SOURCE WATER ASSESSMENT
INTERIM REPORT

City of Scappoose Water System
PWS # 4100792
Scappoose, Oregon
Columbia County

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Prepared for
The City of Scappoose

by

Department of Human Services
Health Services
Drinking Water Program

Available in Alternate Formats by contacting the DHS DWP at (541) 726-2587

Source Water Assessment Interim Report

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1. Introduction

Traditionally, water systems have relied on proper water system management, water quality monitoring and, if necessary, water treatment to ensure that the water they serve meets drinking water standards. In spite of the best of these efforts, however, contamination of drinking water can still occur. The costs, both tangible and intangible, to a water system contending with a contaminated water supply are significant. At minimum, there is the cost of increased monitoring that will be required to make certain that the water does not pose a significant health risk. At contaminant concentrations exceeding a drinking water standard, the system may be dealing with the cost of installing and maintaining treatment, the loss of the drinking water source, i.e., a well, and most assuredly, a concerned and often frightened public.

Beginning with the 1986 Amendments to the Safe Drinking Water Act, an additional "barrier to contamination" was recognized at the federal level. A shift from the "reactive" approach of water treatment to a "proactive" approach of prevention began to take place. Although water treatment may be necessary in some cases, it is much more cost effective to prevent the contamination from happening in the first place. A recent estimate by the Oregon Department of Environmental Quality (DEQ) and the Department of Human Services Drinking Water Program (DHS) compared the estimated cost of prevention (less than $15 per resident) to the actual cost of investigation and treatment (more than $1500 per resident) in a small Oregon community impacted by a volatile organic contaminant that exceeded the drinking water standard.

Oregon has a Drinking Water Protection Program in place for groundwater systems, i.e., wells and springs. In order to protect a drinking water resource, a water system must know where the drinking water comes from, what potential sources of pollution exist and what level of threat each presents to the system's drinking water. Up until recently, the costs associated with acquiring this information were the responsibility of the water system, a financial burden that even the most proactive water systems found hard to meet. The 1996 Amendments to the Safe Drinking Water Act lifted that burden from water systems by requiring that the states conduct Source Water Assessments for the water systems within their respective boundaries. The purpose of the Assessment is to provide both groundwater and surface water systems with the information that they need to develop a strategy to protect their source of drinking water if they choose.

As mandated by the 1996 Amendments, a Source Water Assessment for groundwater systems consists of the following: (1) the identification of the area that directly overlies that part of the aquifer supplying drinking water to the well or spring, (2) an inventory of potential sources of contamination within that area, and (3) the evaluation of the susceptibility of the water system to

contamination from those sources. Funding for assessments was provided to the states through the Act as part of the state's Drinking Water Revolving Loan Fund.

In this interim report, we focus on the first two elements of the Source Water Assessment, identifying the critical area of protection and inventorying potential sources of contaminants within that area. This information provides you with a map of where your drinking water comes from and identifies the potential threats to its quality. The third element, our assessment of the susceptibility of your drinking water to those potential contaminant sources, will be provided to you by the end of 2005, or sooner, if you wish to move forward with developing a drinking water protection plan.

The DEQ and DHS worked with a citizen's advisory committee and with DHS' Drinking Water Advisory Committee to design a program that would meet the needs of Oregon's public water systems. The Environmental Protection Agency (EPA) has certified that Oregon's plan meets the requirements of the Safe Drinking Water Act. Within the program, DHS has the responsibility of working with groundwater systems in general, as well as with transient noncommunity water systems.

We believe public awareness is a powerful tool for protecting drinking water and that the information provided in this report will help you increase local awareness regarding land use activities and local drinking water quality. We have also included a groundwater fact sheet and a list of Oregon specific drinking water protection information and resources in Appendices. Although developing a Drinking Water Protection Plan is voluntary in Oregon, it is hoped that the information provided in the Source Water Assessment Report will be used as a basis for reducing the risk of contamination to your source.

1.1 Groundwater Basics

In order to protect a groundwater source of drinking water, it is important to understand how the groundwater system works, e.g., where groundwater comes from, how it occurs in the subsurface, how it moves, and how it becomes contaminated. Included in the Appendix of this report is a Fact Sheet about groundwater that you can use to help increase the awareness of others regarding groundwater and its susceptibility to contamination.

Groundwater is part of the hydrologic cycle which controls the distribution of water on the earth's surface. Groundwater is therefore linked to other water sources, notably surface water such as streams, rivers, and lakes. Virtually without exception, groundwater originates as precipitation at the earth's surface which sinks through the soil and percolates down to the water-table. The fact that groundwater originates at the surface is what makes it vulnerable to contamination. As recharging groundwater moves downward through the soil and vadose zone, it comes in contact not only with the geologic materials present, but also with any contaminants contained within the soil and/or vadose zone. Therefore, recharging groundwater can carry

contaminants downward to the aquifer. Likewise liquid chemicals, if present in large enough quantities, can enter the aquifer by following the same path as recharging groundwater.

The direction and speed with which groundwater moves is controlled by the slope of the water-table and aquifer permeability. The slope of the water-table often mimics, in a subdued sense, the earth's surface with groundwater moving from high areas to low areas. Aquifer permeability is a measure of how easy it is for groundwater to move through the geologic material that makes up the aquifer. Geologic materials with greater permeability allow groundwater to move with less restriction. In general, groundwater movement is measured in terms of a few inches to a few feet per day. A pumping well can significantly influence the speed and direction of groundwater movement by drawing the water-table down in its vicinity, creating a depression in the water-table. As the well continues to pump, the depression in the water-table spreads out through the aquifer and leads to the formation of a "capture zone". Groundwater inside the capture zone is eventually pumped to the earth's surface by the well.

When wells are used as a water source, we identify the drinking water protection area for the water system by delineating those portions of the capture zone around the well(s) where, on average, it will take 10 or 15 years (depending on the delineation technique used) for water moving through the aquifer to arrive at the well. We have also identified the 5-, 2-, and 1- year capture zones around the well(s) to enhance the overall usefulness of the drinking water protection area.

1.2 Well Construction

When a well is drilled, the drilling equipment first passes through the vadose zone until it encounters the water-table. Within the vadose zone, the open pore spaces between soil and sediment particles and/or the open fractures within the bedrock material are only partially filled with water. Most of the open pore/fracture space is filled with air, therefore, little if any water can be obtained from the vadose zone. The water-table marks the top of the saturated zone, where the open pore/fracture spaces are, for the most part, completely saturated (full) with groundwater. It should be understood that within the saturated zone, groundwater does not occur as underground rivers, lakes, or veins. An aquifer is any geologic material located below the water-table (and is therefore water saturated) that can yield an adequate water supply to a well. Geologic materials that tend to yield large quantities of water to wells include sand and gravel deposits, porous lava flows, and fractured bedrock.

2. Water System Background

The public-owned City of Scappoose water system is community water system located in Columbia County. According to the DHS Safe Drinking Water Information System (**SDWIS**) on-line database, this system is supplied by two wells (designated the Dutch Canyon Well and the Miller Road Well #1) and three surface water sources (South Fork Scappoose Creek, Gourley Creek and Lacey Creek) and serves approximately 5,200 people through 1,810 connections. The source water assessment for the surface water sources has been addressed in an earlier report. This report addresses the groundwater sources for this water system. Water treatment for Particulate Removal, Disinfection and Corrosion Control is considered necessary at this time.

2.1 Location of the Drinking Water Sources

We have located your drinking groundwater sources using a Trimble GeoExplorer II Global Positioning System (GPS) unit. The data has been differentially corrected to remove some of the common positioning errors. The location of the source(s), with the corresponding Drinking Water Protection Area, has been placed in a Geographic Information System (GIS) layer and projected onto a USGS 7.5 minute topographic map that is included within this report. In order to be consistent with the topographic map, the projection uses the NAD1927 datum. The latitude and longitude values given on the map and below, however, reflect a projection in the more commonly used WGS1984 datum.

Data collection specifics include:

- 150 individual measurements,
- linked to a minimum of four satellites,
- a PDOP of less than 6 (pertains to precision of measurement), and
- a signal to noise ratio of greater than 5.

The raw data was subjected to differential correction using the PATHFINDER software. The location data for your drinking groundwater sources using the WGS84 datum is as follows:

Source	Latitude	Longitude
Dutch Canyon Well, Source AD	45° 44’ 23.600”	122° 52’ 50.600”
Miller Road Well #1, Source BA	45° 45’ 28.200”	122° 51’ 36.790”

2.2 Source Construction

The construction log for Dutch Canyon Well indicates it was installed to a depth of 228 feet in 1979. This ten inch diameter well was cased (piping installed) to a depth of 187 feet and cement

sealed in the upper 45 feet. A well seal fills the annular space between the casing and the hole, preventing the well from increasing the aquifer's susceptibility to surface water and contaminant infiltration. As described, the well seal is adequate. The well was screened between 187 and 227 feet (this is where water enters the well). A 48 hours pump test performed during well installation showed that they could pump the well at 500 gallons per minute with 72 feet of drawdown (drawdown is the water level drop in the well during pumping). The water level in the well prior to pumping (its static water level) was 61 feet below land surface.

The Miller Street Well was installed in 2001 to a depth of 220 feet. The construction log for this eight inch diameter well indicates it was cased to 170 feet and cement sealed to a depth of 19 feet. The well seal as described is adequate. Well screens were installed between 170 and 190 feet. An air test indicated the well pumped 100 gallons per minute. The static water level was eight feet below land surface.

The construction logs for these wells (called the Water Well Reports) are found in the Appendix.

2.3 Nature and Characteristics of the Aquifer

The Columbia River Valley Alluvial Aquifer supplying drinking water to the City of Scappoose water system consists of unconsolidated sands and gravel.

Descriptions in the well construction log for the Dutch Canyon Well shows that the aquifer consists of gravels and sands, beginning at sixty feet below land surface. The materials above the aquifer are layers of clay, clay with sand, and clay with gravel. The Miller Street Well is at a lower elevation and the depth to the gravel and sand aquifer is approximately eight feet. The average thickness of the aquifer appears to be about 170 feet. The overall groundwater flow is towards the east. This aquifer is considered unconfined, because the thickness of the overlying clay layers varies significantly in the areas (based on the well logs). Therefore, surface water or contaminant infiltration is possible within the protection areas for each well.

3. Delineation Results

DHS Drinking Water Program staff collected and reviewed source location data, aquifer description information and the water use data (see below) to delineate the Drinking Water Protection Area (DWPA) for this water system. The DWPA identifies the surface area which overlies the portion of the aquifer that's supplying groundwater to the water system (see Figure 1 in the Appendix). The area included in the DWPA is designed to illustrate where the next 15

years of groundwater supply is coming from, with additional one-year, two-year, and five-year "Time-Of-Travel Zones" to enhance the figures usefulness.

The following information is needed determine a DWPA: precise source locations, the aquifer porosity (the ratio of water volume to aquifer volume), the aquifer thickness (the production interval of the aquifer) and the approximate water use within the system. Having determined the source locations (see section 1), estimated the production interval (see section 2), and assigned the likely porosity value (25% is a typical value for sand and gravel aquifers), the next step is estimating the aquifer usage. Based on water use data provided by the water system, the flow rates are approximately 288 gallons per minute for the Dutch Canyon well and 720 gallons per minute for the Miller Road Well. The resulting DWPA for the City of Scappoose water system (shown in the Appendix as Figure 1) was determined using the MWCAP analytical method. Additional information regarding the parameters used in the delineation process including; the delineation method, estimated pump rate(s), and aquifer characteristics can be found in "Parameters Used in Delineation Model" in the Appendix.

4. Potential Contaminant Source Inventory

An inventory of potential contamination sources was performed within the Drinking Water Protection Area and the results are shown in Figure 2 in the Appendix. The primary intent of the inventory was to identify and locate significant potential contaminant sources of concern. This 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 for Scappoose is supplied by two groundwater wells and intakes on South Scappoose, Gourlay, and Lazy Creeks. This Source Water Assessment addresses only the groundwater component of Scappoose's drinking water supply. The surface water component was previously addressed in a report to Scappoose dated August 3, 2000.

4.1 Potential Contaminant Sources within the Two-Year Time-of-Travel Zone for the Wells

The delineated two-year time of travel zone for the Miller well is primarily dominated by residential land use. The delineated two-year time of travel zone for the Dutch Canyon well is primarily dominated by a mix of commercial, agricultural, and residential land use. A total of ten potential contaminant source locations (Reference Numbers 12 through 21 on Figure 2 and Table 2 in the Appendix Materials) were identified in the combined two-year time-of-travel

zones for the wells. Potential sources of contamination (PCSs) identified within the 2-year time-of-travel for each of the wells is detailed below:

Well Number	PCSs within the Two-year Time-of- Travel Zone
Miller Well	A park, the drinking water treatment plant, high density housing areas, and non-irrigated crops.
Dutch Canyon Well	Rural homes, non-irrigated crops, a construction company, a sub station, large parking lots, an underground injection well, and an underground storage tank.

The potential contaminant sources within the two-year time-of-travel all pose a relatively higher to moderate risk to the drinking water supply with the exception of the rural homes, non-irrigated crops, and the drinking water treatment plant, which present a lower risk. Two of the potential contaminant sources have a high risk of transmitting micro-organisms to the groundwater including the septic systems associated with the rural homes and the underground injection well.

4.2 Potential Contaminant Sources within the Five-Year and Ten-Year Time-of-Travel Zones for the Wells

The drinking water protection area within the five-year and ten-year time-of-travel zones for the Miller well is primarily occupied by a mix of residential and agricultural land use. The drinking water protection area within the five-year and ten-year time-of-travel zones for the Dutch Canyon well is primarily occupied by a mix of residential, commercial, and agricultural land use. An additional twenty potential contaminant source locations were identified in this area for both wells, which are detailed on Table 2 in the Appendix Materials and summarized below. Area-wide potential sources such as the residential areas and transportation corridors extend from the two-year time-of-travel zone into the ten-year time-of-travel zone. These land uses occur throughout the drinking water protection area and are shown on Figure 2 in the location nearest to the well.

Well Number	PCSs within the Five and Ten-year Time-of- Travel Zone
Miller Well	Home machine shops, aboveground storage tank, an unknown operation, home machine shop, the sewage treatment plant, and a DEQ Cleanup Program site.
Dutch Canyon Well	A medical office, sewer lines, gas stations, high density housing areas, a carwash, Highway 30, aboveground storage tanks, auto repair shops, grazing animals, underground storage tanks, and a possible pesticide/chemical handling/storage area.

The potential contaminant sources within the five-year and ten-year time-of-travel all pose

relatively higher to moderate risk to the drinking water supply with the exception of the underground storage tanks, which present a lower risk.

5. Conclusions

The City of Scappoose water system draws water from the gravels and sands of the Columbia River Valley Alluvial Aquifer. The presence of several high- and moderate-risk potential contaminant sources within the protection area was confirmed through a potential contaminant source inventory.

6. Recommended Use of the Source Water Assessment Report

The costs associated with contaminated drinking water are high. Developing an approach to protect that resource, such as a Drinking Water Protection Plan, can reduce the potential for contamination of the local drinking water supply. This report contains a summary of the local geology and well construction issues as they pertain to the quality of your drinking water source. We have identified the area we believe to be most critical to preserving your water quality (the Drinking Water Protection Area) and have identified potential sources of contamination within that area. We believe public awareness is a powerful tool for protecting drinking water and that the information provided in this report will help you increase local awareness regarding the relationship between land use activities and drinking water quality. To that end, the process for developing a Drinking Water Protection Plan can be summarized as follows:

Assessment Phase (Source Water Assessment Provided by DHS and DEQ)

- Delineate the area that serves as the source of the public water supply (Drinking Water Protection Area (DWPA))
- Inventory the potential risks or sources of contamination within the DWPA
- Determine the areas most susceptible to contamination upon system's request

Protection Phase (performed by the water system or community)

- Assemble a local Drinking Water Protection Team
- Enhance the Source Water Assessment if necessary
- Develop a plan to reduce the risk of contamination (protect the resource)
- Develop a contingency plan to address the potential loss of the drinking water supply

- Certify (optional) and implement the Drinking Water Protection Plan

The assessment phase was funded by the federal Safe Drinking Water Act. Its purpose is to supply the water system with the information necessary to develop a Drinking Water Protection Plan. In Oregon, development of 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 Source Water Assessment (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 refine this preliminary list of potential contaminant sources.

It is also important to remember that not all of the inventoried activities will need to be addressed if you choose to develop a Drinking Water Protection Plan. When developing a protection plan, potential contaminant sources which pose little or no threat to your drinking 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 for developing a 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 system should target these facilities with greater levels of education and technical assistance to minimize the risk of contamination.

Limited technical assistance is available through the DEQ and Drinking Water Program at DHS for water systems that choose to move beyond the assessments and voluntarily develop a Drinking Water Protection Plan. By using the results of the assessment, the water system/community can form a Drinking Water Protection Team comprised of individuals that have a stake in the plan's implementation.

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. This 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. Community-based protection can draw on the knowledge and successful adaptive practices within the 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 to solve the problem are clearly defined, and technical assistance is available.

In community-based protection, citizens have more control and are therefore more likely to participate in the program and be 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.

Protecting the drinking water supply in a community can also be a very effective way to encourage all citizens to participate in issues which directly affect everyone in that community. This often leads to more public involvement in other significant local decisions concerning future livability issues, e.g., 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 strengthen the local rural and urban relationships through communication and increased understanding. The risks and sources of water quality problems are not only from industries, farmers, and managed forest, but every individual living, commuting, and working in that area.

Communities/water systems interested in developing Drinking Water Protection Plans may contact the Department of Environmental Quality (503-229-5413) or the DHS Drinking Water Program (541-726-2587) for further information.

Appendix

Figure 1. Map of the Drinking water protection area

Figure 2. Map of Potential Contaminant Sources within the Drinking water protection area

Inventory of Potential Contaminant Sources

Well Report(s)

Groundwater Information Sheets

Drinking Water Protection In Oregon

NOTE: Additional copies of the appendix materials are available upon request by calling (541) 726-2587