

Source Water Assessment Report

City of Veneta
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Prepared for
City of Veneta

by

Department of Human Services
Oregon Health Division
Drinking Water Program



and

Department of Environmental Quality
Drinking Water Protection Program



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City of Veneta: Source Water Assessment Report Summary

The City of Veneta Water System Source Water Assessment Report (SWA Report) contains information about the origin, natural characteristics, potential contamination threats, and susceptibility of the drinking water supply for the City of Veneta Water System. The information contained in the SWA Report is valuable to the development of a Drinking Water Protection Plan (DWPP) that is suitable for the City of Veneta. The Oregon Health Division (OHD) and Oregon Department of Environmental Quality (DEQ) recognize such a DWPP as crucial to the economic viability of most public water systems in Oregon.

Groundwater is a critical natural resource for drinking as well as for industrial and agricultural uses. Water treatment and routine water quality monitoring conducted by Oregon's 3619 public water systems prevents chronic (long term) consumer exposure to potentially harmful compounds (both naturally occurring and man-made) and biological constituents, such as bacteria, viruses, and parasites. However, these efforts focus on reacting to a contamination event once a problem has been identified rather than preventing the occurrence of the contamination event in the first place. Encouraging Oregon's public water suppliers to voluntarily switch from a reactive to a proactive water quality preservation approach requires collecting vital information about the drinking water supply origin and the contaminant sources that may threaten the supply.

The 1986 and 1996 amendments to the Safe Drinking Water Act (SDWA) provide the framework for protecting Oregon's drinking water sources at the local (water system) level. As a result of the 1986 SDWA amendments, the Department of Environmental Quality and Oregon Health Division created a guidance manual that outlines the step-by-step process for developing a voluntary state certified groundwater DWPP. The 1996 SDWA amendments provided funding for the development of customized SWA Reports, on a national scale, for all public water systems recognized by the U.S. Environmental Protection Agency (EPA). In Oregon, the intent of these reports is to empower public water suppliers and their customers with the knowledge of the origin and potential threats to their drinking water supply. The DEQ and OHD believe that such knowledge will foster the organization of local Drinking Water Protection Teams that will develop community based protection plans focusing on preservation (and in some cases, enhancement) of present drinking water quality.

Scope of the Project

The overriding purpose of this project is to provide information to the City of Veneta that is vital in the development of a drinking water protection plan. There are four primary objectives of this report.

- Delineate the drinking water protection area (DWPA) for the City of Veneta's existing well source.
- Determine the aquifer sensitivity within the DWPA, i.e., how easily a contaminant, released at the surface would be able to migrate to the aquifer.
- Inventory significant potential contaminant sources within the delineated area.
- Quantify, in relative terms, the susceptibility of the water system to the potential contaminant sources inside the delineated drinking water protection area.

Delineation Summary

The City of Veneta derives its drinking water from two wells, numbers 4 and 9, at elevations of approximately 420 and 380 feet, respectively. The aquifer that supplies the wells consists of sand and sand and gravel that collectively are referred to as the Older Alluvium of the southern Willamette Valley. These sediments represent ancient stream deposits derived from the erosion of sedimentary rocks of the Coast Range. The alluvium deposits that supply the City's water lies below approximately 40 feet of silt and clay. Seasonally, this silt/clay layer contains water. The Older Alluvium rests directly on top of marine sandstones and siltstones of the Tyee Formation, a component of the Coast Range rocks.

The purpose of the delineation process is to determine the drinking water protection area. This is the area on the surface that directly overlies that part of the aquifer that supplies groundwater to the wells. Contaminants released within the DWPA may be transported to the aquifer and eventually to the well. Aquifer characteristics used to delineate the DWPA (see Figure S-1) were based on well reports, published literature, limited pump test data, and field measurements. A two-dimensional analytical computer model (RESSQC) was used to identify the area. The DWPA has been divided into four time-of-travel zones, 1-, 2-, 5- and 10-year time of travel, to assist the community in prioritizing protection strategy development.

The delineated drinking water protection area allows the City of Veneta to focus management strategies and resources on the area(s) where the most benefit to the drinking water resources will occur.

Potential Contaminant Source Inventory Summary

The primary intent of this inventory is to identify and locate significant potential sources of contaminants of concern within the City of Veneta's drinking water protection area. The inventory was conducted by reviewing applicable state and federal regulatory databases and land use maps, interviewing persons knowledgeable of the area, and conducting a windshield survey

by driving through the drinking water protection area to field locate and verify as many of the potential contaminant source activities as possible. It is important to remember the sites and areas identified are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

The Drinking Water Protection Area for both wells is primarily occupied by residential, municipal and commercial land uses within the City of Veneta in the areas west of Well #4 and is occupied by rural residential (some high density residential) and agricultural land uses east of Well #4 (including the area surrounding Well #9). A total of twenty-nine potential contaminant sources were identified in the two-year TOT zone for Well #4 and Well #9. Twenty-six of the twenty-nine potential contaminant sources within the two-year TOT have relatively higher to moderate risk rankings. The higher to moderate risk sites include: several automotive service and repair stations, several commercial sites, a waste transfer station, the highway and railroad transportation corridors, the drinking water treatment plant, two City of Veneta wells that are currently out of service, an irrigation well, the city pool, irrigated crops, boarding stables, and the high density residential areas, and areas with a high density of septic systems. Several of these land uses occur throughout the drinking water protection area (such as the high density housing areas, irrigated crops, and the highway).

Sixteen potential contaminant sources, which are similar in nature to the potential sources identified within the two-year TOT, were identified between the two-year TOT and the ten-year TOT for wells #4 and #9. The potential contaminant sources between the two-year TOT and the ten-year TOT all have relatively higher to moderate risk rankings with the exception of a mini-storage facility, which presents a lower risk to the drinking water supply.

Susceptibility Analysis Summary

In order to evaluate the level of threat to drinking water quality that the potential contaminant sources (PCSs) pose within the drinking water protection area the Safe Drinking Water Act requires states to conduct a susceptibility analysis of the system. Oregon defines susceptibility as the relative potential of contamination reaching that part of the aquifer being used by a public water system for drinking water purposes. Whether or not a particular drinking water source becomes contaminated depends on two major factors: (1) the occurrence and distribution of facilities that are considered as potentially moderate- to high risk to drinking water where a release of the chemicals that they use, manufacture, or store could occur, and (2) the characteristics of the soil and subsoil materials that separate the surface from the aquifer and control how readily those contaminants could move to groundwater.

In conducting a susceptibility analysis, we combine the delineation and inventory discussed above with a determination of the sensitivity of the aquifer, i.e., how readily contaminants can migrate from the surface or near surface to the aquifer, considering variables related to the natural environment, e.g., depth to the water table, nature of the aquifer, the potential for water to infiltrate to the aquifer, and available water from precipitation or irrigation at the surface.

Once the sensitivity analysis has been completed, it is used along with the presence and distribution of PCSs to determine the relative threat that the PCSs pose to the water system, i.e., the susceptibility of the system to these PCSs. This leads to a determination of whether the drinking water source is at low-, medium- or high relative risk to contamination as a function of all or part of the PCSs in your area, the natural environment, or some other activity or occurrence.

The aquifer supplying the drinking water to the City of Veneta system is considered to be unconfined to semiconfined with an aquifer depth of approximately 40 feet. The permeability of the material between the surface and the aquifer is considered moderately permeable based on soil characteristics and determination of the infiltration potential of water from the surface.

The City of Veneta has not had any detections of coliform bacteria, organic chemicals (VOCs or SOCs), or inorganic chemicals, e.g., arsenic, selenium, chromium, etc., at the source. Nitrate concentrations in all the wells have been below 2 mg/L (standard = 10 mg/L) and have not been detected in the current wells in use, i.e., wells 4 and 9. Sodium concentrations are in the 20-30 mg/L and as such, do not pose a health risk. Individuals on a restricted sodium diet should inform their doctor of this character

The City derives its water from the alluvial aquifer below the silt/clay layer at the surface. During the wet season, this silt/clay layer will yield water to wells. Because of the proximity of the water in the silt/clay layer to the surface, it is highly vulnerable to pollution from land use activities. Most of the area wells have casing seals that do not extend below 20-25 feet. Because of this, shallow water may be able to migrate within the silt/clay layer to the casings of these wells and down into the aquifer below.

Well reports are on file for only 18 wells within the section containing the City's production wells. Given the number of private wells that existed in the community prior to the establishment of the water system, it is suspected that a much larger number of old and potentially improperly sealed wells exist within the community.

Areas of aquifer sensitivity were identified and are shown as on figure S-1. Vertical lines represent areas of higher sensitivity, horizontal lines reflect areas of moderate sensitivity and areas without pattern are considered lower sensitivity. Overlaying the potential contaminant source inventory on to the delineation and sensitivity map (figure S-1) indicates that a number of the high risk PCSs are located in areas where the aquifer is moderately sensitive.

The susceptibility analysis provides the City of Veneta with information that can be used to prioritize which of the moderate- to high-potential risk facilities should be addressed first in developing a drinking water protection plan.

Use of this Report and Specific Recommendations

Clean safe drinking water is fundamental to the viability of any water system. Protecting that drinking water source is a wise and relatively inexpensive investment in the community's future. Developing a local Drinking Water Protection Plan will provide significant benefits to the community, many of which are directly related to the susceptibility analysis. Issues that may apply directly to the City of Veneta are discussed below.

The analysis is a basis for focusing limited resources to protect the drinking water source. The delineation provides the City of Veneta with information regarding where the location of land area that directly overlies their aquifer, i.e., the Drinking Water Protection Area (DWPA). The sensitivity analysis tells the community where within the DWPA is the aquifer most sensitive to contamination from the surface and when combined with the PCS inventory, clearly illustrates those potential threats that should be addressed first. Potential contaminant sources located

within the shorter time-of-travel zones and/or located in areas of higher aquifer sensitivity pose a greater risk to the drinking water supply.

A review of the PCS inventory and the distribution of moderate sensitivity indicates that the City of Veneta Water System has at least seven PCSs of potentially high risk within a moderately sensitivity area (Fig S-1). It is recommended that the community focus initially on the PCSs closest to the wellhead as they potentially pose the greatest threat to the aquifer. Particular emphasis should be given to the potentially high-risk PCS.

Although the number of other wells on record within the City of Veneta's Drinking Water Protection Area are few, it is likely that a significantly larger number exist that were drilled prior to the registration requirement. It is recommended that as part of the overall drinking water protection strategy, an education program be initiated to raise public awareness of the potential of wells providing a pathway for contamination of the community's drinking water supply. The program should stress adequate maintenance and testing of other wells, fencing the wellhead to prevent unwanted access and to keep livestock away, the removal of any chemical storage in the vicinity of the wellhead, etc. The community should encourage the formal abandonment of unused wells. Additional strategies for potential ways to reduce the risk from other commercial/industrial, agricultural/rural and residential/municipal PCSs can be found in the management section of the Oregon Wellhead Protection Guidance Manual (Stewart and Nelson, 1996).

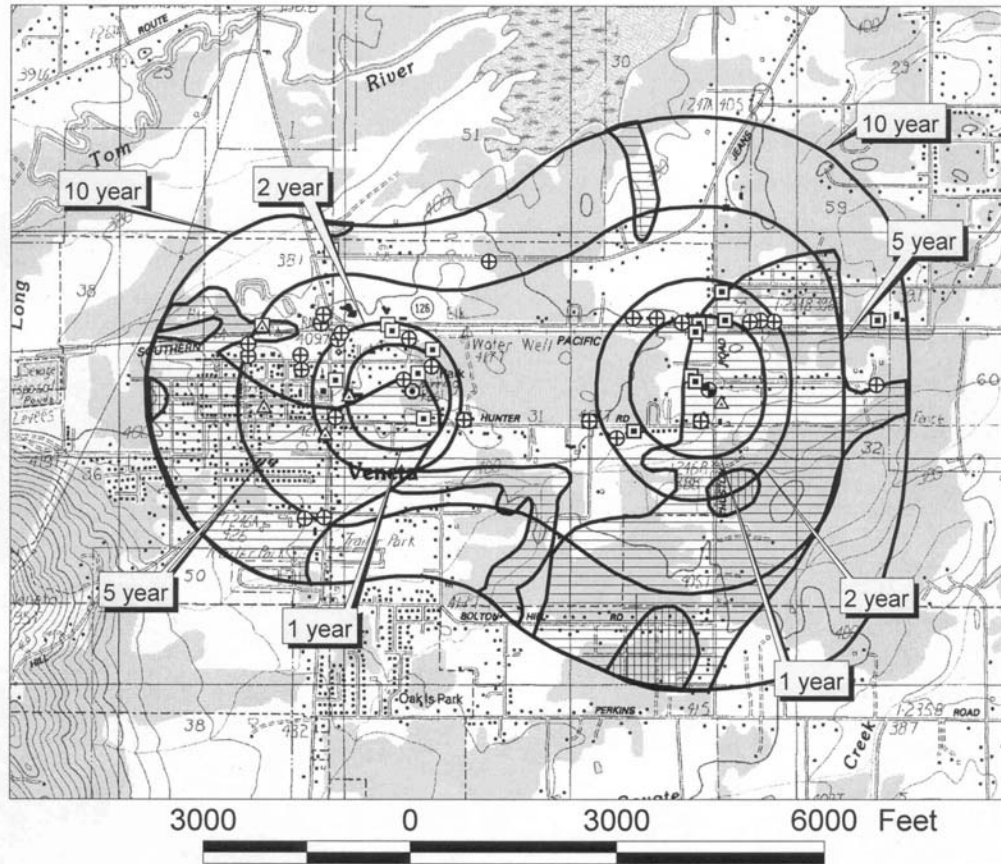
The delineation, inventory and susceptibility analysis provides the community with a significant amount of information regarding where their drinking water comes from and what are the risks to the quality of that source.

The delineation and susceptibility analysis has been designed so as to meet proposed requirements for groundwater systems, including monitoring waivers and the groundwater (disinfection) rule. Data needed to address these regulatory options and requirements have been collected and made available through this report to the City of Veneta.

The combined delineation, inventory, and sensitivity/susceptibility analysis provides a basis for recognizing where the greatest threats to the water system occur and for developing a local drinking water protection plan. If you are interested in developing a Drinking Water Protection Plan you may contact the Department of Environmental Quality (503-229-5413) or the Oregon Health Division (541-726-2587) for further information.

Figure S-1

City of Veneta Drinking Water Protection Area Potential Contaminant Sources and Sensitivity Analysis



Drinking Water Protection Area
Time-of-Travel Zones as
Indicated, e.g., 10 year

1:24,000

Well 4: 44° 03' 00.8061" N 123° 20' 44.7936" W
Well 9: 44° 03' 01.2708" N 123° 19' 45.8802" W
USGS Veneta, OR Quadrangle
T: 17S R: 5W Sec: 31

- ⊙ Well 4
- ⊕ Well 9

Potential Contaminant Sources
Relative Risk (See Note 1):

- ⊕ Higher
- ▣ Moderate
- △ Lower

Sensitivity Analysis:

- Vertical Ruled Pattern: Higher Sensitivity
- Horizontal Ruled Pattern: Moderate Sensitivity
- No Pattern: Lower Sensitivity

Note 1: Sites and areas noted in this figure are potential sources of contamination to the drinking water identified by Oregon drinking water protection staff. Environmental contamination is not likely to occur when chemicals are used and managed properly.



1 City of Veneta: Source Water Assessment Report

1.1 Introduction

Groundwater is an essential natural resource that supports domestic, agricultural, and industrial survival. There are approximately 3,619 public water systems in Oregon, 88% of which rely on ground water to satisfy part or all of their drinking water needs. These water systems supply drinking water to 77% of Oregon's population (Stewart and Nelson, 1996). It is in every community's best interest to develop a program that protects this valuable resource from contamination.

In 1996, Congress amended the Safe Drinking Water Act and provided resources for state agencies to assist community water systems by delineating (identifying) drinking water protection areas, conducting potential contaminant source inventories, and conducting an analysis of the susceptibility to those contaminants. These are referred to as source water assessments and will be done for every public water system in Oregon. To support this effort, the Oregon Health Division (OHD) will provide community and non-transient non-community groundwater systems with a delineation and sensitivity analysis of their drinking water source. The Department of Environmental Quality (DEQ) will delineate and conduct sensitivity analyses on surface water systems. The sensitivity analysis for each system will be coupled with DEQ's potential contaminant source inventory inside the drinking water protection area to estimate the public water system's susceptibility to contamination.

Voluntary community involvement will increase OHD's and DEQ's abilities to quantify local hydrogeologic/hydrologic conditions and make use of site-specific information, ultimately increasing the quality of the assessment. Therefore, local community citizens/officials play an extremely important role in accomplishing the public water system assessments, and the subsequent voluntary development and implementation of a drinking water protection plan.

The requirements for water quality monitoring of public water systems in Oregon provide some degree of assurance of safe drinking water; however, all systems are vulnerable to potential contamination. One of the best ways to ensure safe drinking water is to develop a local plan designed to protect against potential contamination. Not only will this measure add a margin of safety; it will raise awareness of the consumers and/or local community of the risks of drinking water contamination. It is our hope that each community will use the assessment results as a basis for developing a drinking water protection plan.

The City of Veneta's Source Water Assessment Report (SWA Report) contains information about the origin, natural characteristics, potential contamination threats, and susceptibility of the drinking water supply for the City of Veneta. The information contained in the SWAP Report is valuable to the development of a community-based Drinking Water Protection Plan (DWPP) that is suitable for the City of Veneta. The OHD and DEQ recognize such a DWPP as crucial to the economic viability of most public water systems in Oregon.

The purpose of the SWA Report is to develop information that enables public water system owners, consumers, and others to initiate and/or promote actions to protect drinking water sources

(Stewart and Nelson, 1999). Throughout the development of this report, the City of Veneta has been in the process of initiating the development of a protection plan for their water supply. It is believed that such plans will ensure the preservation of water quality and quantity, thus benefiting the health and economic viability of the public water system and surrounding community. There are four primary goals of this report:

- Identify (delineate) the boundaries of the groundwater recharge area that supplies drinking water to the City of Veneta, i.e., identify the drinking water protection area (DWPA).
- Determine the sensitivity of the aquifer within the DWPA to potential contamination, i.e., how readily a contaminant released at the surface may find its way into the drinking water source.
- Identify potential sources of regulated and non-regulated contaminants within the DWPA.
- Determine the susceptibility of the City of Veneta Water System to those contaminants.

Those public water systems/communities that are interested in developing a Drinking Water Protection Plan (DWPP) should use the information collected in this report to help assemble a Drinking Water Protection Team and identify suitable management practices that will minimize the risk of a contamination release to the groundwater inside the protection area. Such management strategies should be based on the contaminant type, location of the potential contaminant source relative to the drinking water source, and the aquifer susceptibility. Technical assistance for the development of a Drinking Water Protection Plan is available from the Department of Environmental Quality and the Oregon Health Division.

1.2 Background

The City of Veneta has a number of wells within the community. Currently, the drinking water supply for the City is provided by two wells, numbers 4 and 9, which produce water from a sand and sand and gravel alluvial aquifer within the Older Alluvium of the southern Willamette Valley. Current OHD records indicate that approximately 2,000 residents are provided water by the system. Continued growth is anticipated within the community because of its proximity to the Eugene-Springfield area.

The wells are located in Section 31, Township 17 south, Range 5 west. Topographic map coverage is supplied by Veneta 7.5 minute quadrangle. A more precise location of the City's wells was accomplished using a Trimble GeoExplorer II Global Positioning System (GPS) unit. Data collection criteria included a minimum of four satellite fixes, at least 150 separate measurements with a PDOP (position dilution of precision) of less than six. The data were differentially corrected using the Pathfinder Office 2.0A software and the Portland State University base station. The location of the wells is as follows:

Well 4:

44° 03' 00.80608" north latitude
123° 20' 44.79362" west longitude

UTM Coordinates:
N 4877293 meters
E 472300 meters

Well 9:
44° 03' 01.27081" north latitude
123° 19' 45.88023" west longitude
UTM Coordinates:
N 4877302 meters
E 473611 meters

Well 8:
44° 03' 07.29769" north latitude
123° 21' 17.65464" west longitude
UTM Coordinates:
N 4877496 meters
E 471570 meters

Well 7:
44° 03' 09.06548" north latitude
123° 20' 59.40152" west longitude
UTM Coordinates:
N 4877549 meters
E 471976 meters

Well 2:
44° 03' 04.80961" north latitude
123° 20' 41.77910" west longitude
UTM Coordinates:
N 4877416 meters
E 472368 meters

Well 1:
44° 03' 04.09208" north latitude
123° 20' 39.92421" west longitude
UTM Coordinates:
N 4877394 meters
E 472409 meters

2 Delineation of the Drinking Water Protection Area

The Drinking Water Protection Area (DWPA) is defined as the area on the surface that overlies that portion of the aquifer that supplies water to a well or spring. If a contaminant is released at the land surface above the capture zone, the contaminant can be carried by infiltrating precipitation down to the capture zone for the well or spring and be transported laterally to the well or spring by groundwater movement in the aquifer. The delineation of the DWPA is a fundamental aspect of any Drinking Water Protection Plan. For the City of Veneta, this process specifically identifies the aquifer that is supplying water to the well. The map of the DWPA provides the public water system and/or the community with the knowledge of the area around the well where contamination poses the greatest threat to the drinking water supply. This allows the public water system and/or community to develop management strategies that will have the most impact on protecting the water supplied by the well. Typically, the DWPA is divided into four areas based on time-of-travel (TOT) zones that indicate the amount of time it takes groundwater to move from that zone to the discharging well, i.e., 1-, 2-, 5- and 10-year time-of-travel zones. The delineated drinking water protection area and identified zones will allow the City of Veneta to focus its management strategies and resources on the area where the most benefit to the drinking water resource will occur.

The delineation of the DWPA requires an understanding of the regional geology and hydrogeology of the area of interest. This information is summarized below.

2.1 Regional Geology

The area is located within the upper Willamette River basin in that part of west-central Oregon that lies between the Coast and Cascade Ranges in the Pacific Border physiographic province (Frank, 1973). The principle geologic units found in the area are the Holocene Younger Alluvium, the Pleistocene and Holocene Older Alluvium, the Eocene and Oligocene Fisher Formation, the undated Spencer Formation and the Eocene Tyee Formation together with Oligocene or younger igneous intrusive rocks.

2.1.1 Younger Alluvium

This formation consists largely Coarse Gravels and cobbles as large as 6 inches in diameter, some sandy zones and a small proportion of silt. The unit occurs as flood plains adjacent to the McKenzie and Willamette Rivers (Frank, 1973). Groundwater moves very freely within this formation.

2.1.2 Older Alluvium

This formation is Pliocene in age (Appendix H) and consists of sand and gravel interspersed with mixtures of sand, silt, and clay. The unit contains lenticular bodies of gravel and sand that seem to be interconnected and allow free movement of ground water. Deposit tends to be finer (smaller) materials than the younger alluvium. The Older Alluvium occurs beneath the main valley plain and foothills of the upland parts of the area. Coarser sediment equivalent to the Younger Alluvium occur along the Long Tom River and other smaller streams in the area and

also some terrace deposits in the southwestern part of the area (Frank, 1973).

2.1.3 Intrusive Rocks

Igneous rocks that have intruded older rocks as dikes and sills of diabasic and basaltic composition are found within the area.

2.1.4 Eugene Formation

This formation consists of marine-deposited sediments of fine- to coarser grained arkosic micaceous sandstone, interbedded shale, and occasional lenses of fine volcanic ash (Frank, 1973).

2.1.5 Fisher Formation

This formation consists largely of tuff and breccia; includes large amounts of basaltic and rhyolitic debris (Frank, 1973).

2.1.6 Spencer Formation

This formation consists of a marine sequence of tuffaceous sandstone, shale and mudstone (Frank, 1973).

2.1.7 Tyee Formation

This formation consists of marine sandstone beds interbedded with siltstone and mudstone (Frank, 1973) and is Eocene in age (Appendix H).

2.2 Regional Hydrogeology

On the basis of the geologic, hydrologic, and physiographic conditions, the study area is divided into two major areas: the lower flatter topography that is transitional to the shoreline area of Fern Ridge Reservoir and an upland area of steeper topography, e.g., Bolton Hill. Older alluvial deposits underlie the lowland. These deposits contain the most productive aquifers. In this area, the alluvial deposits are semiconfined to unconfined in nature and discharge to rivers or local streams. The consolidated rocks, i.e., siltstone, sandstone, etc., that comprise the bulk of the upland areas, and underlie the alluvial deposits, generally yield small to moderate quantities of water to wells, are generally confined and are generally not hydraulically connected to the alluvial aquifers. Locally, groundwater may be saline in nature because of the longer residence time of the water in these rocks.

A Geological Survey Water-Supply Paper describing the Eugene-Springfield area (Frank, 1973) includes the Veneta region in its discussion of regional groundwater occurrences. Frank (1973) provides maps of hydraulic head distribution in the Veneta area. His maps indicate that groundwater converges on Veneta from both the southeast and the northwest before moving towards the east-northeast. Frank (1973) indicates that in most areas the Older Alluvium has relatively low permeability, however, he notes that in the Veneta area the permeability of the Older Alluvium is substantially higher than average. Water levels were measured by Frank in September 1969 and again in January 1970; no significant differences in head were noted.

2.3 Delineation Methodology

For water systems served by wells and having a population of more than 500, delineation involves using the pump rate of the well, characteristics of the aquifer, including thickness, and permeability, and the nature of area groundwater flow to determine the capture zone of the well, i.e., that part of the aquifer that supplies water to the well.

2.3.1 Pump Rate of the Well

During the delineation process an attempt is made to estimate current and future (expanded) water demand(s) placed on the well(s) in question without exceeding the physical or legal capacity of the well(s). All groundwater based DWPA delineations require a water use estimate (Q) to determine the volume of aquifer potentially utilized by the water system. In Oregon, the maximum pumping capacity of any given well is established by well design, aquifer characteristics, and water use law. Aquifer characteristics aside, the physical pumping capacity of any well is limited by the diameter of the wellbore or the installed casing, whichever is less. Oftentimes, the designed maximum pumping capacity of a well is specifically identified in a water system's Master Plan which may take into account additional physical aspects including well efficiency and interference effects from nearby wells. If the public water system does not have a Master Plan, the maximum pumping capacity can be estimated based on the borehole or casing diameter reported on the well log.

The legal pumping capacity for a public water supply well is governed by Oregon water use law. If groundwater use for domestic purposes exceeds 15,000 gallons per day (5,000 gpd for commercial use) or more than a half-acre of land is irrigated, then Oregon water use law dictates that a Water Right be obtained from the Oregon Water Resources Department. A Water Right establishes the maximum amount of water that the holder of the Right can extract from the sources identified on the Right. In some cases the Right may also outline conditional uses that limit when and for how long water can be discharged from the well(s). Any water system exceeding 15,000 gallons per day usage that does not have a water right should contact the Oregon Water Resource Department or the local District Water Masters office and begin the Water Right Application process.

Although the City has a number of wells, only two of them, wells 4 and 9 (Fig. 2), are projected for use to supply the community with drinking water. Discussions with water system personnel indicate that well 4 is limited in its pumping to a maximum of 270-280 gallons per minute (gpm). Higher levels of pumping of well 4 would cause air entrainment. For purpose of the delineation effort, a pumping rate of 275 gpm (52940 ft³/day) was used. The pump rate of well 9 is typically 350 gpm, although rates as high as 700 gpm are possible. To account for the potential of growth in the community, the 350 gpm was increased by 125% to 437.5 gpm (84225 ft³/day) for modeling purposes.

2.3.2 Aquifer Characteristics

For the purpose of delineating the drinking water protection area, well reports from the area were examined to determine the nature of the aquifer and the thickness of the part of the aquifer that is being tapped by wells 4 and 9. The aquifer supplying the City of Veneta well is composed of

Older Alluvium sand and gravel, sand and silt deposits that were deposited by ancient river systems draining the Coast Range Mountains. Well logs typically indicate 25 to 40 feet of silt and/or clay deposits immediately below the surface, although this layer is less than 10 feet thick in the vicinity of Dunham Avenue.

The fine-grained layer is underlain by a series of sand, gravel, and sand and gravel to a depth of at least 180 feet in the vicinity of wells 4 and 9. These alluvial sediments thin markedly to the west and south. Well logs indicate that there may have been some topography on the Tyee Formation surface when the alluvium was deposited, e.g., a well at 25421 E Bolton Road appears to encounter Tyee Formation rocks at a depth of only 30 feet; alluvial sediments are not described in the well log. Alluvial sediments are found in wells to the southwest, e.g., along Erdmann Way. Perhaps the area near the E. Bolton Road site represents a small hill that existed on the Tyee surface prior to deposition of the alluvium.

Older underlying sedimentary rocks of the Tyee Formation are encountered at a depth of approximately 160 feet in western Veneta (well 8) and are exposed at the surface at Bolton Hill west of the community. City well 8 appears to penetrate approximately 23 feet into the underlying Tyee Formation. The more saline character of groundwater reported from the Tyee Formation may explain the observation that groundwater from well 8 has approximately four times the sodium concentration as other City wells (see section 4.1.5 below).

The Older Alluvium aquifer is considered to behave as a semi-confined to unconfined aquifer with the fine-grained deposits at the surface serving as the confining unit at least part of the year. Several drillers report encountering water in this fine-grained layer. Based on reported and measured static water levels, and the lithologies reported in the well logs, the coarser-grained sediments immediately below the fine-grained layer are considered to be saturated during the wet season. Static water levels rise above this level indicating a measure of confinement.

The aquifer thickness (b) estimate is dependent on two factors; (1) the total thickness of the water-bearing zone(s) intercepted by the uncased hole, well screens, or perforations, and (2) the degree to which the open hole, well screens, and perforations penetrate the water-bearing zone(s). This information is usually collected from a single well log that may not include an adequate amount of information about the aquifer and well screen/perforation placement. The Guidance Manual (Stewart and Nelson, 1996) identifies several techniques for conducting a conservative aquifer thickness adjustment based on limited well log information. To this list of techniques, OHD staff have added additional methods for real-world well conditions that are not addressed by the Guidance Manual. Regardless of the technique applied to this particular delineation, the goal of the thickness adjustment is to provide a reasonable estimate that will not grossly exceed the actual effective aquifer thickness surrounding the well(s).

Both wells 4 and 9 are variably screened within the depth range of 75 to 180 feet below the surface. For purpose of modeling, an aquifer thickness of 40 feet was chosen. This thickness is considered a conservative estimate of true thickness and as such, will provide an added element of protection for the community.

The estimate of permeability, i.e., hydraulic conductivity (K), was made from pumping-drawdown (specific capacity) measurements provided in the well reports. For purposes of this report, only specific capacity tests that exceeded four hours were utilized. The geometric mean of those measurements indicated a hydraulic conductivity of 23 feet/day. The combination of

thickness and hydraulic conductivity ($b \times K$) yields a transmissivity of 920 ft²/day.

Porosity is the ratio of the volume of voids (openings) in a geological formation being drilled to the overall volume of the material without regard to size, shape, interconnection, or arrangement of openings. The effective porosity of a geologic material is the ratio of the volume of interconnected voids to the overall volume of the material. It is assumed that groundwater moves through the interconnected voids of a geologic material, therefore it is important to identify a reasonable estimate the aquifer effective porosity to determine the size of the protection area around the well(s).

The porosity of a material increases as a result of a good sorting, rounded grains, small particle size, unconsolidated character, and high secondary porosity (fracturing and/or dissolution of aquifer material). Porosity decreases as a result of poor sorting, irregular shaped particles, lack of stratification, large particle size, and cementation/compaction. The effective porosity for the aquifer supplying Veneta was estimated at 0.25 based on the descriptions provided by the well logs.

2.3.3 Nature of Groundwater Flow

The surface of the water table (or potentiometric surface) is not flat. There are areas where this surface is at a higher elevation and areas where it is lower. Groundwater naturally flows from areas where the water table is high to where it is low. The elevation of the surface is generally referred to as the hydraulic head, therefore, groundwater flows from where it has a high hydraulic head to where the head is lower. How fast groundwater moves depends on the difference in hydraulic head, i.e., the gradient, and the hydraulic conductivity.

A regional water-level map for the southern Willamette Valley area including the Veneta region is available (Frank, 1973). This map indicates that groundwater flows in a northwest direction beneath Veneta. This direction, however, was based on only two wells in the Veneta area and, as a consequence, six additional wells, City wells 1, 2 and 7, and wells at 87701 Erdman Way, 25498 East Bolton Hill Road and 25446 Hunter Road, were selected for measurement during this study. These measurements were contoured and indicate a more complex configuration of water levels in the area (Fig. 1). Based on this new data, groundwater is actually flowing in an east-northeasterly direction. Further, the shape of the contours indicate a significant impact on the direction of groundwater flow by local streams. Groundwater clearly discharges to the West Fork Coyote Creek and the small easterly flowing stream between Hunter and Bolton Hill Roads.

The head distribution and resulting direction of groundwater flow indicate that much of the recharge to the aquifer supplying Veneta must come from direct infiltration of precipitation in the immediate Veneta area between the wells and Bolton Hill to the west. Recharge may also come from infiltration of runoff from Bolton Hill. An additional source of recharge may be groundwater from the underlying Tyee Formation. Limited data is available, however the City's well number 2 penetrates into the underlying Tyee Formation and provides static water levels for the upper silt/clay (8 feet), the sand and gravel aquifer (54 feet) and the underlying sedimentary rock (35 feet).

The static water level for well 2 indicates that there is a downward gradient from the silt/clay to the underlying sand and gravel aquifer. This downward trend is reflected in several other wells and is considered to reflect conditions area-wide. The data also suggests that there is an upward gradient from the Tyee into the sand and gravel aquifer. If this is the case, there may in fact be

some recharge to the aquifer from below in areas where fractures or other pathways exist that allow groundwater from the sedimentary aquifer to flow upwards into the sand and gravel aquifer.

The average direction of groundwater flow toward wells 4 and 9 was determined to be N70E. The slope of the water level surface was measured from figure 1 to be 0.0015 feet/foot.

2.4 Modeling of the Drinking Water Protection Area

The delineation of the Drinking Water Protection Area for the City of Veneta was accomplished using the two-dimensional analytical model RESSQC, distributed by the U.S. EPA. The model solves an equation for groundwater flow based on input regarding site-specific characteristics. The model portrays a steady-state condition, i.e., groundwater flow is not influenced by time e.g., wells coming on and off, and calculates the movement of groundwater back in time as a function of the hydraulic head distribution as modified by the operation of the public water supply wells. The model output is a map that shows the well and the pathlines followed by the water molecules. The pathlines can be displayed for any groundwater time-of-travel. A limitation to the model is that it must assume that the aquifer is uniform in character in all directions. For this reason, it is very important to provide input parameters to the model that are representative of the actual variations observed in the area of interest (see subsections 2.3.1, 2.3.2 and 2.3.3).

In section 2.3.3 it was noted that there was evidence that groundwater discharge to the West Fork Coyote Creek and to an unnamed smaller drainage just to the south of well 9. Area residents indicated that the smaller drainage, closest to the wells, flowed variably throughout the year. An inspection by the Region 2 Watermaster, Michael Mattick, in September 1999 indicated no visible flow where the drainage crosses Huston Road and minimal flow near the outlet to Fern Ridge Reservoir. Mattick estimated that during maximum winter flows, discharge could exceed 20 cubic feet per second (cfs), however year-around averages were probably less than one cfs.

To account for the potential impact of discharge to Huston Road drainage, it was assumed the average discharge was one cfs, ~450 gpm, and that the flow came entirely from groundwater. To simulate this situation, 10 imaginary wells, pumping a total of 450 gpm, and ranging from 10 gpm on the west to 80 gpm on the east were placed along the drainage. The net effect of this simulation was a slight increase in the size of the delineated area. The delineation shown in figure 2 incorporates the drainage simulation.

For the purpose of providing the community with a tool to prioritize the development of management strategies, the drinking water protection area is divided into several different Time-of-Travel (TOT) zones: 1-year, 2-year, 5-year and 10-year TOTs. It is important to realize, therefore, that the delineation provided in this report only identifies the area overlying the next 10 years of drinking water. In fact, the actual zone of contribution (ZOC) for Veneta's wells is much larger. The TOTs provide the community with knowledge of the length of time it would take a contaminant, once delivered to the aquifer, to travel to the well. For example, a contaminant in the aquifer at the 2-year TOT boundary would move to the well within 2 years.

3 Inventory of Potential Contaminant Sources

3.1 Objectives

This section discusses the methods and results of the inventory of potential contaminant sources that was completed for the City of Veneta's delineated drinking water protection area. The purpose of the inventory was to:

- Provide information on the locations of potential contaminant sources, especially those that present the greatest risks to the water supply,
- Provide an effective means of educating the local public about potential problems, and
- Provide a reliable basis for developing a local management plan to reduce the risks to the water supply.

3.2 Background

The primary intent of an inventory is to identify and locate significant potential sources of any of the contaminants of concern within the drinking water protection area. Significant sources of contamination can be defined as any facility or activity that stores, uses, or produces, the contaminants of concern and has a sufficient likelihood of releasing such contaminants to the environment at levels that could contribute significantly to the concentration of these contaminants in the source waters of the public water supply.

Inventories were focused primarily on the potential sources of contaminants regulated under the federal Safe Drinking Water Act (SDWA). This includes contaminants with a maximum contaminant level (MCL), contaminants regulated under the Surface Water Treatment Rule, and the microorganism *Cryptosporidium*. The inventory was designed to identify several categories of potential sources of contaminants including micro-organisms (i.e., viruses, *Giardia lamblia*, *Cryptosporidium*, and bacteria); inorganic compounds (i.e., nitrates and metals); and organic compounds (i.e., solvents, petroleum compounds and pesticides). Contaminants can reach a water body (groundwater, rivers, lakes, etc.) from activities occurring on the land surface or below it. Contaminant releases to water bodies can also occur on an area-wide basis or from a single point source.

It is advantageous to identify as many potential risks as possible within the drinking water protection area during the inventory. It is important to remember the sites and areas identified in this section are only **potential** sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly. Not all of these inventoried activities pose actual high risks to your public water supply. The day-to-day operating practices and environmental (contamination) awareness varies considerably from one facility or land use activity to another. When one considers potential risks, we make "worst-case" assumptions. One assumption that has to be made when considering potential risks to water bodies is that the facility or activity is not employing good management practices or pollution prevention. This is important because it is the potential risk that we are attempting to determine.

Also, assumptions were made about particular types of land use. For example, it is assumed that rural residences associated with farming operations have specific potential contamination sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops.

In-depth analysis or research was not completed to assess each specific facility's compliance status with local, state and/or federal programs or laws. Further, the inventory process did not include an attempt to identify unique contamination risks at individual sites such as facilities (permitted or not) that do not safely store potentially hazardous materials.

Not all of the inventoried activities will need to be addressed if you choose to develop a Drinking Water Protection Plan. After the delineation, inventory, and susceptibility analysis are complete, a "management" plan can be developed to protect your public water supply. When developing a protection plan, sources which pose little to no threat to your public water supply can be screened out. For example, if any of these land use activities are conducted in a manner that already significantly reduces the risk of a contamination release, the facility would not need to re-evaluate their practices based on any drinking water protection "management". One of the goals of developing a Drinking Water Protection Plan based on the inventory results is to address those land use activities that do pose high or moderate risks to your public water supply.

3.3 Methodology

Past, current, and possible future potential sources of contaminants were identified through a variety of methods and resources. In completing this inventory, DEQ used readily available information including review of DEQ and other agencies' databases of currently listed sites, interviews with the public water system operator, and field observation as discussed below.

The process for completing the inventory included several steps, which are summarized as follows:

1. Relevant information as of August 1, 1999 was collected from applicable state and federal regulatory databases including the following lists:
 - DEQ Environmental Cleanup Site Information System (ECSI) which includes the U.S. EPA National Priorities List (NPL) and the U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) list;
 - DEQ leaking underground storage tank (LUST) list;
 - DEQ registered underground storage tank (UST) list;
 - DEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits);
 - DEQ Active Solid Waste Disposal Permits list;
 - DEQ Dry Cleaners list;

 - State Fire Marshall Hazardous Material Handlers (HAZMAT) site list (information on materials in a gas-form was not used since gaseous compounds rarely pose a threat to surface water or groundwater); and

- DEQ Hazardous Waste Management Information System (HWIMSY) list which includes U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers and U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits.

Because of the way various state and federal databases are set up, the specific location of listed sites is not always given or accurate within the database. DEQ verified the presence and approximate location of potential contaminant sources within the drinking water protection area by consulting with local community members and/or by driving through the area (windshield survey) as discussed below in subsequent inventory steps.

2. Land use/ownership maps were obtained from statewide geographic information system (GIS) coverage and/or local planning department. The land use maps were evaluated to establish the potential threat that existing or future land uses might pose to the quality of your water supply. Four general categories of land use were evaluated: residential/municipal, commercial/industrial, agricultural/forest, and other land uses (see Appendix C, Table 1).
3. Public water system officials, or someone they designated as knowledgeable of the area, were interviewed to identify potential sources that are not listed elsewhere in databases or on maps and to assist in locating potential sources listed in the state and federal databases.
4. A windshield survey was conducted by driving through the drinking water protection area to field locate and verify as many as possible of the potential contaminant source activities.
5. High-, medium-, or low-risk ratings were assigned to each potential contaminant source based on the Oregon Source Water Assessment Plan (1999). A summary of the types of potential contaminant sources and level of assigned risk is presented in Appendix C, Table 1 (Summary of Potential Contaminant Sources by Land Use). The comments section of Appendix C, Table 2 (Inventory Results- List of Potential Contaminant Sources) provides justification for any modifications to the risk rating that may have resulted from field observations that were different from what is typically expected for the specific facility. For example, a “random dumpsite” is typically considered a moderate risk to groundwater. However, if disposal of hazardous or toxic substances was observed during the field visit, the risk rating may be modified to “high”. Relative risk ratings are considered an effective way for the PWS and community to prioritize management efforts for the drinking water protection area. When the PWS and community enhance the inventory for use in developing management options, the community may need to conduct further analysis to more closely evaluate the actual level of risk.
6. A final summary of the inventoried sources and the GIS base map were produced, and are presented in this report.

Not all of the activities that are potential contaminant sources were inventoried in the entire drinking water protection area. The inventory of sources of microorganisms such as bacteria, viruses and cryptosporidium focused primarily on areas within the 2-year time-of-travel because of limitations on survivability of the organism. Potential sources of microbes are highlighted on Appendix C, Table 1.

3.4 Results

The results of the inventory were analyzed in terms of current, past, and future land uses; their time of travel (TOT) relationship to the well site; and their associated risk rating. In general, land uses that are closest to the well and those with the highest risk rating pose the greatest threat to your drinking water supply. Inventory results are summarized in Appendix C, Tables 1 and 2 and

are shown on figures 3, 4 and 5.

3.4.1 Within Two-Year Time of Travel

Well #4: The delineated two-year time of travel zone surrounding Well #4 is primarily dominated by residential, municipal and commercial land uses within the City of Veneta. Fourteen potential contaminant sources (Reference Numbers 4 -7, 11-13, 16, 19, 20, 21, 24, 25 and 46 on Figure 4 and Appendix C, Table 2) were identified in the two-year TOT zone for Well #4. The potential contaminant sources within the two-year TOT all have relatively higher to moderate risk rankings with the exception of an elementary school and the fire station, which present a lower risk to the drinking water supply. The higher to moderate risk sites include: several commercial sites, the highway and railroad transportation corridors, two City of Veneta wells that are currently out of service, the drinking water treatment plant, the city pool, and the high density residential areas, and areas with high density of septic systems. Several of these land uses occur throughout the drinking water protection area (such as the high density housing areas and the highway) and are shown on figure 4 in the location nearest to the well. Two of the potential sources (a veterinary hospital and the septic system area) have a high risk of transmitting microorganisms to the groundwater.

Well #9: Approximately 75 % of the delineated two-year time of travel zone surrounding Well #9 is occupied by more rural residential and commercial land uses within the City of Veneta and the other 25 % is occupied by irrigated agricultural land. Sixteen potential contaminant sources (Reference Numbers 27-30, 32-35, 37, 38, and 40-45 on Figure 5 and Appendix C, Table 2) were identified in the two-year TOT zone. The potential contaminant sources within the two-year TOT all have relatively higher to moderate risk rankings with the exception of a rural residential area with less than one septic system per acre, which presents a lower risk to the drinking water supply. The higher to moderate risk sites include: several automotive service and repair stations, a waste transfer station, the highway and railroad transportation corridors, an irrigation well, irrigated crops, boarding stables, high density residential areas, and areas with high density of septic systems. Several of these land uses occur throughout the drinking water protection area (such as the high density housing areas and the highway) and are shown on figure 5 in the location nearest to the well. Three of the potential sources (the boarding stables, the garbage service and the septic system areas) have a high risk of transmitting microorganisms to the groundwater.

3.4.2 Overview of Inventory Results within Five-Year and Ten-Year Time of Travel

The Drinking Water Protection Area between the two-year TOT and the ten-year TOT for both wells is primarily occupied by residential, municipal and commercial land uses in the areas west of Well #4 and is occupied by rural residential (some high density residential) and agricultural land uses east of Well #4 (including the area surrounding Well #9). The sixteen potential contaminant sources identified between the two-year TOT and the ten-year TOT are detailed on Table 2 in Appendix C and include sources similar to those discussed for the drinking water protection area within the two-year TOT. The potential contaminant sources between the two-year TOT and the ten-year TOT all have relatively higher to moderate risk rankings with the exception of a mini-storage facility, which presents a lower risk to the drinking water supply.

4 Susceptibility Analysis

In order to evaluate the level of threat to drinking water quality that the potential contaminant sources pose within the drinking water protection area, the Safe Drinking Water Act requires states to conduct a susceptibility analysis of the system. This section of the Source Water Assessment report identifies the susceptibility of the drinking water source of the City of Veneta Water System. The report provides a discussion of what a susceptibility analysis is, how it was accomplished for Veneta's drinking water source, and gives some general recommendations on how the susceptibility analysis can be used to help prepare a Drinking Water Protection Plan.

Susceptibility can be defined as the relative potential of contamination reaching the well(s) being used by a public water system for drinking water purposes. Whether or not a particular drinking water source becomes contaminated depends on two major factors: [1] the occurrence and distribution of facilities that are considered as potentially moderate- to high risk to drinking water, as determined during the inventory process, and [2] the characteristics of the soil and subsoil materials that separate the surface from the aquifer and that control how readily released contaminants could move to groundwater.

Step 2 above is called the sensitivity analysis, which is used along with the presence and distribution of PCSs to determine the relative threat that the PCSs pose to the water system, i.e., the susceptibility of the system to these PCSs. This leads to a determination of whether the drinking water source is at low-, medium- or high-relative risk to contamination as a function of all or part of the PCSs in the area, the natural environment, or some other activity or occurrence. It is important to understand that a system can have low susceptibility characteristics relative to some criteria, e.g., well construction, and high susceptibility characteristics relative to other criteria, e.g., a shallow unconfined aquifer.

4.1 Sensitivity Analysis

The sensitivity analysis consists of evaluations of the following issues:

- Nature of the aquifer.
- Depth to the water table.
- Infiltration Potential of the aquifer.
- Distribution of moderate- to high-permeability soils in the DWPA.
- History of water quality of the source.
- Construction on the water system's well, if appropriate.
- Sanitary Survey results related to the collection facility.
- Other wells in the vicinity of the production wells.

The data used to determine the susceptibility is derived from field studies, well reports, soil maps, sanitary survey reports, water quality monitoring records and published reports.

4.1.1 Nature of the Aquifer and Depth to the Water Table

The aquifer supplying the City of Veneta consists of alluvial deposits of interlayered sand, gravel, and sand and gravel of the Older Alluvium Formation (Frank, 1973). The aquifer is overlain by approximately 40 feet of silt/clay and topsoil. The static water level (SWL), the depth to water in the well when it is at rest, i.e. not being pumped, in the alluvial aquifer varies seasonally, being lower in the late summer and fall and higher in the spring, and varies with the elevation of the well. Typical SWLs in the late summer and fall are in the range of 50 to 70 feet, while those in the spring may be on the order of 30 feet.

The SWL data indicate that the alluvial aquifer varies from unconfined in the late summer-fall to confined or semi-confined in the spring. The confining unit is the ~40 feet of silt/clay above the alluvial sediments. For purposes of the sensitivity analysis, we are assuming an semi-confined aquifer with a depth of 40 feet.

It should also be noted that the overlying silt/clay confining unit is itself often water-bearing. The SWLs within this unit are on the order of 8 to 12 feet, sometimes much shallower. The importance here is that the hydraulic head of the water within the silt/clay is higher (closer to the surface) than that in the alluvial aquifer. This indicates that water will tend to flow from the silt/clay to the alluvial aquifer. During pumping, the head difference would be even greater.

4.1.2 Infiltration Potential

The Infiltration Potential (IP) is an estimate of the ability of water to infiltrate from the surface to the aquifer. It is based on (1) the depth to the aquifer, (2) an estimate of the weighted permeability of the material between the surface and the aquifer, a parameter referred to as the Traverse Potential, and (3) the hydraulic surplus, or the amount of water available from precipitation and/or irrigation at the surface that is able to infiltrate into the subsurface. The IP is determined for the system's primary source(s) of drinking water.

The Infiltration Potential scoring in Oregon varies from 0 to 10, with the higher number indicating a greater potential of infiltration of water from the surface, i.e., a higher sensitivity of the aquifer. The sensitivity ranking based on Infiltration Potential is as follows:

Sensitivity	Infiltration Potential
High	>7
Moderate	4 to ≤ 7
Low	<4

Infiltration Potential Data at the City of Veneta Well 4:

Depth to the Aquifer*:	40 feet
Weighted Hydraulic Conductivity	0.48 gal/day/ft ²
Traverse Potential:	4
Precipitation:	25 inches/year**

Infiltration Potential: 5

Infiltration Potential Data at the City of Veneta Well 9:

Depth to the Aquifer*: *30 feet*
Weighted Hydraulic Conductivity *0.46 gal/day/ft2*
Traverse Potential: *4*
Precipitation: *25 inches/year***

Infiltration Potential: 5

Infiltration Potential Data at the City of Veneta Well 8:

Depth to the Aquifer*: *40 feet*
Weighted Hydraulic Conductivity *0.08 gal/day/ft2*
Traverse Potential: *2*
Precipitation: *25 inches/year***

Infiltration Potential: 3

Infiltration Potential Data at the City of Veneta Well 2:

Depth to the Aquifer*: *55 feet*
Weighted Hydraulic Conductivity *0.06 gal/day/ft2*
Traverse Potential: *1*
Precipitation: *25 inches/year***

Infiltration Potential: 2

Infiltration Potential Data at the City of Veneta Well 1:

Depth to the Aquifer*: *46 feet*
Weighted Hydraulic Conductivity *0.5 gal/day/ft2*
Traverse Potential: *2*
Precipitation: *25 inches/year***

Infiltration Potential: 3

* Depth to aquifer or first water-bearing zone below the casing seal
* Based on an infiltration of 50% of precipitation (46 inches)

The value of the Infiltration Potential for the City of Veneta Water System wells 4 and 9 is 5, indicating a moderate sensitivity level for the aquifer that supplies the well. An additional 18 wells in the City were evaluated for infiltration potential. The values determined ranged from 4 to 7 (Appendix F).

4.1.3 Soil Sensitivity

To supplement the IP data, the nature of the soils within the DWPA were also evaluated. Specifically, based on data provided from Soil Survey Reports, the time-of-travel (TOT) for water across the soil profile under saturated conditions and assuming a gradient = 1.0, were determined for each mapped soil unit. Sensitivity, based on soil TOT, is as follows:

Sensitivity	TOT (hours)
High	<65
Moderate	65-256
Low	>256

The specific soils, their respective TOTs and resulting sensitivities within the City of Veneta DWPA are given below. The number associated with each soil corresponds to the mapped area(s) on the soil map, included in Appendix E.

<u>Soil</u>		<u>TOT (hr)</u>	<u>Sensitivity</u>
45C	Dupee Silt Loam	117	Moderate
73	Linslaw Loam	323	Low
79	McBee Silty Clay Loam	48	High
98	Noti Loam	151	Moderate
120B	Salkum Silty Loam	307	Low
121B	Salkum Silty Clay Loam	307	Low
126	Tahkenitch Loam	17	High
128B	Veneta Loam	364	Low
134	Wapato Silty Clay Loam	122	Moderate

4.1.4 Distribution of Sensitivity

The sensitivity of the City of Veneta is directly related to the soil distribution and the values of infiltration potential. There are two soils within the area, namely the McBee Silty Clay Loam and the Tahkenitch Loam that have high permeabilities, with a travel time of less than 50 hours. The soils cover only small areas within the DWPA; the bulk of the soils yield moderate to low sensitivity.

The soil data and infiltration potential data were overlain to produce the overall aquifer sensitivity map. The variability of the resulting sensitivity within the DWPA is displayed as patterned areas on the accompanying map (Fig 6, Appendix B). Those areas in which the vertical lined pattern is displayed are moderately sensitive to land activities at the surface.

4.1.5 History of Water Quality of the Source

Public water systems are required to routinely monitor the water they serve for a list of contaminants as a function of their classification. A detection of any contaminant may indicate that a pathway exists for this and other contaminants to reach the aquifer supplying the well. It is important to realize that the results from a given sample only provide information regarding the water quality at the time the sample was collected. Water quality can change with time for a number of reasons, including contamination and seasonal recharge. The fact that a water sample

does not currently contain contaminants is no guarantee that contamination cannot happen in the future. The monitoring history for the City of Veneta Water System is summarized below:

- Volatile Organic Compounds (VOCs)/Synthetic Organic Compounds (SOCs): No detections in individual wells. Low levels of PCE have been detectable since 1991 in water coming from the storage tank. No detections were found in any of the wells. OHD determined that the tank liner was the source.
- Inorganic Compounds (compound, date, and concentration): Sodium detections for wells 4 and 9 are in the vicinity of 20-30 mg/L. Sodium from a single sample from well 8 in 1992 was 101 mg/L. The source of the sodium is likely natural, and for well 8, probably comes from the underlying Tyee Formation (see section 2.3.2 above). No other IOCs, with the exception of a low-level detection of barium, have been detected in the City's wells.
- Nitrate/Nitrite (date - concentration): Wells 1 (1983 - 1.20 mg/L), 7 (1990 – 0.7 mg/L) and 8 (1992 – 1.90 mg/L) have experienced isolated, but low concentrations (health standard = 10.0 mg/L). Wells 4 and 9, currently used by the City for drinking water have had no detections of nitrate.
- Coliform Bacteria: The system has had two occurrences of a positive routine total coliform tests since August 1999. These samples were collected in the distribution system as required by OHD and in each case, repeats were negative. Samples were not collected at the wells. No other coliform detections have occurred since 1995.

4.1.6 Construction of Water System's Wells

In section 4.1.1 the presence of shallow water, often at depths of less than 10 feet, was recognized in the upper silt/clay unit. During the wet season, it is likely that this layer is saturated throughout. Given the shallow nature of this water, its vulnerability to contamination is much higher. Of concern here is the opportunity for this shallow water to gain access to the aquifer that supplies Veneta's drinking water. Most of area wells are sealed to less than 25 feet (e.g., 16 out of the 21 identified in Appendix D), and most of those to less than 20 feet. These wells, which technically meet well construction standards, do allow shallow water to gain access to the casing and potentially migrate down to the aquifer. Although it cannot be demonstrated directly with the current data, it is believed that wells with seals less than 30 feet may be susceptible to the impacts of this shallow water. Well 4 is sealed to 30 feet, well 9 is sealed to 19 feet.

4.1.7 Sanitary Survey Results

The sanitary survey is an essential element of a safe drinking water program. It is considered the first line of defense in helping public water systems protect public health. Water systems are periodically inspected for the purpose of identifying construction, operational or source defects that make the system vulnerable to contamination, particularly fecal in origin. Water systems are provided a sanitary survey report that notes any deficiencies in the system, and may direct the system to make necessary corrections.

The most recent sanitary survey of the City of Veneta Water System was completed in May, 1989

by a staff member of the Oregon Health Division’s Drinking Water Program. Comments made during that survey are not considered indicative of the present condition of the system. Veneta is scheduled to have a new survey completed in 2000.

4.1.8 Proximal Wells

Regardless of the construction of the City's wells, other proximal wells may provide conduits for contaminants to reach the aquifer used by the water system. The greater the number of wells in the vicinity, the greater is the risk of some of those wells being inadequately constructed, thereby compromising the community’s water quality. The risk becomes significantly greater for older wells, i.e., pre-1979 construction, because of less stringent construction standards at that time and because of the potential of well seals deteriorating with age.

To qualitatively evaluate the relative risk of other wells, the number of wells in the section containing the production well or well is determined, distinguishing between those that were drilled prior to 1979 from those drilled in 1979 or more recently. The other wells score is determined as follows:

$$\text{Other Wells Score} = \text{no. of post-1978 wells} + 4 \times (\text{no. of pre-1979 wells})$$

The relative risk ranking for the production well as a function other wells is assigned as follows:

Other Wells Score ¹	Ranking	Sensitivity
>1600 ²	10	High
800 – 1600	9	High
525 – 799	8	High
400 – 524	7	Moderate
320 – 399	6	Moderate
260 ³ – 319	5	Moderate
225 – 259	4	Moderate
200 – 224	3	Low
175 – 199	2	Low
160 ⁴ – 174	1	Low
<160	0	Low

1. Score calculated using the equation below and assuming that 50% of the wells in the section containing the production well are pre-1979. Other Wells Score = [no. of post-1978 wells] + 4 x [no. of pre-1979 wells]

2. Approximately equivalent to 1 well/acre.

3. Approximately equivalent to 1 well/5 acres.

4. Approximately equivalent to 1 well/10 acres.

A review of available well reports for section 31 of T17S, R5W containing the City of Veneta Water System’s wells 4 and 9 indicated a total of 27 well records. Of those wells, 18 were drilled before 1979 and 9 were drilled after 1978. The City of Veneta Water System’s Other Well score is calculated as follows:

$$\text{Other Well Score} = 9 + (4 \times 18) = 81$$

The Relative Risk Ranking for the City of Veneta Water System’s well is 0, implying a very low sensitivity to contamination via this pathway. However, the submission of a well report to the state was not required until the late 1950s. Wells drilled before that date may not be recorded.

Prior to the establishment of Veneta's public water system, drinking water was provided to residents by private wells. As a result, there are likely many other wells present in the DWPA that were not registered with the Water Resources Department, either because they were drilled prior to regulations requiring registration, or were otherwise not reported. The presence of other wells may be particularly relevant to well 4, which is closest to the City.

4.2 Sensitivity Summary

As indicated above, the actual sensitivity of the drinking water source of a water system depends on a number of contributory factors, some of which are only slightly related. The purpose of the sensitivity exercise is to identify those factors that may pose more of a risk than others within the community's drinking water protection area. It provides information with respect to facilities within the DWPA or land areas within the DWPA that should be given greater priority and oversight in the implementation of a Drinking Water Protection Plan.

- **Nature of the Aquifer:** The City of Veneta Water System's well draws water from a semi-confined to unconfined alluvial aquifer. Even though the aquifer is unconfined during part of the year, the relatively thick silt/clay layer above the aquifer indicates that is only moderately sensitive.
- **Depth to the Water Table** (an indication of the distance and time required for a contaminant of move to the aquifer): The City of Veneta Water System's aquifer occurs at a depth of ~40 feet, at least during the wet season. Water levels are deeper during the late summer-early fall. The greater the depth to the water table, the more the risk is reduced. The aquifer is shallow, however, as above, the significant silt/clay layer reduces the risk.
- **Weighted Hydraulic Conductivity** (an indication of the permeability of the soil and subsoil above the aquifer): The soil and subsoil material above the aquifer in the vicinity of wells 4 and 9 have a high weighted hydraulic conductivity of ~0.5 gal/day/ft², a moderate value.
- **Traverse Potential:** This parameter considers the depth to the aquifer and the weighted hydraulic conductivity to estimate how readily the subsurface above the aquifer would transmit available water. A Traverse Potential of greater than 5 indicates a highly sensitive aquifer. The Traverse Potential for the City of Veneta aquifer at wells 4 and 9 is 4. Higher values, up to 7, occur elsewhere in the DWPA.
- **Infiltration Potential:** This parameter relates the Traverse Potential, i.e., depth and weighted hydraulic conductivity, and available water to indicate the potential of water moving from the surface to the aquifer on a scale of 1 to 10. The infiltration potential for the City of Veneta's aquifer at wells 4 and 9 is 5, yielding a moderate aquifer sensitivity. Infiltration potentials elsewhere in the DWPA range up to 7.
- **Water Quality - Dissolved Constituents:** There have been no detections of regulated SOCs/VOCs/IOCs in the system's wells. Concentrations of sodium, probably natural in origin, exceed 20 mg/L. At this level, local physicians should be made aware of this source of sodium for their patients on low-sodium diets. Sodium concentration in well 8, which the City no longer uses, is in excess of 100 mg/L. As indicated above, this concentration probably reflects the fact that the well is open to the underlying Tyee Formation. Nitrate has

not been detected in either well 4 or 9 and is below 2 mg/L in all the other City wells that have been tested. Nitrate concentrations in excess of 3 mg/L are considered to indicate the presence of contaminants from the surface or near surface. Nitrate is very mobile in the subsurface. Its presence in higher concentrations (> 3 mg/L) indicates that an avenue may exist for other less mobile contaminants to gain access to the aquifer. Nitrate sources include agricultural activities (fertilizer) and on-site septic systems.

- **Water Quality - Microbiological:** OHD records indicate there have been confirmed positive total coliform water samples taken from the City of Veneta's drinking water. The presence of coliform bacteria is indicative of a pathway through which these surface-derived contaminants are gaining access to the aquifer. Although coliform sources are ubiquitous, a common source of fecal coliform is septic systems. The City of Veneta does not chlorinate its water and is currently working with OHD to find the cause of this problem.
- **Sanitary Survey Results** (provides an assessment of the integrity of the wellhead and surrounding infrastructure as they pertain to potential contaminant sources): The most recent sanitary survey (January, 1999) indicated the need for some repairs of the cement slab around the well casing. It is important that the water system continue to practice good management practices.
- **Other Wells Relative Risk Ranking** (proximal wells may provide conduits for contamination to enter the aquifer, particularly if they are pre-1979 construction): Eighteen of the 27 known wells in the sections containing the system's wells were drilled prior to 1979. This leads to a relative risk ranking of 0, which is a low susceptibility with respect to this potential source of contamination. Wells, if failing or inadequately constructed, could provide a direct avenue to the aquifer, compromising the natural protection generally afforded a confined aquifer. Educational materials should be directed at all residents in the vicinity of the community who use private wells for drinking water or irrigation.

A sensitivity form in Appendix E summarizes the factors that contribute to moderate- to high-sensitivity for the City of Veneta aquifer. The water system can use this form to target specific issues of sensitivity.

4.3 The Presence and Distribution of Potential Contaminant Sources of Moderate- and High-Risk

The presence of Potential Contaminant Sources (PCSs) within the DWPA provides the potential sources of chemicals that could, if improperly managed or released, impact the water quality of the aquifer. Small quantities of these chemicals, in some cases a gallon or less, can significantly impact aquifers. **The DEQ and OHD strongly recommend that the community address all high- and moderate-risk PCSs that occur within their DWPA in order to reduce the risk of their drinking water supply becoming polluted.** How the PCSs are prioritized and the level of management strategies that are appropriate depend on the proximity of the PCS to the well or well and whether the sensitivity of the aquifer at the PCS site is high, medium or low. The results of the PCS inventory performed for the City of Veneta Water System by the Department of Environmental Quality is shown on the accompanying maps (Appendix B, Figs. 3, 4 and 5) and

are summarized as a function of time-or-travel zones in the table below.

	Within 2 year TOT	Within 10 year TOT
Well 4: No. Of High and Moderate Risk PCSs	12	24
Well 9: No. Of High and Moderate Risk PCSs	14	18

In general, PCSs within the shorter time-of-travel zones pose greater risk than those in the longer time-of-travel zones. Also of concern is the location and distribution of these sources with respect to high and moderately sensitive areas. Overlaying the PCS location map and the sensitivity map for the City of Veneta Water System provides a tool to determine the susceptibility of the community's drinking water supply to contamination from each PCS. The table below indicates the relationship between susceptibility of the drinking water from a specific PCS and the identified PCS risk and aquifer sensitivity at the site.. The community can use the PCS location numbers on the inventory map in conjunction with the displayed aquifer sensitivity and relative risk rankings for each PCS from Table 2 (Appendix C) to identify the susceptibility of the drinking water source to contamination from each PCSs and take steps to reduce the risk accordingly.

When a public water system is determined to have a high or moderate susceptibility from a specific site, i.e., a given PCS, as a result of a particular condition or set of conditions, it means that a significant risk of contamination of the drinking water system exists as a result of that condition or set of conditions. The susceptibility analysis cannot predict when, or if, contamination will actually occur, but it does recognize conditions that are highly favorable for contamination to occur. If a contaminant release to soils or groundwater should occur in the area of high susceptibility, it is very likely that contamination of the aquifer would occur if remedial actions are not completed as soon as possible.

Relative Susceptibility Matrix

		Aquifer Sensitivity ¹		
		<u>Low</u>	<u>Moderate</u>	<u>High</u>
Field Risk ² :	<u>Moderate</u>	<i>Low</i>	<i>Moderate</i>	<i>High</i>
	<u>High</u>	<i>Moderate</i>	<i>High</i>	<i>High</i>

1. As indicated on Figure 6, Appendix B

2. As indicated for the facility in question in Table 1, Appendix C

If a public water system's drinking water source is determined to be of high or moderate susceptibility relative to a given PCS, it is recommended that the system identify those condition(s) that lead to that susceptibility rating and take immediate steps to protect the resource through remedying the condition, e.g., repairing or replacing faulty well construction, working directly with facility operators to implement sound management practices, etc.

Water systems with a low susceptibility relative to a given PCS should consider all identified factors that could lead to high susceptibility in the future and take action to prepare a strategy to protect the resource in the future. Raising public awareness through signs and other education

programs, encouraging proper well construction, encouraging the use of best management practices in existing facilities, use zoning to maintain low density, etc., are good ways of ensuring that the water source retains its low susceptibility.

5 Source Water Assessment: Uses and Recommendations

Clean safe drinking water is fundamental to the viability of any community. Protecting that drinking water source is a wise and relatively inexpensive investment in the community's future. Developing and implementing a local Drinking Water Protection Plan will provide significant benefits to the community, many of which are directly related to the susceptibility analysis. Issues that may apply directly to the City of Veneta are discussed below.

The analysis provides a basis for focusing limited resources within the school community to protect the drinking water source(s). The delineation provides the community with information regarding where the location of land area that directly overlies their aquifer, i.e., the Drinking Water Protection Area (DWPA). It is within the DWPA that if a spill occurs, or other improper chemical management occurs, contaminants may migrate downward to the aquifer. The sensitivity analysis tells the community where within the DWPA the aquifer is most sensitive to contamination from the surface and when combined with the PCS inventory, clearly illustrates those potential threats that should be addressed first. Potential contaminant sources located within the shorter time-of-travel zones and/or located in areas of high aquifer sensitivity pose a greater risk to the drinking water supply.

A review of the PCS inventory and the distribution of high sensitivity indicates that the City of Veneta Water System has 44 PCSs of potentially moderate to high risk within the DWPA. It is recommended that the community focus initially on the facilities in the moderately sensitive area as they potentially pose the greatest threat to the aquifer. Particular emphasis should be given to the potentially high-risk PCS. Making these facilities aware of free technical service that is available through the Department of Environmental Quality's Pollution Prevention Program would be significant step in chemical inventory and waste reduction and in increasing awareness of best management practices that would reduce the risk these facilities pose to groundwater. Further details and contacts are available in the state's Guidance Manual for Drinking Water Protection.

Although the number of other wells on record within the City of Veneta's Drinking Water Protection Area are few, it is likely that additional wells exist that were drilled prior to regulations requiring the submittal of well reports, i.e., the late 1950s. It is recommended, therefore, that as part of the overall drinking water protection strategy, an education program be initiated to raise public awareness of the potential of wells providing a pathway for contamination of the community's drinking water supply. The program should stress adequate maintenance and testing of other wells, fencing the wellhead to prevent unwanted access and to keep livestock away, the removal of any chemical storage in the vicinity of the wellhead, etc. The community should encourage the formal abandonment of unused wells.

It is stressed here that at the time these wells were drilled, most met the well construction standards that were applicable at that time. The fact that they have been identified here does not mean that these wells are in fact serving as conduits for contamination. This information is provided to assist the community in focusing their outreach efforts to the owners of old wells.

The delineation, inventory and susceptibility analysis provides the community with a significant

amount of information regarding where their drinking water comes from and what are the risks to the quality of that source. Knowing where the resource is allows the community's planning authority to make decisions regarding proposed land uses within the community that are compatible with both the drinking water resource and the vision of community growth embraced by the community's leaders.

The delineation and susceptibility analysis has been designed so as to meet proposed requirements for groundwater systems, including monitoring waivers and the groundwater (disinfection) rule. Data needed to address these regulatory options and requirements have been collected and made available through this report to the community.

The combined delineation, inventory, and sensitivity/susceptibility analysis provides a basis for recognizing where the greatest threats to the water system occur and for developing a local drinking water protection plan. Education is considered to be one of the most important strategies in protecting a community's drinking water supply.

5.1 Developing a Drinking Water Protection Plan

The process for developing a Drinking Water Protection Plan can be summarized as follows:

5.1.1 Assessment Phase (Source Water Assessment Report performed by OHD and DEQ)

- Delineate the area that serves as the source of the public water supply ("drinking water protection area" for groundwater wells or surface water intakes)
- Inventory the potential risks or sources of contamination
- Determine the areas most susceptible to contamination

5.1.2 Protection Phase (performed by the community)

- Assemble a local Drinking Water Protection Team
- Enhance the Source Water Assessment
- Develop a plan to protect the supply (reduce the risk of contamination)
- Develop a contingency plan to address the potential loss of the system
- Certify (optional) and implement the Drinking Water Protection Plan

As you know, the assessment phase work was funded by the federal Safe Drinking Water Act. The assessment is simply the first three steps of developing a protection plan for your public water supply. Developing a protection plan is voluntary.

Prior to moving into the protection phase, DEQ recommends the inventory presented in this document be reviewed in detail to clarify the presence, location, operational practices, actual risks, etc. of the identified facilities and land use activities. The SWA inventory should be regarded as a preliminary review of potential sources of contamination within the drinking water protection area. Resources within the community should be used to do an "enhanced inventory" to complete this preliminary list of potential sources of contamination.

It is also important to remember that not all of the inventoried activities will need to be addressed

if you chose to develop a Drinking Water Protection Plan. When developing a protection plan, sources, which pose little or no threat to your public water supply, can be screened out. For example, if any of the land use activities are conducted in a manner that already significantly reduces the risk of a contamination release, the facility would not need to re-evaluate their practices based on drinking water protection “management”. One of the goals of developing a Drinking Water Protection Plan based on the inventory results is to address those land use activities that do pose high or moderate risks to your public water supply. The community should target these facilities with greater levels of education and technical assistance to maximize the risk of contamination.

Limited technical assistance is available through DEQ and OHD for communities that choose to move beyond the assessments and voluntarily develop a Drinking Water Protection Plan. Using the results of the assessment (and enhanced inventory), the local community can form a “Drinking Water Protection Team” of community members and develop a plan to reduce the risks of contamination from those sources.

Forming a local team to help with the development of a protection plan is very important. Oregon’s drinking water protection approach relies upon the concept of “community-based protection”, as are many other water quality programs. Community-based protection simply refers to the concept of allowing local control and decision-making to implement the water quality protection effort. Community-based protection is successful only with significant local citizen stakeholder involvement.

The primary advantage of community-based protection is that it links community needs to environmental needs. Any successful protection program will need to be flexible enough to allow the community to adopt the “tools” or elements that are most appropriate for them. Allowing this local control in making the changes necessary for improving water quality will accomplish two key elements of restoration and protection. Community-based protection can draw on the knowledge and successful adaptive practices of the local area. Landowners generally know best how to achieve water resource restoration and protection as long as a thorough explanation of the problem is provided, the objectives are defined, and some free technical assistance is provided. Secondly they have more local control, citizens will also be more likely to participate in the program and more willing to assist with the educational and outreach effort, which will make the plan successful. We recommend that the protection plan be developed so as *to minimize any burdens on individual property owners, but maximize the equity in responsibility for reducing the risks of future contamination.*

Drinking water protection involves developing protection strategies for groundwater or surface water sources of public water supplies. There are many similarities between this program and other water quality protection programs, and it is essential that water quality efforts are coordinated and linked in each geographic area as much as possible. DEQ is committed to linking the drinking water protection efforts to other habitat and water quality improvement efforts for fish in Oregon, as well as the ongoing work to address Clean Water Act 303 (d) water-quality-limited streams. One of the primary means of providing technical assistance is to give your community the information and coordination necessary to create these links. Other agencies will also be involved in providing technical assistance is to give your community the information and coordination necessary to create these links. Other agencies will also be involved in providing technical assistance as protection plans are developed. For example, on farmlands, the Oregon Department of Agriculture will provide assistance as provided for under Senate Bill 1010. In developing recommendations for protecting the drinking water source area, your community

can maximize the use of existing programs in Oregon that offer free technical assistance. Examples of such programs include:

- Pollution prevention technical assistance from the Department of Environmental Quality,
- Sanitary survey assistance from the Oregon Health Division
- Household hazardous waste assistance from the Department of Environmental Quality,
- Land use planning from the Department of Land Conservation and Development,
- Agricultural water quality management plans from the Oregon Department of Agriculture,
- Water conservation education from the Water Resources Department, or
- Rural water quality outreach from the Oregon State Extension Service

Protecting the drinking water supply in a community can also be a very effective way to encourage all citizens to participate in an issue which directly affects everyone in that community. This often leads to more public involvement in other significant local decisions concerning future livability issues (i.e., land use planning). In communities already developing and implementing Drinking Water Protection Plans, the process has served to bring many diverse interests together on a common goal and strengthened the local rural and urban relationships through communication and increased understanding. We must continue to do a better job in our outreach efforts to point out that we are all part of the existing water quality problems. The risks and sources of water quality problems are not only from industries, farmers, and managed forests, but every individual living, commuting and working in that area.

Communities interested in developing Drinking Water Protection Plans may contact the Department of Environmental Quality (503-229-5413) or the Oregon Health Division (541-726-2587) for further information.

6 Glossary of Terms

Abandonment. With respect to wells, abandonment refers to removing or completely perforating the casing and injecting grout under pressure to fill the existing bore hole to the surface. State law requires that abandonment be done in a manner such that vertical movement of water in the well bore or within the annular space surrounding the well casing is effectively and permanently stopped (OAR 690-220-005 through 690-220-140).

Alluvial. Stream related, i.e., alluvial sediments are sands, silts and gravels that were deposited by a stream.

Aquifer. Any geologic material below the surface in which all the open spaces are filled with water and is permeable enough to yield water to a well.

Casing Seal. A seal that is placed in the annular space of the upper part of the well to prevent access to the casing of surface and near surface water. Seal material is usually cement, bentonite or a mixture of the two.

Community Water System. A public water system that has at least 15 connections (homes) or serves at least 25 year around residents.

Confined Aquifer. An aquifer that is separated from the surface by a low permeability layer. Recharge to a confined aquifer is often some distance from the well.

Contaminant. Any constituent, natural or synthetic, chemical, organism or particulate, the presence of which in water causes a decrease in the quality of that water.

Contamination. The degradation of water quality, i.e., pollution, through the addition of a chemical, nutrient or microorganism to the water.

Cooling Columns. Fractures in volcanic rocks that form when the lava continues to shrink as it cools. Fractures are often near vertical and are very regular in shape, giving the impression of columns.

Delineation. The identification, through hydrogeologic means, of the drinking water protection area (DWPA).

DEQ. Oregon Department of Environmental Quality

Drinking Water Protection Area (DWPA). The land area that directly overlies that part of the aquifer that supplies groundwater to a well or well for a given time-of-travel.

Drinking Water Protection Plan (DWPP). A community-based plan or strategy designed to reduce the risk of contamination of a public drinking water source.

Effective Porosity. The fraction of the aquifer or other geologic material that consists of interconnected pore spaces.

Global Positioning System (GPS). An instrument that receives and processes signals from several satellites simultaneously for the purpose of determining an accurate location of a feature on the earth's surface.

Groundwater. Water that originates as precipitation infiltrating from the surface and that fills the open spaces between soil and rock particles or occurs within the fractures of bedrock below the surface.

Hyaloclastics. An assemblage of geologic materials that are formed when lava encounters water, including pillows, fragment lava fragments and volcanic glass.

Hydraulic Conductivity. A measurement of the rate in which water can move through a geologic medium, i.e., the permeability.

Hydraulic Head. The potential energy that the water possesses, often expressed as the elevation of the water in the well and the well is not being pumped. Head is the driving force for groundwater movement.

Hydraulic Gradient. The change in hydraulic head with distance in the direction of

groundwater flow.

Hydraulic Surplus. Water available at the surface from precipitation and/or irrigation that infiltrates below the root zone.

Hydrogeology. That branch of geology that consists of the study of the origin and occurrence of groundwater.

Hydrogeologic Province. An area that can be characterized by a continuous groundwater flow system and has defined aquifer properties that are similar throughout.

Imbricated Gravels. Gravels in which the individual particles are oriented in the same direction as the result of current flow when the gravels were deposited, specifically, the long axis of the individual gravel pieces are found to be leaning against one another in the direction in which the current was flowing.

Infiltration Potential (IP). An indication of the ease of which water, potentially carrying contaminants, can move from the surface to the aquifer. A combination of the hydraulic surplus and traverse potential.

Intracanyon Lava Flow. A lava flow that moved through an existing canyon or stream valley.

IOCs. Inorganic chemicals including constituents such as arsenic, chromium, nickel, nitrate, selenium, sodium, etc.

Listed Sites. Sites that have been identified on state or federal regulatory databases.

Management Plan. See drinking water protection plan.

Nontransient Noncommunity Water System. A public water system that serves at least 25 of the same people for at least 6 months out of a year, e.g., a school or work place.

OHD. Oregon Health Division.

Paleocanyon. An ancient canyon that has been filled in with subsequent geologic materials.

Pillows. Rounded to ovoid masses of lava rock that formed when the original lava erupted into water. Pillows are on the order of less than one foot to several feet in longest dimension.

Plio-Pleistocene. A period of geologic time extending from late Pliocene time (1.5-2 million years ago) to early Pleistocene time (1.0 to 1.5 million years ago).

Pore Space. Open spaces within soil or subsoil material.

Potential Contaminant Source (PCS). A facility, land use or activity that by its nature, i.e., the chemicals used or stored, waste material resulting from their practices, etc., poses a risk of pollution of groundwater in an aquifer.

Saturated Conditions. The condition in which all the open spaces in the material are filled with water.

Sensitivity. The characteristics of the site that relate to the ease of which a contaminant, if present, can move to the aquifer, e.g., depth to the aquifer, permeability of the soil and subsoil material, amount of rainfall, etc.

SOCs. Synthetic organic chemicals, primarily pesticides.

Source Water Assessment (SWA). An assessment of the location of that contains a public water system's source of drinking water, the identification of potential contaminant sources within the area and susceptibility of the drinking water to contamination.

Well. A site where groundwater emerges at the surface.

Susceptibility. The potential risk of contamination of a drinking water supply as a combined result of the presence of potential contaminant sources and aquifer sensitivity.

Time-of-Travel (TOT). The length of time it takes groundwater to move from one point to another. In the delineation process, the time-of-travel is used to determine the size of the drinking water protection area.

Traverse Potential (TP). The ability of the soil and subsoil materials above the aquifer to transmit water to the aquifer. A function of the permeability and depth to the aquifer.

Unconfined Aquifer. Generally shallow aquifers in which no low-permeability layers separate

the aquifer from the land surface.

Vesicular. The property of some lava flows of having numerous holes (gas bubbles) in the rock.

VOCs. Volatile organic compounds, including fuels and solvents.

Volcaniclastic. Volcanic products, e.g., volcanic ash or pieces of volcanic rock, that have been transported and deposited by a stream.

Water Table. The top of an unconfined aquifer. Above the water table the openings in the rock or sediment are largely filled with air. Below the water table (in the aquifer) the openings are filled with water.

Appendix A: References Cited

Frank, F. J., 1973, Groundwater in the Eugene-Springfield Area, Southern Willamette Valley, Oregon, Geological Survey Water-Supply Paper 2018, pp. 1-65.

Stewart, S. and Nelson, D., 1999, Source Water Assessment Plan: Implementation of the Safe Drinking Water Act 1996 Amendments. Oregon Department of Environmental Quality and Oregon Health Division.

Appendix B: Figures

Figure 1. City of Veneta - Hydraulic Head Map

Figure 2. City of Veneta Drinking Water Protection Area (DWPA)

Figure 3. City of Veneta Drinking Water Protection Area -Potential Contaminant Sources

Figure 4. City of Veneta Drinking Water Protection Area -Potential Contaminant Sources: Well 4

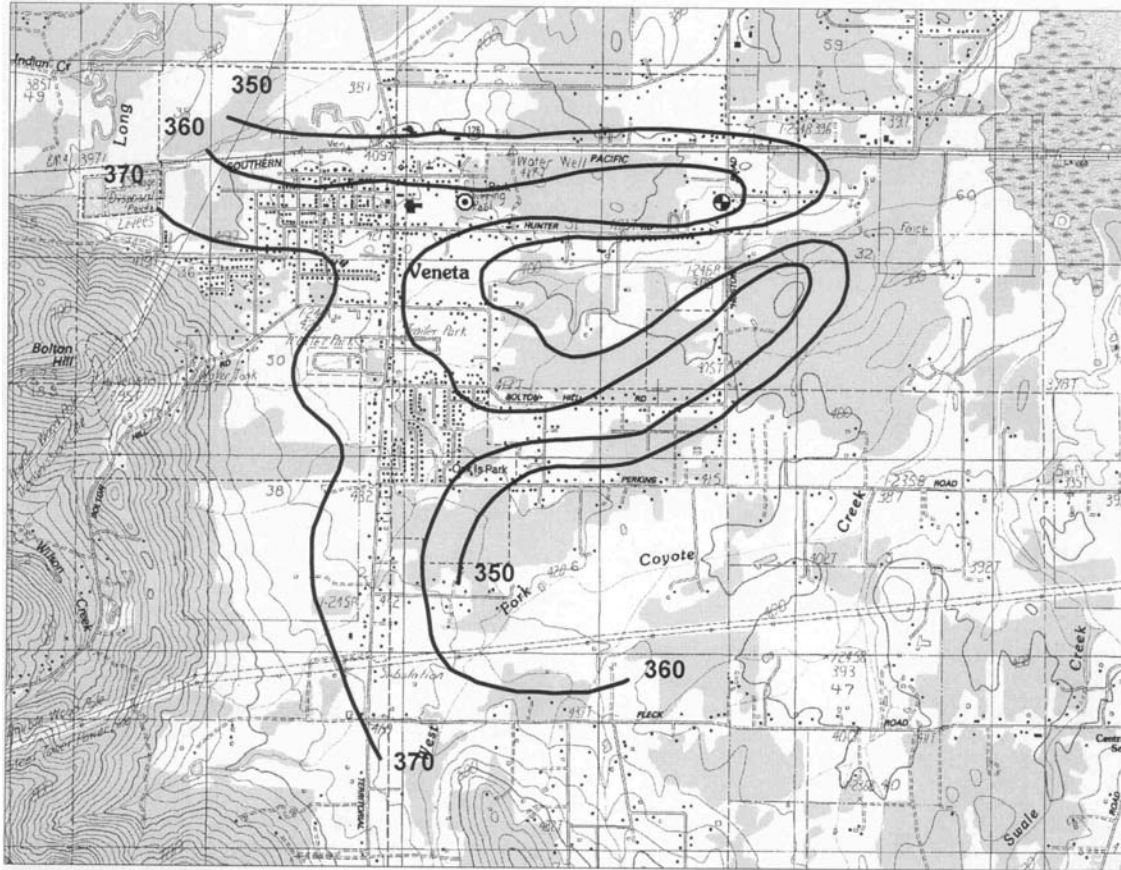
Figure 5. City of Veneta Drinking Water Protection Area -Potential Contaminant Sources: Well 9

Figure 6. City of Veneta Drinking Water Protection Area and Sensitivity Analysis

Figure 7. City of Veneta Drinking Water Protection Area – Potential Contaminant Sources and Sensitivity Analysis




Figure 1

City of Veneta Hydraulic Head Map



4000 0 4000 8000 Feet

1:30,000

-  Hydraulic Head Contours
-  Well 9
-  Well 4

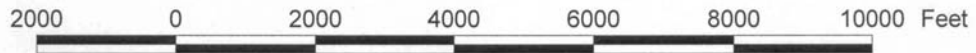
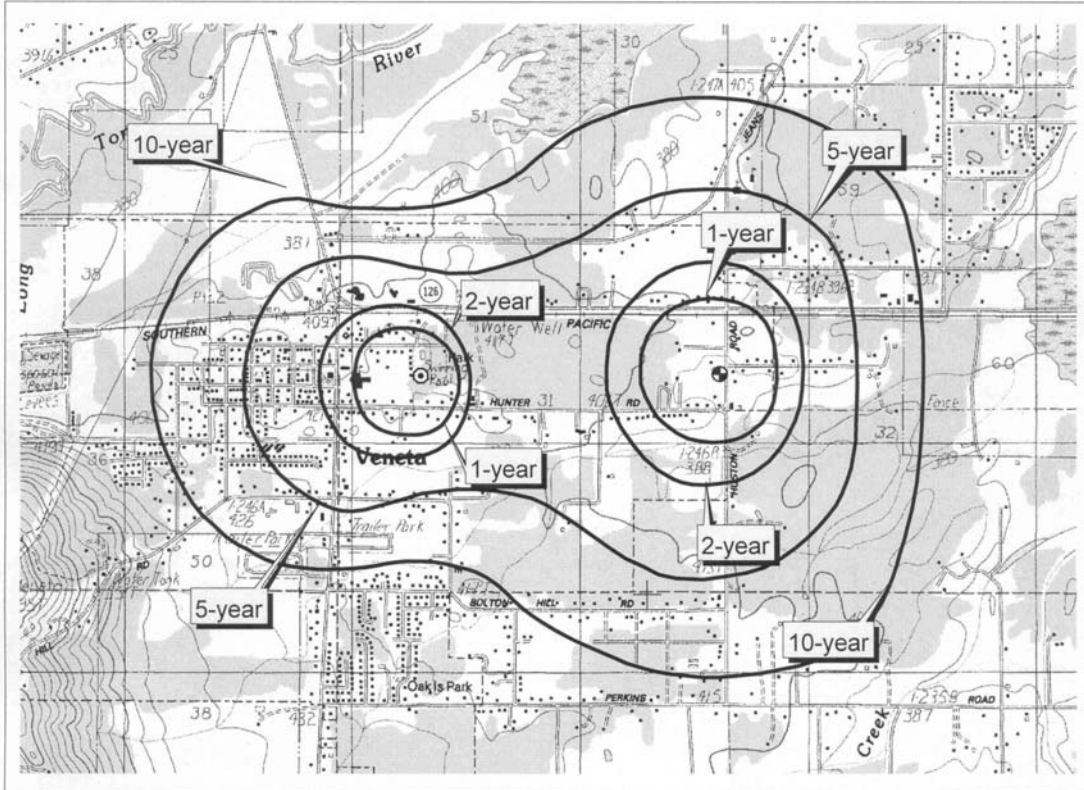


Numbers on the hydraulic head contours represent the elevation of the water table above sea level.



Figure 2

City of Veneta Drinking Water Protection Area (DWPA)



Drinking Water Protection Area (DWPA)
1, 2, 5, and 10 year Time-of-Travel (TOT)
zones indicated
2-D Analytical Model : RESSQC

Scale 1: 24000

Model Parameters
Transmissivity: 920 ft²/day
Aquifer Thickness: 40 feet
Effective Porosity: 0.25
Gradient: 0.0015 towards N70E
Water Use ft³/day: Well 4: 52940; Well 9: 84225

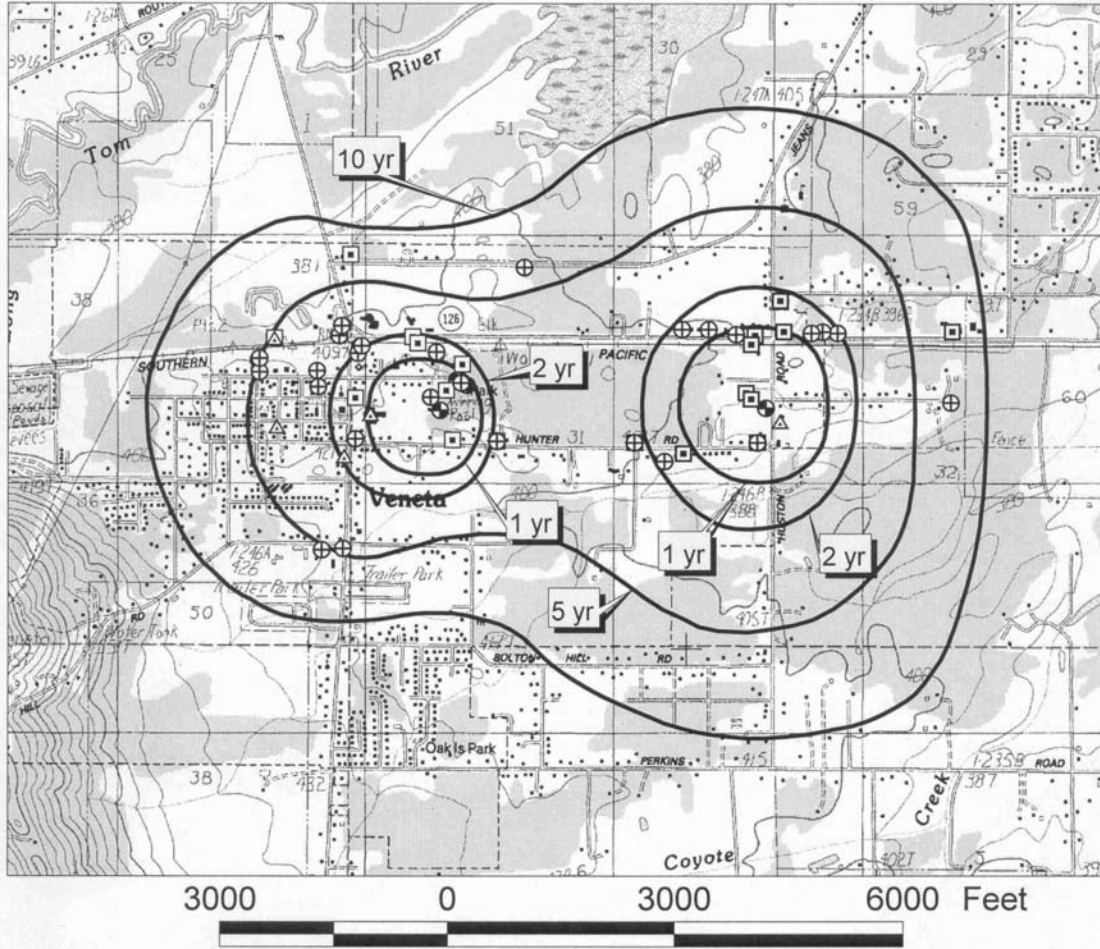
Well 4: 44° 03' 00.8061" N 123° 20' 44.7936" W
Well 9: 44° 03' 01.2708" N 123° 19' 45.8802" W
USGS Veneta, OR Quadrangle
T: 17S R: 5W Sec: 31

Prepared by: DN Date: 10/1/99
Project Manager: DN
Reviewed by: DN RG#: 1224
File#: 4100920



Figure 3

City of Veneta Drinking Water Protection Area Potential Contaminant Sources



DWPA Time-of-Travel Zones
As Indicated, e.g., 10 yr

1:24000

- Well
- Potential Contaminant Sources
Relative Risk:
- ⊕ Higher
- Moderate
- △ Lower



Figure 4

City of Veneta Drinking Water Protection Area Potential Contaminant Sources: Well 4

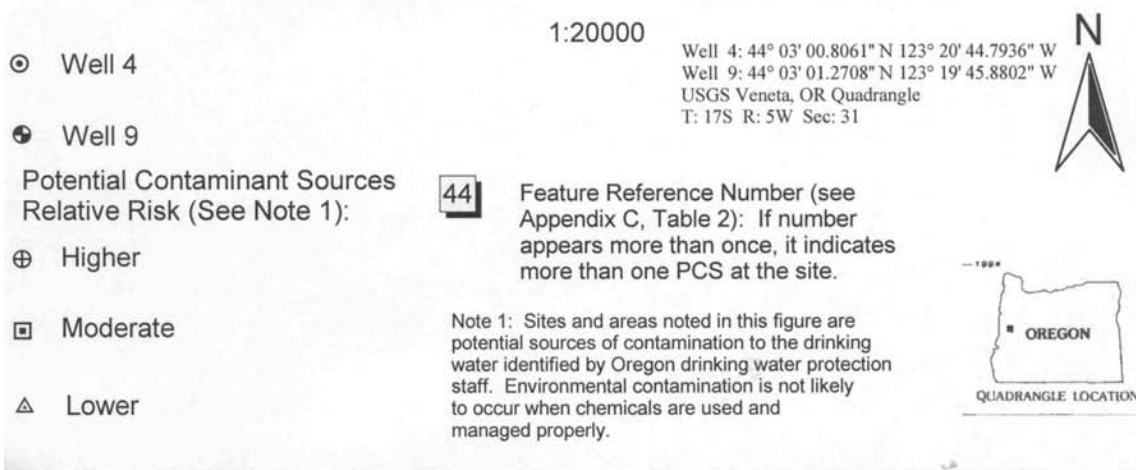
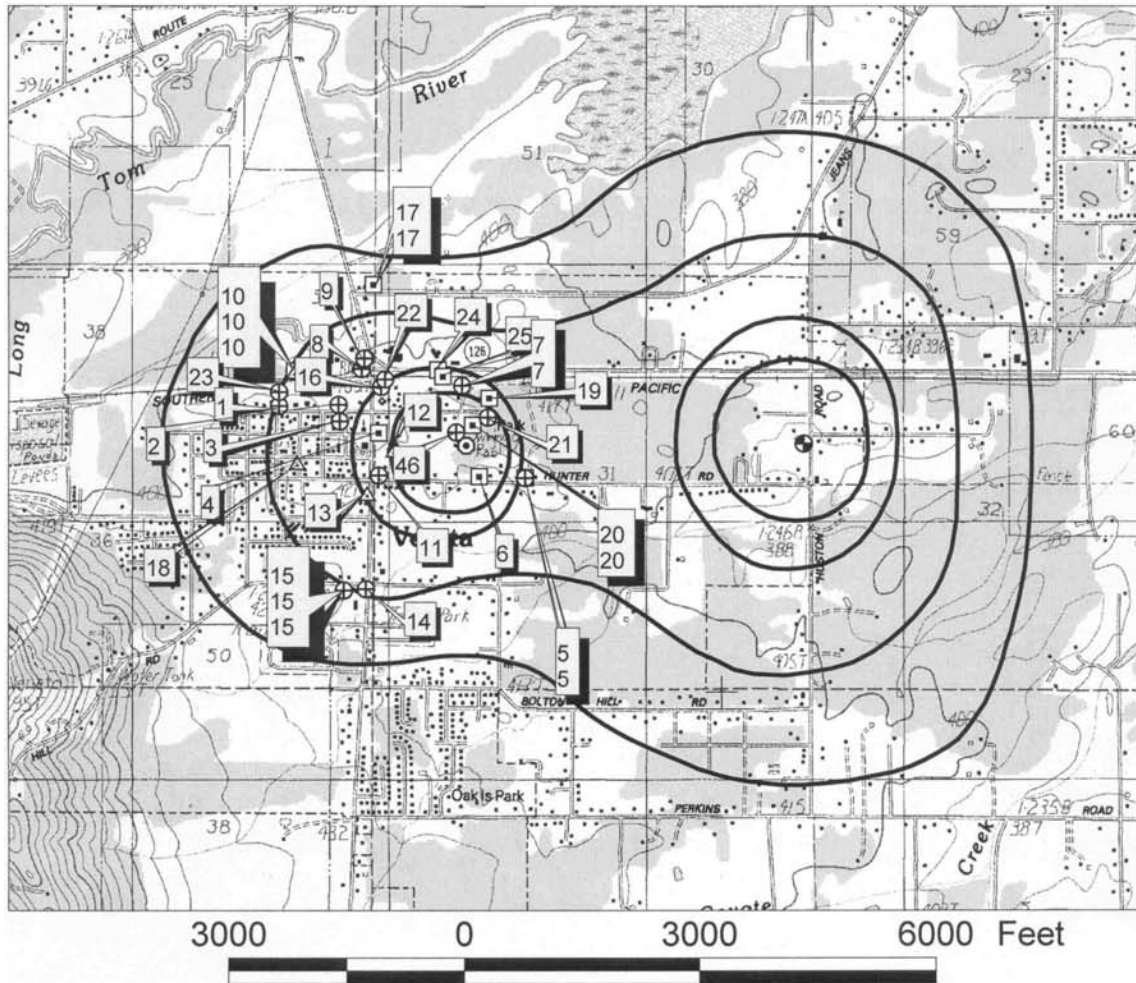
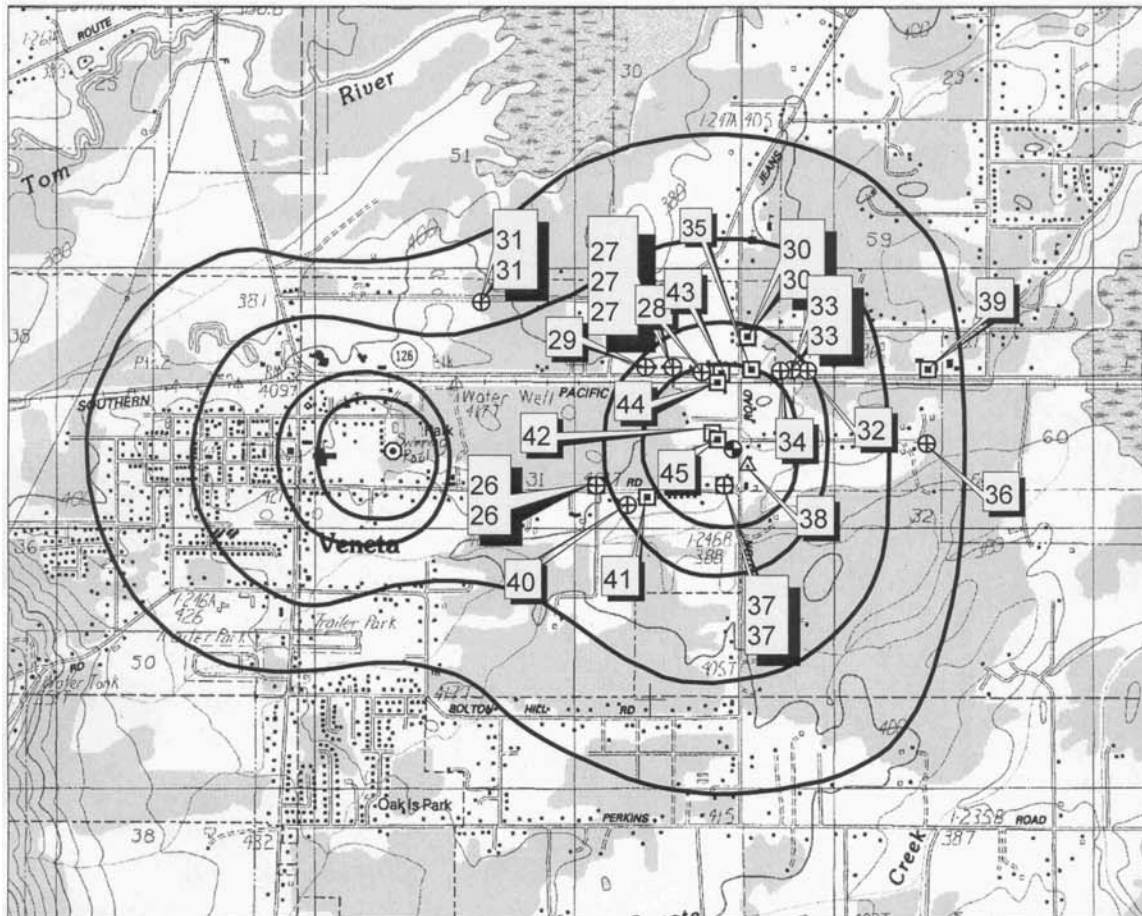


Figure 5

City of Veneta Drinking Water Protection Area Potential Contaminant Sources: Well 9



3000 0 3000 6000 Feet

1:20000

Well 4: 44° 03' 00.8061" N 123° 20' 44.7936" W
Well 9: 44° 03' 01.2708" N 123° 19' 45.8802" W
USGS Veneta, OR Quadrangle
T: 17S R: 5W Sec: 31



○ Well 4

⊕ Well 9

Potential Contaminant Sources
Relative Risk (See Note 1):

⊕ Higher

□ Moderate

△ Lower

44

Feature Reference Number (see
Appendix C, Table 2): If number
appears more than once, it indicates
more than one PCS at the site.

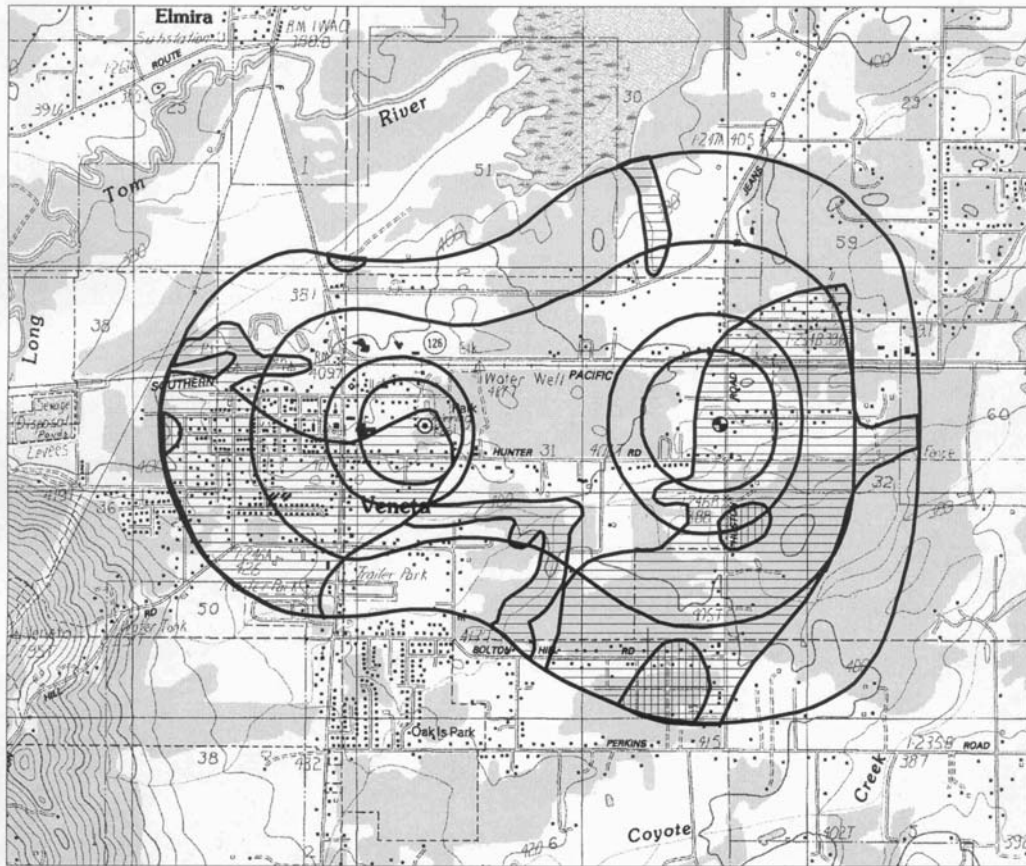
Note 1: Sites and areas noted in this figure are
potential sources of contamination to the drinking
water identified by Oregon drinking water protection
staff. Environmental contamination is not likely
to occur when chemicals are used and
managed properly.



QUADRANGLE LOCATION

Figure 6

City of Veneta Drinking Water Protection Area and Sensitivity Analysis



3000 0 3000 6000 Feet

1:24,000

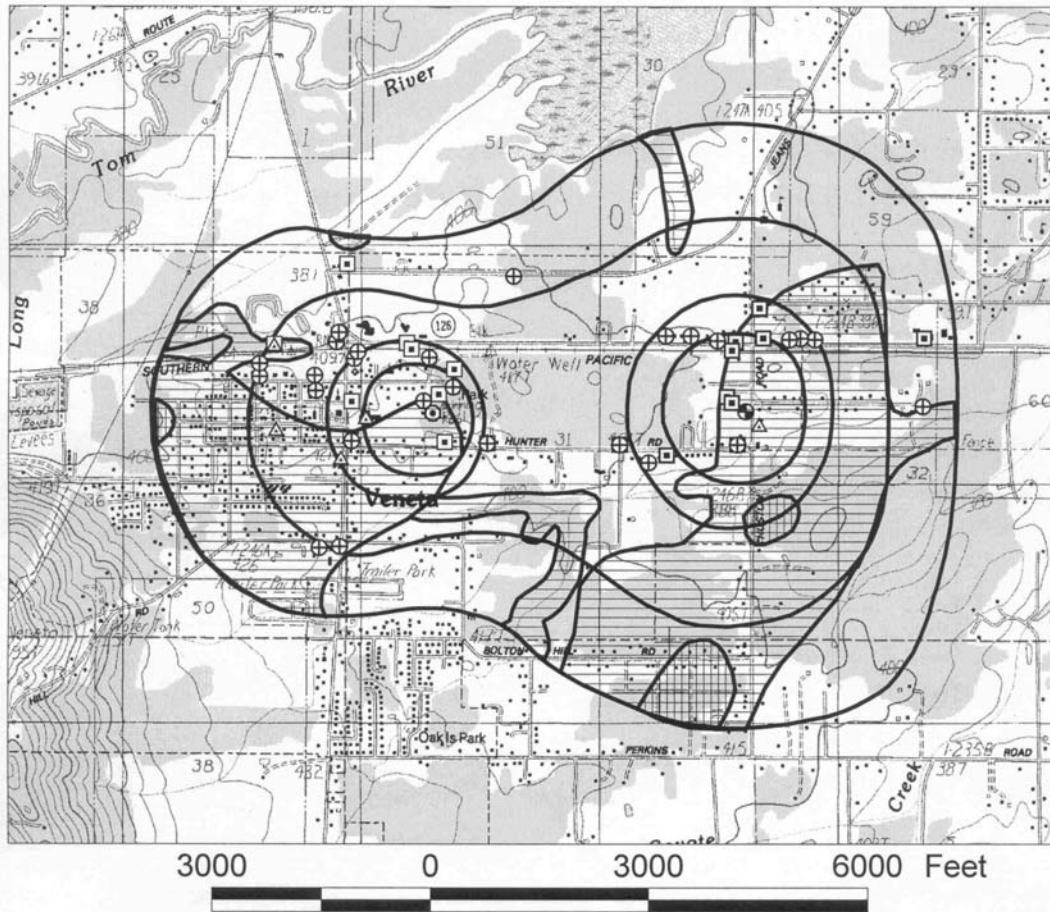
- Moderate Sensitivity
- High Sensitivity
- DWPA Boundaries
- Well 9
- Well 4

Sensitivity based on soil surveys and data from area well reports.



Figure 7

City of Veneta Drinking Water Protection Area Potential Contaminant Sources and Sensitivity Analysis



⊙ Well 4

⊕ Well 9

Potential Contaminant Sources
Relative Risk (See Note 1):

⊕ Higher

▣ Moderate

△ Lower

1:24,000

Well 4: 44° 03' 00.8061" N 123° 20' 44.7936" W
Well 9: 44° 03' 01.2708" N 123° 19' 45.8802" W
USGS Veneta, OR Quadrangle
T: 17S R: 5W Sec: 31



Sensitivity Analysis:

Vertical Ruled Pattern: Higher Sensitivity
Horizontal Ruled Pattern: Moderate Sensitivity
No Pattern: Lower Sensitivity

Note 1: Sites and areas noted in this figure are potential sources of contamination to the drinking water identified by Oregon drinking water protection staff. Environmental contamination is not likely to occur when chemicals are used and managed properly.



Appendix C: Tables

Table 1 – Summary of Potential Contaminant Sources by Land Use

Table 2 – Inventory Results- List of Potential Contaminant Sources

Note 1 for all Tables and Figures: Sites and areas identified in this Table are only *potential* sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

**APPENDIX C - INVENTORY OF POTENTIAL CONTAMINANT SOURCES
VENETA, CITY OF - PWS # 4100920
OREGON SOURCE WATER ASSESSMENT**

Inventory Results

Table 1. Summary of Potential Contaminant Sources by Land Use

Table 2. Inventory Results - List of Potential Contaminant Sources

Table 3. Results of Regulatory Database Search

Notes for Tables:

Sites and areas identified in these Tables are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

Total number of sources listed in Table 1 in the DWPA may not add up to the total number of potential contaminants sources in Table 2 because more than one type of potential contaminant source may be present at any given facility.

Data collected by Elizabeth Esseks Oregon DEQ on 10/21/99.

Acronyms:

AST - Aboveground Storage Tank

DC - DEQ's Dry Cleaner database

DEQ - Oregon Department of Environmental Quality

DWPA - Drinking Water Protection Area

ECSI - DEQ's Environmental Cleanup Site Information database

HWIMSY - DEQ's Hazardous Waste Information Management System database

LUST - DEQ's Leaking Underground Storage Tank database

NPDES - National Pollution Discharge Elimination System

PCS - Potential Contaminant Source

PWS - Public Water System

SFM - State Fire Marshall's database of hazardous materials

SIS - DEQ's Source Information System database (includes WPCF & NPDES permits)

SWMS - DEQ's Solid Waste Management System database

UST - DEQ's Underground Storage Tank database or Underground Storage Tank

WPCF - Water Pollution Control Facility

WRD - Oregon Water Resources Division database for water rights information

**TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE
PWS # 4100920 VENETA, CITY OF**

Residential/Municipal Land Uses

Potential Contamination Source	Notes	Relative Risk Level	Total in DWPA
Airport - Maintenance/Fueling Area		Higher	0
Apartments and Condominiums		Lower	0
Campgrounds/RV Parks	(1)	Lower	0
Cemeteries - Pre-1945		Moderate	0
Drinking Water Treatment Plants		Moderate	1
Fire Station		Lower	1
Fire Training Facilities		Moderate	0
Golf Courses		Moderate	0
Housing - High Density (> 1 House/0.5 acres)		Moderate	4
Landfill/Dumps	(1)	Higher	0
Lawn Care - Highly Maintained Areas		Moderate	0
Motor Pools		Moderate	0
Parks		Moderate	0
Railroad Yards/Maintenance/Fueling Areas		Higher	0
Schools		Lower	1
Septic Systems - High Density (> 1 system/acre)	(1)	Higher	3
Sewer Lines - Close Proximity to PWS	(1)	Higher	1
Utility Stations - Maintenance Transformer Storage		Higher	0
Waste Transfer/Recycling Stations	(1)	Moderate	1
Wastewater Treatment Plants/Collection Stations	(1)	Moderate	0
Other: CITY POOL		Moderate	1

NOTES:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water.

Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) - Potential source of microbial contamination

(2) - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

**TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE
PWS # 4100920 VENETA, CITY OF**

Commercial/Industrial Land Uses

Potential Contamination Source	Notes	Relative Risk Level	Total in DWPA
Automobiles - Body Shops		Higher	2
Automobiles - Car Washes		Moderate	1
Automobiles - Gas Stations		Higher	5
Automobiles - Repair Shops		Higher	8
Boat Services/Repair/Refinishing		Higher	0
Cement/Concrete Plants		Moderate	0
Chemical/Petroleum Processing/Storage		Higher	0
Dry Cleaners		Higher	1
Electrical/Electronic Manufacturing		Higher	0
Fleet/Trucking/Bus Terminals		Higher	0
Food Processing		Moderate	0
Furniture/Lumber/Parts Stores		Moderate	1
Home Manufacturing		Higher	0
Junk/Scrap/Salvage Yards		Higher	1
Machine Shops		Higher	1
Medical/Vet Offices	(1)	Moderate	1
Metal Plating/Finishing/Fabrication		Higher	0
Mines/Gravel Pits		Higher	0
Office Buildings/Complexes		Lower	0
Parking Lots/Malls (> 50 Spaces)		Higher	2
Photo Processing/Printing		Higher	0
Plastics/Synthetics Producer		Higher	0
Research Laboratories		Higher	0
RV/Mini Storage		Lower	1
Wood Preserving/Treating		Higher	0
Wood/Pulp/Paper Processing and Mills		Higher	0
Other: LOGGING - RELATED INDUSTRY		Higher	1

NOTES:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water.

Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) - Potential source of microbial contamination

(2) - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

**TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE
PWS # 4100920 VENETA, CITY OF**

Agricultural/Forest Land Uses

Potential Contamination Source	Notes	Relative Risk Level	Total in DWPA
Auction Lots	(1)	Higher	0
Boarding Stables	(1)	Moderate	1
Confined Animal Feeding Operations (CAFOs)	(1)	Higher	0
Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	(2)	Moderate	2
Crops - Nonirrigated (inc. Christmas trees, grains, grass seed, pasture)		Lower	0
Farm Machinery Repair		Higher	0
Grazing Animals (> 5 large animals or equivalent/acre)	(1)	Moderate	0
Lagoons/Liquid Wastes	(1)	Higher	0
Land Application Sites	(1)	Moderate	0
Managed Forest Land - Broadcast Fertilized Areas		Lower	0
Managed Forest Land - Clearcut Harvest (< 35 yrs.)		Moderate	0
Managed Forest Land - Partial Harvest (< 10 yrs.)		Moderate	0
Managed Forest Land - Road Density (> 2 mi./sq. mi.)		Moderate	0
Pesticide/Fertilizer/Petroleum Storage, Handling, Mixing, & Cleaning Areas		Higher	1
Recent Burn Areas (< 10 yrs.)		Lower	0
Managed Forest Lands - Status Unknown		Moderate	0
Other			0

NOTES:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water.

Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) - Potential source of microbial contamination

(2) - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

**TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE
PWS # 4100920 VENETA, CITY OF**

Miscellaneous Land Uses

Potential Contamination Source	Notes	Relative Risk Level	Total in DWPA
Above Ground Storage Tanks - Excluding Water		Moderate	3
Channel Alterations - Heavy		Lower	0
Combined Sewer Outfalls	(1)	Lower	0
Stormwater Outfalls	(1)	Lower	0
Composting Facilities	(1)	Moderate	0
Historic Gas Stations		Higher	1
Historic Waste Dumps/Landfills	(1)	Higher	0
Homesteads - Rural - Machine Shops/Equipment Maintenance		Higher	0
Homesteads - Rural - Septic Systems (< 1/acre)	(1)(3)	Lower	1
Injection/Dry Wells, Sumps - Class V UICs	(1)	Higher	0
Kennels (> 20 Pens)	(1)	Lower	0
Military Installations		Higher	0
Random Dump Sites		Moderate	0
River Recreation - Heavy Use (inc. campgrounds)	(1)	Lower	0
Sludge Disposal Areas	(1)	Moderate	0
Stormwater Retention Basins	(1)	Moderate	0
Transmission Lines - Right-of-Ways		Lower	0
Transportation - Freeways/State Highways/Other Heavy Use Roads		Moderate	2
Transportation - Railroads		Moderate	2
Transportation - Right-Of-Ways - Herbicide Use Areas		Moderate	0
Transportation - River Traffic - Heavy		Lower	0
Transportation - Stream Crossing - Perennial		Lower	0
UST - Confirmed Leaking Tanks - DEQ List		Higher	3
UST - Decommissioned/Inactive		Lower	0
UST - Nonregulated Tanks (< 1,100 gals or Large Heating Oil Tanks)		Higher	0
UST - Not Upgraded and/or Registered Tanks		Higher	0
UST - Upgraded/Registered - Active		Lower	2
UST - Status Unknown		Higher	1
Upstream Reservoirs/Dams		Lower	0
Wells/Abandoned Wells		Higher	4
Large Capacity Septic Systems (serves > 20 people) - Class V UICs	(1)	Higher	0
Construction/Demolition Areas		Moderate	0
Other			0

NOTES:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) - Potential source of microbial contamination

(2) - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts	Comments
1	Automobiles - Repair Shops	DICK'S DIESEL SERVICE	NORTHEAST CORNER BROADWAY AND 6TH/24917 BROADWAY	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.	
2	Automobiles - Repair Shops	POODLE CREEK BOYS	NORTHWEST CORNER BROADWAY AND 2ND	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.	
3	UST - Confirmed Leaking Tanks - DEQ List	US WEST	SOUTHEAST CORNER BROADWAY AND 2ND	VENETA	Database (2) Field-Observation Interview	Between 2-yr and 5-yr TOT	Higher	Existing contamination from spills, leaks, or improper handling of stored materials may impact the drinking water supply.	
4	Medical/Vet Offices	VENETA VETERINARY HOSPITAL	NORTHEAST CORNER TERRITORIAL AND DUNHAM ROAD	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Spills, leaks, or improper handling of x-ray, biological, chemical, and radioactive wastes and other materials during transportation, use, storage and disposal may impact the drinking water supply.	
5	Housing - High Density (> 1 House/0.5 acres)	HOUSING EAST OF 25251 HUNTER RD	HOUSING EAST OF 25251 HUNTER ROAD	VENETA	Field-Observation Interview	Within the 2-yr TOT.	Moderate	Improper use, storage, and disposal of household chemicals may impact the drinking water supply. Stormwater run-off or infiltration may carry contaminants to drinking water supply.	
	Septic Systems - High Density (> 1 system/acre)						Higher	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Cumulative effects of multiple systems in an area may impact drinking water supply.	

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
6	Housing - High Density (> 1 House/0.5 acres)	HIGH DENSITY HOUSING ON SEWER	HOUSING WEST OF 25251 HUNTER ROAD	VENETA	Field-Observation Interview	Within the 2-yr TOT.	Moderate	Improper use, storage, and disposal of household chemicals may impact the drinking water supply. Stormwater run-off or infiltration may carry contaminants to drinking water supply.
7	Automobiles - Repair Shops	OREGON DEPARTMENT OF TRANSPORTATION	EAST END OF LUTHER	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
	UST - Status Unknown						Higher	Spills, leaks, or improper handling of stored materials may impact the drinking water supply.
8	Parking Lots/Malls (> 50 Spaces)	WEST LANE CENTER (SHOPPING CENTER)	TERRITORIAL AND HWY 126 (NORTH SIDE OF HWY 126)	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Higher	Spills and leaks of automotive fluids in parking lots may impact the drinking water supply.
9	Dry Cleaners	FERN RIDGE CLEANERS	88348 TERRITORIAL ROAD/NORTH OF HWY 126	VENETA	Database (2) Field-Observation	Between 2-yr and 5-yr TOT	Higher	Spills, leaks, or improper handling of dry cleaning solvents and other chemicals during transportation, use, storage and disposal may impact the drinking water supply.
10	Automobiles - Car Washes	VENETA CHEVRON	24927 HWY 126	VENETA	Database (2) Field-Observation	Between 2-yr and 5-yr TOT	Moderate	Improper management of vehicle wash water may result in soaps, oils, greases, and metals impacting the drinking water supply.
	Automobiles - Gas Stations						Higher	Spills, leaks, or improper handling of fuels and other materials during transportation, transfer, and storage may impact the drinking water supply.
	UST - Upgraded/Registered - Active						Lower	Spills or improper handling during tank filling or product distribution may impact the drinking water supply.
11	Historic Gas Stations	VENETA AUTO SHOP	NORTHEAST CORNER HUNTER AND TERRITORIAL	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Higher	Historic spills, leaks, or improper handling of solvents and petroleum products may impact the drinking water supply. Abandoned underground storage tanks may be present.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
12	Schools	VENETA ELEMENTARY SCHOOL	NORTHEAST CORNER MCCUTCHEON AVE. AND TERRITORIAL	VENETA	Field-Observation	Within the 2-yr TOT.	Lower	Over-application or improper handling of cleaning products, pesticides or fertilizers used on the school grounds may impact drinking water. Vehicle maintenance wastes may contribute contaminants.
13	Fire Station	LANE COUNTY FIRE DISTRICT #1	WEST SIDE TERRITORIAL/SOUTH OF HUNTER	VENETA	Field-Observation	Within the 2-yr TOT.	Lower	Spills, leaks, or improper handling of chemicals and other materials during transportation, use, storage and disposal may impact the drinking water supply.
14	Pesticide/Fertilizer/Petroleum Storage, Handling, Mixing, & Cleaning Areas	OREGON STATE FORESTRY OFFICE	87950 TERRITORIAL	VENETA	Database (2) Field-Observation	Between 2-yr and 5-yr TOT	Higher	Leaks, spills and improper handling of pesticides, fertilizers and petroleum products may impact drinking water source.
15	Automobiles - Gas Stations	LANE COUNTY MAINTENANCE/PUBLIC WORKS	24974 BOLTON HILL ROAD WEST OF ODF	VENETA	Database (2) Field-Observation	Between 5-yr and 10-yr TOT	Higher	Spills, leaks, or improper handling of fuels and other materials during transportation, transfer, and storage may impact the drinking water supply.
	Automobiles - Repair Shops						Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
	UST - Confirmed Leaking Tanks - DEQ List						Higher	Existing contamination from spills, leaks, or improper handling of stored materials may impact the drinking water supply.
16	Parking Lots/Malls (> 50 Spaces)	FERN RIDGE CENTER	TERRITORIAL /LUTHER (SOUTH OF HWY 126)	VENETA	Field-Observation	Within the 2-yr TOT.	Higher	Spills and leaks of automotive fluids in parking lots may impact the drinking water supply.
17	Automobiles - Gas Stations	JERRY BROWN CO. CFN CARD LOCK	25095 JEANS ROAD/NORTH OF HWY 126	VENETA	Field-Observation	Between 5-yr and 10-yr TOT	Moderate	Spills, leaks, or improper handling of fuels and other materials during transportation, transfer, and storage may impact the drinking water supply.
	Above Ground Storage Tanks - Excluding Water						Moderate	Spills, leaks, or improper handling of stored materials may impact the drinking water supply.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
18	RV/Mini Storage	BROADWAY MINI STORAGE	88188 6TH STREET	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Lower	Spills, leaks, or improper handling of automotive fluids and other materials during transportation, storage and disposal may impact the drinking water supply.
19	Drinking Water Treatment Plants	VENETA WATER TREATMENT PLANT	EAST END EAST BROADWAY	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Moderate	Treatment chemicals and equipment maintenance materials may impact groundwater or surface water source.
20	Above Ground Storage Tanks - Excluding Water Other CITY POOL	VENETA CITY POOL	EAST END EAST BROADWAY	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Moderate Moderate	Spills, leaks, or improper handling of stored materials may impact the drinking water supply. The impacts to this potential contaminant source will be addressed during the enhanced inventory.
21	Wells/Abandoned Wells	CITY OF VENETA WELLS #1 AND 5	NORTHEAST OF WELL #4/EAST END OF BROADWAY	VENETA	Field-Observation	Within the 2-yr TOT.	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source. PERCHLOROETHYLENE DETECTED IN WELL #1
22	Wells/Abandoned Wells	CITY OF VENETA WELL #7	SOUTHEAST CORNER HWY 126 AND TERRITORIAL	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source. SODIUM DETECTED IN WELL #7
23	Wells/Abandoned Wells	CITY OF VENETA WELL #8	NORTH OF INTERSECTION OF 6TH AND E BROADWAY	VENETA	Field-Observation	Between 2-yr and 5-yr TOT	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source. SODIUM DETECTED IN WELL #8
24	Transportation - Freeways/State Highways/Other Heavy Use Roads	HWY 126	NORTH OF CITY OF VENETA WELL #4	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.
25	Transportation - Railroads	SOUTHERN PACIFIC RAILROAD	NORTH OF CITY OF VENETA WELL #4	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Rail transport elevates the risk for leaks/spills of fuel & other haz. materials. Installation/maintenance of tracks may increase erosion & slope failure causing turbidity. Over-application/improper handling of pesticides may impact the water supply.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
26	Housing - High Density (> 1 House/0.5 acres)	HIGH DENSITY HOUSING/HIGH DENSITY SEPTIC	EAST OF 25251 HUNTER ROAD	VENETA	Field-Observation Interview	Between 2-yr and 5-yr TOT	Moderate	Improper use, storage, and disposal of household chemicals may impact the drinking water supply. Stormwater run-off or infiltration may carry contaminants to drinking water supply.
	Higher						If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Cumulative effects of multiple systems in an area may impact drinking water supply.	
27	Automobiles - Gas Stations	SUNNYSIDE (NEW TEXACO)	25547 HWY 126	VENETA	Database (2) Field-Observation Interview	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of fuels and other materials during transportation, transfer, and storage may impact the drinking water supply.
	Higher						Existing contamination from spills, leaks, or improper handling of stored materials may impact the drinking water supply.	
	Lower						Spills or improper handling during tank filling or product distribution may impact the drinking water supply.	
28	Automobiles - Repair Shops	TRACY MCGEE'S AUTO SALES	25613 HWY 126	VENETA	Database (2) Field-Observation Interview	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
	Higher						Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.	
29	Automobiles - Repair Shops	UNKNOWN AUTO REPAIR SHOP	WEST OF SUNNYSIDE ON HWY 126	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
30	Automobiles - Gas Stations	PACIFIC PRIDE CARD LOCK	NORTHEAST CORNER HUSTON AND HWY 126 (NORTH OF HIGH	VENETA	Database (2) Field-Observation	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of fuels and other materials during transportation, transfer, and storage may impact the drinking water supply.
	Moderate						Spills, leaks, or improper handling of stored materials may impact the drinking water supply.	
	Above Ground Storage Tanks - Excluding Water							

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
31	Other LOGGING - RELATED INDUSTRY Machine Shops	PIONEER RESOURCES	25330 JEANS ROAD	VENETA	Database (2) Field-Observation	Between 5-yr and 10-yr TOT	Higher Higher	Spills, leaks, or improper handling of chemicals and other materials during transportation, use, storage, and disposal may impact the drinking water supply. Spills, leaks, or improper handling of solvents, metals, and other chemicals or materials during transportation, use, storage and disposal may impact the drinking water supply.
32	Automobiles - Repair Shops	WOODALL'S REPAIR SHOP	25821 HWY 126	VENETA	Field-Observation	Within the 2-yr TOT.	Higher	Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
33	Automobiles - Body Shops Automobiles - Repair Shops	C AND L AUTOMOTIVE	25808 HWY 126	VENETA	Database (2) Field-Observation Interview	Within the 2-yr TOT.	Higher Higher	Improper management of vehicle paints, thinners, and primer products may impact the drinking water supply. Spills, leaks, or improper handling of automotive fluids, solvents, and repair materials during transportation, use, storage and disposal may impact the drinking water supply.
34	Automobiles - Body Shops	HIGH TECH COLLISION	WEST OF C AND L ON HWY 126	VENETA	Field-Observation	Within the 2-yr TOT.	Higher	Improper management of vehicle paints, thinners, and primer products may impact the drinking water supply.
35	Waste Transfer/Recycling Stations	VENETA GARBAGE SERVICE	JUST OFF HWY 126 - EAST OF HUSTON ROAD	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Improper management of water contacting waste material may impact the drinking water supply.
36	Junk/Scrap/Salvage Yards	VENETA AUTO RECYCLERS	SOUTHEAST END OF TIDBALL/25850 TIDBALL	VENETA	Field-Observation	Between 5-yr and 10-yr TOT	Higher	Spills, leaks, or improper handling of automotive chemicals, batteries, and other waste materials during storage and disposal may impact the drinking water supply.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts	
37	Septic Systems - High Density (> 1 system/acre)	W SIDE HUSTON RD/HIGH DENSITY HOUSING W/SEPTIC	SOUTH OF WELL #9/WEST SIDE HUSTON ROAD	VENETA	Field-Observation	Within the 2-yr TOT.	Higher	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Cumulative effects of multiple systems in an area may impact drinking water supply.	
	Moderate						Improper use, storage, and disposal of household chemicals may impact the drinking water supply. Stormwater run-off or infiltration may carry contaminants to drinking water supply.		
38	Homesteads - Rural - Septic Systems (< 1/acre)	E SIDE HUSTON RD/LOW DENSITY HOUSING W/SEPTIC	SOUTH OF WELL #9/EAST SIDE HUSTON ROAD	VENETA	Field-Observation	Within the 2-yr TOT.	Lower	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Use of drain cleaners and dumping household hazardous wastes can result in groundwater contamination.	
39	Furniture/Lumber/Parts Stores	NAPA AUTO PARTS	25901 HWY 126	VENETA	Field-Observation	Between 5-yr and 10-yr TOT	Moderate	Spills, leaks, or improper handling of hazardous chemical products and other materials in inventory during transportation, use, storage and disposal may impact the drinking water supply.	
40	Wells/Abandoned Wells	IRRIGATION WELL	WEST SOUTHWEST OF WELL #9/SOUTHEAST CORNER OF BAKE	VENETA	Database (2)	Within the 2-yr TOT.	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source.	Location and type of use based on WRD database - needs verification.
41	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	IRRIGATED CROPS NEAR IRRIGATION WELL	SOUTHEAST CORNER OF BAKER AND HUNTER	VENETA	Database (2)	Within the 2-yr TOT.	Moderate	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	Location and type of use based on WRD database - needs verification.
42	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	IRRIGATED CROPS	BETWEEN RAILROAD LINES AND HUNTER AND HUSTON/EAST	VENETA	Database (2)	Within the 2-yr TOT.	Moderate	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	Location and type of use based on WRD database - needs verification.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100920 VENETA, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type Comments	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts
43	Transportation - Freeways/State Highways/Other Heavy Use Roads	HWY 126	RUNS EAST/WEST NORTH OF WELL #9	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.
44	Transportation - Railroads	SOUTHERN PACIFIC RAILROAD	RUNS EAST/WEST NORTH OF WELL #9/PARALLEL AND SOUTH	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Rail transport elevates the risk for leaks/spills of fuel & other haz. materials. Installation/maintenance of tracks may increase erosion & slope failure causing turbidity. Over-application/improper handling of pesticides may impact the water supply.
45	Boarding Stables	BOARDING STABLES NEAR WELL #9	JUST WEST OF WELL #9	VENETA	Field-Observation	Within the 2-yr TOT.	Moderate	Improper storage and management of animal wastes and wastewater in areas of concentrated livestock may impact drinking water.
46	Sewer Lines - Close Proximity to PWS	SEWER LINES - CLOSE PROXIMITY TO WELL	WITHIN 2-YEAR TOT FOR CITY OF VENETA WELL #4	VENETA	Interview	Within the 2-yr TOT.	Higher	If not properly designed, installed, and maintained, sewer lines can impact drinking water, especially adjacent to a waterbody or within the 2-year time-of-travel zone for drinking water wells.

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 3. RESULTS OF REGULATORY DATABASE SEARCH
PWS# 4100920 VENETA, CITY OF

Reference

No. (1)	Name	Database Listings (2)
3	US WEST	SFM - Fuel Oil #1 stored in Aboveground Tank SFM - Lead Acid Batteries-wet stored in Other UST list-PWS needs to verify tank permit status LUST list with unknown status
9	FERN RIDGE CLEANERS	Drycleaners list: facility that is not currently using solvents (drop-off and pick-up only). Past practices are unknown and may include solvent use. SFM - stored in
10	VENETA CHEVRON	UST list with a status of 2 UST(s) upgraded and 0 not upgraded to DEQ 1998 technical standards.
11	VENETA AUTO SHOP	UST list-PWS needs to verify tank permit status
14	OREGON STATE FORESTRY OFFICE	SFM - 2,4-d stored in Plastic Bottles Or Jugs
14	OREGON STATE FORESTRY OFFICE	SFM - Paint stored in Can SFM - Hydraulic Oil stored in Steel Drum SFM - Garlon 4 stored in Can SFM - Garlon 3a stored in Can SFM - Dowpon M stored in Cylinder SFM - Diesel Fuel stored in Underground Tank SFM - Bivert stored in Can SFM - Accord stored in Can SFM - Velpar stored in Plastic Bottles Or Jugs LUST list with unknown status SFM - Arsenal stored in Plastic Bottles Or Jugs SFM - Used Motor Oil stored in Steel Drum SFM - Solvent stored in Steel Drum
15	LANE COUNTY MAINTENANCE/PUBLIC WORKS	LUST list with unknown status
17	JERRY BROWN CO. CFN CARD LOCK	UST list-PWS needs to verify tank permit status SFM - Diesel stored in Aboveground Tank
19	VENETA WATER TREATMENT PLANT	SFM - Gasoline stored in Aboveground Tank SFM - Soda Ash stored in Bag
20	VENETA CITY POOL	SFM - Sodium Hypochlorite stored in Plastic Or Non-metallic Drum SFM - Sodium Hypochlorite stored in Tank Inside Building

Notes: (1) See Table 2 and Figure. (2) For State Fire Marshals (SFM) list, information on materials in a gaseous-form is not presented since gaseous compounds rarely pose a threat to groundwater or surface water.

TABLE 3. RESULTS OF REGULATORY DATABASE SEARCH
PWS# 4100920 VENETA, CITY OF

Reference No. (1)	Name	Database Listings (2)
27	SUNNYSIDE (NEW TEXACO)	ECSI site with suspected contamination. UST list with a status of 4 UST(s) upgraded and 0 not upgraded to DEQ 1998 technical standards. LUST cleanup initiated on 2/22/91. PWS should verify cleanup progress. LUST cleanup initiated on 7/23/98. PWS should verify cleanup progress.
31	PIONEER RESOURCES	SFM - Antifreeze stored in Steel Drum SFM - Chemcoa Citra Kleen stored in Steel Drum SFM - Grease stored in Other SFM - Motor Oil stored in Tank Inside Building SFM - Waste Motor Oil stored in Aboveground Tank SFM - Waste Oil stored in Aboveground Tank
32	WOODALL'S REPAIR SHOP	SFM - Used Motor Oil stored in Aboveground Tank
33	C AND L AUTOMOTIVE	ECSI site with suspected contamination.

Appendix D: Well Reports for the Veneta Area

Appendix E: Well Summary Map and Information

Map No.	Well Report Name	Depth	Kw	TP	IP	Seal Depth
1	Lavone Nelson	38	0.7	4	5	18
2	James Davis	52	1.84	4	5	20
3	Kevin Cochran	35	0.46	4	5	18
4	City of Veneta - well 4	40	0.48	4	5	30
5	Don Persyn	75	0.48	3	4	38
6	Matt Raisanen	80	0.53	3	4	23
7	Orval Gay	55	0.9	4	5	35
8	Eugene Perry	24	0.46	3	4	24
9	City of Veneta– well 9	~30	0.46	4	5	19
10	Dale Duke	53	0.48	3	4	20
11	Darlene Dahlin	35	3.6	7	7	18
12	Virgil Estep	86	0.73	4	5	18
13	Lenny Martin	70	3.4	6	6	20
14	Ken Rolfe	50	0.74	4	5	20
15	City of Veneta- well 8	40	0.75	4	5	20

Appendix F: Sensitivity Summary Form

The form on the following page summarizes the aquifer sensitivity as estimated for the City of Veneta (see Appendix B, Figure 6). Features or conditions that have been checked "Yes" contribute to the sensitivity of the aquifer. Note that a given source can have features or conditions that contribute to both high- and moderate-aquifer sensitivity.

Sensitivity Summary – Well 4

Sensitivity Summary – Well 9

Sensitivity Summary¹: Well 4

Highly Sensitive Source: Yes No

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Cobbles/gravel
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Fractured bedrock
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other Aquifer (describe)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Organic Chemical Detection
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inorganic Chemical Detection (>50% MCL)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Source-related Coliform: total: fecal: Date:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nitrate-N > 5mg/L: ConcentrationDate
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Construction Deficiencies from Sanitary Survey:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Casing Seal Missing
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inappropriate Casing Seal Material:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Traverse Potential >5 (Not performed on TNCWS):
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Infiltration Potential >7 (Not performed on TNCWS)

Moderately Sensitive Source: Yes No

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Shallow (<50 feet) Confined Aquifer and Thin (<15ft) Confining Unit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Deep Unconfined Aquifer:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fractured Bedrock at Surface:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Aquifer Character unknown
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Commingleing of Aquifers Suspected
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nitrate-N 1-4.9 mg/L: Concentration:Date
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inorganic Chemical Detection (<50% of MCL)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Construction Deficiencies from Sanitary Survey:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Report Missing or unavailable
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Casing Seal Unknown
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Well Constructed prior to 1979
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other Wells Score > 400
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Soil with TOT <65 hours in DWPA:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Infiltration Potential 4 to 7 (Not performed on NTNCWS): 5
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Surface water within 500 feet:

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked 'yes' indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments: Shallow Water-bearing zones at 40 feet, 10 feet below the seal

Sensitivity Analysis Completed by: Dennis Nelson **Date:** 02/07/00

Sensitivity Summary¹: Well 9

Highly Sensitive Source: Yes No

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Cobbles/gravel
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Unconfined Aquifer: Fractured bedrock
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other Aquifer (describe)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Organic Chemical Detection
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inorganic Chemical Detection (>50% MCL)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Source-related Coliform: total: fecal: Date:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nitrate-N > 5mg/L: ConcentrationDate
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Construction Deficiencies from Sanitary Survey:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Casing Seal Missing
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inappropriate Casing Seal Material:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Traverse Potential >5 (Not performed on TNCWS):
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Infiltration Potential >7 (Not performed on TNCWS)

Moderately Sensitive Source: Yes No

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Shallow (<50 feet) Confined Aquifer and Thin (<15ft) Confining Unit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Deep Unconfined Aquifer:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fractured Bedrock at Surface:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Aquifer Character unknown
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Commingling of Aquifers Suspected
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Nitrate-N 1-4.9 mg/L: Concentration:Date
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inorganic Chemical Detection (<50% of MCL)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Construction Deficiencies from Sanitary Survey:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Report Missing or unavailable
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Casing Seal Unknown
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Well Constructed prior to 1979
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other Wells Score > 400
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Soil with TOT <65 hours in DWPA:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Infiltration Potential 4 to 7 (Not performed on NTNCWS): 5
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Surface water within 500 feet:

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked 'yes' indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments: Shallow Water-bearing zones likely in upper 41 feet, only sealed to 19 feet

Sensitivity Analysis Completed by: Dennis Nelson **Date:** 02/07/00

**Appendix G: Sample Public Education Brochure
for the City of Veneta**

Protecting the City of Veneta's Drinking Water Developing a Drinking Water Protection Plan

The City of Veneta is developing a plan to protect the City's drinking water supply. The City derives its water from two wells within the community. The wells produce water from a sand and gravel aquifer that is located below the city. Having a continuous supply of high-quality drinking water is important to the community. Veneta's drinking water currently meets federal standards and City officials and local and area residents are taking steps to ensure that Veneta's water continues to do so.

Groundwater in the aquifer is recharged primarily from precipitation falling on the surface, sinking into the ground and moving down to the water table. Groundwater moves from the west to the east-northeast beneath the community. Activities at and below the land surface have resulted in elevated concentrations of pollutants varying from nitrate to pesticides and solvents in groundwater elsewhere in Oregon. This could happen in Veneta if steps to protect the resource are not taken.

Once groundwater becomes contaminated, it is often extremely difficult and expensive to clean up. A contaminated aquifer may impact wells for years. The cost of protecting the aquifer is much less than the cost of clean up or installing treatment.

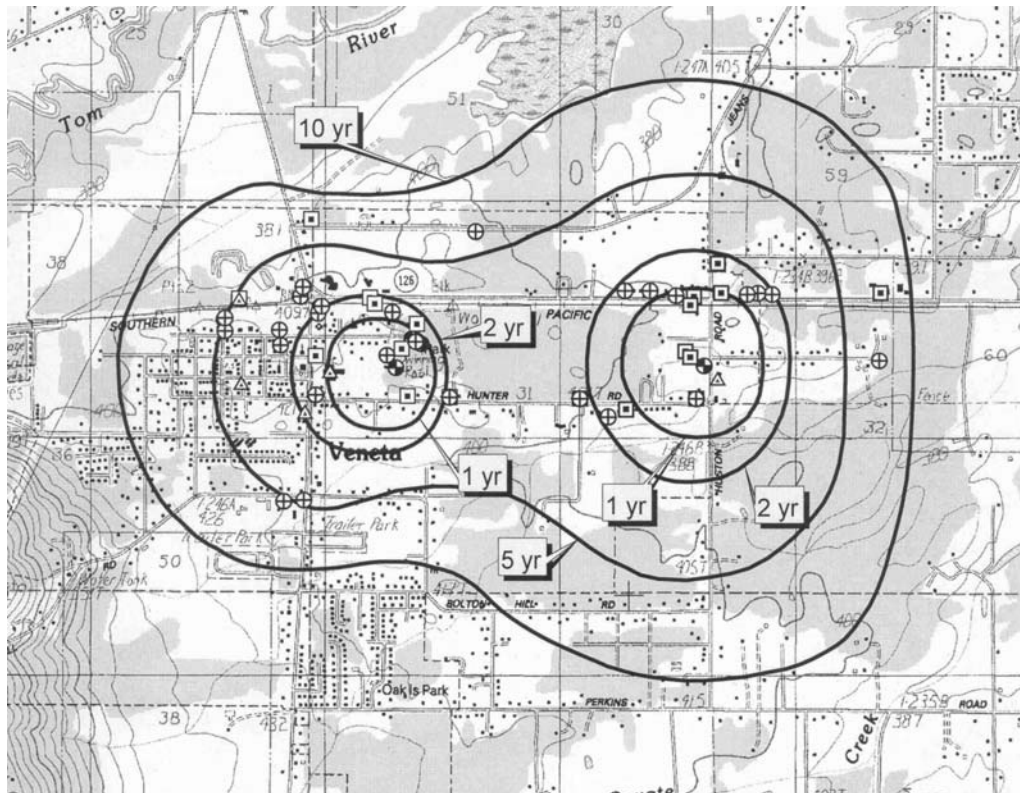
There are three main steps in developing a drinking water protection plan:

1. The first step is to determine what part of the aquifer actually supplies water to the wells. This involves using well logs and field measurements to determine the nature of the aquifer and the direction of groundwater flow. The delineation of the drinking water protection area has been completed by the Oregon Health Division (see outlined area in the accompanying figure).
2. The second step is an inventory of potential sources of contaminants in that drinking water protection area. This has been completed by the Department of Environmental Quality; potential sources are shown in the figure as symbols, indicating the potential risk of these sources is higher (circles with crosses [+]), moderate (squares), or lower (triangles). These facilities are potential risks only. Environmental contamination is not likely to occur when chemicals are used and managed properly.
3. Finally, using the above information, a management plan, developed by a local community team, is put together with the goal of developing strategies to reduce the risk of those contaminant sources impacting the aquifer. OHD and DEQ have provided the City with a Source Water Assessment Report that, through the combination of the delineation, sensitivity analysis and inventory, provides the community with the ability to focus limited resources where they will do the most good.

Typical management strategies include:

- Posting signs to indicate to residents and visitors that they are entering a sensitive area, i.e., the land surface that directly overlies the source of Veneta's drinking water.
- Public education is considered a key issue in drinking water protection. Once individuals learn that the things they do at the surface could impact the water they drink, they are more careful about how they use and dispose of chemicals and wastes.
- Encouraging businesses, industry and agriculture to incorporate best management practices, designed to lower the risk of contamination; providing technical assistance as appropriate.
- Informing area residents of the proper way to use, store and dispose of household chemicals.

- Working to have a household hazardous waste collection made available to the community.
- Developing local spill response plans so that if a release does occur, timely efforts will be undertaken to keep it from infiltrating to groundwater.
- Recognizing “Clean Water Partners” in the community. Often times, certain local businesses, industry and agriculture are already doing things that are designed to protect the resource. These as well as where additional efforts are undertaken, must be recognized and encouraged on a community level.



Veneta’s Drinking Water Protection Area: Shown above is the drinking water protection area for the City’s wells. Potential contaminant sources and the relative risk associated are shown as different symbols (see text). Times given in the figure, e.g., 2 year, reflect groundwater travel times within the aquifer. For example, groundwater at the 2 year boundary would reach the well within 2 years.

The City of Veneta is in the process of putting together the Drinking Water Protection Team. Individuals representing various parts of the community, e.g., residential areas, business and industry, agriculture, etc., will be asked to serve on the team. Benefits to having a state-certified drinking water protection plan in place include long-term safe drinking water, reduced monitoring costs for the community, and a planning tool that can be used for many other community projects. **Individuals interested in participating in the process should contact Jerry Shanbeck, Public Works Director for the City, at 935-2191.** Those interested in Drinking Water Protection in general may contact Julie Harvey, Department of Environmental Quality (503-229-5664) or Dennis Nelson, Oregon Health Division’s Drinking Water Program (541-726-2587).

Appendix H: Geologic Time Scale

Geologic Time	Age (mya)¹	Formations Discussed In This Report
Cenozoic		
Quaternary		
Holocene	~0.01	
Pleistocene	~2	Older Alluvium
Tertiary		
Pliocene	~5	
Miocene	~25	
Oligocene	~38	
Eocene	~55	Tyee Formation
Paleocene	~65	
Mesozoic		
Cretaceous	~130	
Jurassic	~205	
Triassic	~245	
Paleozoic		
Permian	~290	
Pennsylvanian	~320	
Mississippian	~360	
Devonian	~400	
Silurian	~420	
Ordovician	~495	
Cambrian	~600	
Precambrian	~4,600	

1. Million Years Ago