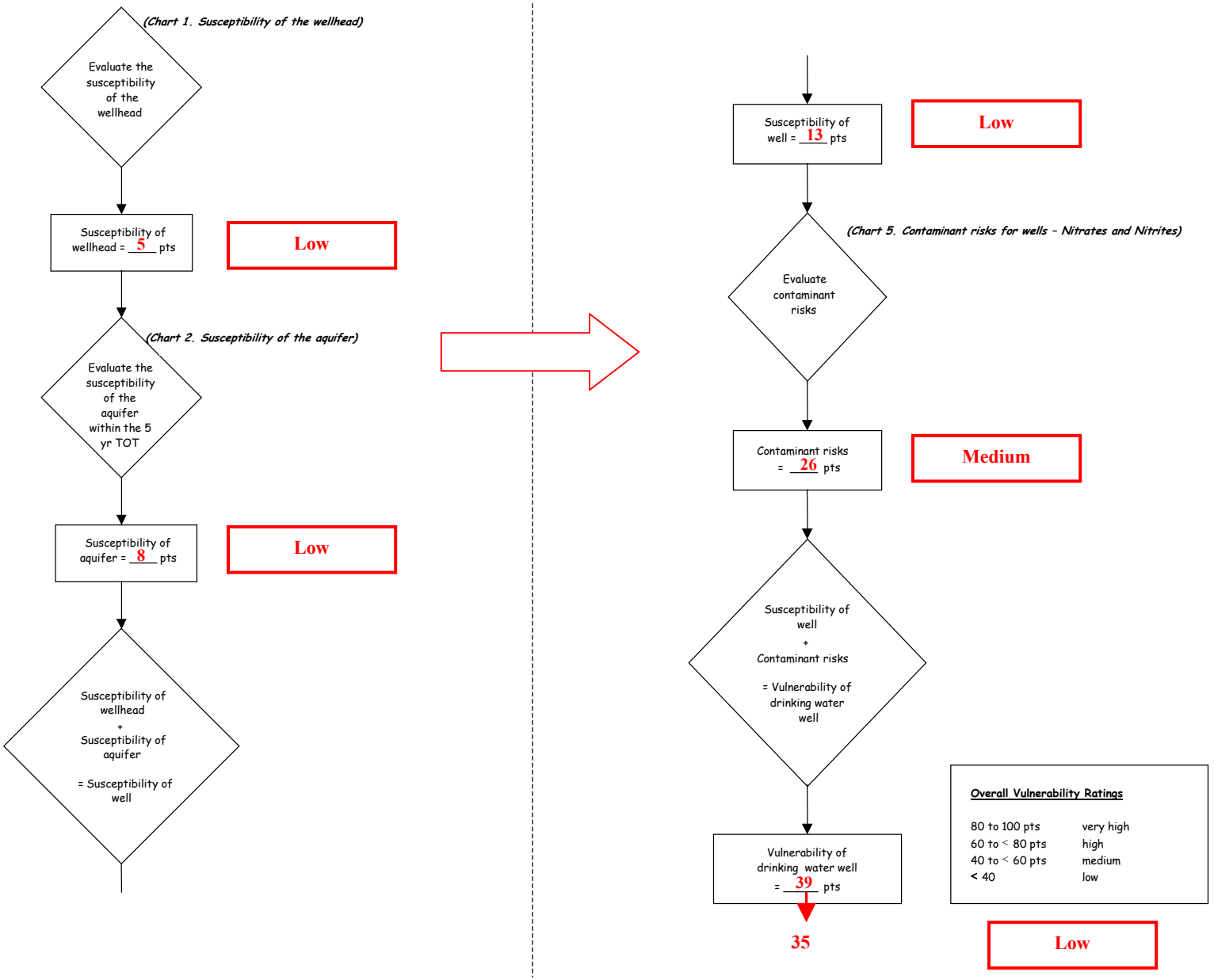


Chart 7. Contaminant risks for Rangeview Trailer Court– Volatile Organic Chemicals

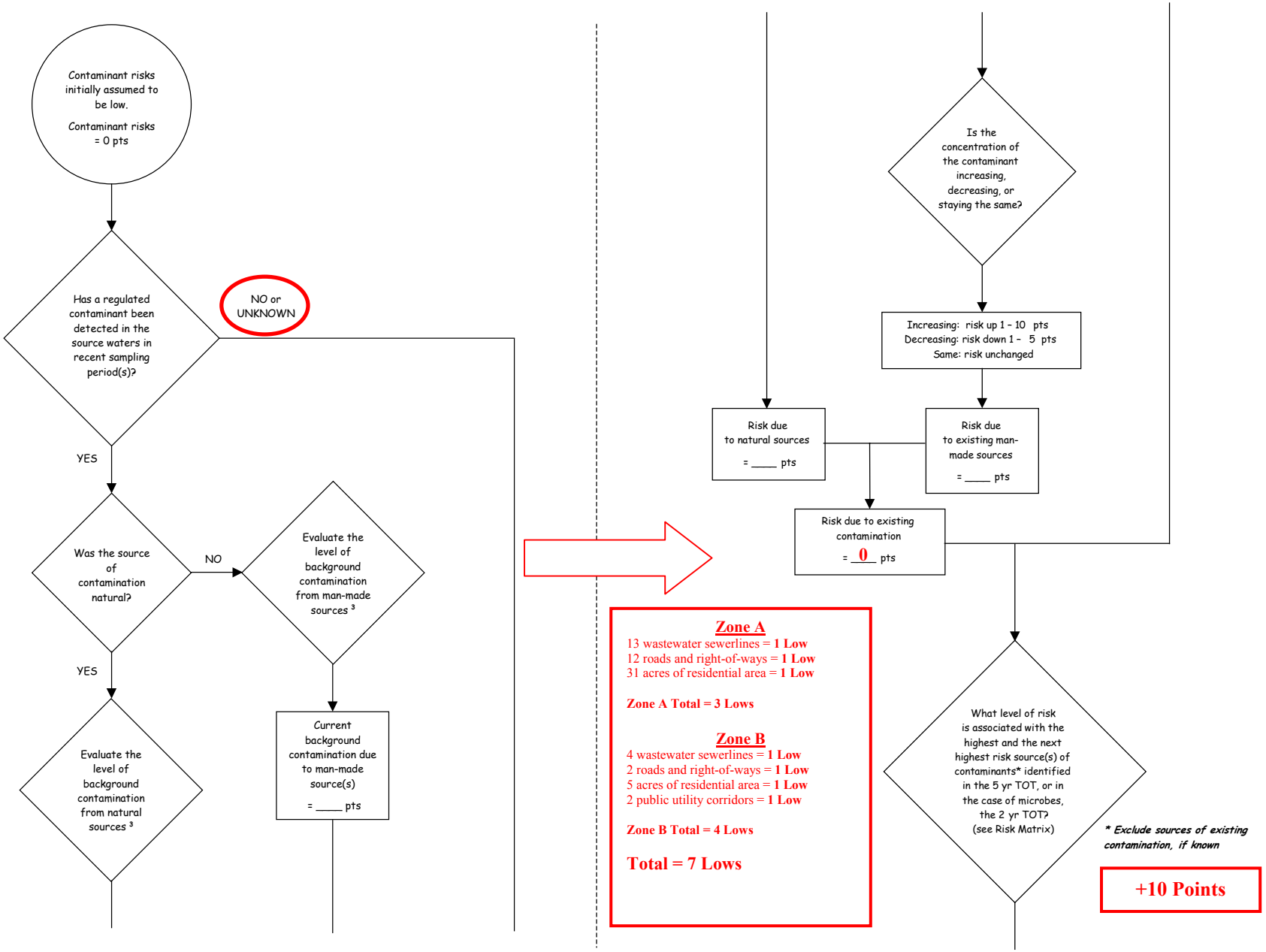


Chart 7. Contaminant risks for Rangeview Trailer Court– Volatile Organic Chemicals (Continued)

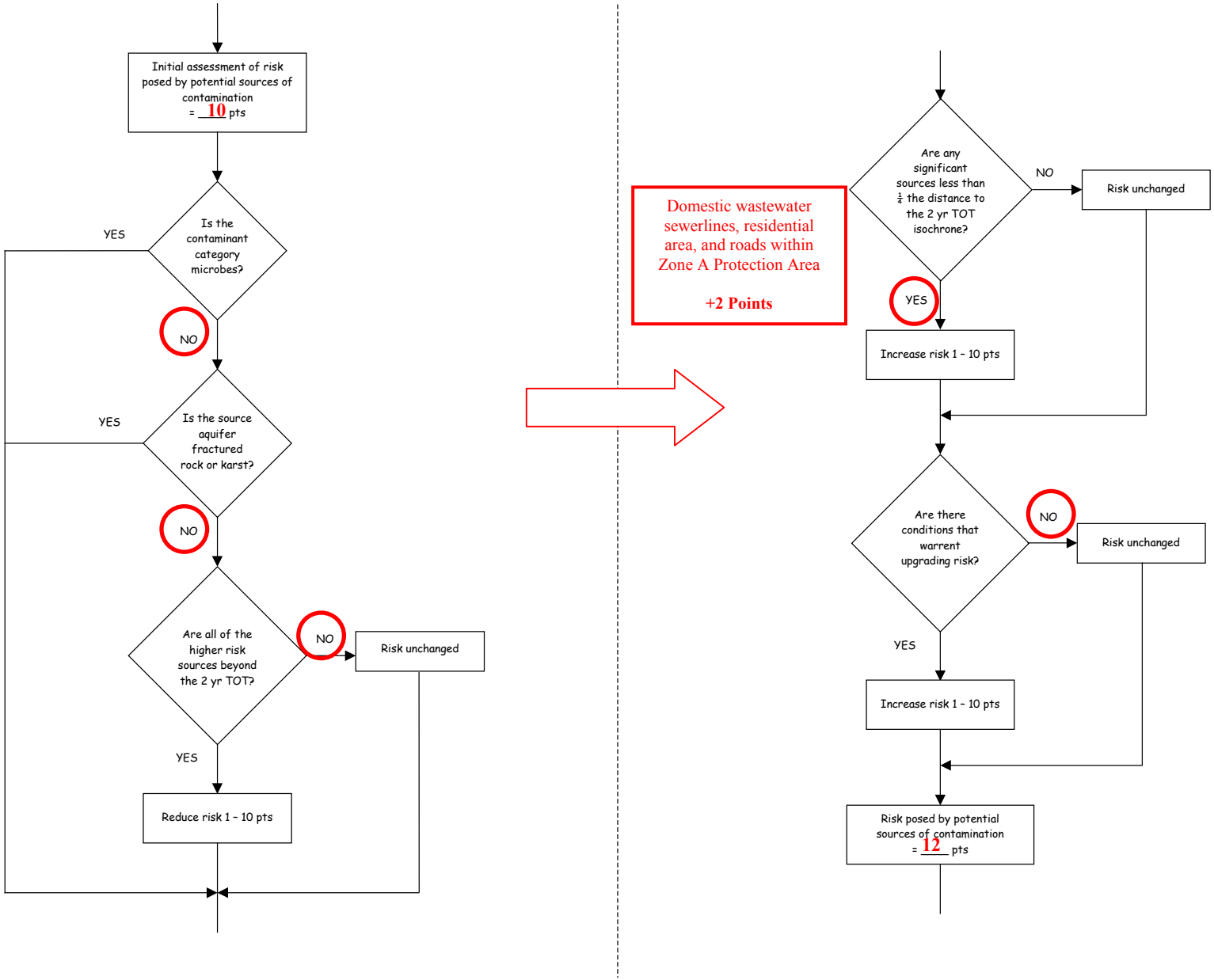
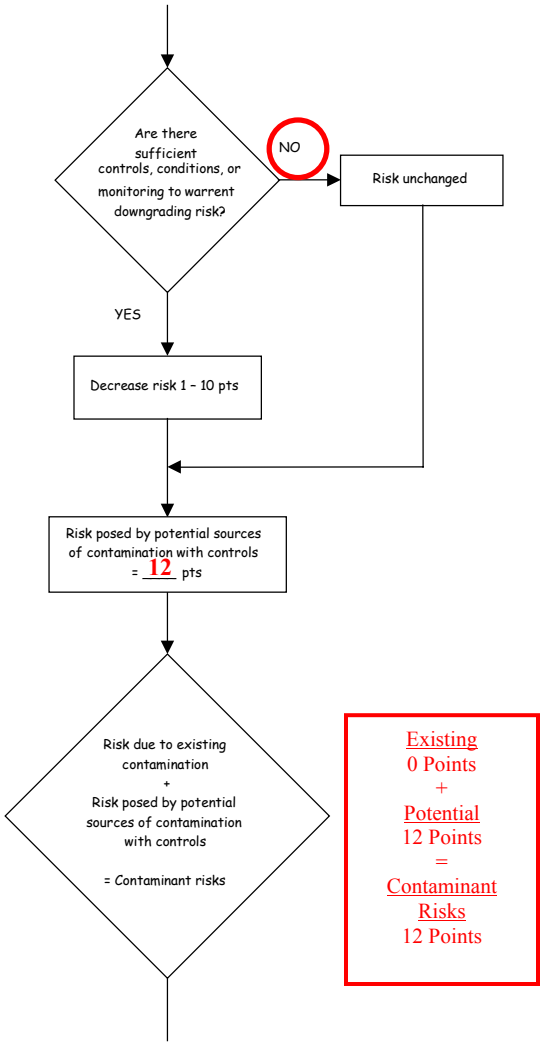


Chart 7. Contaminant risks for Rangeview Trailer Court– Volatile Organic Chemicals (Continued)



Existing
0 Points
+
Potential
12 Points
=
Contaminant
Risks
12 Points

* *Truncate risk at 50 pts*

Contaminant risks*
= 12 pts

Low

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Table 3. Risk Matrix for Contaminant Sources for Rangeview Trailer Court– Volatile Organic Chemicals

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	7 Lows	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

Chart 8. Vulnerability analysis for Rangeview Trailer Court– Volatile Organic Chemicals

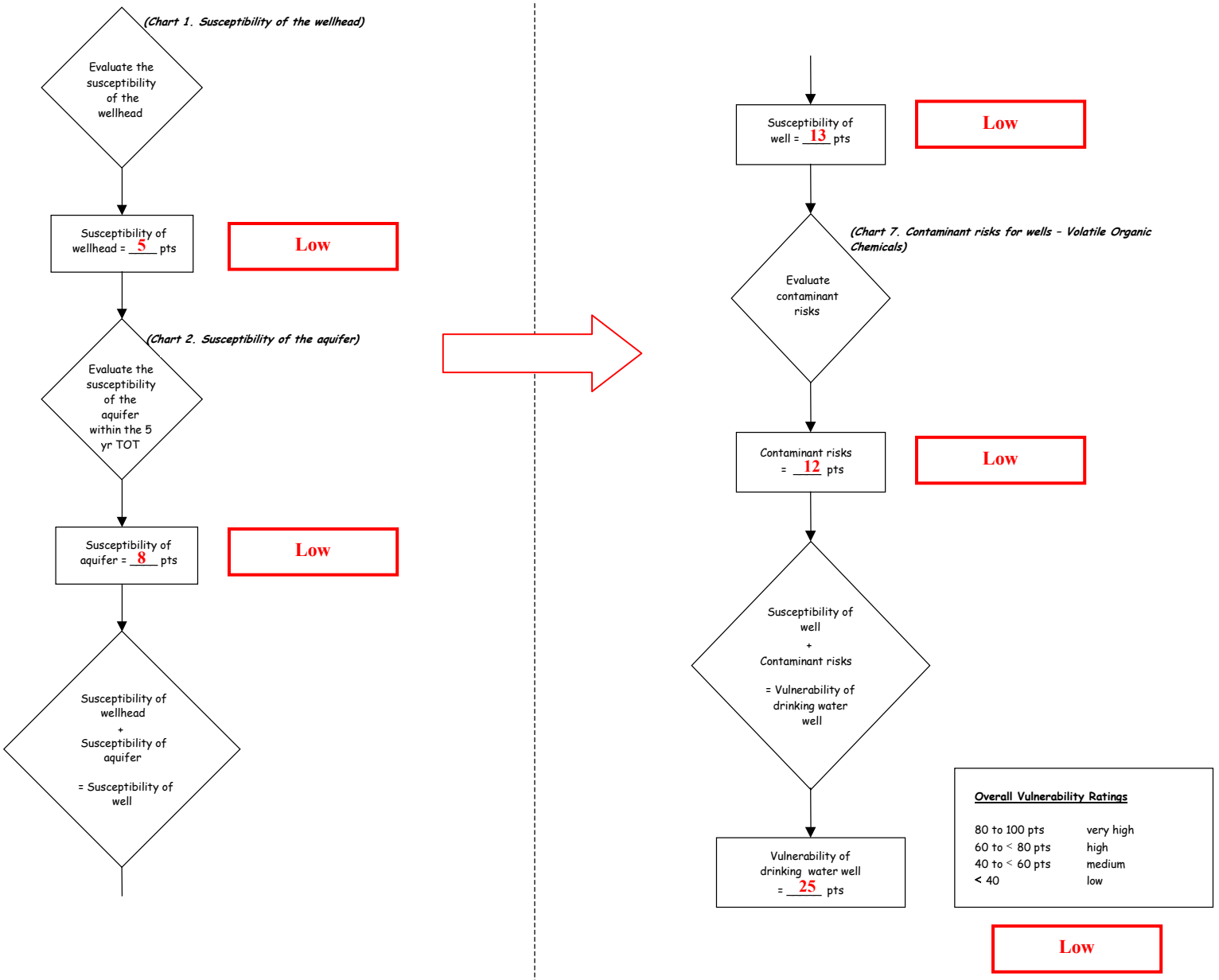


Chart 9. Contaminant risks for Rangeview Trailer Court– Heavy Metals, Cyanide, and other Inorganic Chemicals

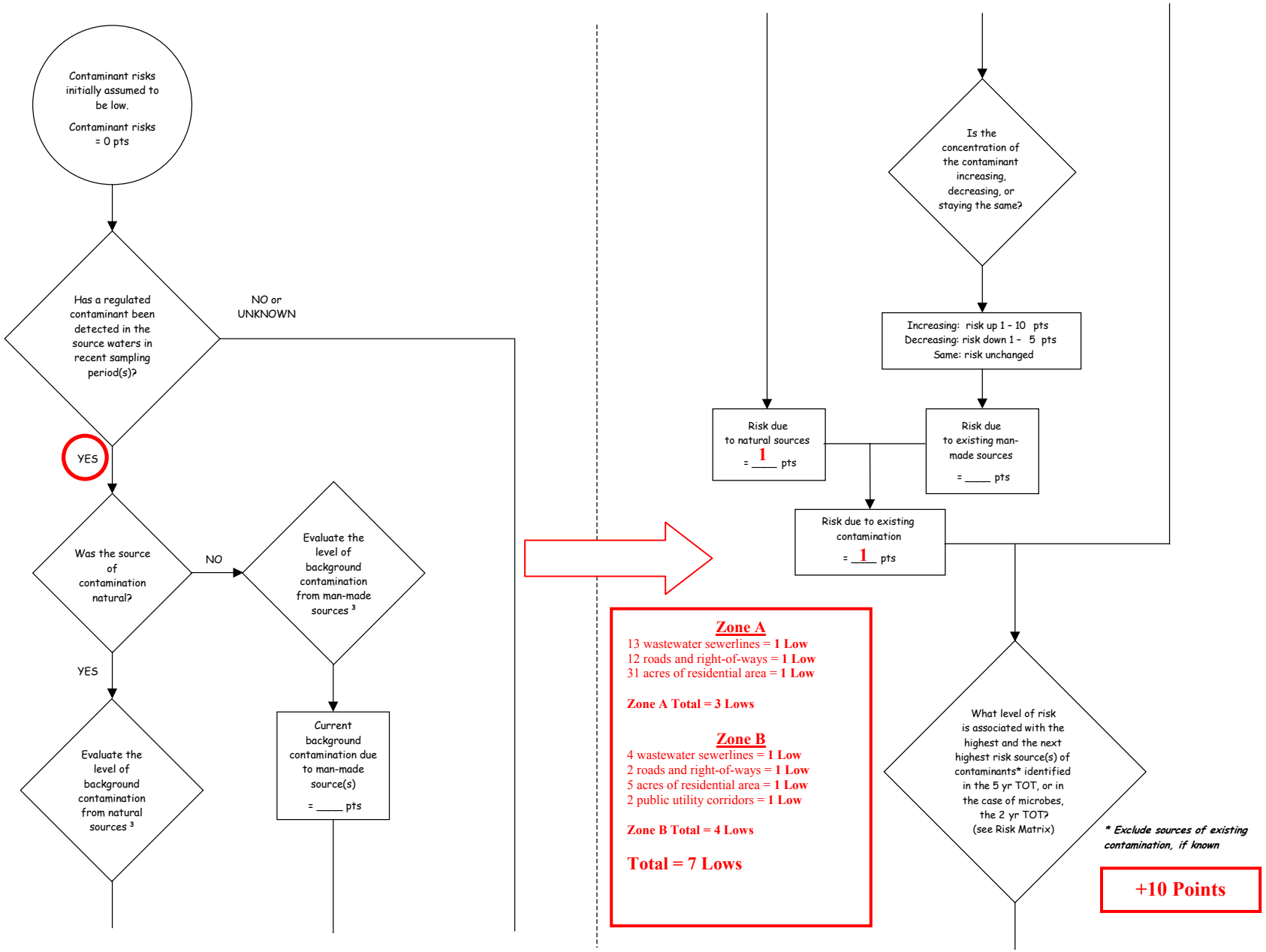


Chart 9. Contaminant risks for Rangeview Trailer Court– Heavy Metals, Cyanide, and other Inorganic Chemicals (Continued)

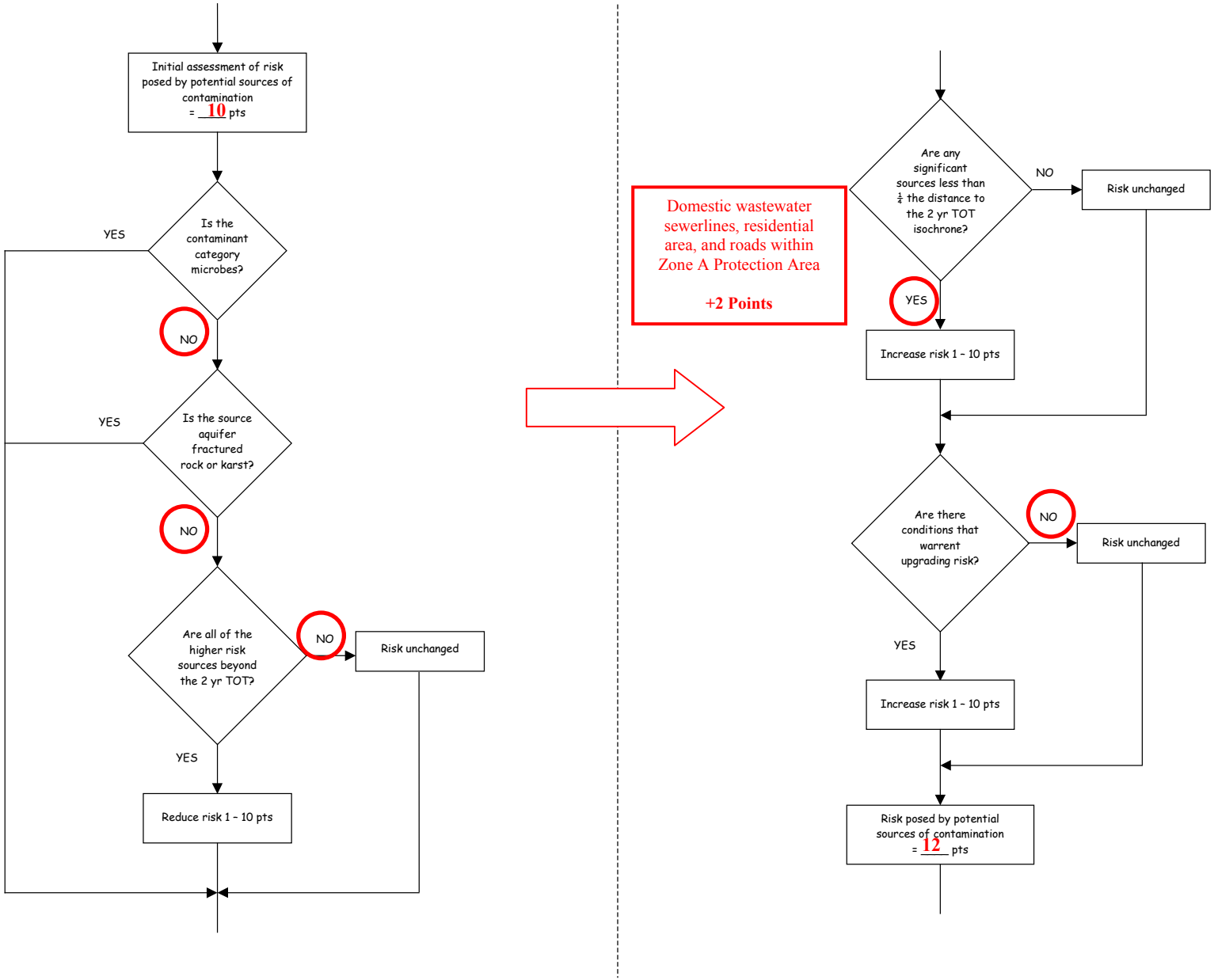
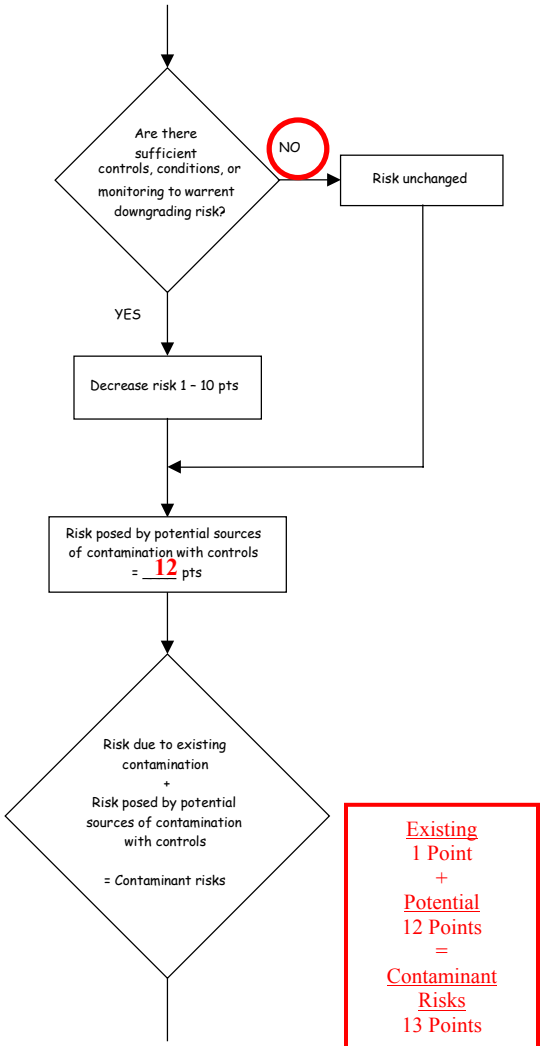


Chart 9. Contaminant risks for Rangeview Trailer Court– Heavy Metals, Cyanide, and other Inorganic Chemicals (Continued)



Existing
1 Point
+
Potential
12 Points
=
Contaminant
Risks
13 Points

* *Truncate risk at 50 pts*

Contaminant risks*
= 13 pts

Low

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Barium

0.061 mg/L on 12/5/95

Maximum Contaminant Level (MCL)
= 0.2mg/L
0.061/2
= 0.0305 or 3% of MCL

+1 Point

Existing contamination increases risk by 1 Point

Table 4. Risk Matrix for Contaminant Sources for Rangeview Trailer Court– Heavy Metals, Cyanide, and other Inorganic Chemicals

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	**7 Lows**	**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	

Chart 10. Vulnerability analysis for Rangeview Trailer Court– Heavy Metals, Cyanide, and other Inorganic Chemicals

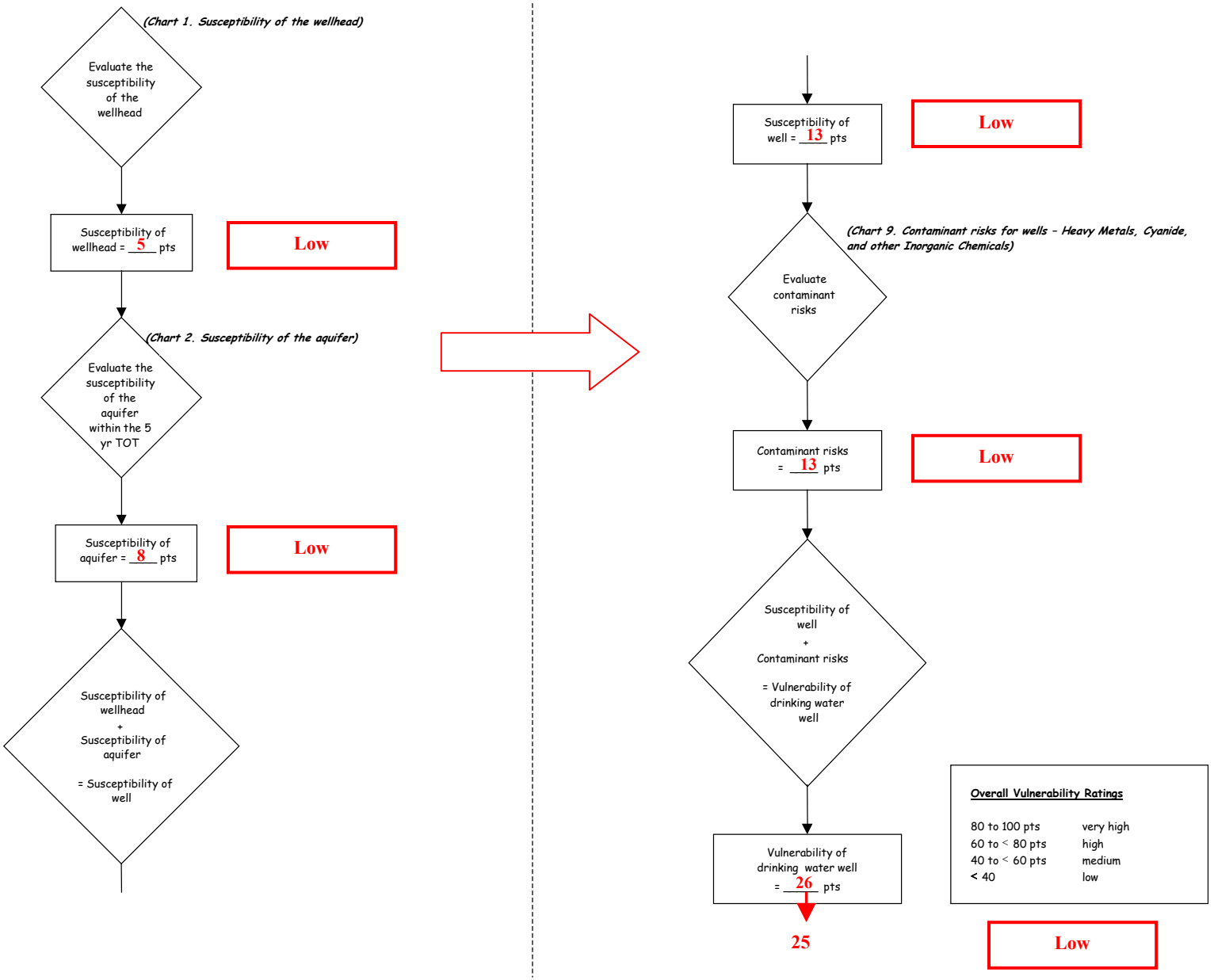


Chart 11. Contaminant risks for Rangeview Trailer Court– Synthetic Organic Chemicals

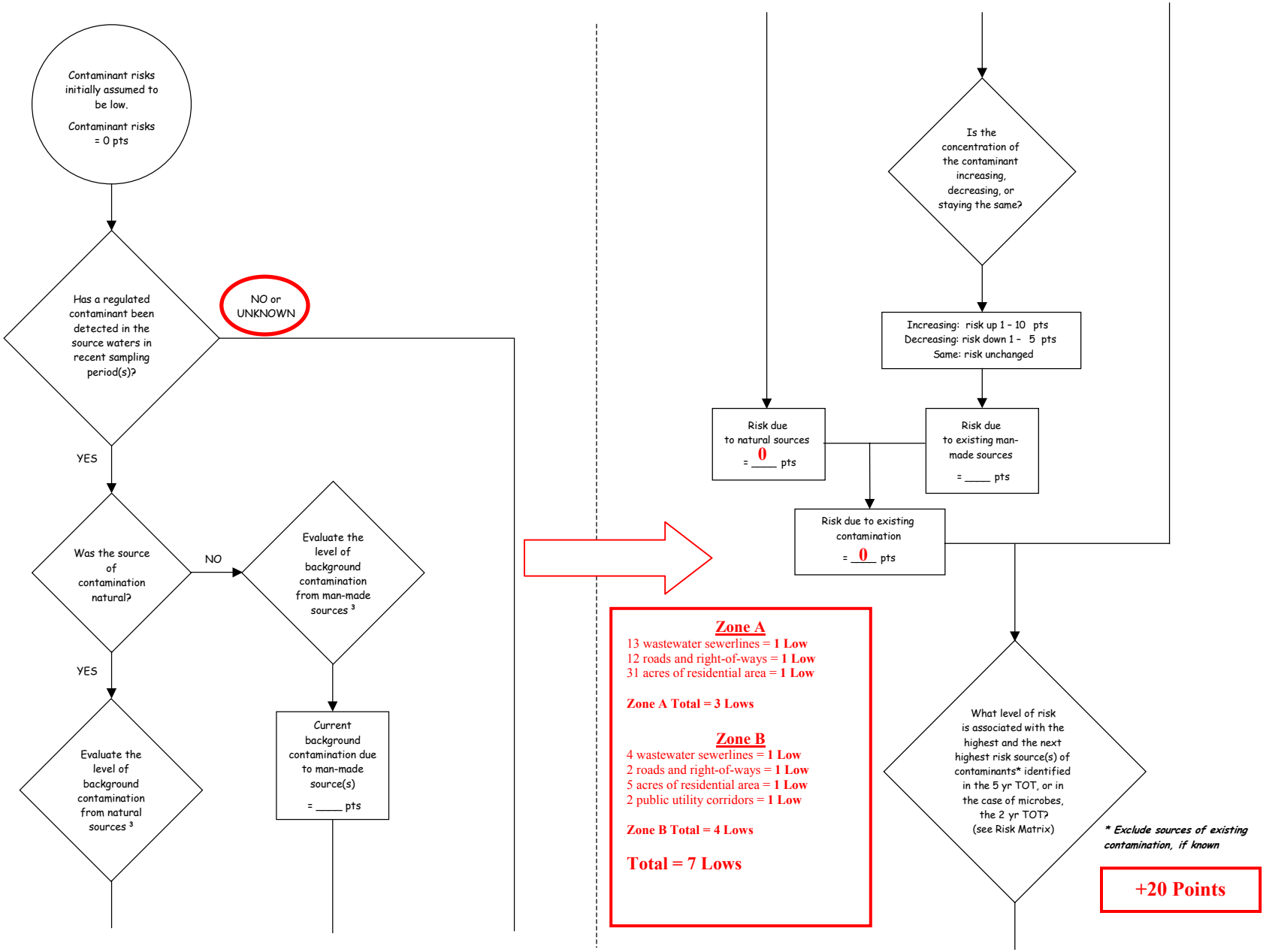


Chart 11. Contaminant risks for Rangeview Trailer Court– Synthetic Organic Chemicals (Continued)

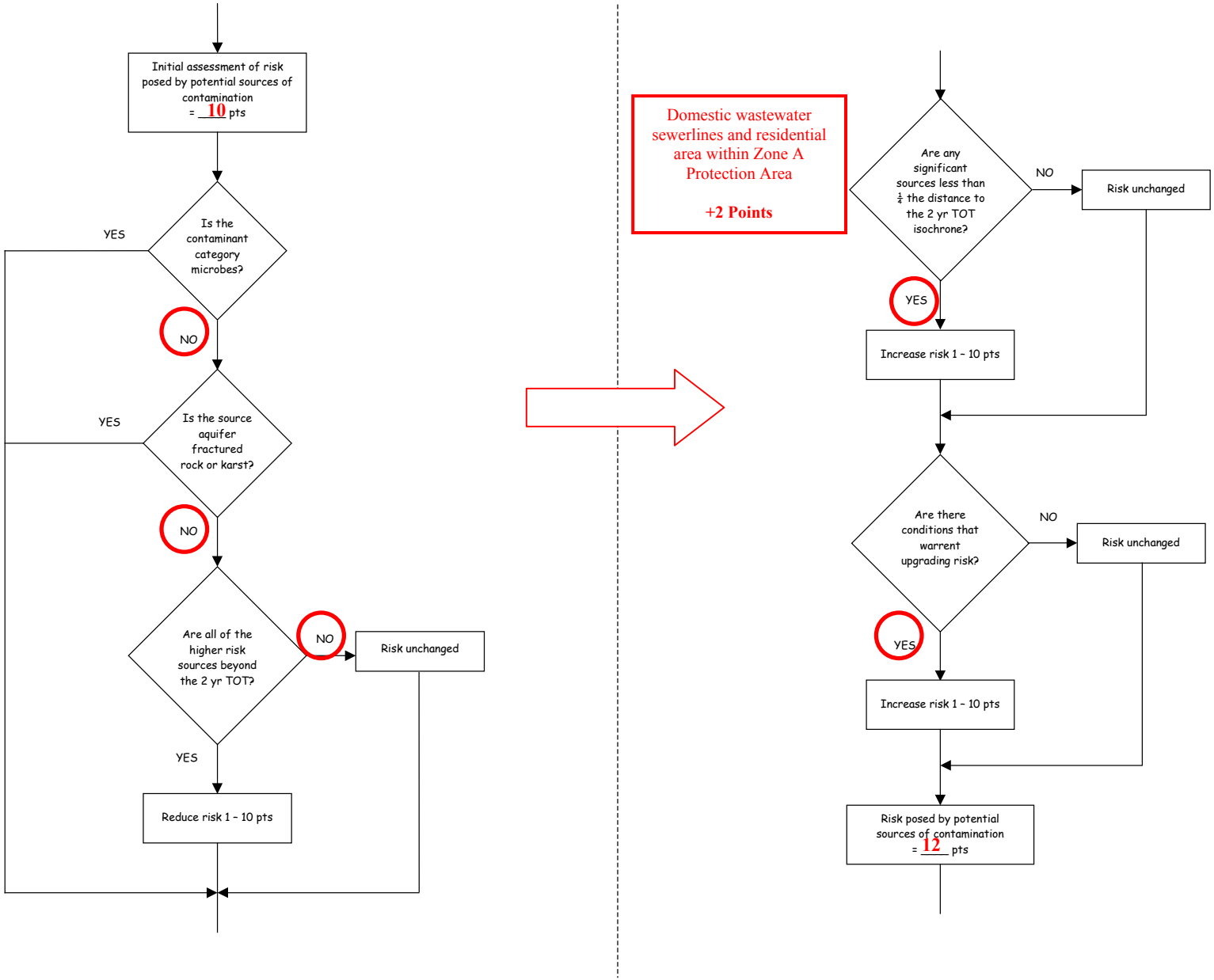
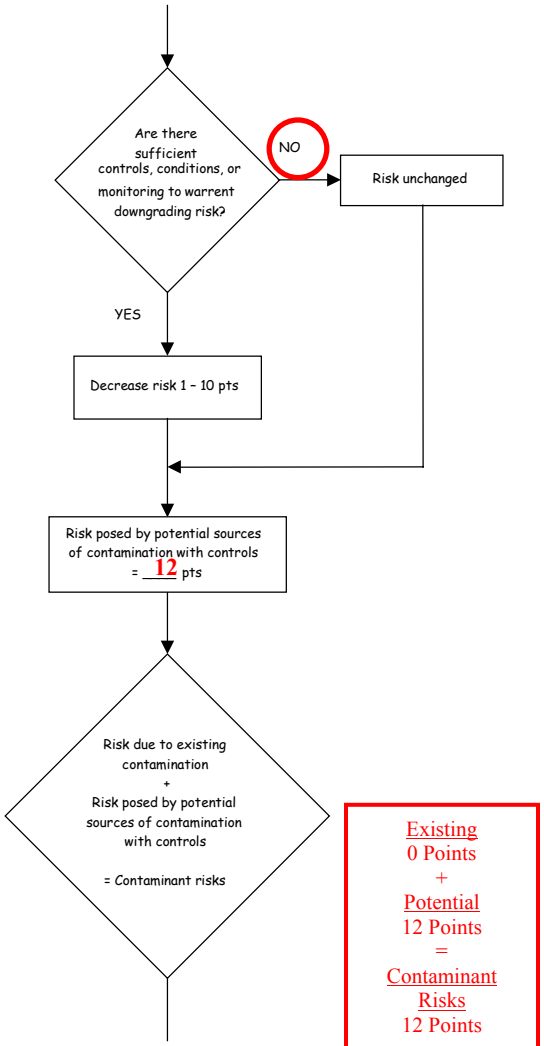
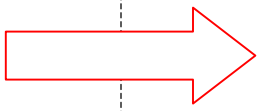


Chart 11. Contaminant risks for Rangeview Trailer Court– Synthetic Organic Chemicals (Continued)



Existing
0 Points
+
Potential
12 Points
=
Contaminant Risks
12 Points



** Truncate risk at 50 pts*

Contaminant risks* = 12 pts

Low

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Table 5. Risk Matrix for Contaminant Sources for Rangeview Trailer Court– Synthetic Organic Chemicals

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	7 Lows	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

Chart 12. Vulnerability analysis for Rangeview Trailer Court– Synthetic Organic Chemicals

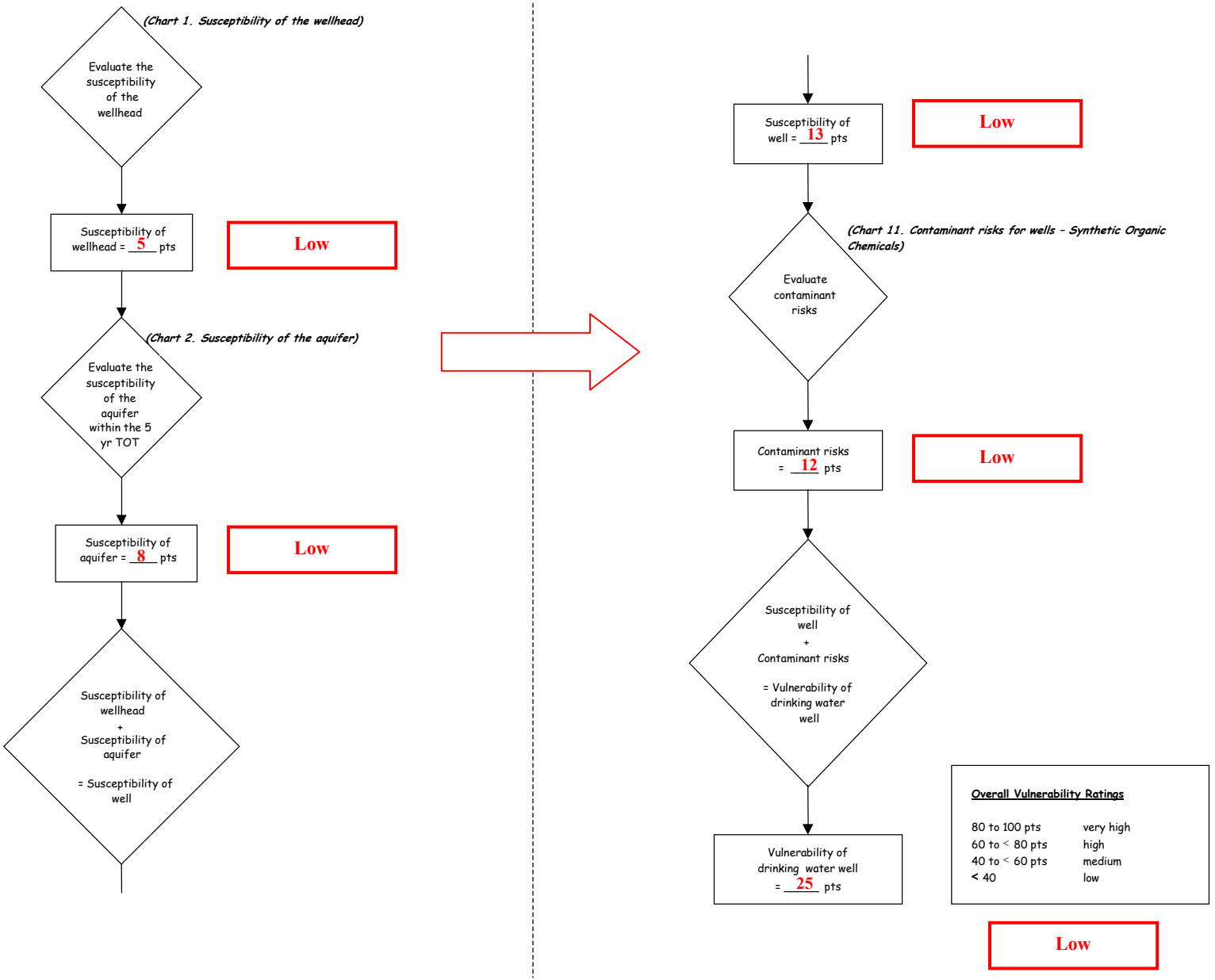


Chart 13. Contaminant risks for Rangeview Trailer Court– Other Synthetic Organic Chemicals

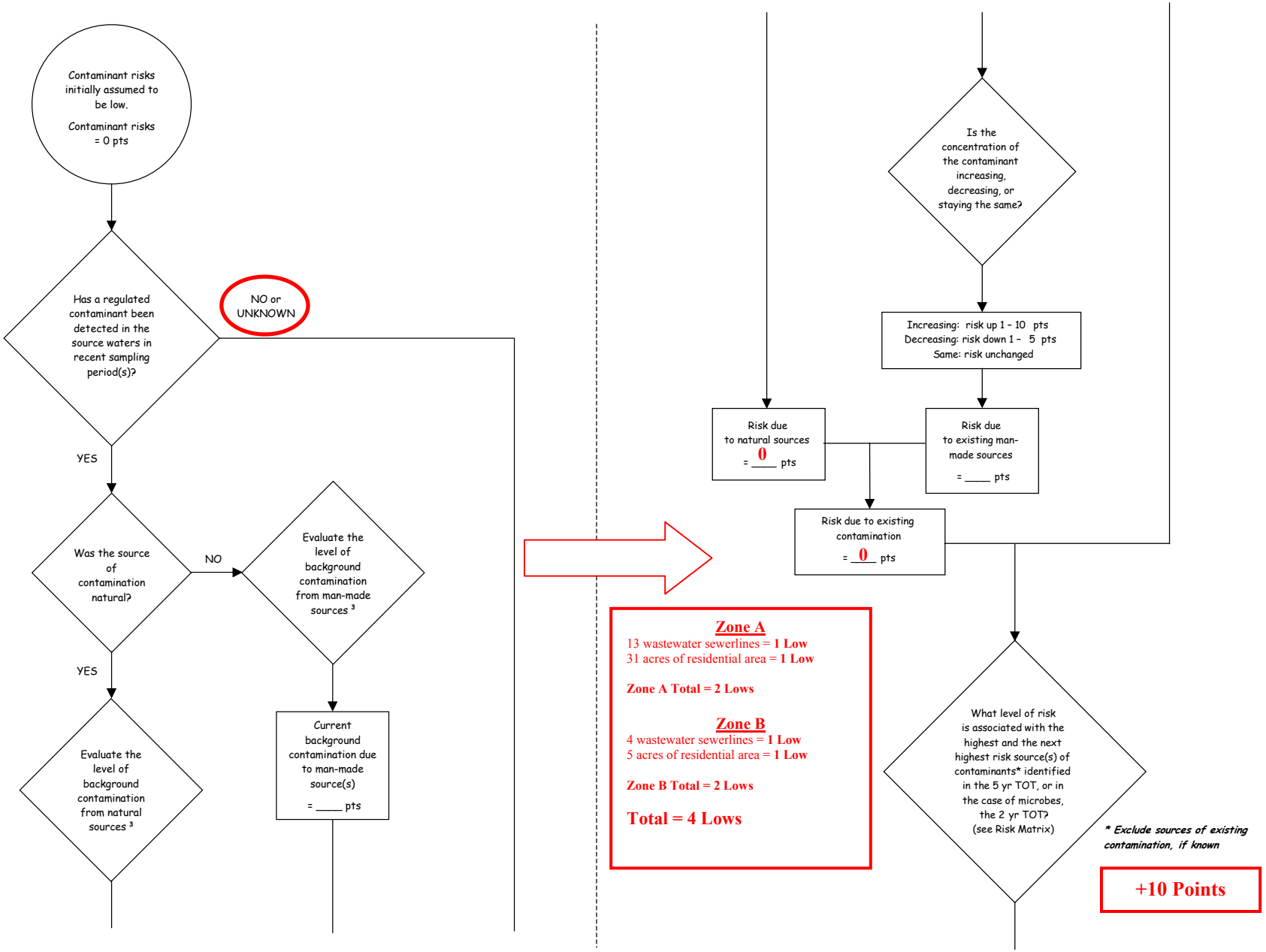


Chart 13. Contaminant risks for Rangeview Trailer Court– Other Synthetic Organic Chemicals (Continued)

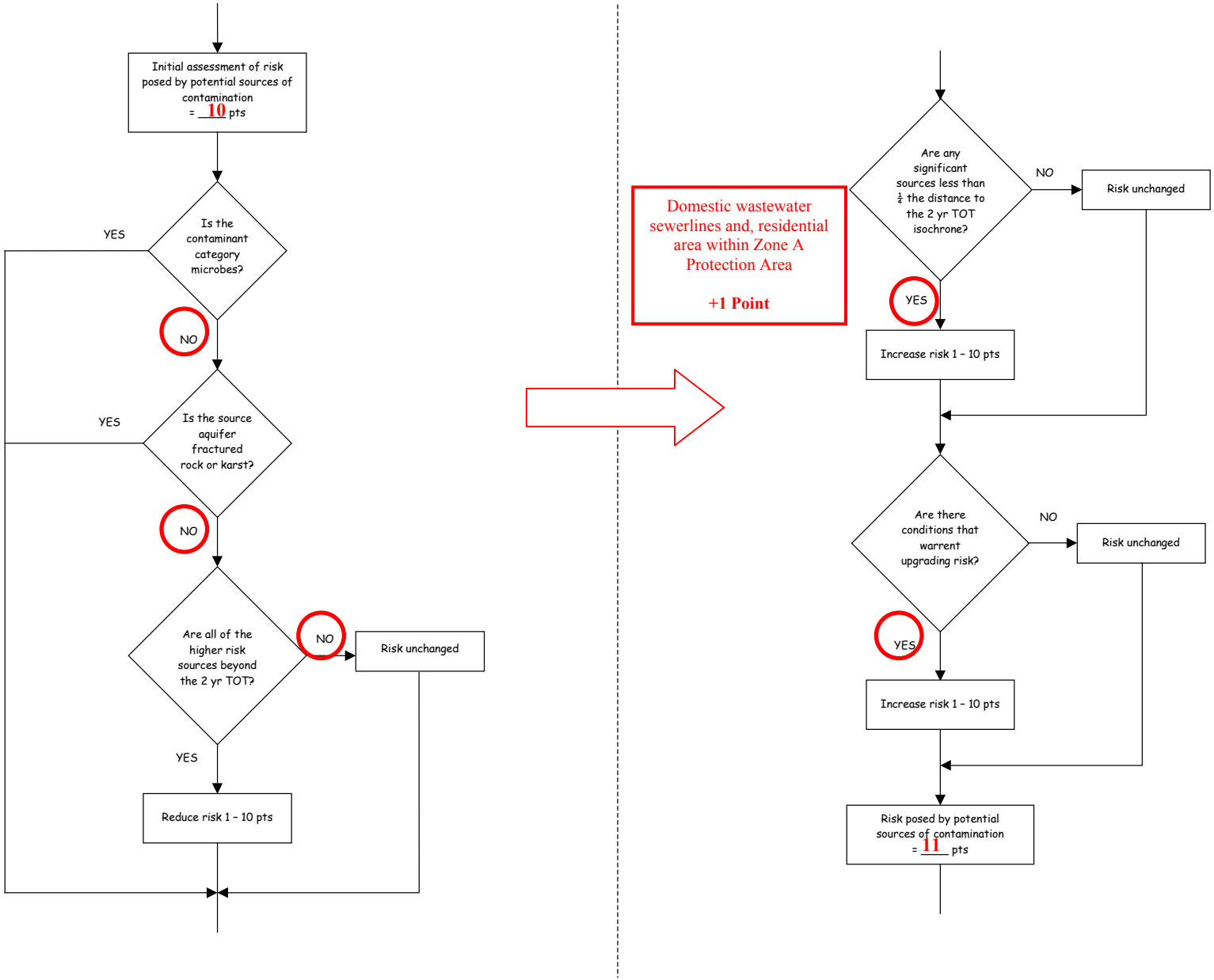
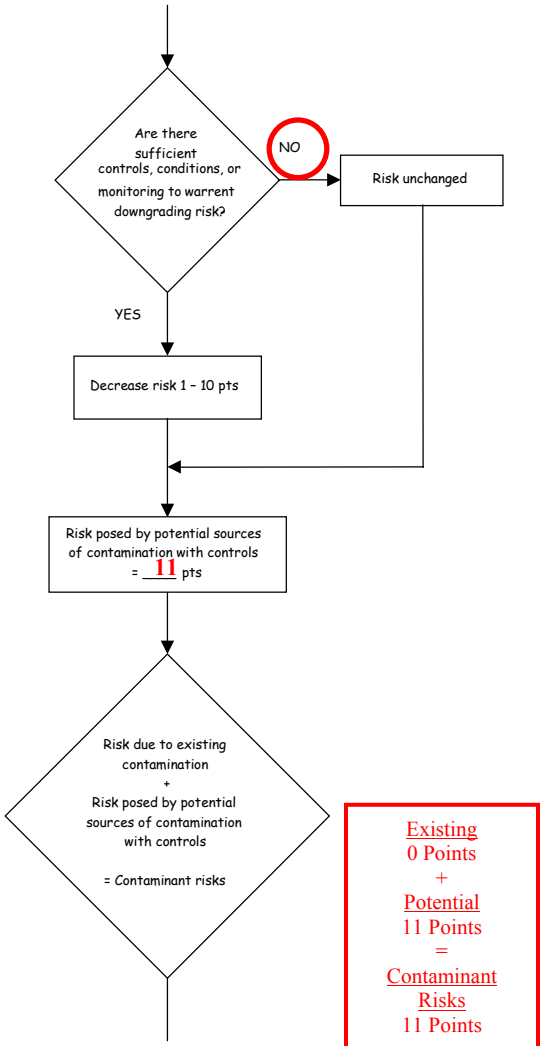
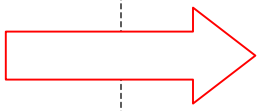


Chart 13. Contaminant risks for Rangeview Trailer Court– Other Synthetic Organic Chemicals (Continued)



Existing
0 Points
+
Potential
11 Points
=
Contaminant Risks
11 Points



* *Truncate risk at 50 pts*

Contaminant risks* = 11 pts

Low

3. Level of Background Contamination

> MCL	50 pts
0.5 MCL to < MCL	20 pts
0.2 MCL to < 0.5 MCL	10 pts
'detect' to < 0.2 MCL	5 pts

Contaminant Risk Ratings

40 to 50 pts	very high
30 to < 40 pts	high
20 to < 30 pts	medium
< 20	low

Table 6. Risk Matrix for Contaminant Sources for Rangeview Trailer Court– Other Synthetic Organic Chemicals

Level of Risk Associated with the Highest Risk Sources

Next Highest Risk Sources(s)	4 Lows	**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

Chart 14. Vulnerability analysis for Rangeview Trailer Court– Other Synthetic Organic Chemicals