Report

Drinking Water Source Monitoring Project Phase I and Phase II (2008-2010)

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State of Oregon
Department of
Environmental
Quality

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Executive Summary

This multi-phase project examines drinking water source monitoring and associated contaminants. Oregon Department of Environmental Quality and Oregon Health Authority (OHA) drinking water staff looked at whether there are potential human health risks beyond those routinely monitored by federal Safe Drinking Water Act regulations at 34 public water supply systems throughout Oregon. Through this project, the two agencies also sought to determine priorities for technical assistance and contamination prevention efforts statewide.

During Phase 1 of this project (2008-09), DEQ collected surface water from 6 source areas above intakes and groundwater samples from 7 wells that have multiple land uses in the source areas and are considered high-risk sources, as identified through a state analysis of susceptible systems. During Phase II of the project (2010), DEQ collected surface water and groundwater samples from 11 intakes, 9 wells, and 1 spring where there have been high levels of nitrate contamination, from systems that requested testing, and from those systems considered vulnerable to nearby sources of contaminants.

Staff analyzed samples for several hundred compounds, including Oregon-specific herbicides, insecticides, pharmaceuticals, volatile organic compounds (including cleaners), fire retardants, polycyclic aromatic hydrocarbons (organic compounds produced as byproducts of fuel burning) and plasticizers.

OHA toxicologists reviewed and interpreted analytical results of each round of samples and sent the results to the individual public water systems. This report provides a summary of all of the analytical results.

In general, data from this project show that very low levels of some contaminants are present in these drinking water source waters. The levels of these contaminants meet existing applicable standards and guidelines and are well within acceptable limits. Contaminants detected were consistent with other studies conducted in similar source areas across the country.

Funding for this project came through the federal Safe Drinking Water Act (Drinking Water Revolving Loan Fund Set-Asides for Local Assistance: drinking water protection).

Program Background and Scope

In Oregon, the Oregon Health Authority (OHA) is responsible for oversight of drinking water quality at public water systems. OHA is also responsible for administering and enforcing national drinking water regulations established by the U.S. Environmental Protection Agency (EPA) under the federal Safe Drinking Water Act (SDWA), through an arrangement with EPA called "Primacy." Under Primacy, OHA adopts state regulations that are no less stringent than federal regulations, and OHA enforces those regulations directly with public water suppliers. EPA oversees the OHA Primacy program.

SDWA regulations require public water systems to meet Maximum Contaminant Levels (MCLs), or in some cases, treatment technique requirements, for specific regulated contaminants in water delivered to users for drinking. EPA has established MCLs or treatment techniques for 91 contaminants, taking into account both protection of public health and the level of environmental protection that water systems can achieve using the best available water treatment technology.

About 2,700 public water systems in Oregon are subject to regulation under the federal Safe Drinking Water Act. Public water systems are federally defined as those serving 25 or more people at least 60 days per year. Community water systems have 15 or more service connections used by year-round residents. Currently, 882 community water systems serve an estimated 3.2 million Oregonians. Another 346 are non-transient, non-community water systems including schools or workplaces with independent water supply systems that serve the same people day after day. The remaining 1,471 are transient non-community water systems serving transient populations such as campgrounds, parks or restaurants with their own independent water supply systems. An additional 921 very small water systems, those serving 10 to 24 people each and representing approximately 16,000 Oregonians, are subject only to state regulations under the Oregon Drinking Water Quality Act. Not covered by either state or federal drinking water standards are an estimated 600,000 Oregonians who get their drinking water from individual home wells. For information on public water systems in Oregon, including monitoring data, status, and type of treatment technology, go to the OHA website at: http://www.healthoregon.org/dwp

Amendments made to the Safe Drinking Water Act in 1996 directed and empowered state drinking water programs to begin or expand efforts to protect sources of drinking water. In Oregon, OHA partnered with DEQ to jointly carry out a statewide drinking water source protection effort. OHA secured available set-aside funds from Oregon's allocation of the Drinking Water State Revolving Fund, and the agencies began joint efforts to 1) conduct assessments of public drinking water sources, and 2) work with local communities to assist them in implementing local protection efforts.

Safe drinking water supplies are dependent upon well-maintained and operated treatment systems and distribution networks. However, it is widely recognized now that even new state-of-the-art treatment technologies can be challenged by the contaminants from

diverse activities on land used as sources of drinking water, including the proliferation of new synthetic chemical compounds, strong microbial pathogens, and pharmaceuticals in the waste stream. Safe drinking water supplies will increasingly depend upon working to protect the source areas from contamination. Protecting the drinking water source areas in Oregon is vitally important for reducing the future costs of treatment, and perhaps more importantly, reducing the health risks associated with the contaminants that are not monitored and/or removed through existing regulatory requirements. This project is part of the drinking water protection work in Oregon.

The issue of "emerging contaminants" gained significant attention when national monitoring data results were released by the United States Geological Survey (USGS) in 2005. Several of their monitoring sites included Oregon waters. New chemical compounds were identified in local surface water and groundwater resources, similar to those found across the country. Scientists in Oregon questioned the potential for these pollutants to be in Oregon's drinking water sources.

SDWA does not require that the source waters supplying public drinking water systems be sampled: only the finished or treated water gets sampled prior to delivery to customers. In order to learn more about the quality of the source waters serving public water systems, DEQ and OHA developed a sampling plan for the source waters upstream of surface water intakes and at groundwater extraction wells serving public water systems. Data previously collected as part of the Source Water Assessment project, as well as a Susceptibility Analysis project helped to determine the priorities for the sampling plan. The chemical compounds selected for the sampling plan include those not addressed in the Safe Drinking Water Act requirements.

Determining Susceptibility to Risks

In 2005, DEQ and OHA completed "Source Water Assessments" for all Oregon public water systems. These were mandated by the federal SDWA Amendments of 1996. For the assessment reports, the agencies used geologic data and geographic information system (GIS) technology to produce maps delineating the source areas for all ground water wells and surface water intakes. The agencies were also required to identify locations of potential risks from over 100 separate land uses and activities. Over 15,500 of these potential contaminant risks were located in those source areas upstream and upgradient of public water systems. The top five potential contaminant risks identified for surface drinking water sources were: managed/clearcut forests; irrigated crops; grazing animals (>5/acre); above ground fuel/chemical tanks; and auto repair shops. The top five potential contaminant risks identified within ground water source areas were: high density housing (includes onsite systems); transportation corridors; above ground fuel/chemical tanks; irrigated crops; and underground fuel storage tanks. All of this data is compiled in a database and used frequently for research and strategic planning. More information on the source water assessments, including the report summaries, source area maps, methodology, and inventory results can be found on the DEQ website: http://www.deq.state.or.us/wq/dwp/results.htm

Using the data from the source water assessments, DEQ and OHA were able to identify the Oregon public water systems that have high susceptibility to risks of contamination. Details of the susceptibility analysis are included in Appendix A. Database queries and GIS were used to rank the systems in groups called Tier 1 through 4. Tier 1 systems are considered at highest risk due to the number and proximity of the individual contamination risk sites, and the sensitivity of the source area where those contaminant risks are located. The groundwater recharge or source areas considered "sensitive" included those within a 2-year time-of-travel zone from each well and have shallow depths, alluvial sediments or fractured bedrock in the recharge zone, and a high infiltration potential. The characteristics of the sensitive areas within surface water watersheds include 1000-foot setbacks from the stream banks, high-erosion soils, high slopes, and high-infiltration soils (especially those near the stream banks).

There were 211 surface water intakes analyzed and ranked. For surface water, 47 systems fell within the Tier 1 ranking of high risk, 40 are within Tier 2, and 31 are in Tier 3. Out of 1827 groundwater sources analyzed, 569 were in Tier 1, 324 were in Tier 2, and 289 were in Tier 3.

The susceptibility analysis for the public water systems statewide has two important uses. The data allows DEQ and other natural resource agencies to prioritize technical assistance, grants, and to develop workplans for monitoring and potential research. The susceptibility analysis also provides the individual water systems with information on where their greatest risk occurs and where to focus available resources for protection. The identification of the high-risk systems has already served as an important tool for determining priorities for drinking water protection work.

Drinking Water Source Monitoring Plan

The goal of this Drinking Water (DW) Source Monitoring project is to determine future program priorities based on actual data.
In Phase I, there were three primary objectives of the study, including to:

- Collect and analyze samples from surface water and groundwater for a list of contaminants of interest,
- Utilize the results as screening-level data on whether there are potential human health risks beyond those routinely monitored under the SDWA regulations in the drinking water systems that were determined to be at higher risk (Tier 1) from the upstream potential sources of contamination, and,
- Utilize the study results to improve strategic planning and determine priorities for technical assistance and pollution prevention.

In order to select locations for sampling, database queries were first performed for existing water quality data. Most upstream and upgradient source areas do not have ambient monitoring stations for regulated drinking water parameters, so this step did not prove to be very useful. The Susceptibility Analysis results were then used to select priorities. Public water systems were selected from the Tier 1 group and those with a variety of land uses and activities in their source areas were ranked the highest.

In the initial Phase I sampling, the DEQ/OHA team determined that it would be most useful to choose locations that represented a cross-section of land uses or activities. The source waters for 6 surface water systems and 7 groundwater systems were tested in May, June, and October of 2008. For the surface water systems, the sampling sites included City of Detroit (Mackey Creek), City of Gold Hill (Rogue River), City of Jefferson (Santiam River), City of Riddle (Cow Creek), City of Seaside (South Fork Necanicum River), and the City of Hillsboro/Joint Water Commission (Tualatin River). For groundwater systems, the wells tested included Independence Water System (Polk County), City of Oakridge (Lane County), City of Keizer (Marion County), City of Spray (Wheeler County), Avion Water Company (Deschutes County), City of Vale (Malheur County), and Whispering Pines Mobile Lodge (Linn County).

In Phase II, there were two criteria for selecting locations for sampling:

- Public water systems with consistent high levels of nitrates or prominent high-risk land uses or activities in the source area. This included systems with large-scale single land use risks or activities that are high priority Tier 1 and 2 systems. For example, intakes or wells would be sampled where source areas include all agriculture, all urban, an NPDES discharge just upstream, or all forests.
- Local community or public water system requests based on citizens' or officials' concerns. This included systems that have requested monitoring and have verified susceptibility to contaminants, and those risks encompass large portions of the watershed or recharge area.

The Phase II sampling locations included 11 surface water intakes, 9 wells, and 1 spring. The samples were taken in June and September 2010. For the surface water systems, the locations included Lincoln City (Schooner Creek), Siletz (Siletz River), Albany (Albany Canal), Lawson (Cow Creek), Grants Pass (Rogue River), Clarks Branch (South Umpqua), Creswell (Coast Fork of the Willamette River), Sheridan (South Yamhill), Port Orford (Hubbard Creek), Reedsport (Clear Lake), Odell (Hood River County spring discharge), and Adair Village (Willamette River). The groundwater wells included systems serving Junction City (Lane County), Coburg (Lane County), Monmouth (Polk County), Veneta (Lane County), Island City (Union County), Sherman High School (Sherman County), The Dalles (Wasco County), Forest Park (Clackamas County), and Fairview (Tillamook County).

In developing a priority "contaminants of interest" list of pollutants, the OHA/DEQ team used recent national USGS emerging contaminant data in drinking water source areas, an analysis of current unmonitored pollutants used in Oregon, other state source monitoring programs, and consultations with environmental toxicologists at Oregon State University and OHA that have public health/drinking water expertise. Data sources for prioritizing within each group of pollutant included USGS national detection data on pharmaceuticals (see http://toxics.usgs.gov/regional/emc/); cleaners; VOCs; fire retardants from a 2007 analysis of Oregon's highest risks from household chemicals (see http://www.deq.state.or.us/lq/sw/hhw/index.htm); pesticides used in Oregon forestry management from Oregon Department of Forestry records; pesticides used in Oregon agriculture from a 2002 DEQ Willamette Valley study; and for other areas of the state,

Pesticide Stewardship Partnership data based on past DEQ monitoring in agricultural areas. Other high-risk chemicals were added for review by OHA toxicologists based on recent public water system monitoring results and national data analysis from EPA's drinking water records.

After developing lists within each pollutant group, the final priorities were selected by the toxicologists based on determinations of potential risks to public health. Most of the chemical compounds that were analyzed for are not monitored under the Safe Drinking Water Act requirements. Over 50 compounds were identified as "contaminants of interest" for drinking water in Oregon, including:

- herbicides (total of 12 from agriculture/forestry/urban land uses or sources)
- insecticides (12 from agriculture/urban sources)
- fungicides (3 from agriculture/forestry sources)
- metals (copper, arsenic, mercury)
- bacteria/pathogens (coliform from human and animal wastes)
- drugs (5 from human waste discharge---onsite or wastewater treatment plants)
- cleaners/VOCs (7 from wastewater/industry sources)
- fire retardants (3 from wastewater/urban sources)
- PAHs (5 from combustion-air deposition/runoff from industrial or urban sources)
- plasticizers (1 from industry/urban sources)

Table 1 lists over 50 compounds that are considered drinking water "contaminants of concern" priorities, and indicates the potential land uses or activities where these can originate in the source areas. When the DEQ Laboratory analyzed for these compounds, the list significantly expanded in number as the methods were selected at the lab. For example, the method analysis for Semi-Volatile Organic Compounds by Gas Chromatograph/Mass Spectrum includes approximately 126 compounds. All of the data quality indicators and analytes for this project are listed in Appendix B. Field analytical methods can be found in the Watershed Assessment Mode of Operations Manual which is available on the DEQ Laboratory website at, deqlab3\SOP\Watershed Assessment\DEQ03-LAB-0036-SOP.pdf. Included in the expanded analysis were also 67 volatile organic compounds, 32 pesticides, and 16 metals. Additional analytes were reported and summarized as part of the chemical analysis results; the final lab report included 272 compounds.

For the surface water sites, samples were pulled from the river or stream at a point near the intake. For Phase I sampling only, additional samples were collected approximately 200' and 400' upstream of the intake. Actual field locations where samples were pulled depended on access to the river or stream. At the groundwater wells, sampled were pulled from a pre-selected well at the first access point after the water was pumped above ground. In wells where there was no access prior to chlorination, many of the organic compounds could not be analyzed with an adequate degree of confidence. Due to the access issues, not all of the groundwater wells had all analytes reported in the results.

Data Evaluation

The data from both Phase I and II testing revealed that there are very low levels of contaminants present in the source waters sampled. OHA toxicologists analyzed DEQ's lab results to provide interpretative information to the public water supplier and local community officials at each source water site. OHA compared the sample results to current Safe Drinking Water Act drinking water standards, secondary standards, or health guidance levels in scientific publications and toxicological research information. Most contaminant levels were orders of magnitude lower than any established standards or regulatory limits.

Appendix B summarizes all analytical results from Phase I and II. Results of the Phase I DW Source sampling may be broadly summarized as follows:

- 28 percent of samples analyzed from surface water sources had at least one contaminant
- 22 percent of samples from wells had at least one contaminant
- Two groundwater samples (at one well) were found to have arsenic and manganese at levels above the secondary drinking water standards
- Eight surface water samples (at five intakes) were found to have aluminum at levels above the secondary drinking water standards
- The highest number of contaminant detections in surface water included microbes, steroids/hormones, metals, phthalates and pesticides
- The highest number of contaminant detections in groundwater included steroids/hormones (cholesterol), metals, and pesticides (Atrazine)
- One surface water source contained three pharmaceuticals at low levels: Sulfamethoxazole (an antibiotic), Carbamazepine (a mood stabilizer), and Diphenhydramine (an antihistamine)

For individual samples, the lab results are available from the DEQ LEAD website via the LASAR database. In this report, we will summarize the results of the analytes detected. In the surface water sources sampled, the insecticide DEET was found at 85 percent of the sites, the herbicides Atrazine and Diuron were found at 43 percent of the sites and Fluometuron was detected at 28 percent of the sites. Overall, pesticides were present in 29 percent of surface water source samples, but the highest concentrations were at levels below the state's water quality criteria for aquatic life, health-based levels, or drinking water standards (where available). Diethylphthalate and Bis(2-ethylhexyl)phthalate were found at 57 percent of the sites. Metal compounds were identified in almost half of the sites sampled. The highest number of detections included aluminum (at 100 percent), barium and manganese (at 57 percent). Since most metals in Oregon waters are from natural sources and attach to suspended clays in streams, it is not unusual to find high concentrations in source waters. Where the secondary maximum contaminant levels were exceeded for aluminum and manganese, the levels are likely significantly reduced by the drinking water treatment facility. Conventional treatment processes reduce turbidity and suspended solids from the source water with filtration. Finished drinking water samples at these public water systems met the established federal drinking water standards.

In the groundwater sources, the herbicide Atrazine was detected in 40 percent of the samples, but the levels never exceeded the drinking water standard. In the limited number of samples that were analyzed for steroids and hormones, all of them had coprostanol, considered a marker for human wastes. This can come from both onsite septic systems, as well as from wastewater treatment discharges upstream. Arsenic and manganese were also found in high concentrations at separate sample sites. Arsenic is a very common natural contaminant in Oregon's groundwater. The high levels of both arsenic and manganese are indicative of geologic formations supplying the well water. In many areas of Oregon, these metals are quite common and treatment is necessary to reduce those levels where the drinking water standards are routinely exceeded. Metals were found at about half of the well sites sampled, but most were well within acceptable drinking water standards.

Results of the Phase II DW Source sampling were similar to Phase I (see Appendix B). In the surface water systems, there were low level detections of pesticides, pharmaceuticals, phthalates, steroids, hormones and e coli. In the groundwater systems, there were low levels of pesticides, pharmaceuticals, phthalates, steroids, and hormones. Key findings associated with these results are presented below.

As part of the project's susceptibility analysis, DEQ also evaluated land uses/activities for source areas of each of the intakes and wells. Project staff conducted further evaluation of potential sources of contaminants on a site-by-site basis for each contaminant detected. These contaminants are likely from multiple land uses and activities in the watershed or recharge area for the wells. Since the levels were very low in this sampling project, OHA and DEQ will use the data analysis to determine potential associations with sources and to provide technical assistance to public water systems to reduce concentrations of source water contaminants.

Key findings from the data analysis of Phase I and II:

POTENTIAL SOURCES OF CONTAMINANTS TO SURFACE WATER SUPPLIES

- Microbes (E. coli), steroids and hormones are human waste byproducts and are likely from upstream wastewater discharge, high-density onsite septic systems discharging to groundwater, or heavy recreational uses.
- Metals can be from industrial or wastewater discharge, but most likely come from natural suspended clays in streams. In surface waters where metals were found, the concentrations were higher in the spring, which may be indicative of potential agricultural fertilizer sources.
- Phthalates are contaminants from plastics, perfumes, car care products, cosmetics and flooring. Phthalates in surface water can come from the breakdown of PVCs, plastics or flooring materials. Another very likely source is wastewater discharges and high-density housing with onsite septic systems, since the compounds are found in so many household products.
- Pesticides can enter surface waters from agricultural fields, forests, urban lawns, and roadside spraying. Results from this drinking water source monitoring suggest the primary sources are orchards, irrigated crops, harvested forests and high-density housing. The insect repellant DEET enters

surface waters from swimmers or wastewater from baths/showers after application to skin. DEET is very persistent once it enters a water body.

- Pharmaceuticals were detected in source waters that have both multiple wastewater treatment discharges upstream, as well as high-density housing using onsite wastewater disposal. It is well documented that drugs are primarily found in human urine and can also come from improper disposal of unused drugs in toilets.

POTENTIAL SOURCES OF CONTAMINANTS TO GROUNDWATER SUPPLIES

- Steroids and hormones are very likely linked to human waste byproducts released through onsite septic systems into groundwater. The most common marker of these byproducts is coprostanol, found in human feces.
- Metals are very common in Oregon's groundwater resources from natural geologic formations but are also found in stormwater runoff/infiltration from urban areas and agricultural fertilizer applications.
- Pesticides are found at low levels in wells surrounded by agricultural activities and high-density housing. Household lawn applications of pesticides can contribute as many pesticides to local groundwater resources as large-scale crop irrigation and spraying.

Other Relevant Comparative Studies

Other studies conducted recently identify levels of concern in Oregon drinking water sources. For example, DEQ has conducted pesticide monitoring in the Clackamas River since 2005. This river serves as the source of drinking water for more than 380,000 citizens. DEQ sampling results showed two insecticides at levels that exceed state water quality criteria. DEQ is collaborating with USGS on this project, along with the local Soil and Water Conservation District, Clackamas River Basin Council, Oregon State University Extension Service and Oregon Department of Agriculture. DEQ and the other state agencies are working to develop benchmarks for pesticides of concern because the state does not have water quality standards for many of them. This will result in a statewide Pesticide Management Plan that will prioritize pesticides of concern and list a set of desired actions to deal with these pesticides. With this data, DEQ, the Oregon Department of Agriculture and Oregon Department of Forestry can work with pesticide producers and applicators in the basin to reduce pollutant loads to levels that do not pose public health risks.

The USGS also conducted extensive monitoring for other contaminants in the Clackamas River starting in 2002. Sample results found 63 pesticides in source water and 15 pesticides in treated water. Twelve of the pesticides in finished drinking water do not have maximum contaminant levels set by state or federal agencies. For the three pesticide contaminants that do have standards, the treated Clackamas River water meets federal standards for drinking water. USGS has developed health-based screening levels for most pesticides without drinking water standards. The pesticides and other detected concentrations in the raw drinking water sources were very low and did not exceed any of

the screening levels established thus far by USGS. Other toxics of concern found in this drinking water supply included various plasticizers, disinfection byproducts and volatile organic compounds, including benzene and toluene ("Concentration Data for Anthropogenic Organic Compounds in Ground Water, Surface Water, and Finished Water of Selected Community Water Systems in the United States, 2002-05." USGS: 2007). This new data is particularly useful in identifying specific sources and land uses that are contributing toward pollutants. This will assist DEQ and other natural resource agencies in making better decisions about how to prevent contamination in source waters.

When Oregon's results are compared with national data from USGS and other researchers, OHA and DEQ find that most of the Oregon percentages are lower for contaminant detections. In a national reconnaissance study, USGS found that human waste byproducts, several nonprescription drugs, the insect repellent DEET and detergent metabolites were all found at detection frequencies above 75%. During 2008 and 2009, Underwriters Laboratories Inc. (UL) conducted analyses of more than 200 finished drinking water samples from across the United States. This data included samples from 145 public water systems in 29 states. UL conducts regulatory testing for Safe Drinking Water Act compounds, but in this project also tested for a broad range of pharmaceuticals. Cotinine, a nicotine metabolite, was found in 57 percent of the samples. A synthetic fragrance, Galaxolide, was found in 53 percent of the samples. The most common prescription drug found was Carbamazapine, an anti-depressant, at 46 percent. DEET insect repellent was found in 41% of the samples. UL is quick to point out that this data is limited – of the top 120 drugs now prescribed in the United States, only a couple of those have lab standards currently available. The vast majority of prescription drugs cannot be measured in drinking water or source water.

There are many other research projects underway to test for emerging contaminants in drinking water sources and treated water. The majority of analytical results in drinking water tests reveal very low concentrations. Until recently, chemists did not even have the technology to measure the compounds at parts-per-billion or parts-per-trillion levels. It is clear now, however, that these personal care products and pesticides and drugs are found in virtually every stream tested in the country where humans reside or recreate. State agencies also recognize that drinking water treatment plants cannot completely eliminate toxic contaminants from source waters.

Using the Data

OHA and DEQ will use data from this Drinking Water Source Monitoring project to help prioritize the drinking water source areas for other partnership programs. These projects can be implemented with the help of DEQ and OHA drinking water protection staff within source areas for drinking water intakes or wells. The DW Source Monitoring project and drinking water protection efforts are closely linked to other current DEQ and OHA toxics monitoring and pollution prevention initiatives, especially the DEQ Toxics Reduction project (see http://www.deq.state.or.us/toxics/index.htm) and the Oregon Toxics Monitoring Program (see http://www.deq.state.or.us/lab/wqm/toxics.htm).

As part of DEQ's drinking water protection strategies, the agency has mapped on GIS the intakes of all public water systems and outfalls of all National Pollutant Discharge

Elimination System permitted facilities. An estimated 208 publicly-owned wastewater collection/treatment systems serve the majority of Oregon's urban centers. There are 52 that process more than 10 million gallons per day. These 52 large wastewater treatment plants are part of a statewide project designed to reduce toxics discharged into Oregon waterways. DEQ's Priority Persistent Pollutant List process identified 117 toxic pollutants that persist in the environment and/or accumulate in animals. In 2010 and 2011, Oregon's 52 largest municipal wastewater treatment facilities then sampled effluent twice to determine whether any of 117 persistent pollutants were present above plan initiation levels. Sixteen of these facilities are upstream of public water system intakes. Of the 117 pollutants tested, only five pollutants occurred above the threshold levels set by DEQ resulting in the requirement for several municipalities to develop pollutant reduction plans. Pollutant reductions in treatment plant discharges will ultimately reduce the pollutants in the drinking water sources. Drinking water protection staff are available to assist communities upstream of intakes as they seek to reduce the toxic compounds in discharges from wastewater treatment plants.

In its existing Pesticide Stewardship Partnership projects, DEQ and its partners work to identify streams with elevated levels of pesticides and to find ways to reduce contaminant drift and runoff in those streams, using a collaborative, voluntary approach. The goals include developing better monitoring of pesticides and improved pesticide management and reduction strategies. These projects have been successful in reducing both the levels of pesticides in streams, as well as the potential risks from stored pesticides picked up through collection events documented in five basins. Safe Drinking Water Act monitoring across Oregon shows 53 public water systems with consistent detections of pesticides. These are areas where the drinking water protection staff can focus small-scale Pesticide Stewardship Partnership projects using the existing successful strategy.

To address existing turbidity problems, DEQ worked with 15 public water systems to research and document water quality issues associated with nonpoint sources. Many of these systems had chronic problems with high turbidity – some so severely that public water system intakes must be shut down periodically due to extremely high turbid water. High turbidity levels can also carry additional contaminants, such as nutrients and pesticides, into and through the water treatment facilities. The DEQ turbidity research study included collection of raw water data, interviews with operators, GIS analysis of land uses, and field inspections. The final report provides an analysis of the turbidity impacts for public water systems. The report can be found at this link: http://www.deq.state.or.us/wq/dwp/docs/TurbidityAnalysisOregonPWS201006.pdf The data from the report will also be used to develop climate change projections and identify strategies for protecting the most vulnerable systems from losses due to landslide-causing storms and land-use changes.

The DW Source Monitoring data will be shared with other agencies and US EPA to assist in efforts to address the emerging contaminant issues in drinking water. Determining what is "safe" water for public health and aquatic health is difficult. The important first step is identifying the presence and concentrations of the emerging contaminants in the source waters. In terms of evaluating the risks, the primary challenge facing scientists at this time is that there are few standards to analyze the results. There are many toxic contaminants for which there are no drinking water or health-based standards. The synergistic and cumulative effects of the various compounds that have been detected in

water are not known. DEQ and OHA will continue to track the new data and toxicological research and adjust work plans and priorities as necessary. Through the drinking water protection efforts, DEQ will continue to work to reduce the levels of contaminants in source waters to provide the highest quality waters to the public water system treatment plants.

The DEQ and OHA drinking water team will continue to prioritize statewide program efforts and local technical assistance using new data from the DW Source Monitoring project and other important data collection projects in Oregon. The near-term strategy for addressing the new "emerging" micro contaminants includes collecting more specific data to assess risks, continuing to prioritize potential exposure risks based on scientific research, and actively minimizing the input of toxics from known sources (primarily, collection events and public education).

Appendix A.

Description of Statewide Susceptibility Analysis and Prioritization for Drinking Water Source Areas

The DEQ Drinking Water Protection Program database and GIS layers contain information from the Source Water Assessments. This includes data on the occurrence and location of over 15,000 facilities or land uses that may release contamination to drinking water sources and the sensitivity of each well, spring, or intake to those potential sources of contamination that are located within the drinking water source area.

The overall susceptibility of each drinking water source (well, spring, or surface water intake) was evaluated based on the number and type of potential contaminant sources (PCSs) within the drinking water source area (DWSA) and the level of sensitivity of the DWSA. This analysis has already been used by the Drinking Water Protection Program as the foundation for evaluating how and where to provide active outreach and technical assistance. It also provided priority sampling locations for Phase I of the DW Source Monitoring Project.

For Groundwater and Surface Water:
As part of the Assessments, the PCSs were identified between 2001 and 2005 based on a list of over 100 separate categories (covering commercial/industrial, residential/municipal, and agricultural/forestry land uses) that were developed by a statewide advisory committee. Based on the type of facility and the nature of the chemicals used, the potential sources of contamination identified represent a lower-, moderate-, or higher-relative risk to the drinking water source. PCSs were also classified as "area-wide" sources or "point" sources. The area-wide sources represent the approximate area where the land use or activity occurs and were marked at a point closest to the intake. The point sources represent the approximate point where the land use or activity occurs. In the susceptibility analysis, the PCSs were "weighted" following these general rules:

- PCSs in sensitive areas were given twice the weight of PCSs that were not located in sensitive areas. Sensitive areas for groundwater DWSAs included the 2-year time-of-travel zone for wells and short-term recharge area for spring sources. Sensitive areas for surface water included a 1000-foot setback from perennial water bodies, areas with high erosion or runoff potential, and high permeability areas.
- Area-wide PCSs were given twice the weight of point sources (since the database does not account for the total area within the DWSA that is potentially affected),
- High-risk PCSs were given twice the weight of moderate-risk PCSs, and
- PCSs with lower risks were not included in the susceptibility ranking.

Drinking Water Source Monitoring Project
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For Surface Water DWSAs:
The surface water drinking water watersheds were ranked into Tiers 1-4 (Tier 1 = highest priority) based on either:

- NUMBER of weighted[1] potential contaminant sources in the entire drinking water protection area,
- Weighted[1] potential contaminant source DENSITY in the entire drinking water protection area (density calculations for sensitive areas only are not currently available),
- Weighted[1] potential contaminant source DENSITY in the entire drinking water protection area PLUS the drinking water protection areas located UPSTREAM within the same sub-basin as defined by the US Geological Survey 4th field Hydrologic Unit (drinking water protection areas are delineated intake to intake)

Summary of Surface Water Susceptibility[2]
Total number of SW drinking water sources (intakes) 211

Tier 1	47
Tier 2	40
Tier 3	31
Tier 4	83
No SWA Data at DEQ (unknown susceptibility)	10

(EWEB, SUB, Wilsonville, Salem Public Works, Berndt Creek Water Co-op in Columbia County, Anglers Cove in Jackson Co., Canby's Springs Gallery, Manzanita's Anderson Creek, Midland WA Springs and Unnamed Creek)

For Groundwater DWSAs:
Wells and springs are considered sensitive if they meet one of these criteria:

1. They draw from aquifers that were identified as sensitive in the source water assessments based on aquifer characteristics, vadose zone characteristics, or high infiltration potential (from precipitation and irrigation);
2. The entry point for the well or spring has had chemical detection(s) of a volatile organic compound (VOC) or synthetic organic compound (SOC) in the past as recorded in Department of Human Services' Safe Drinking Water Information System data as of November 2006;
3. The well or spring is classified by OHA as groundwater under the direct influence of surface water (GU) (evaluation protocol at http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/SourceWater/Pages/gwudi.aspx)

Wells and springs that did not meet any of these criteria are considered to have low sensitivity to potential sources of contamination.

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[1] As discussed in the general section on Groundwater and Surface Water, PCSs in sensitive areas or area-wide PCSs were weighted double due to their importance.

[2] For surface water: Tier 1 includes intakes that fell in the upper 10% based on percentile rank in any of the three categories (percentile rank >= 90%). Tier 2 included the next 10% (percentile rank between 80% and 90%), Tier 3 included the next 10% (percentile rank between 70% and 80%) and Tier 4 included intakes with percentile rank less than 70%.

Note: DWSAs that did not have adequate data entered in OHA's SWAP 97 database to determine if they were sensitive were labeled as "NR" for Needs Review and were included in this "sensitive" category which is a conservative approach – OHA will review the SWA reports to determine sensitivity and adjustments will be made at a later date. Currently, all springs, infiltration galleries, Ranney wells, and wells classified by OHA as groundwater in hydraulic connection with surface water (HC) are included in this "Needs Review" category.

The 1182 "sensitive" wells and springs were ranked into three tiers (Tier 1 = highest priority) by percentile rank based on either:

- NUMBER of weighted[1] potential contaminant sources in the entire drinking water source area; or
- Weighted[1] potential contaminant source DENSITY in the entire drinking water source area.

Summary of Groundwater Susceptibility[3]

Total number of GW drinking water sources	1,827
Number of "sensitive" GW sources	1,182
Tier 1	569
Tier 2	324
Tier 3	289
Low Sensitivity GW DWSAs	562
Low Sens_Group1	280
Low Sens_Group2	173
Low Sens_Group3	109
NoSWAData at DEQ3 (unknown susceptibility)	83

Some Source Water Assessments were completed by the PWS and DEQ does not have the data on potential contaminant sources to rank their overall susceptibility.[4]

3 For groundwater: Tier 1 includes wells and springs classified as "sensitive" that fell in the upper third based on percentile rank in either of the two bulleted categories (percentile rank between 66% and 100%). Tier 2 included the middle third (percentile rank between 33% and 66%) and Tier 3 included the bottom third (percentile rank less than 33%). LowSens-Group 1 includes wells and springs that were NOT classified as "sensitive" and fell in the upper third based on percentile rank in either of the two categories (percentile rank between 66% and 100%). Group 2 included the middle third (percentile rank between 33% and 66%) and Group 3 included the bottom third (percentile rank less than 33%)

4 Information on the potential contaminant sources and/or the delineation for these PWSs may not be fully included in this data: 4100143 - Brightwood Water Works; 4100200 - City of Coburg; 4100287 - Eugene Water and Electric Board; 4100296 - City of Fairview Water Dept.; 4100394 - Idanha City Water; 4100418 - Junction City Water Utilities; 4100443- City of Klamath Falls Water Dept.; 4100513 - Medford Water Commission (Big Butte springs); 4100657 - Portland Bureau of Water Works; 4100666 - Powell Valley Road and Water District; 4100731- Salem Public Works; 4100837 - Springfield Utility Board; 4100839 - Rainbow Water District (Springfield); 4100954 - City of Wilsonville; 4101068 - Big Valley Woods RV Resort; 4101241 - Zig Zag Water Co-op; 4105581 - Weiss Estates Water System; 4193745 - Lebanon High School.

Appendix B.

Drinking Water Source Monitoring Project Analytical Methods, Compounds, Detection Limits and Summary of Detected Analytes

Table 1. Priority Chemicals and Compounds
OHA/DEQ Drinking Water Source Monitoring Project (2008-2010)

Chemical Compound	Potential Contaminant Source(s)	Is there a SDWA MCL for this compound?
HERBICIDES		
Trifluralin	Agriculture	No
Hexazinone	Forestry/agriculture	No
Triclopyr	Agriculture /forestry/residential	No
Metolachlor	Agriculture	No
Linuron	Agriculture	No
Napropamide	Agriculture	No
Pendimethalon	Agriculture	No
Diuron	Agriculture	No
2,4-D	Forestry/agriculture/residential	Yes
Atrazine	Forestry/agriculture	Yes
Imazapyr	Forestry	No
Dacthal	Agriculture	No
INSECTICIDES		
Ethoprop	Agriculture	No
Diazinon	Agriculture/urban runoff	No
Chlorpyrifos	Agriculture/urban runoff	No
Azinphos-methyl	Agriculture	No
Imidacloprid	Agriculture/urban runoff	No
Propoxur	Agriculture/urban runoff	No
Permethrin	Agriculture/urban runoff	No
N, N-diethyltoluamide (DEET)	Wastewater/urban runoff	No
Lindane	Wastewater/urban runoff	Yes
Carbaryl	Agriculture/some forestry	No
Malathion	Agriculture	No
Dieldrin	Agriculture (banned)	No
FUNGICIDES		
Chlorothalonil	Agriculture/residential/forestry	No
Propiconazole	Agriculture	No
Pyraclostrobin	Agriculture/golf courses	No
METALS		
Copper	Natural/agriculture/ vineyards	Yes
Arsenic	Natural sources/wood treatment	Yes
Mercury	Commercial/industry/natural/ air deposition	Yes
BACTERIA/PATHOGENS		
Coliform (E Coli)	Agriculture/ CAFOs/recreation	Yes
DRUGS		
Carbamazepine	Wastewater –WWTP/onsite	No
Venlafaxine	Wastewater	No
Caffeine	(indicator)	No

CLEANERS & VOCs		
Tetrachloroethylene	Wastewater –housing/industry	Yes
Triclosan	Wastewater -housing	No
4-nonylphenol	Wastewater -housing	No
Trichloroethene	Industry	Yes
Benzene	Industry/vehicles– runoff & spills	Yes
Ethylbenzene	Industry/vehicles - runoff & spills	Yes
Toluene	Industry/vehicles - runoff & spills	Yes
FIRE RETARDANTS		
Decca-PBDE	Wastewater/urban runoff	No
Tri (2-chloroethyl) phosphate	Wastewater/urban runoff	No
Tri(dichlorisopropyl) phosphate	Wastewater/urban runoff	No
Phosphate		
PAHs		
Benzo (a) pyrene	Combustion – air dep & runoff	Yes
Chrysene	Combustion – air dep & runoff	No
Pyrene	Combustion – air dep & runoff	No
Anathracene	Combustion - air dep & runoff	No
Fluoranthene	Combustion - air dep & runoff	No
PLASTICIZERS		
Diethylphthalate	Industry/urban	No

NOTE: The listed potential contaminant sources are based on pertinent data from other studies for this parameter. Data sources for both chemical compounds and potential contaminant sources include:

- USGS frequency data on pharmaceuticals from Dana Kolpin, USGS (February 12, 2007 email).
- Cleaners, VOCs, fire retardants from a 2007 DEQ analysis of Oregon's highest risks from household chemicals.
- List of pesticides used in forestry from ODF estimates (Knotts, January 2008 document).
- List of pesticides used in agriculture from DEQ 2002 Willamette Valley study, USGS data, and Pesticide Stewardship Partnership data based on past DEQ monitoring downstream of numerous agricultural areas.
- Other high-risk chemicals added by agency toxicologists based on PWS monitoring results and national data analysis.

Table 2. Analytical Methods, Compounds, and Detection Limits
OHA/DEQ Drinking Water Source Monitoring Project (2008-2010)

Notes:

*** = detected in at least one source water sample (sw or gw)**

(1) LOQ = Limit of quantitation/method detection limit - note that slight variations of the LOQ are present in individual lab reports. Refer to specific lab report for precise LOQ if needed.

(2) Compounds addded to analysis in Fall 2008 Round

(3) Compounds addded to analysis in Spring 2009 Round

(4) Compounds addded to analysis in Summer 2010 Round

(5) Compounds addded to analysis in Fall 2010 Round

(6) Compounds only analyzed during Phase I (2008/ 09)

(7) Compounds analyzed by Method 8321 in 2010 Rounds

(8) SVOCs analyzed by GC/MS-SPE by 8270C in 2008/09 and by GC/MS-Toxics 525.2 in 2009

Metals in Source Water by EPA Method 200.8

(except Mercury by Method 245.1)	LOQ [1]	Unit
Total Mercury	0.02	µg/L
Total Recoverable Aluminum* (6)	3	µg/L
Total Recoverable Antimony	2	µg/L
Total Recoverable Arsenic*	2	µg/L
Total Recoverable Barium* (6)	2	µg/L
Total Recoverable Beryllium (6)	0.3	µg/L
Total Recoverable Cadmium (6)	0.3	µg/L
Total Recoverable Chromium* (6)	0.5	µg/L
Total Recoverable Copper*	5	µg/L
Total Recoverable Lead*	0.2	µg/L
Total Recoverable Manganese* (6)	5	µg/L
Total Recoverable Nickel* (6)	1	µg/L
Total Recoverable Selenium	2	µg/L
Total Recoverable Silver (6)	0.1	µg/L
Total Recoverable Thallium	0.1	µg/L
Total Recoverable Zinc*	5	µg/L

Phenoxy Herbicides by GC/ECD Method 6640B

2,4,5-T	0.3	µg/L
2,4-D	0.1	µg/L
2,4-DB	0.6	µg/L
3,5-Dichlorobenzoic acid	0.3	µg/L
4-Nitrophenol (6)	0.7	µg/L
Acifluorfen	0.2	µg/L
Bentazon (6)	0.7	µg/L
Dicamba	0.3	µg/L
Dichloroprop	0.3	µg/L
Dinoseb	0.3	µg/L
MCPA	20	µg/L
MCPP	59	µg/L
Pentachlorophenol	0.1	µg/L
Picloram	0.6-2.0	µg/L
Silvex	0.1	µg/L
Triclopyr	0.3	µg/L

Steroids and Hormones by HRGC/HRMS by Method 1698

17a-Estradiol(2)	0.002	µg/L
17a-Ethynyl Estradiol (2)	0.01	µg/L
17ß-Estradiol (2)	0.002	µg/L
beta-Sitosterol* (4)	0.025	µg/L
Cholesterol* (2)	0.06	µg/L
Coprostanol* (2)	0.04	µg/L
Diethylstilbestrol* (4)	0.002	µg/L
Estriol (2)	0.025	µg/L
Estrone (2)	0.002	µg/L
Stigmastanol* (4)	0.025	µg/L

Organic Compounds by LC/MS/MS Method 8321

	LOQ [1]	Unit
Acetochlor	0.0096	µg/L
Alachlor	0.0096	µg/L
Ametryn	0.0038 est	µg/L
Aminocarb	Void	µg/L
Atrazine*	0.0038 est	µg/L
Azinphos Methyl	0.019	µg/L
Baygon	0.0038	µg/L
Carbaryl *	0.0048	µg/L
Carbofuran	0.0038	µg/L
DEET*	0.0048	µg/L
Diuron*	0.0038	µg/L
Fluometuron*	0.0038	µg/L
Imazapyr*	0.0038	µg/L
Imidacloprid	0.019	µg/L
Linuron	0.0038	µg/L
Methiocarb	0.0038	µg/L
Methomyl	0.0038	µg/L
Metolachlor*	0.0096	µg/L
Metribuzin	0.0038	µg/L
Mexacarbate	Void	µg/L
Neburon	0.0048	µg/L
Oxyamyl	0.0038	µg/L
Prometon	0.0038 est	µg/L
Prometryn	0.0038 est	µg/L
Propazine	0.0038 est	µg/L
Propiconazole	0.019	µg/L
Pyraclostrobin	0.0038	µg/L
Siduron	0.0038	µg/L
Simazine	0.0038 est	µg/L
Simetryn	0.0038 est	µg/L
Terbutryne	0.0038 est	µg/L
Terbutylazine*	0.0038 est	µg/L

Pharmaceuticals by LC/MS/MS Method 1694

Acetaminophen	0.256	µg/L
Caffeine	0.128	µg/L
Carbamazepine *	0.0128	µg/L
Codeine	0.026	µg/L
Cotinine (5)	0.0132	µg/L
Diphenhydramine *	0.0128	µg/L
Ibuprofen (5)	0.263	µg/L
Pimozide (5)	0.105	µg/L
Roxithromycin (5)	0.011	µg/L
Sulfamethoxazole *	0.0128	µg/L
Triclosan (5)	1.052	µg/L
Venlafaxine	0.0128	µg/L

Semi-volatile Organic Compounds by GC/MS-Toxics II Method 8270D (8)

	LOQ [(1)]	Unit
2,4-Dinitrotoluene	0.040	µg/L
2,6-Dinitrotoluene	0.020	µg/L
4,4`-DDD	0.020	µg/L
4,4`-DDE	0.020	µg/L
4,4`-DDT (3)	0.020	µg/L
Acenaphthene (6)	0.020	µg/L
Acenaphthylene	0.020	µg/L
Alachlor (7)	0.020	µg/L
Aldrin	0.020	µg/L
alpha-BHC [Hexachlorocyclohexane,alpha-]	0.020	µg/L
Ametryn (6)	0.020	µg/L
Anthracene	0.020	µg/L
Atraton (6)	0.080	µg/L
Atrazine (7)	0.080	µg/L
Azinphos-methyl (7)	0.020	µg/L
Benzo(a)anthracene	0.020	µg/L
Benzo(a)pyrene	0.020	µg/L
Benzo[b]fluoranthene	0.020	µg/L
Benzo[g,h,i]perylene	0.020	µg/L
Benzo[k]fluoranthene	0.020	µg/L
beta-BHC [Hexachlorocyclohexane, beta-]	0.020	µg/L
Bis(2-ethylhexyl)adipate	0.396	µg/L
Bis(2-ethylhexyl)phthalate*	0.396	µg/L
Bromacil	Void	µg/L
Butachlor	0.020	µg/L
Butylate	0.030	µg/L
Butylbenzylphthalate *	0.297	µg/L
Carboxin	0.025	µg/L
Chlorobenzilate(a)	0.020	µg/L
Chloroneb	0.025	µg/L
Chlorothalonil	0.020	µg/L
Chlorpropham (CIPC)	0.020	µg/L
Chlorpyriphos (Dursban)	0.040	µg/L
Chrysene	0.020	µg/L
cis-Chlordane	0.020	µg/L
Cyanazine	0.025	µg/L
Cycloate	0.020	µg/L
Dacthal	0.020	µg/L
DEET (6)	0.020	µg/L
delta-BHC [Hexachlorocyclohexane, delta-]	0.020	µg/L
Diazinon	0.099	µg/L
Dibenz[a,h]anthracene	0.020	µg/L
Dichlorvos	0.020	µg/L
Dieldrin	0.020	µg/L
Diethylphthalate*	0.297	µg/L
Dimethoate (2)	0.020	µg/L
Dimethylphthalate	0.297	µg/L
Diphenamid	0.020	µg/L
Disulfoton	0.045	µg/L
Endosulfan I	0.030	µg/L
Endosulfan II	0.020	µg/L
Endosulfan sulfate	0.020	µg/L
Endrin	0.059	µg/L
Endrin Aldehyde	0.040	µg/L
EPTC (Eptam)	0.020	µg/L

	LOQ [(1)]	Unit
Ethoprophos	0.030	µg/L
Etridiazole	0.040	µg/L
Fenamiphos	Void	µg/L
Fenarimol	0.020	µg/L
Fenvalerate+Esfenvalerate (2)	0.396	µg/L
Fluoranthene	0.020	µg/L
Fluorene	0.020	µg/L
Fluridone	0.020	µg/L
Heptachlor	0.020	µg/L
Heptachlor epoxide (4)	0.030	µg/L
Hexachlorobenzene	0.020	µg/L
Hexachlorocyclopentadiene (6)	0.020	µg/L
Hexazinone	0.040	µg/L
Imidan (Phosmet) (2)	0.020	µg/L
Indeno[1,2,3-cd]pyrene	0.020	µg/L
Isophorone	0.020	µg/L
Lindane	0.020	µg/L
Malathion	0.030	µg/L
Methoxychlor	0.020	µg/L
Methyl paraoxon	0.020	µg/L
Methyl Parathion (2)	0.020	µg/L
Metolachlor (7)	0.020	µg/L
MGK-264	0.050	µg/L
Molinate	0.020	µg/L
Napropamide	0.020	µg/L
Norflurazon	0.020	µg/L
PCB-1 (2-Chlorobiphenyl)	0.025	µg/L
PCB-154 (2,2`,4,4`,5,6`-Hexachlorobiphenyl)	0.020	µg/L
PCB-171 (2,2`,3,3`,4,4`,6-Heptachlorobiphenyl)	0.020	µg/L
PCB-200 (2,2`,3,3`,4,5`,6,6`-Octachlorobiphenyl)	0.020	µg/L
PCB-29 (2,4,5-Trichlorobiphenyl)	0.020	µg/L
PCB-47 (2,2`,4,4`-Tetrachlorobiphenyl)	0.030	µg/L
PCB-5 (2,3-Dichlorobiphenyl)	0.020	µg/L
PCB-98 (2,2`,3`,4,6-Pentachlorobiphenyl)	0.020	µg/L
Pebulate	0.020	µg/L
Pendimethalin	0.020	µg/L
Pentachlorophenol(analyzed by 6640B in 2010)	0.080	µg/L
Permethrin	0.040	µg/L
Phenanthrene *	0.020	µg/L
Phosdrin (Mevinphos) (4)	0.030	µg/L
Prometon (7)	0.020	µg/L
Prometryn (7)	0.020	µg/L
Pronamide	0.020	µg/L
Propachlor	0.020	µg/L
Propazine (7)	0.020	µg/L
Pyrene	0.020	µg/L
Pyriproxyfen (2)	0.198	µg/L
Simazine (7)	0.040	µg/L
Simetryn (7)	0.020	µg/L
Tebuthiuron	0.020	µg/L
Terbacil	0.040	µg/L
Terbufos	0.040	µg/L
Terbutryne (7)	0.020	µg/L
Tetrachlorvinphos	0.025	µg/L
trans-Chlordane	0.020	µg/L

Semi-volatile Organic Compounds by GC/MS-Toxics II Method 8270D (7) (continued)

	LOQ (1)	Unit
trans-Nonachlor	0.020	µg/L
Triadimefon	0.020	µg/L
Tricyclazole	0.020	µg/L
Trifluralin	0.020	µg/L
Vernolate	0.020	µg/L
2,2',4-Tribromodiphenyl ether (PBDE 17) (6)	0.020	µg/L
2,4,4'-Tribromodiphenyl ether (PBDE 28) (6)	0.020	µg/L
2,2',4,4'-Tetrabromodiphenyl ether (PBDE 47) (6)	0.020	µg/L
2,3',4,4'-Tetrabromodiphenyl ether (PBDE 66) (6)	0.020	µg/L
2,3',4',6-Tetrabromodiphenyl ether (PBDE 71) (6)	0.020	µg/L
2,2',3,4,4'-Pentabromodiphenyl ether (PBDE 85) (6)	0.020	µg/L
2,2',4,4',5-Pentabromodiphenyl ether (PBDE 99) (6)	0.020	µg/L
2,2',4,4',6-Pentabromodiphenyl ether (PBDE 100) (6)	0.020	µg/L
2,2',3,4,4',5'-Hexabromodiphenyl ether (PBDE 138) (6)	0.020	µg/L
2,2',4,4',5,5'-Hexabromodiphenyl ether (PBDE 153) (6)	0.020	µg/L
2,2',4,4',5,6'-Hexabromodiphenyl ether (PBDE 154) (6)	0.020	µg/L
2,2',3,4,4',5',6-Heptabromodiphenyl ether (PBDE 183) (6)	0.020	µg/L

Volatile Organic Compounds by GC/MS Method 8260 B (2010 VOC analysis by ESC Lab Sciences)

	LOQ (1)	Unit
1,1,1,2-Tetrachloroethane	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L
1,1,2,2-Tetrachloroethylene (6)	0.5	µg/L
1,1,2-Trichloroethane	1.0	µg/L
1,1-Dichloroethane	1.0	µg/L
1,1-Dichloroethylene	1.0	µg/L
1,1-Dichloropropene	1.0	µg/L
1,2,3-Trichlorobenzene	1.0	µg/L
1,2,3-Trichloropropane (TCP)	1.0	µg/L
1,2,3-Trimethylbenzene (4)	1.0	µg/L
1,2,4-Trichlorobenzene	1.0	µg/L
1,2,4-Trimethylbenzene	1.0	µg/L
1,2-Dibromo-3-chloropropane (DBCP)	5.0	µg/L
1,2-Dibromoethane (EDB)	1.0	µg/L
1,2-Dichlorobenzene	1.0	µg/L
1,2-Dichloroethane	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L
1,2-Dimethylbenzene (6)	0.5	µg/L
1,3,5-Trimethylbenzene	1.0	µg/L
1,3-Dichlorobenzene	1.0	µg/L
1,3-Dichloropropane	1.0	µg/L
1,4/1,3-Dimethylbenzene (6)	1.0	µg/L
1,4-Dichlorobenzene	1.0	µg/L
2,2-Dichloropropane	1.0	µg/L
2-Butanone (MEK)	10.0	µg/L
2-Chloroethyl Vinyl Ether	void	µg/L
2-Chlorotoluene	1.0	µg/L
4-Chlorotoluene	1.0	µg/L
4-isopropyltoluene	1.0	µg/L
4-Methyl-2-Pentanone (MIBK)	10.0	µg/L
Acetone	50.0	µg/L
Acrolein (2-Propenal)	Void	µg/L
Acrylonitrile (4)	10.0	µg/L
Benzene	1.0	µg/L
Bromobenzene	1.0	µg/L
Bromochloromethane (6)	0.5	µg/L
Bromodichloromethane *	1.0	µg/L
Bromoform	1.0	µg/L
Bromomethane	5.0	µg/L
Carbon Disulfide *	1.0	µg/L
Carbon Tetrachloride	1.0	µg/L
Chlorobenzene	1.0	µg/L
Chloroethane	5.0	µg/L
Chloroform *	5.0	µg/L
Chloromethane	2.5	µg/L
cis-1,2-Dichloroethylene	1.0	µg/L
cis-1,3-Dichloropropene	1.0	µg/L
Dibromochloromethane *	1.0	µg/L
Dibromomethane	1.0	µg/L
Dichlorodifluoromethane	5.0	µg/L
Diisopropyl ether (4)	1.0	µg/L
Ethyl Benzene	1.0	µg/L
Hexachloro-1,3-Butadiene	1.0	µg/L
Isopropylbenzene (Cumene)	1.0	µg/L
Methylene Chloride	5.0	µg/L
MtBE	1.0	µg/L
Naphthalene	5.0	µg/L
n-butylbenzene	1.0	µg/L
n-Propylbenzene	1.0	µg/L
sec-Butylbenzene	1.0	µg/L
Styrene	1.0	µg/L
tert-Butylbenzene	1.0	µg/L
Tetrachloroethylene	1.0	µg/L
Toluene *	5.0	µg/L
trans-1,2-Dichloroethylene	1.0	µg/L
trans-1,3-Dichloropropene	1.0	µg/L
Trichloroethylene	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L
Trichlorotrifluoroethane	1.0	µg/L
Vinyl Chloride	1.0	µg/L
Xylene(total) (4)	3.0	µg/L
Tentatively Identified Compound (6)	5.0	µg/L

Microbiology (Method 9223B by Oregon DHS/OHA)

	LOQ (1)	Unit
E. Coli*	1	MPN/100 ml

Table 3. Detected Analytes* for Surface Water Samples (2008-2010)
OHA/DEQ Drinking Water Source Monitoring Project

Compound	Units	Method Detection Limit	Drinking Water/Health Standards (see notes)	Sample Number	34853	34854	34855	34853	35152	35153	34856	34857	34858	34856	34857	34858	34862	34863	FieldDup	34864	34862	34863	34864	34865	34866	34867
				DEQ Lab Report No.	20080511	20080511	20080511	20081104	20081104	20081104	20080511	20080511	20080511	20081104	20081104	20081104	20080511	20080511	20080511	20080511	20081103	20081103	20081103	20080511	20080511	20080511
				Sample Date	5/13/2008	5/13/2008	5/13/2008	10/14/2008	10/14/2008	10/14/2008	5/13/2008	5/13/2008	5/13/2008	10/14/2008	10/14/2008	10/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	10/14/2008	10/14/2008	10/14/2008	5/14/2008	5/14/2008	5/14/2008
					Spring2008	Spring2008	Spring2008	Fall 2008	Fall 2008	Fall 2008	Spring2008	Spring2008	Spring2008	Fall 2008	Fall 2008	Fall 2008	Spring2008	Spring2008	Spring2008	Spring2008	Fall 2008	Fall 2008	Fall 2008	Spring2008	Spring2008	Spring2008
					City of Detroit Intake - Mackey Creek	City of Detroit 100yds upstream of intake-Mackey Creek	City of Detroit 200yds upstream of intake-Mackey Creek	City of Detroit Intake - Mackey Creek	City of Detroit Intake - Breitenbush River intake	City of Detroit 200yds upstream of intake-Breitenbush River	City of Jefferson Intake - Santiam River	City of Jefferson upstream of intake - Santiam R.at RM 9.71	City of Jefferson upstream of intake - Santiam R. at RM 9.78	City of Jefferson Intake - Santiam River	City of Jefferson upstream of intake - Santiam R.at RM 9.71	City of Jefferson upstream of intake - Santiam R. at RM 9.78	Hillsboro JWC Intake - Tualatin R.	Hillsboro JWC upstrm of intake-Tualatin R.at RM 54.69	Hillsboro JWC upstrm of intake-Tualatin R.at RM 54.69	Hillsboro JWC upstream of intake-Tualatin R at RM 54.87	Hillsboro JWC Intake - Tualatin R.	Hillsboro JWC upstrm of intake-Tualatin R.at RM 54.69	Hillsboro JWC upstream of intake-Tualatin R at RM 54.87	Seaside Intake-So. Fork Necanicum River	Seaside 100 yds upstream of intake - SFNecanicum R.	Seaside 500 yds upstream of intake-SFNecanicum R.
Organic Compounds by LC/MS/MS Method 8321																										
DEET (insecticide)	ug/L	0.0025 - 0.004	Not Available		**0.0065**	<0.0025	**0.0038**	<0.0025 est.	<0.0025 est.	<0.0025 est.	**0.0054**	**0.0053**	**0.0053**	<0.0025 est.	**0.0026 est. (7)**	<0.0025 est.	**0.0034**	<0.0025	**0.0027**	**0.0030**	**0.0026 est. (7)**	**0.0025 est. (7)**	<0.0025	**0.0033**	<0.0025	**0.0055**
Atrazine (herbicide)	ug/L	0.0025 - 0.004	3 ppb (MCL)		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0203**	**0.0209**	**0.0214**	**0.0218**	**0.0043 est. (7)**	**0.0044 est. (7)**	**0.0038 est. (7)**	<0.002	<0.002	<0.002
Diuron (herbicide)	ug/L	0.0025 - 0.004	2–200 ppb (HBSL) / (CCL)		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	**0.0091**	**0.0095**	**0.0100**	**0.0095**	**0.0035**	**0.0041**	**0.0034**	<0.002	<0.002	<0.002
Fluometuron (herbicide)	ug/L	0.0025 - 0.004	4 ppb (HBSL)		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Imazapyr (herbicide)	ug/L	0.020 - 0.040	20000 ppb (HBSL)		<0.020	<0.020	<0.020	<0.020 est	<0.020 est	<0.020 est	<0.020	<0.020	<0.020	<0.020 est	<0.020 est	<0.020 est	<0.020	<0.020	<0.020	<0.020	<0.020 est	<0.020 est	<0.020 est	<0.020	<0.020	<0.020
Metolachlor (herbicide)	ug/L	0.005 - 0.009	700 ppb (HBSL) / (CCL)		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0059**	**0.0068**	**0.0057**	**0.0061**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Carbaryl (insecticide)	ug/L	0.0025 - 0.005	40–400 ppb (HBSL)		<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Pharmaceuticals by LC/MS/MS Method 1694																										
Sulfamethoxazole (antibiotic)	ug/L	0.010	Not Available		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Carbamazepine (anticonvulsant and mood stabilizing drug)	ug/L	0.010	Not Available		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diphenhydramine (antihistamine)	ug/L	0.010	Not Available		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenoxy Herbicides by GC/ECD Method 6640B																										
	ug/L	varies	varies		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semi-volatile Organic Compounds by GC/MS - SPE Method 8270C (used GC/MS-Toxics II Method 8270 in Summer and Fall 2010)																										
Phthalates																										
Butylbenzylphthalate	ug/L	0.200 - 0.400	100 ppb (HBSL)		<0.200	<0.200 est.	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200 est.	<0.200	<0.200	<0.200	<0.200 est.	<0.200 est.	<0.200 est.	<0.200 est.	<0.200	<0.200	<0.200	<0.200 est.	<0.200 est.	<0.200 est.
Diethylphthalate	ug/L	0.040 - 0.300	6000 ppb (HBSL)		<0.040 est.	<0.040 est.	<0.040 est.	<0.040	<0.040	<0.040	<0.040 est.	<0.040 est.	<0.040 est.	<0.040	**0.052 est. (2)(8)**	<0.040	<0.040	<0.040	**0.170 est. (2)**	<0.040	**0.050 est. (2)(8)**	<0.040	<0.040	**0.043 est. (2)**	<0.040	<0.040
Bis(2-ethylhexyl)phthalate	ug/L	0.0400 - 0.500	6 ppb (MCL)		<0.500	<0.500 est.	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500 est.	<0.500	**1.154 est. (2)(11)**	<0.500	<0.500	<0.500 est.	<0.500 est.	<0.500 est.	<0.500	<0.500	<0.500	<0.500 est.	<0.500 est.	<0.500 est.
PAHs																										
Phenanthrene	ug/L	0.020	210 ppb (FL)		<0.020	<0.020 est.	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	**0.0430**	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Steroids and Hormones by HRGC/HRMS by Method 1698																										
Coprostanol	ug/L	0.005-0.090	Not Available		NA	NA	NA	<0.005 est.	VOID (10)	<0.005 est.	NA	NA	NA	**0.014 est.(4)**	**0.014 est. (4)**	**0.015 est.(4)**	NA	NA	NA	NA	**0.148 est.(4)**	**0.106 est.(4)**	**0.116 est.(4)**	NA	NA	NA
Cholesterol	ug/L	0.075 - 0.400	Not Available		NA	NA	NA	**0.231 est. (4)(8)**	VOID (10)	**0.286 est.(4)(8)**	NA	NA	NA	**0.827 est.(4)(8)**	**0.719 est.(4)(8)**	**0.851 est.(4)(8)**	NA	NA	NA	NA	**1.536 est. (2)(4)(9)**	**1.352 est.(4)(9)**	**1.140 est.(4)(9)**	NA	NA	NA
beta-Sitosterol	ug/L	0.002 - 0.025	Not Available		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Stigmastanol	ug/L	0.010 - 0.025	Not Available		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds by GC/MS Method 8260B (by ESC Lab Sciences in 2010 monitoring)																										
Carbon Disulfide	ug/L	0.500	700 ppb (HBSL)		<0.500	<0.500	<0.500	**0.5400**	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Toluene	ug/L	0.500	1000 ppb (MCL)		<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**0.6**	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Metals by Method 200.8 except mercury by Method 245.1																										
Aluminum	ug/L	3.0 to 20	50 to 200 ppb (SMCL)		**22.30**	**21.10**	**21.40**	**9.90**	**8.90**	**11.70**	**216.00**	**173.00**	**197.00**	**64.00**	**55.10**	**42.60**	**419.00**	**601.00**	**620.00**	**639.00**	**307 est. (5)**	**334 est. (5)**	**356 est. (5)**	**52.10**	**44.50**	**41.60**
Arsenic	ug/L	2.0	10 ppb (MCL)		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Barium	ug/L	2.0	2000 ppb (MCL)		**11.00**	**11.90**	**11.40**	**14.40**	<2.0	<2.0	**2.40**	**2.30**	**2.40**	<2.0	<2.0	<2.0	**5.40**	**6.70**	**6.50**	**6.30**	**5.30**	**5.20**	**5.40**	**2.30**	**2.20**	**2.30**
Chromium	ug/L	0.5 to 1.0	100 ppb (MCL)		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5
Copper	ug/L	0.5 to 1.5	1300 ppb (TT-AL)		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	**1.90**	**1.80**	**1.80**	<1.5	<1.5	<1.5	<0.5	<0.5	<0.5
Lead	ug/L	0.2 to 1.5	15 ppb (TT-AL)		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1.5	<1.5	<1.5	<1.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Manganese	ug/L	5.0	50 ppb (SMCL)		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**7.80**	**6.50**	**6.80**	<5.0	<5.0	<5.0	**63.40**	**34.30**	**33.40**	**32.50**	**34.50**	**28.90**	**30.80**	<5.0	<5.0	<5.0
Nickel	ug/L	1.0	100 ppb (HBSL)		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	2.0 to 3.0	5000 ppb (SMCL)		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<2.0	<2.0	<2.0
Microbiology																										
E Coli	MPN/ 100ml	1	(TT)		<1	<1	<1	<1 est.	**3 est. (4)**	**4 est. (4)**	**6**	**2**	**9**	**5**	**5**	**5**	**36**	**81 est. (4)**	**78 est. (4)**	**57 est. (4)**	**71 est. (4)**	**55 est. (4)**	**58 est. (4)**	<1 est. (4)	**2 est. (4)**	<1 est. (4)
General Sample Parameters																										
Field Turbidity	NTU	1	(TT)		<1	<1	<1	<1	<1	<1	2	2	2	<1	<1	<1	8	10	9	7	5	5	5	3	2	2
Total Solids	mg/L	10	(TT)		46	47	45	74	57	59	38	38	37	45	40	41	74	78	70	72	70	72	71	41	42	39

Table 3. Detected Analytes* for Surface Water Samples (2008-2010)
OHA/DEQ Drinking Water Source Monitoring Project

Sample Number				34865	34866	34867	34859	34860	34861	34859	34860	34868	34868	FieldDup	34869	34870	34868	FieldDup	34869	34870	34457	34456	36312
DEQ Lab Report No.				20081107	20081107	20081107	20080511	20080511	20080511	20081089	20081089	20081089	20080511	20080511	20080511	20080511	20081089	20081089	20081089	20081089	20100485 / 20100689	20100485 / 20100689	20100892
Sample Date				10/15/2008	10/15/2008	10/15/2008	5/13/2008	5/13/2008	5/13/2008	10/8/2008	10/8/2008	10/8/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	10/8/2008	10/8/2008	10/8/2008	10/8/2008	6/8/2010 and 7/28/2010	6/8/2010 and 7/28/2010	9/21/2010
				Fall 2008	Fall 2008	Fall 2008	Spring2008	Spring2008	Spring2008	Fall 2008	Fall 2008	Fall 2008	Spring2008	Spring2008	Spring2008	Spring2008	Fall 2008	Fall 2008	Fall 2008	Fall 2008	Jun / Jul 2010	Jun / Jul 2010	Sep-10
Compound	**Units**	**Method Detection Limit**	**Drinking Water/Health Standards (see notes)**	Seaside Intake-So. Fork Necanicum River	Seaside 100 yds upstream of intake - SF Necanicum R.	Seaside 500 yds upstream of intake-SF Necanicum R.	Gold Hill Intake-Rogue R.	Gold Hill 200yds upstream of intake - Rogue R.	Gold Hill 400 yds upstream of intake-Rogue R.	Gold Hill Intake-Rogue R.	Gold Hill 200yds upstream of intake - Rogue R.	Gold Hill 400 yds upstream of intake-Rogue R.	City of Riddle Intake - Cow Creek	City of Riddle Intake - Cow Creek	City of Riddle 200 yds upstream of intake - Cow Creek	City of Riddle 400 yds upstream of intake - Cow Creek	City of Riddle Intake - Cow Creek	City of Riddle Intake - Cow Creek	City of Riddle 200 yds upstream of intake - Cow Creek	City of Riddle 400 yds upstream of intake - Cow Creek	City of Siletz Intake - Siletz River	City of Lincoln City Intake - Schooner Creek	City of Creswell Intake - Coast Fork Willamette R.
Organic Compounds by LC/MS/MS Method 8321																							
DEET (insecticide)	ug/L	0.0025 - 0.004	Not Available	<0.0025 est.	<0.0025 est.	<0.0025 est.	**0.0059**	**0.0048**	**0.0061**	<0.0025	**0.0030**	**0.0030**	**0.0051**	<0.0025	<0.0025	**0.0033**	<0.0025	<0.0025	<0.0025	<0.0025	<0.0048	<0.0049	<0.0049
Atrazine (herbicide)	ug/L	0.0025 - 0.004	3 ppb (MCL)	<0.002 est.	<0.002 est.	<0.002 est.	**0.0028**	**0.0023**	**0.0025**	<0.002	<0.002	<0.002	**0.0042**	**0.0045**	**0.0043**	**0.0043**	<0.002	**0.0023**	**0.0021**	<0.002	**0.0044 est. (7)**	<0.0039 est. (7)	**0.0061**
Diuron (herbicide)	ug/L	0.0025 - 0.004	2–200 ppb (HBSL) / (CCL)	<0.002 est.	<0.002 est.	<0.002 est.	**0.0049**	**0.0043**	**0.0049**	**0.0034**	**0.0040**	**0.0042**	**0.0036**	**0.0039**	**0.0047**	**0.0045**	**0.0026**	**0.0035**	**0.0032**	**0.0021**	<0.0038	<0.0039	<0.0039
Fluometuron (herbicide)	ug/L	0.0025 - 0.004	4 ppb (HBSL)	<0.002 est.	<0.002 est.	<0.002 est.	<0.002	**0.0021**	**0.0023**	<0.002	<0.002	<0.002	**0.0028**	<0.002	<0.002	**0.0031**	<0.002	<0.002	<0.002	<0.002	<0.0038	<0.0039	<0.0039
Imazapyr (herbicide)	ug/L	0.020 - 0.040	20000 ppb (HBSL)	<0.020 est	<0.020 est	<0.020 est	<0.020	<0.020	<0.020	<0.020 est	<0.020 est	<0.020 est	<0.020	<0.020	<0.020	<0.020	<0.020 est	<0.020 est	<0.020 est	<0.020 est	VOID (12)	VOID (12)	<0.039 est
Metolachlor (herbicide)	ug/L	0.005 - 0.009	700 ppb (HBSL) / (CCL)	<0.005 est.	<0.005 est.	<0.005 est.	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0096	<0.0098	<0.0099
Carbaryl (insecticide)	ug/L	0.0025 - 0.005	40–400 ppb (HBSL)	<0.0025 est.	<0.0025 est.	<0.0025 est.	<0.0025	<0.0025	<0.0025	**0.0032 est. (6)**	**0.0033 est. (6)**	**0.0038 est. (6)**	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025 est.	<0.0025 est.	<0.0025 est.	<0.0025	<0.0048	<0.0049	<0.0049
Pharmaceuticals by LC/MS/MS Method 1694																							
Sulfamethoxazole (antibiotic)	ug/L	0.010	Not Available	<0.010 est.	<0.010 est.	<0.010 est.	**0.011 est. (2)**	**0.010**	**0.013 est. (2)**	**0.07**	**0.07**	**0.07**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0128	<0.0134	<0.0129
Carbamazepine (anticonvulsant and mood stabilizing drug)	ug/L	0.010	Not Available	<0.010 est.	<0.010 est.	<0.010 est.	<0.010	<0.010	<0.010	**0.0220**	**0.0240**	**0.0220**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0128	<0.0134	<0.0129
Diphenhydramine (antihistamine)	ug/L	0.010	Not Available	<0.010 est.	<0.010 est.	<0.010 est.	<0.010	<0.010	<0.010	<0.010	**0.0090**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0128	<0.0134	<0.0129
Phenoxy Herbicides by GC/ECD Method 6640B																							
	ug/L	varies	varies	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	VOID (3)	ND	ND	ND	ND	ND	ND	NA	NA	ND
Semi-volatile Organic Compounds by GC/MS - SPE Method 8270C (used GC/MS-Toxics II Method 8270 in Summer and Fall 2010)																							
Phthalates																							
Butylbenzylphthalate	ug/L	0.200 - 0.400	100 ppb (HBSL)	<0.200	<0.200	<0.200	**0.3800**	<0.200	VOID (1)	<0.200	<0.200	<0.200	<0.200 est.	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200 est.	<0.292 (15)	<0.292 (15)	<0.295
Diethylphthalate	ug/L	0.040 - 0.300	6000 ppb (HBSL)	<0.040	<0.040	<0.040	<0.040 est.	<0.040 est.	VOID (1)	<0.040	<0.040	<0.040	**0.040 est. (2)**	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040 est.	<0.292 (15)	<0.292 (15)	<0.295
Bis(2-ethylhexyl)phthalate	ug/L	0.0400 - 0.500	6 ppb (MCL)	<0.500	<0.500	**0.585 est. (2)**	<0.500	<0.500	VOID (1)	<0.500	**0.602 est.(2)(11)**	<0.500	<0.500 est.	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	**0.675 est. (2)(11)**	<0.389 est. (13)(15)	**1.740 est. (2)(11)(14)(15)**	<0.393
PAHs																							
Phenanthrene	ug/L	0.020	210 ppb (FL)	<0.020	<0.020	<0.020	<0.020	<0.020	VOID (1)	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020 est.	<0.019 (15)	<0.019 (15)	<0.020
Steroids and Hormones by HRGC/HRMS by Method 1698																							
Coprostanol	ug/L	0.005-0.090	Not Available	<0.005	<0.005	<0.005	NA	NA	NA	**0.389 est. (4)**	**0.340 est. (4)**	**0.017 est. (4)**	NA	NA	NA	NA	**0.019 est. (4)**	**0.352 est. (4)**	**0.020 est. (4)**	**0.021 est. (4)**	<0.0943	<0.0939	Void (16)
Cholesterol	ug/L	0.075 - 0.400	Not Available	**0.371 est.(4)(8)**	**0.252 est.(4)(8)**	**0.391 est.(4)(8)**	NA	NA	NA	**2.14 est. (4)(9)**	**2.07 est. (4)(9)**	**1.040 est.(4)(9)**	NA	NA	NA	NA	**1.22 est. (4)(9)**	**2.26 est. (4)(9)**	**1.17 est. (4)(9)**	**1.320 est. (4)(9)**	<0.471	<0.469	Void (16)
beta-Sitosterol	ug/L	0.002 - 0.025	Not Available	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.189 est. (12)**	**0.220 est. (12)**	Void (16)
Stigmastanol	ug/L	0.010 - 0.025	Not Available	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.0356 est. (12)**	**0.0316 est. (12)**	Void (16)
Volatile Organic Compounds by GC/MS Method 8260B (by ESC Lab Sciences in 2010 monitoring)																							
Carbon Disulfide	ug/L	0.500	700 ppb (HBSL)	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<1.0	<1.0	<1.0
Toluene	ug/L	0.500	1000 ppb (MCL)	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<5.0	<5.0	<5.0
Metals by Method 200.8 except mercury by Method 245.1																							
Aluminum	ug/L	3.0 to 20	50 to 200 ppb (SMCL)	**20.00**	**21.40**	**18.90**	**580.00**	**823.00**	**797.00**	**190 est. (5)**	**189 est. (5)**	**195 est. (5)**	**63.40**	**45.60**	**63.00**	**45.80**	<20	<20	<20	<20	NA	NA	NA
Arsenic	ug/L	2.0	10 ppb (MCL)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	**1.1**
Barium	ug/L	2.0	2000 ppb (MCL)	**2.10**	**2.20**	**2.20**	**8.00**	**8.40**	**8.40**	**8.50**	**8.40**	**8.40**	**17.80**	**18.40**	**13.90**	**13.80**	**18.00**	**17.50**	**17.10**	**17.50**	NA	NA	NA
Chromium	ug/L	0.5 to 1.0	100 ppb (MCL)	<0.5	<0.5	<0.5	<1.0	**1.10**	<1.0	<1.0	<1.0	<1.0	**0.99**	**0.82**	**1.00**	**1.06**	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
Copper	ug/L	0.5 to 1.5	1300 ppb (TT-AL)	<0.5	<0.5	<0.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	**1.34**	**1.29**	<1.5	**1.10**	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	**0.87**
Lead	ug/L	0.2 to 1.5	15 ppb (TT-AL)	<0.2	<0.2	<0.2	<1.5	**1.90**	**2.60**	<0.2	<0.2	<0.2	**2.99**	**4.08**	**2.70**	**3.72**	<0.2	**0.21**	<0.2	<0.2	<0.2	<0.2	<0.10
Manganese	ug/L	5.0	50 ppb (SMCL)	<5.0	<5.0	<5.0	**21.00**	**25.20**	**26.00**	**15.00**	**14.80**	**15.00**	**6.70**	**12.30**	**7.20**	**5.10**	<5.0	<5.0	<5.0	<5.0	NA	NA	NA
Nickel	ug/L	1.0	100 ppb (HBSL)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.90**	**1.80**	**1.90**	**2.00**	**1.50**	**1.50**	**1.50**	**1.50**	NA	NA	NA
Zinc	ug/L	2.0 to 3.0	5000 ppb (SMCL)	<2.0	<2.0	<2.0	**17.30**	**6.00**	**9.60**	<3.0	<3.0	<3.0	**9.40**	**10.40**	**4.50**	**3.90**	<3.0	<3.0	<3.0	<3.0	<5.0	<5.0	<2.5
Microbiology																							
E Coli	MPN/ 100ml	1	(TT)	**1**	**3**	**1**	**36 est. (4)**	**46 est. (4)**	**51 est. (4)**	**53 est. (4)**	**40 est. (4)**	**46 est. (4)**	**3 est. (1)**	**2 est. (1)**	**11 est. (4)**	VOID (1)	**50 est. (4)**	**38 est. (4)**	**38 est. (4)**	**46 est. (4)**	**28**	**13**	**108**
General Sample Parameters																							
Field Turbidity	NTU	1	(TT)	<1	<1	<1	6	10	12	4	4	4	1	1	2	1	1	1	1	1	3 and <1 (15)	**3 and 1 (15)**	**5**
Total Solids	mg/L	10	(TT)	48	47	48	72	77	75	89	91	90	72	73	68	71	92	91	85	88	39	44	67

Table 3. Detected Analytes* for Surface Water Samples (2008-2010)
OHA/DEQ Drinking Water Source Monitoring Project

Compound	Units	Method Detection Limit	Drinking Water/Health Standards (see notes)	10351 20100892 9/21/2010 Sep-10 Adair Village Water System Intake - Willamette River	36316 20100892 9/21/2010 Sep-10 City of Albany Intake - Albany Canal	36314 20100901 / 20100896 9/21/2010 Sep-10 City of Port Orford Intake - Hubbard Creek	36315 20100901 / 20100896 9/21/2010 Sep-10 City of Reedsport Intake - Clear Lake	36313 20100901 9/22/2010 Sep-10 City of Grants Pass Intake - Rogue River	36311 20100901 9/22/2010 Sep-10 Clarks Branch Water Assoc. Intake - S. Umpqua River	36309 20100901 9/22/2010 Sep-10 Lawson Acres Water Intake - Cow Creek	36317 20100897 9/22/2010 Sep-10 City of Sheridan Intake - S. Yamhill River	Minimum detected	Maximum detected	# of Stations with Detections (excludes field duplicates where results are similar)	# of DW Sources with Detections
Organic Compounds by LC/MS/MS Method 8321															
DEET (insecticide)	ug/L	0.0025 - 0.004	Not Available	**0.0055**	<0.0038	<0.0049	<0.0049	**0.0106**	<0.0048	<0.0048	<0.0049	0.0025	0.0106	22/48	8/18
Atrazine (herbicide)	ug/L	0.0025 - 0.004	3 ppb (MCL)	<0.004	<0.019	<0.0039	<0.0039	<0.004	<0.0039	<0.0039	<0.0039	0.0021	0.0218	16/48	5/18
Diuron (herbicide)	ug/L	0.0025 - 0.004	2–200 ppb (HBSL) / (CCL)	<0.004	<0.0038	<0.0039	<0.0039	**0.0152**	<0.0039	<0.0039	<0.0039	0.0021	0.0152	19/48	4/18
Fluometuron (herbicide)	ug/L	0.0025 - 0.004	4 ppb (HBSL)	<0.040 est.	<0.0038	<0.0039	<0.0039	<0.004	<0.0039	<0.0039	<0.0039	0.0028	0.0031	4/48	2/18
Imazapyr (herbicide)	ug/L	0.020 - 0.040	20000 ppb (HBSL)	<0.040 est	<0.038 est	<0.039 est	<0.039 est	<0.040 est	<0.039 est	<0.039 est	**0.138 est (7)(12)**	0.1380	0.1380	1/46	1/16
Metolachlor (herbicide)	ug/L	0.005 - 0.009	700 ppb (HBSL) / (CCL)	<0.004	<0.0096	<0.0097	<0.0098	<0.010	<0.0097	<0.0097	<0.0098	0.0059	0.0068	3/48	1/18
Carbaryl (insecticide)	ug/L	0.0025 - 0.005	40–400 ppb (HBSL)	<0.005	<0.0038	<0.0049	<0.0049	<0.005	<0.0048	<0.0048	<0.0049	0.0032	0.0038	3/48	1/18
Pharmaceuticals by LC/MS/MS Method 1694															
Sulfamethoxazole (antibiotic)	ug/L	0.010	Not Available	<0.0129	<0.0132	<0.0134	<0.0136	**0.0286**	**0.0146**	<0.0135	<0.0131	0.0000	0.0000	8/48	3/18
Carbamazepine (anticonvulsant and mood stabilizing drug)	ug/L	0.010	Not Available	<0.0129	<0.0132	<0.0134	<0.0136	<0.0134	<0.0132	<0.0135	<0.0131	0.0000	0.0000	3/48	1/18
Diphenhydramine (antihistamine)	ug/L	0.010	Not Available	<0.0129	<0.0132	<0.0134	<0.0136	<0.0134	<0.0132	<0.0135	<0.0131	0.0000	0.0000	1/48	1/18
Phenoxy Herbicides by GC/ECD Method 6640B															
	ug/L	varies	varies	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0/45	0/16
Semi-volatile Organic Compounds by GC/MS - SPE Method 8270C (used GC/MS-Toxics II Method 8270 in Summer and Fall 2010)															
Phthalates															
Butylbenzylphthalate	ug/L	0.200 - 0.400	100 ppb (HBSL)	<0.019	<0.294	<0.303	<0.290	<0.291	<0.304	<0.296	<0.300	0.000	0.000	1/47	1/18
Diethylphthalate	ug/L	0.040 - 0.300	6000 ppb (HBSL)	<0.291	<0.294	<0.303	<0.290	<0.291	<0.304	<0.296	<0.300	0.040	0.170	5/47	4/18
Bis(2-ethylhexyl)phthalate	ug/L	0.0400 - 0.500	6 ppb (MCL)	<0.387	<0.392	**0.454 est. (2)**	<0.387	**0.414 est. (2)**	<0.405	<0.394	<0.400	0.414	1.740	7/47	7/18
PAHs															
Phenanthrene	ug/L	0.020	210 ppb (FL)	<0.019	<0.020	<0.020	<0.019	<0.019	<0.020	<0.020	<0.020	0.043	0.043	1/47	1/18
Steroids and Hormones by HRGC/HRMS by Method 1698															
Coprostanol	ug/L	0.005-0.090	Not Available	<0.0992	<0.0998	<0.0997	<0.0995	**0.259 (18)**	<0.101	<0.0991	<0.0961	0.014	0.389	13/48	5/18
Cholesterol	ug/L	0.075 - 0.400	Not Available	**0.792 (18)**	**0.559 (18)**	**0.624 (9)(18)**	**0.670 (18)**	**1.250 (18)**	**0.706 (18)**	**0.694 (18)**	**0.757 (18)**	0.231	2.260	26/48	16/18
beta-Sitosterol	ug/L	0.002 - 0.025	Not Available	**0.764 (18)**	**0.565 (18)**	**1.130 (9)(18)**	**0.550 est. (9)(18)**	**0.560 (9)(18)**	**0.540 (9)(18)**	**0.426 (9)(18)**	**0.624 (9)(18)**	0.189	1.130	11/11	11/11
Stigmastanol	ug/L	0.010 - 0.025	Not Available	**0.212 (18)**	**0.091 (18)**	**0.213 (9)(18)**	**0.464 est. (17)(18)**	**0.0993 (18)**	**0.052 est. (18)**	**0.0536 (18)**	**0.101 (18)**	0.032	0.213	11/11	11/11
Volatile Organic Compounds by GC/MS Method 8260B (by ESC Lab Sciences in 2010 monitoring)															
Carbon Disulfide	ug/L	0.500	700 ppb (HBSL)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.540	0.540	1/48	1/18
Toluene	ug/L	0.500	1000 ppb (MCL)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0.600	0.600	1/48	1/18
Metals by Method 200.8 except mercury by Method 245.1															
Aluminum	ug/L	3.0 to 20	50 to 200 ppb (SMCL)	NA	NA	NA	NA	NA	NA	NA	NA	8.90	639.00	33/36	7/7
Arsenic	ug/L	2.0	10 ppb (MCL)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.10	1.10	1/48	1/18
Barium	ug/L	2.0	2000 ppb (MCL)	NA	NA	NA	NA	NA	NA	NA	NA	2.10	18.40	31/36	6/7
Chromium	ug/L	0.5 to 1.0	100 ppb (MCL)	NA	NA	NA	NA	NA	NA	NA	NA	0.82	1.06	4/36	2/7
Copper	ug/L	0.5 to 1.5	1300 ppb (TT-AL)	**1.77**	**1.43**	<0.75	<0.75	**1.74**	<0.75	**0.94**	**1.10**	0.87	1.90	11/48	8/18
Lead	ug/L	0.2 to 1.5	15 ppb (TT-AL)	**0.49**	**0.28**	<0.10	<0.10	**0.27**	<0.10	<0.10	<0.10	0.21	4.08	9/48	5/18
Manganese	ug/L	5.0	50 ppb (SMCL)	NA	NA	NA	NA	NA	NA	NA	NA	5.10	63.40	18/36	4/7
Nickel	ug/L	1.0	100 ppb (HBSL)	NA	NA	NA	NA	NA	NA	NA	NA	1.50	2.00	6/36	1/7
Zinc	ug/L	2.0 to 3.0	5000 ppb (SMCL)	**13**	**4.2**	<2.5	<2.5	**2.6**	<2.5	<2.5	<2.5	3.90	10.40	9/48	5/18
Microbiology															
E Coli	MPN/ 100ml	1	(TT)	**16**	**326**	**157 est. (4)**	**2 est. (4)**	**46 est. (4)**	**36**	**62**	**921**	1	921	40/47	16/18
General Sample Parameters															
Field Turbidity	NTU	1	(TT)	**4**	**5**	**2**	<1	**9**	<1	<1	**3**	1	10	40/47	18/18
Total Solids	mg/L	10	(TT)	68	37	65	52	101	96	84	60	10	92	48/48	18/18

Notes:

* A complete list of analytical methods, compounds, and typical detection limits is available in a separate table.

- Generally three samples were collected for each public water system source in 2008. The first sample was collected from the source water just upstream of the intake, a second was collected 100 to 200 yards upstream of the intake and a third was collected 200 to 500 yards upstream of the intake. In 2010, one sample was collected from each source just upstream of the intake.

- Reported results include A+ and B level data. A+ level data are of known quality, were collected by DEQ and meet current QC limits as established by the Laboratory's Quality Systems Manual. B level data may not meet established QC but is within marginal acceptance criteria. B level data values may be accurate; however a QC measure failed (e.g., batch failed to meet blank QC limit) - The data may still be useable based on the data users' quality objectives.

(1) Sample bottle broken during shipment.
(2) Estimate: Quality control parameters were biased high or failed high. The sample result may be biased high.
(3) Sample used for matrix spike. Sample voided.
(4) Estimate: analyzed beyond recommended holding time.
(5) Estimated because analytical result is above the upper calibration limit but within the upper linear range
(6) Estimate: Quality control parameters were biased or failed low. The sample results are to be considered estimates.
(7) Estimate: Quality control parameters were biased or failed low. he sample results may be biased low.
(8) Estimate: Analyte found in method blank and/or the transport blank. Sample result less than 10 times the blank value. Sample result may be biased high.
(9) Analyte found in method blank and/or the transport blank. Sample result greater than 10 times the blank value. The data integrity is not affected.
(10) Sample lost at the laboratory.
(11) Estimate: result exceeds calibration range.
(12) ICV or LCS outside acceptance limits
(13) The sample result is non-detect - LCS failed low, CVC is biased high and the method and transfer blank contained the target analyte.
(14) Batch duplicate failed the precision criteria. The methods and transfer blank contain the target analyte at ~175 ppt. Sample results are considered estimates for sample concentrations less than 10x the blank contamination level.
(15) Samples collected for semi-volatile analysis in June 2010 were compromised at the lab. The sources were resampled 7/28/10.
(16) Field Primary is Void because labeled surrogate compounds were not recovered. Field Duplicate results are reportable.
(17) Peak detected did not meet the criteria for ion ratio. The analyte concentration reported is the estimated maximum possible concentration.
(18) The Internal standard is not useable due to inconsistent recoveries throughout the batch. Labeled surrogates were evaluated by external calibration. Native compounds are

Acronyms:

OHA - Oregon Health Authority
DEQ - Oregon Department of Environmental Quality
ND - Not detected
NTU - nephelometric turbidity units
NA - Not analyzed
ug/L - micrograms per liter (parts per billion (ppb))
est. - Sample result is considered an estimate due to divergence from analytical quality control limits. Please refer to the specific qualifier/note for more details.

Drinking Water / Health Standard Abbreviations:

(MCL) Primary Maximum Contaminant Level
(SMCL) Secondary Maximum Contaminant Level
(CCL) Currently unregulated - proposed for further evaluation on the federal Contaminant Candidate List
(TT) / (TT-AL) Treatment Technique required – Action Level is given
(FL) Florida drinking water standard [USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93)]
(HBSL) USGS/EPA Health-based Screening levels (Toccalino, P.L., Norman, J.E., Booth, N.L, and Zogorski, J.S., 2008, Health-based screening levels: A tool for evaluating what water-quality data may mean to human health: U.S. Geological Survey, National Water-Quality Assessment Program, accessed October 6, 2008 at http://water.usgs.gov/nawqa/HBSL/)

Table 4. Detected Analytes* for Groundwater Samples (2010)
OHA/DEQ Drinking Water Source Monitoring Project

Sample ID DEQ Lab Report No. Sample Date Compound	Units	Method Detection Limit	Drinking Water/Health Standard (see Notes)	36240 20100891 9/21/2010 Fall 2010 City of The Dalles	24242 20100887 9/21/2010 Fall 2010 Fairview WD (Tillamook)	36233 20100484 6/8/2010 Summer 2010 Junction City Water Utilities	36233 20100696 8/3/2010 Summer 2010 Junction City Water Utilities	36235 20100484 6/8/2010 Summer 2010 City of Monmouth	36235 20100696 8/3/2010 Summer 2010 City of Monmouth	36237 20100484 6/8/2010 Summer 2010 Forest Park Mobile Village (Clackamas Co.)	36237 20100696 8/3/2010 Summer 2010 Forest Park Mobile Village (Clackamas Co.)	36237-Dup 20100696 8/3/2010 Summer 2010 Forest Park Mobile Village (Clackamas Co.)	36236 20100478 6/7/2010 Summer 2010 City of Veneta	36236 20100696 8/2/2010 Summer 2010 City of Veneta	36234 20100478 6/7/2010 Summer 2010 City of Coburg	36234 20100696 8/3/2010 Summer 2010 City of Coburg	36238 20100491 6/9/2010 Summer 2010 Island City	36238 20100688 7/28/2010 Summer 2010 Island City	36239 20100491 6/9/2010 Summer 2010 Sherman Jr/Sr High School	36239-Dup 20100491 6/9/2010 Summer 2010 Sherman Jr/Sr High School	36239 20100688 7/28/2010 Summer 2010 Sherman Jr/Sr High School	36254 20100491 6/9/2010 Summer 2010 Odell Water System (Wasco Co.	36254 20100688 7/28/2010 Summer 2010 Odell Water System (Wasco Co.)	Min	Max	# of Detections (excludes void &field duplicates where results are
Organic Compounds by LC/MS/MS Method 8321																												
Terbutylazine (pesticide)	ug/L	0.004	2 ug/L (HBSL)	**0.0062**	<0.0039	<0.0039	NA (1)	<0.0039	NA (1)	<0.0039	NA (1)	NA (1)	<0.0038	NA (1)	<0.0039	NA (1)	<0.0039	NA (1)	<0.0039	<0.0039	NA (1)	<0.0039	NA (1)	**0.0062**	**0.0062**	**1/10**
Remaining OCs	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**ND**	**ND**	**0/10**
Pharmaceuticals by LC/MS/MS Method 1694																												
Sulfamethoxazole	ug/L	.0126	Not Available	<.00132	<.00129	<.00121	NA (1)	<.00123	NA (1)	<.00126	NA (1)	NA (1)	<.00123	NA (1)	**0.0184**	NA (1)	<.00129	NA (1)	<.00121	<.00125	NA (1)	<.00124	NA (1)	**0.0184**	**0.0184**	**1/10**
	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**ND**	**ND**	**0/10**
Phenoxy Herbicides by GC/ECD Method 6640B																												
	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**ND**	**ND**	**0/10**
Semi-volatile Organic Compounds by GC/MS-Toxics II Method 8270D																												
Bis(2-ethylhexyl)phthalate	ug/L	0.500	6 ug/L (MCL)	<0.403 (6)	<0.392 (6)	NA (1)	**0.424 est (2)(3) (4)(5)**	NA (1)	**0.702 est (2)(3) (4)(5)**	NA (1)	**0.415 est (2)(3) (4)(5)**	**<0.388 est (6)(3) (5)(7)**	NA (1)	**0.461 est (2)(3) (4)(5)**	NA (1)	**1.040 est (2)(3) (4)(5)**	NA (1)	<0.396 est (2)(6) (3)(5)	NA (1)	NA (1)	**0.493 est (2)(3) (4)(5)**	NA (1)	**0.419 est (2)(3) (4)(5)**	**0.4150**	**1.0400**	**7/10**
Remaining SVOCs	ug/L	varies	varies	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	**ND**	**ND**	**0/10**
Steroids and Hormones by HRGC/HRMS Method 1698																												
beta-Sitosterol	ug/L	0.002	Not Available	**0.003 est (8)(9)**	**0.005 est (8)(9)**	<0.002 (10)	NA (1)	<0.002 (10)	NA (1)	<0.002 (10)	NA (1)	NA (1)	<0.002 (10)	NA (1)	<0.002 (10)	NA (1)	**0.0184 est (10)**	NA (1)	<0.002 est (10)	<0.002 est (10)	NA (1)	**0.0023 est (10)**	NA (1)	**0.0000**	**0.0000**	**0/10**
Remaining Steroids and Hormones	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**ND**	**ND**	**0/10**
Volatile Organic Compounds by GC/MS Method 8260B																												
Remaining VOCs	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**ND**	**ND**	**0/10**
Metals by Method 200.8 except mercury by Method 245.1																												
Copper	ug/L	0.5	1300 ug/L (TT-AL)	**3.57**	**12.40**	**2.3**	NA (1)	**32.2**	NA (1)	<1.5	NA (1)	NA (1)	**26.9**	NA (1)	<1.5	NA (1)	**23.7**	NA (1)	<1.5	<1.5	NA (1)	<1.5	NA (1)	**2.30**	**32.20**	**6/10**
Lead	ug/L	0.2	15 ug/L (TT-AL)	**0.12**	**1.29**	<0.2	NA (1)	**0.34**	NA (1)	<0.2	NA (1)	NA (1)	**1.25**	NA (1)	<0.2	NA (1)	**2.56**	NA (1)	<0.2	<0.2	NA (1)	<0.2	NA (1)	**0.12**	**2.56**	**5/10**
Zinc	ug/L	2.0	5000 ug/L (SMCL)	<2.5	**8.8**	<5.0	NA (1)	**14.7**	NA (1)	**26.0**	NA (1)	NA (1)	**86.8**	NA (1)	**11.7**	NA (1)	**28.8**	NA (1)	**24.3**	**24.5**	NA (1)	<5.0	NA (1)	**8.80**	**86.80**	**7/10**
Remaining metals	ug/L	varies	varies	ND	ND	ND	NA (1)	ND	NA (1)	ND	NA (1)	NA (1)	ND	NA (1)	ND	NA (1)	ND	NA (1)	ND	ND	NA (1)	ND	NA (1)	**Nd**	**ND**	**0/10**
Microbiology - E coli by Method 9223 B (By DHS)																												
MPN/100ml		1	(TT)	<1	<1	<1 (11)	NA (1)	**3**	NA (1)	<1	NA (1)	NA (1)	<1 (11)	NA (1)	<1	NA (1)	<1 est (11)	NA (1)	<1	<1	NA (1)	<1	NA (1)	**3**	**3**	**1/10**
Field Turbidity																												
	NTU	1	(TT)	<1	**1**	<1	<1	<1	<1	**5**	1	1	<1	**3**	<1	<1	**5 (6 in lab test)**	**4**	<1	<1	<1	<1	<1	**1**	**5**	**4/10**

Notes:

***** A complete list of analytical methods, compounds, and detection limits is available in a separate table.

Reported results include A+ and B level data. A+ level data are of known quality, were collected by DEQ and meet current QC limits as established by the Laboratory's Quality Systems Manual. B level data may not meet established QC but is within marginal acceptance criteria. B level data values may be accurate; however a QC measure failed (e.g., batch failed to meet blank QC limit) - The data is still usable based on the data users' objectives.

(1) Samples collected for semi-volatile analysis in June 2010 were compromised at the lab. The sources were resampled 7/28/10 - 8/3/2010.
(2) Estimate: Quality control parameters were biased high or failed high. The sample result may also be biased high.
(3) Batch duplicate failed the precision criteria.
(4) Sample result is above the upper calibration limit.
(5) The methods and transfer blank contain the target analyte at ~0.175 ppb. Sample results are considered estimates for sample concentrations less than 10x the blank contamination leve
(6) Quality control parameters were biased or failed high. The sample result is non-detect.
(7) Field primary and field duplicate exceeds control limits
(8) Estimate: Analyte found in method blank and/or the transport blank. Sample result less than 10 times the blank value. Sample result may be biased high.
(9) The Internal standard is not useable due to inconsistent recoveries throughout the batch. Labeled surrogates were evaluated by external calibration. Native compounds are not affected.
(10) Estimate: IVC outside acceptance limits.
(11) Sample was analyzed beyond the recommended hold time.

Acronyms:

OHA - Oregon Health Authority (formerly Department of Human Services)
DEQ - Oregon Department of Environmental Quality
est. - Sample result is considered an estimate due to divergence from analytical quality control limits. Please refer to the specific qualifier/note for more details.
ND - Not detected
NA - Not analyzed
ug/L - micrograms per liter (parts per billion - ppb)

Drinking Water ./ Health Standard Abbreviations:

(MCL) Primary Maximum Contaminant Level
(TT) / (TT-AL) Treatment Technique required – Action Level is given
(SMCL) Secondary Maximum Contaminant Level
(TTHM) - Total Trihalomethanes - the sum of the concentrations of the trihalomethane compounds bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform)
(HBSL) USGS/EPA Health-based Screening levels (Toccalino, P.L., Norman, J.E., Booth, N.L, and Zogorski, J.S., 2008, Health-based screening levels: A tool for evaluating what water-quality data may mean to human health: U.S. Geological Survey, National Water-Quality Assessment Program, accessed October 6, 2008 at http://water.usgs.gov/nawqa/HBSL/)

Table 5. Detected Analytes* for Groundwater Samples (2008-2009)
OHA/DEQ Drinking Water Source Monitoring Project

Sample ID DEQ Lab Report No. Sample Date Compound	Units	Method Detection Limit	Drinking Water/Health Standard (see Notes)	35001 20080680 6/24/2008 Spring 2008 City of Oakridge	35002 20080689 6/25/2008 Spring 2008 Avion Water Co. (Bend)	35142 20081096 10/9/2008 Fall 2008 Avion Water Co. (Bend)	35142 Dup 20081096 10/9/2008 Fall 2008 Avion Water Co. (Bend)	35002 20090530 6/24/2009 Spring 2009 Avion Water Co. (Bend)	35003 20080680 6/24/2008 Spring 2008 Whispering Pines Mobile Lodge [1]	35003 Dup 20080680 6/24/2008 Spring 2008 Whispering Pines Mobile Lodge [1]	35004 20080680 6/24/2008 Spring 2008 Independence Water System	35004 20081103 10/14/2008 Fall 2008 Independence Water System	35004 Dup 20081103 10/14/2008 Fall 2008 Independence Water System	35004 20090530 6/24/2009 Spring 2009 Independence Water System	35005 20080680 6/24/2008 Spring 2008 City of Keizer	35006 20080697 6/26/2008 Spring 2008 City of Spray	35007 20080688 6/25/2008 Spring 2008 City of Vale	35007 20081096 10/8/2008 Fall 2008 City of Vale	35007 20090530 6/24/2009 Spring 2009 City of Vale	35007 Dup 20090530 6/24/2009 Spring 2009 City of Vale	Min	Max	# of Detections (excludes void &field duplicates where results are similar)	# of PWS sources with Detections / # of sources with valid data
Organic Compounds by LC/MS/MS Method 8321																									
Atrazine	ug/L	0.002	3 ug/L (MCL)	VOID (2)	<0.002	<0.002	<0.002	NA	VOID (2)	VOID (2)	**0.0027**	<0.002 est.	<0.002 est.	NA	<0.002	**0.0085**	<0.002	<0.002	NA	NA	**0.0027**	**0.0085**	**2/8**	**2/5**
Remaining OCs	ug/L	varies	varies	VOID (2)	ND	ND	ND	NA	VOID (2)	VOID (2)	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	**0**	**0**	**0/8**	**0/5**
Pharmaceuticals by LC/MS/MS Method 1694																									
	ug/L	varies	varies	VOID (2)	ND	ND	ND	NA	VOID (2)	VOID (2)	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	**0**	**0**	**0/8**	**0/5**
Phenoxy Herbicides by GC/ECD Method 6640B																									
Pentachlorophenol (PAH)	ug/L	0.10	1 ug/L (MCL)	<0.10	<0.10	<0.10	<0.02	NA	<0.10	<0.10	<0.10	<0.10	<0.10	NA	<0.10	<0.10	<0.2	<0.10	NA	NA	**0**	**0**	**0/10**	**0/5**
Remaining SVOCs	ug/L	varies	varies	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	**0**	**0**	**0/9**	**0/7**
Semi-volatile Organic Compounds by GC/MS - SPE Method 8270C																									
4,4-DDT (Insecticide)	ug/L	0.020	0.1 to 50 ug/L (state DW standards, varies by state)	VOID (2)	<0.10 (9)	<.020	<.020	<0.019 (11)(13)	VOID (2)	VOID (2)	<0.10 (9)	<0.02 est.	<.020	<0.019 (11)(13)	<0.10 (9)	<0.10 (9)	<0.10 (9)	<0.02	<0.019 (11)(13)	<0.019 (11)(13)	**0**	**0**	**0/11**	**0/5**
Pentachlorophenol (PAH)	ug/L	0.080	1 ug/L (MCL)	VOID (2)	VOID (4)(10)	<0.080 est.	<0.080 est.	<0.096 (11)(12)(13)	VOID (2)	VOID (2)	<0.080	<0.080 est.	<0.080 est.	<0.096 (11)(12)(13)	<0.080	VOID (4)(10)	VOID (4)(10)	<0.080 est.	<0.096 (11)(12)(13)	<0.098 (11)(12)(13)	**0**	**0**	**0/8**	**0/5**
Remaining SVOCs	ug/L	varies	varies	VOID (2)	ND	ND	ND	NA	VOID (2)	VOID (2)	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	**0**	**0**	**0/8**	**0/5**
Steroids and Hormones by HRGC/HRMS Method 1698																									
Cholesterol	ug/L	0.075	Not Available	NA	NA	<0.075 est. (7)(8)	**0.143 est. (7)(8)**	NA	NA	NA	NA	**0.357 est. (7)(8)**	<0.075 est. (7)(8)	NA	NA	NA	NA	**0.102 est. (7)(8)**	NA	NA	**0.102 est.**	**0.357 est.**	**3/3**	**3/3**
Remaining Steroids and Hormones	ug/L	varies	varies	NA	NA	ND	ND	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	ND	NA	NA	**0**	**0**	**0/3**	**0/3**
Volatile Organic Compounds by GC/MS Method 8260B																									
Chlorination By Products																									
Bromodichloromethane	ug/L	0.500	80 (TTHM)	<0.500	<0.500	<0.500	<0.500	NA	**1.9**	**1.9**	<0.500	<0.500	<0.500	NA	<0.500	<0.500	<0.500	<0.500	NA	NA	**1.9**	**1.9**	**1/10**	**1/7**
Chloroform	ug/L	0.500	80 (TTHM)	<0.500	<0.500	<0.500	<0.500	NA	**2 (3)**	**2 (3)**	<0.500	<0.500	<0.500	NA	<0.500	<0.500	<0.500	<0.500	NA	NA	**2 est.**	**2 est.**	**1/10**	**1/7**
Dibromochloromethane	ug/L	0.500	80 (TTHM)	ND (4)	<0.500	<0.500	<0.500	NA	**1.4**	**1.3**	<0.500	<0.500	<0.500	NA	<0.500	<0.500	<0.500	<0.500	NA	NA	**1.3**	**1.4**	**1/10**	**1/7**
Remaining VOCs	ug/L	varies	varies	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	**0**	**0**	**0/10**	**0/7**
Metals by Method 200.8 except mercury by Method 245.1																									
Aluminum	ug/L	3	50 to 200 ug/L (SMCL)	**4.30**	**3.60**	<3	<3	NA	<3	<3	<3	<20	<20	NA	<3	<3	<3	<3	NA	NA	**3.6**	**4.3**	**2/10**	**2/7**
Arsenic	ug/L	2.0	10 ug/L (MCL)	<2.0	**2.00**	**2.10**	**2.20**	NA	<2.0	<2.0	<2.0	<2.0	<2.0	NA	**2.40**	**4.60**	**27.30**	**30.20**	NA	NA	**2**	**30.2**	**6/10**	**5/7**
Barium	ug/L	2.0	2000 ug/L (MCL)	**2.70**	<2.0	<2.0	<2.0	NA	**6.10**	**6.20**	**5.70**	**5.80**	**5.80**	NA	**4.20**	**9.70**	**26.20**	**22.30**	NA	NA	**2.7**	**26.2**	**5/10**	**4/7**
Chromium	ug/L	0.5	100 ug/L (MCL)	<0.5	**0.80**	**0.80**	**0.87**	NA	<0.5	<0.5	**0.64**	<1.0	<1.0	NA	<0.5	**0.58**	**0.55**	<0.5	NA	NA	**0.55**	**0.87**	**6/10**	**4/7**
Copper	ug/L	0.5	1300 ug/L (TT-AL)	**2.08**	<0.5	**0.50**	**0.67**	NA	**4.10**	**4.12**	**0.65**	**7.20**	**3.90**	NA	<0.5	**4.41**	**1.43**	**1.83**	NA	NA	**0.5**	**7.2**	**8/10**	**6/7**
Lead	ug/L	0.2	15 ug/L (TT-AL)	**0.90**	<0.2	**0.25**	**0.32**	NA	<0.2	<0.2	<0.2	**0.71**	**0.91**	NA	<0.2	<0.2	<0.2	**0.24**	NA	NA	**0.24**	**0.91**	**3/10**	**3/7**
Manganese	ug/L	5.0	50 ug/L (SMCL)	<5.0	<5.0	<5.0	<5.0	NA	<5.0	<5.0	<5.0	<5.0	<5.0	NA	**269 (6)**	<5.0	<5.0	<5.0	NA	NA	**269**	**269**	**1/10**	**1/7**
Nickel	ug/L	1.0	100 ug/L (HBSL)	<1.0	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<1.0	NA	<1.0	**1.00**	<1.0	<1.0	NA	NA	**1**	**1**	**1/10**	**1/7**
Zinc	ug/L	2.0	5000 ug/L (SMCL)	**47.00**	**4.30**	**2.50**	**2.70**	NA	**3.00**	**3.30**	**3.60**	**6.20**	**5.10**	NA	<2.0	<2.0	<2.0	<2.0	NA	NA	**2.5**	**47**	**6/10**	**4/7**
Mercury	ug/L	0.02	2 ug/L (MCL)	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	<0.02	<0.02	**0.022**	NA	<0.02	<0.02	<0.02	<0.02	NA	NA	**0.022**	**0.022**	**1/10**	**1/7**

Notes:

***** A complete list of analytical methods, compounds, and detection limits is available in a separate table.

Reported results include A+ and B level data. A+ level data are of known quality, were collected by DEQ and meet current QC limits as established by the Laboratory's Quality Systems Manual. B level data may not meet established QC but is within marginal acceptance criteria. B level data values may be accurate; however a QC measure failed (e.g., batch failed to meet blank QC limit) - The data is still usable based on the data users' objectives.

(1) Access to pre-treatment source water was limited at several of the groundwater sampling sites (Oakridge, Whispering Pines Mobile Lodge, and Spray). The SOC data (including analyses for pesticides, phthalates, and PAHs) for two of these samples (Oakridge and Whispering Pines) was flagged by the lab as "VOID" due to interference in the analytical instruments from addition of chlorine by the drinking water treatment system.

(2) Result cannot be reported due to matrix interference. See Note(1).

(3) Estimate: Analyte found in the equipment or transport blank. The sample result may be biased high.

(4) Estimate: Quality control parameters were biased high or failed high. The sample result may also be biased high.

(5) Estimate: Quality control parameters (CCV) were biased low. The sample result may also be biased low.

(6) Confirmed anomalous high Mn result by reanalysis from raw bottle (no visible solids).

(7) Estimate: Sample was extracted within hold time but sample extract analyzed beyond the recommended holding time.

(8) Estimate: Analyte found in method blank and/or the transport blank. Sample result less than 10 times the blank value. Sample result may be biased high.

(9) The Limit of Quantitation (LOQ) for 4,4-DDT was raised due to lab instrument contamination that occurred during the GCMS tuning process.

(10) Pentachlorophenol by EPA method 8270 was determined to be associated with lab and instrument issues. Result voided. This analyte was reported by SM 6640B with a data quality level of A+

(11) Quality control parameters were biased or failed high. The sample result is non-detect.

(12) Quality control parameters were biased low. The sample result may also be biased low.

(13) Spring 2009 groundwater monitoring was conducted using EPA Method 525.2 for Semi-Volatile Organic Compounds by GC/MS-Toxics

Acronyms:

DHS - Oregon Department of Human Services
DEQ - Oregon Department of Environmental Quality
est. - Sample result is considered an estimate due to divergence from analytical quality control limits. Please refer to the specific qualifier/note for more details.
ND - Not detected
NA - Not analyzed
ug/L - micrograms per liter (parts per billion - ppb)

Drinking Water ./ Health Standard Abbreviations:

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(SMCL) Secondary Maximum Contaminant Level
(TTHM) - Total Trihalomethanes - the sum of the concentrations of the trihalomethane
(HBSL) USGS/EPA Health-based Screening levels (Toccalino, P.L., Norman, J.E., Booth, N.L, and Zogorski, J.S., 2008, Health-based screening levels: A tool for evaluating what water-quality data may mean to human health: U.S. Geological Survey, National Water-Quality Assessment Program, accessed October 6, 2008 at http://water.usgs.gov/nawqa/HBSL/)