MOTT MACDONALD

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Centralia Area Hydrogeologic Framework Summary Report Update

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October 11, 2023

Dear Mike,

Attached is a final Centralia Area Hydrogeologic Framework Summary report for your reference. Minor updates have occurred relative to the February 2023 report version previously provided to you to reflect amendments made to the City of Centralia's water right application G2-30763 and the City of Chehalis' water right application G2-30862. Hydrogeologic conditions documented in the attached report will be used in support of an upcoming water right mitigation plan and draft Report of Examinations developed for the Cities.

Sincerely,

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Centralia Area Hydrogeologic Framework Summary

October 2023

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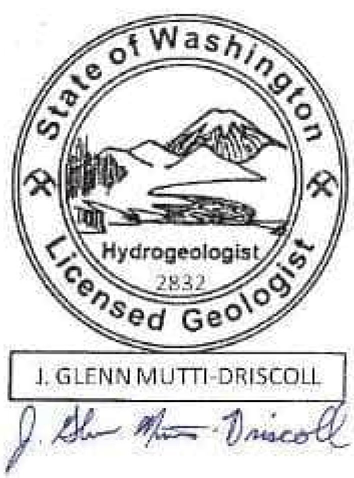
Centralia Area Hydrogeologic Framework Summary

October 2023

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	2/17/23	G. Mutti-Driscoll	I. Jackson	G. Mutti-Driscoll	Client Review Draft
1	3/7/23	G. Mutti-Driscoll		G. Mutti-Driscoll	March 2023 Final Report
2	10/11/23	G. Mutti-Driscoll	Client	G. Mutti-Driscoll	Water right application descriptions updated

This report, and Mott MacDonald's work contributing to this report, were reviewed by the undersigned and approved for release.



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Executive summary

The City of Centralia and City of Chehalis (the Cities) project that potable water demands will increase approximately 8 million gallons per day (MGD) by 2070. To meet these demands, the City of Centralia (Centralia) filed an Application for a New Water Right G2-30763 with the Washington State Department of Ecology (Ecology) on January 31, 2020 requesting withdrawals of 8,333 gallons per minute (gpm) of instantaneous capacity and 8,961 acre-feet per year of annual capacity. Concurrently, Centralia plans to expand their existing wellfields in Borst Park and possibly at their Riverside Park or Wastewater Treatment Plant (WWTP) properties to provide this water supply. The Cities have entered into a Regional Water Supply Agreement (Regional Agreement) whereby Centralia has assigned 3 MGD of the application quantity to the City of Chehalis (Chehalis) along with the right to purchase 3 MGD of mitigation from the TransAlta Water Bank. The Cities' Regional Agreement also provides for cost-sharing and cooperation regarding application processing and future infrastructure. Based on these assignments and at Ecology's request, Chehalis has filed a separate Application for a New Water Right G2-30862 for 3 MGD at the same points of withdrawal and for use within Chehalis's service area. Centralia has also amended Application G2-30763 and requested that it is phased in two parts for processing and decision; G2-30763(A) would be processed for 3 MGD for Centralia municipal water supply, while G2-30763(B) would remain in application status (and on hold) as industrial and/or municipal reserve capacity until the timing and nature of this future growth can more reliably be projected.

All proposed future wellfield locations are within the "green zone" defined for TransAlta's water bank, indicating that groundwater is most likely in hydraulic continuity with either the Skookumchuck River or the Chehalis River downstream of their confluence. Therefore, the Cities plan to mitigate future streamflow impacts due to wellfield pumping through the purchase of instream flow credits from the TransAlta water bank. Mitigation from the water bank applies to the Skookumchuck River and the Chehalis River downstream of their confluence.

The Centralia Outwash Gravel Aquifer (COGA) supports all existing Centralia water supply wells. It is highly permeable and underlies all potential future wellfield locations. The fine-grained alluvial/glacio-lacustrine aquifer upstream of the Skookumchuck-Chehalis River confluence is considered a different aquifer from the COGA because it is finer grained, has lower well yields, and has different groundwater geochemistry. Studies examining groundwater-surface water interactions in the Chehalis basin indicate that in the Centralia area the relationship is dynamic and close to neutral, with reaches transitioning between gaining and losing conditions depending upon season or year. Because of the documented hydraulic connection between the pumping wells and the rivers, disinfection treatment will be necessary for future wellfields within approximately 200 feet of the rivers.

Existing wells in Borst and Riverside parks have yields ranging from 600 to 1,200 gpm, while wells in the WWTP area have documented yields of 500 gpm. Based on future demand projections, the Cities expect to incrementally grow into their requested water right allotments. Initial supply would come from the Borst Park wellfield. Following redevelopment and testing of both wells in 2022, the estimated yield of the Borst Park wellfield is approximately 1,800 gpm (or 2.5 MGD). Supply during later phases of the water-right build out will likely be sourced from the Borst Park area, but could be provided from the Riverside Park or WWTP properties if operations data indicate that sufficient additional capacity does not exist at Borst Park.

Because future wellfield locations are all in close proximity to the Chehalis or Skookumchuck rivers, pumping is expected to capture water from these rivers or groundwater that would otherwise discharge to them. Best-estimate streamflow capture analyses for each proposed future wellfield area estimates that after one year of continuous pumping between 97.3 and 99.8 percent of the pumped groundwater is expected to be captured from the mainstem Chehalis and Skookumchuck rivers. Remaining pumping impacts are expected to primarily occur within the green zone, and therefore TransAlta water can adequately offset pumping impacts. The Cities plan to purchase mitigation water using a 1:1 mitigation approach (where total pumping volumes are offset by purchase of equal volumes of surface water from the water bank). Because much of the pumped water will not be fully consumed, a significant portion of it will return to the Chehalis River at the Cities' WWTP outfalls. Approximate estimates of streamflow increase on the Chehalis River downstream of the Centralia WWTP are 1.8 to 5.8 cfs, with the range dependent on the water-right build out stage.

1 Introduction

The City of Centralia and City of Chehalis (the Cities) project that potable water demands will increase approximately 8 million gallons per day (MGD) by 2070; to meet these demands, the City of Centralia (Centralia) filed an Application for a New Water Right G2-30763 with the Washington State Department of Ecology on January 31, 2020. The water right application requests withdrawals of 8,333 gallons per minute (gpm) of instantaneous capacity and 8,961 acre-feet per year of annual capacity[1]. Centralia plans to expand their existing wellfields at Borst Park, possibly at Riverside Park, and/or develop a new wellfield near their Wastewater Treatment Plant (WWTP) to meet these future demands. Based on assignments from Centralia and at Ecology's request, the City of Chehalis (Chehalis) filed a separate Application for a New Water Right G2-30862 for the 3 MGD allocated to it with the same points of withdrawal and for use within Chehalis's service area. Centralia has also amended Application G2-30763 to reflect this and has requested that it be phased in two parts for processing and decision; G2-30763(A) would be processed for 3 MGD for Centralia municipal water supply, while G2-30763(B) would remain in application status (and on hold) as industrial and/or municipal reserve capacity until the timing and nature of this future growth can more reliably be projected.

Additional groundwater pumping from the proposed wellfield locations could affect instream flows in the Chehalis River and, at the Borst Park or Riverside sites, the Skookumchuck River. In 1976 the Washington State Department of Ecology (Ecology) adopted Chapter 173-522 Washington Administrative Code (WAC), referred to as the instream flow rule in this document, to regulate future uses of surface water and groundwater in hydraulic continuity with surface water within the Chehalis River basin. The instream flow rule establishes minimum baseflows throughout the year along various reaches of the Chehalis River and selected tributaries. Any new water right appropriation that affects flows in the river is subject to interruption when flow falls below the minimum baseflow value, unless mitigation to offset the impacts of the withdrawal is provided. The instream flow rule also seasonally closes several tributaries, including the Skookumchuck River (between July 1 and September 30) to any new appropriation without mitigation, regardless of flow.

The Cities plan to mitigate streamflow impacts from future wellfield pumping through the 1:1 purchase of instream flow credits from the TransAlta water bank (meaning that the amount of instream flow credits purchased will equal the total groundwater pumping volume). The TransAlta water bank is facilitated by surface water right (S2-14966) on the Skookumchuck River, which has been transferred into the state trust program through water right change authorization CS2-14966@1. **Figure 1** is a map of the Centralia area showing Centralia's existing production wells, proposed areas of future withdrawal, and the "green zone" mitigation area delineated in the water bank's Report of Examination (Aspect Consulting, 2021). The green zone is the mapped extent where hydraulic continuity most likely exists between the local aquifer system and the Skookumchuck River and the Chehalis River downstream of their confluence.

[1] The Cities of Centralia and Chehalis have entered into a Regional Water Agreement that provides for cost-sharing and cooperation regarding processing their respective water right applications and for the development of future infrastructure to provide delivery of water from the selected Centralia wellfields to Chehalis to accommodate its future growth (pending water right application approval). Under this agreement, Chehalis will purchase mitigation water directly from TransAlta to offset 3 MGD of pumping impact.

Currently, there are four production wells at Borst Park – two close the Chehalis River (Borst Park wells 1 and 2, which comprise the Borst Park wellfield[2]) and two farther away from the river and adjacent to the tennis courts (Tennis Court wells 1 and 2, which comprise the Tennis Court wellfield). There is one production well at Riverside Park and several irrigation wells at the WWTP. The Borst Park wellfield and the Riverside production well are currently designated emergency wells and have not been used since approximately 2000 when they were classified by the Washington State Department of Health (DOH) as groundwater in hydraulic connection to surface water. The Tennis Court wellfield is actively used for municipal supply year-round, while the irrigation wells at the WWTP are active but not permitted for municipal supply. All proposed areas of future groundwater withdrawal are located within the water bank's green zone. This report has been prepared to support the Cities' proposed water rights mitigation approach by presenting our understanding of the aquifer system underlying the Chehalis and Skookumchuck Rivers in Centralia, its interaction with surface water, and local hydrogeologic conditions near the potential future wellfields.

This work was performed, and this report prepared, for exclusive use by the City of Centralia, and for exclusive application to the project sites, using hydrogeologic practices generally accepted in this area at this time. This is in lieu of other warranties, express or implied.

[2] The Borst Park wellfield discussed in this report refers to the area in the immediate vicinity of Borst Park wells 1 and 2; the Borst Park area discussed in this report refers to the park itself, which includes both the Borst Park and Tennis Court wellfields.

2 Centralia Area Aquifers

The Centralia Outwash Gravel Aquifer (COGA) underlies much of Centralia in the Fords Prairie and Skookumchuck River Valley area (**Figure 1**), including Borst Park, Riverside Park, and the WWTP. Vashon-age recessional glacial outwash sediments and discontinuous older glacial sediments (Penultimate drift deposits) make up the COGA. Vashon-age sediments comprise the bulk of the COGA and were deposited in a high-energy environment when the Skookumchuck River valley was a primary drainage path for the southern lobe of the Puget Lobe ice sheet (Sadowski and others, 2018), depositing large quantities of coarse-grained sediments in the Skookumchuck River valley and parts of the Chehalis River valley (Pitz and others, 2005). During this time period, the large volume of outwash material deposited at the mouth of the Skookumchuck River valley blocked or partially blocked the Chehalis River. This blockage caused the Skookumchuck River to swing in an arc to the northwest (away from the blockage), while to the south in the Chehalis River valley glacial Lake Chehalis formed. Glacial Lake Chehalis extended upstream from the Skookumchuck-Chehalis confluence to beyond the Chehalis and Newaukum river confluence, and deposited mostly fine-grained sediments composed of glacio-lacustrine sand, silt, and clay (Pitz and others, 2005). This depositional history is consistent with the delineated COGA (**Figure 1**), which was initially identified based on the distribution of 89 wells with yields greater than 200 gallons per minute (gpm) (see Robinson & Noble, 1992b presented in **Appendix A**) and excludes zones south of the Chehalis River where lower yielding wells were identified.

The COGA is composed of high permeability gravel and sand and overlies low permeability sandstone or siltstone bedrock. The COGA is shallow, with the aquifer base generally 50 to 80 feet below ground surface and is Centralia's sole-source aquifer. The most permeable sections of the COGA typically extend about 20 to 30 feet above the top of the underlying bedrock. The aquifer is generally unconfined, although lower permeability layers can occur and create local semi-confined conditions, typically close to the Chehalis River due to the deposition of fine-grained alluvium in its floodplain (Pitz and others, 2005). The primary COGA geologic unit is mapped as Vashon recessional outwash gravels (or Qgo(g) as mapped by Pitz and others, 2005 and Sadowski and others, 2018), but also includes alluvium (Qa). Transmissivity values for the COGA are high (ranging from 35,000 to 1,350,000 gallons per day per foot (gpd/ft) at Centralia production wells) and Centralia production wells completed in the COGA have high specific capacity values (ranging from 16 to 477 gpm/ft) (Pacific Groundwater Group, 2016). **Table 1** presents well yield information from active Centralia production wells and other production wells mentioned in this report; **Appendix A** presents locations of wells with potential yields in excess of 200 gpm in the Centralia area.

Upstream of the Skookumchuck-Chehalis River confluence is an alluvial/glacio-lacustrine aquifer. It is considered a separate aquifer unit from the COGA since it is finer grained, less responsive to river stage changes, and has a distinct geochemical signature relative to the COGA (it is reducing) (Pitz and others, 2005). This aquifer also overlies bedrock. It is likely that the contact between the COGA and the alluvial/glacio-lacustrine aquifer is interfingered, with local expressions of coarse-grained COGA material occurring south of the Skookumchuck-Chehalis River confluence until the COGA fully pinches out. Cross sections A-A', B-B', and E-E" shown in **Appendix B** are from Pitz and others (2005) and illustrate the subsurface extent of the coarse-grained Qgo(g) unit. The glacio-lacustrine aquifer is represented in the cross sections by units Qapo(h), Qa (south of the Chehalis-Skookumchuck River confluence) and Mc(w) (locally). The difference between the mapped COGA extent delineated for Centralia and the southern extent of the water bank green zone shown in **Figure 1** is likely a function of this interfingered contact. Additionally, the intent of Centralia's COGA map was to identify high yielding parts of the aquifer for locating future wellfields, and therefore regions where the aquifer is thinner or less productive were not mapped as part of the COGA, but may be included in the water bank green zone.

Figure 2 presents regional groundwater elevations and flow paths for the Centralia-Chehalis area developed by Pitz and others (2005). In general, regional groundwater flow is down-valley and towards the Chehalis River. **Figure 3** is a local map of groundwater elevations and flow paths for the COGA developed by Pacific Groundwater Group (2019), and includes water level data from Pitz and others (2005), Centralia's production and monitoring wells, and several additional sources. It shows that the general groundwater flow direction within the COGA is from the upstream Skookumchuck Valley to the confluence of the Chehalis and Skookumchuck Rivers, and then west to northwest across Fords Prairie to the Chehalis River.

Average annual recharge for the COGA has been estimated in the range of 25-29 inches per year, while significantly less (0-4 inches per year) is estimated for the bedrock areas abutting the unconsolidated river-valley sediments (Gendaszek and Welch, 2018). Because the COGA is a shallow, sole-source aquifer deposited within a bedrock valley (as shown in cross section A-A' in **Appendix B**), the aquifer is bounded by bedrock sidewalls and therefore the primary inflows come from either precipitation-based recharge or Skookumchuck/Chehalis River system losses.

3 Regional Groundwater-Surface Water Interaction Assessments

Proposed groundwater withdrawals from the COGA are expected to impact the Skookumchuck and Chehalis rivers. Because the Cities plan to mitigate their impacts through the release of surface water on the Skookumchuck River, defining the degree of hydraulic connection between the COGA and the Skookumchuck/Chehalis River system is needed to assess the likelihood of success for the proposed mitigation approach. This section summarizes findings from regional studies that include the Centralia area regarding groundwater-surface water surface water interactions, while Section 4 summarizes groundwater-surface water interactions at a local scale for each potential future wellfield.

Ecology and the USGS have conducted streamflow studies along the Chehalis River (Pitz and others, 2005; Ely and others, 2008; Gendaszek, 2011), and evaluated gains and losses along the Chehalis River and Skookumchuck River via seepage runs and instream piezometer measurements. Results from these studies are summarized below.

Ecology measured vertical hydraulic gradients within Chehalis River riverbed sediments, subsurface temperature profiles in riverbed sediments, and stream losses/gains via a seepage run. The seepage run was conducted on September 25, 2003, and found that overall the Chehalis River is losing from the former Boy Scout camp below the Chehalis and Newaukum River confluence to just below the boat ramp at Borst Park. This reach is shown in red in **Figure 4**, which is a reproduction from Plate C of Pitz and others (2005). Four instream piezometers installed along this reach were monitored on a monthly basis between May and October 2004, and all of the piezometers except for the most downstream one consistently had an upward gradient, indicating that the river was gaining at those locations. The most downstream piezometer (AHL141) along this reach was located adjacent to Borst Park and consistently had a downward gradient indicating that the river was losing at this location. The streambed temperature profile from AHL141 also suggests greater river influence than groundwater influence (shown **in Figure 4**), which is consistent with the measured downward hydraulic gradient. These observations lead Pitz and others (2005) to conclude that the river loss likely occurs within the lower two miles of the stream reach, where the streambed transitions from fine-grained sediments (which are typical of the area upstream of the Skookumchuck-Chehalis River confluence) to the generally coarse-grained alluvium and underlying COGA downstream of the confluence.

The reach between the Borst Park boat ramp and the USGS Grand Mound stream gauge (12027500) was gaining during the September 2003 seepage run, as shown in **Figure 4**. The two most upstream piezometers in this reach (AHL142 and AHK 143) exhibit both gaining and losing conditions throughout the course of the year, while the downstream piezometers (AHL144 and AHL145) near the WWTP consistently gain year-round, suggesting that gaining conditions are stronger near the WWTP.

The USGS conducted two seepage runs along the Chehalis River in September 2007 and August 2010, which are compared in Gendaszek (2011). **Figure 5** presents the relative gains and losses along the Chehalis River as measured by the USGS. The USGS identified the reach of the Chehalis River adjacent to Borst Park as near neutral to gaining, while near the WWTP the Chehalis River was neutral to losing. **Figure 5** presents the relative gains and losses along the Chehalis River as measured by the USGS, as well as the locations of Borst Park and

Centralia's WWTP property. A comparison of the USGS reaches with gaining, neutral, or losing conditions with the Ecology reaches (**Figure 4**) indicate that the stream-aquifer interactions along the Chehalis River with the COGA are dynamic and change in space and time. This suggests that river and aquifer water levels are nearly equal and their relationship may differ due to seasonal or shorter-term climatic or pumping stresses.

The USGS also measured flow along the Skookumchuck River between Bucoda and Centralia when the Chehalis River seepage runs were performed. In September 2007, the Skookumchuck River reach was near neutral, while in August 2010 it was gaining.

4 Wellfield Based Groundwater-Surface Water Interaction Assessments

In 1998 Centralia evaluated the potential for groundwater sources under the direct influence of surface water (GWI) at Borst Park Well 2 and the Riverside Well[3] (Centralia Utilities, 1998). This section presents findings from the GWI assessments and more recent site analyses, as well as the expected groundwater-surface water interaction framework for the Tennis Court and WWTP wells.

4.1 Borst Park Wells 1 & 2

Groundwater-surface water interactions for Borst Park wells 1 and 2 are summarized below based on the GWI assessment, hydrogeologic cross-sections, and water levels. A hydrogeologic conceptual model for the Borst Park area is presented at the end of this subsection.

4.1.1 GWI Assessment

Based on Centralia's 1998 GWI evaluation study, DOH determined that the Borst Park wellfield is groundwater in hydraulic connection with surface water (DOH, 2000), but not groundwater under the direct influence of surface water (GWI)[4]. With this designation, the Borst Park wellfield must receive CT6 disinfection treatment before it can be used for potable water supply (DOH, 2000). Following this designation, Centralia stopped pumping the Borst Park wellfield and it has remained idle up to the present. If the pending water right transaction with TransAlta occurs, Centralia plans to construct a treatment facility that meets the CT6 requirement and utilize existing Borst Park wells 1 and 2.

4.1.2 Hydrogeologic Cross Sections and Water Levels

Figure 6 is an elevation cross section comparing Borst Park Well 2 and the Chehalis River that was developed as part of Centralia's GWI evaluation study (Centralia Utilities, 1998). The cross section indicates that the groundwater level elevation in Borst Park Well 2 on March 31, 1998 was approximately 0.8 feet higher than the elevation measured for the Chehalis River.

Figure 7 is an elevation cross section from the Borst Park well completion report (Robinson and Noble, 1993). On June 23, 1993, the groundwater elevation in Borst Park Well 2 was1.4 feet higher than the river, while the groundwater elevation in Borst Park Well 1 (the well farther from the river) was 1.6 feet higher than the river.

These cross sections suggest that under non-pumping conditions in March and June, groundwater flows toward the Chehalis River at these wells. However, when pumping drawdown at Borst Park Well 1 is estimated to be 9.5 feet (at 600 gpm) and at Borst Park Well 2 it is estimated to be 13 feet (at 1200 gpm) (as calculated in **Appendix C**). Therefore, during

[3] The Tennis Court and WWTP wells were not included in this analysis. Both wellfields are relatively far from the Chehalis River (over 1,600 feet and the GWI review guidance generally applies to shallow wells within 200 feet of a surface water body) and at the time Centralia did not operate wells near the WWTP.

[4] Statistical analysis of water quality data and two microparticulate analysis (MPA) samples, which were negative, were used to reach this conclusion If microparticulate organisms from surface water were detected in the well's MPA samples, groundwater from the Borst Park wellfield would be considered groundwater under the direct influence of surface water and require the same level of filtration and treatment as surface water. The two negative MPA samples indicate that the aquifer material between the river and the well is effectively filtering and removing the particulate matter and micro-organisms present in surface water.

pumping conditions groundwater is expected to flow away from the river and toward the wells, causing the river to lose water.

Testing and operation of the Borst Park wells demonstrated that they are responsive to water level elevation changes on the Chehalis River. **Figure 8** is a drawdown plot from the initial testing of the wells (Robinson and Noble, 1993) and a clear upward trend in the groundwater level due to increased river water levels is observable in the pump test data. Additionally, the rapid flattening of the drawdown curve after 10 minutes suggests that the Chehalis River is acting as a recharge boundary and influencing test results. **Figure 9** is a plot of more recent Chehalis River and groundwater levels (from October to November 2022) measured as part of Centralia's Borst Park wellfield rehabilitation and testing work (**Figure 10** shows the location of the monitored wells). **Figure 9** indicates that monitoring well water levels near the Chehalis River respond quickly and in near unison with high-flow river events.

Figure 11 is a cross section for the Borst Park area developed to illustrate the current understanding of the local aquifer system and its relationship to the Chehalis River (see **Figure 10** for its cross-section trace). The interpretations presented are based both on well log information (**Appendix D**) and recent hydraulic testing data (**Appendix C**).

4.1.3 Borst Park Area Hydrogeologic Conceptual Model

In general, in the Borst Park area the COGA is a confined aquifer that has a strong hydraulic connection to the Chehalis River because the river has incised through the COGA's local confining unit. However, there is uncertainty regarding whether a uniform connection mechanism exists between the COGA and the Chehalis River, as suggested by recent wellfield testing (**Appendix C**). Spatial variability in river bottom and aquifer top elevations and/or textural variabilities could enable a direct river-aquifer connection in some areas, while in other areas fine-grained alluvial material could exist between the river bottom and aquifer top, resulting in a local hydraulic connection that is similar to a leaky aquitard.

Aquifer drawdown due to wellfield pumping will primarily occur on the north side of the Chehalis River; during the 2022 Borst Park Well 2 aquifer test approximately 0.5 feet of drawdown was observed at Tennis Court Well 2 (~1,400 feet from Borst Park Well 2) and only 0.11 feet of drawdown was observed at the Nick Road Test Well (~800 feet from Borst Park Well 2, which is about half as far from Borst Park Well 2 as Tennis Court Well 2). In addition to the Nick Road Test Well being on the opposite side of the river boundary, the COGA pinches out to the south, reducing the aquifer's transmissivity and ability to propagate drawdown upstream. A conservatively projected drawdown estimate for the Nick Road Test Well following 100 days of Borst Park Wellfield pumping at 1,800 gpm is 0.3 feet (**Appendix C**). This projected drawdown is small and occurs in the water bank's green zone area, and thus the aquifer water levels are expected to benefit from the planned streamflow mitigation.

4.2 Tennis Court Wells 1 & 2

The Tennis Court wellfield was not tested as part of Centralia's GWI evaluation study since the wells are approximately 1,600 feet from Chehalis River. Rather than capturing water directly from the Chehalis River, the Tennis Court wells likely capture groundwater that would otherwise discharge to it. The Tennis Court Wells are shown in the Borst Park area hydrogeologic cross section (**Figure 11**). Observed drawdown responses at TW-1 (located 12 feet away from Borst Park Well 2) due to Tennis Court wellfield pumping during 2022 monitoring (**Figure 9**) as well as historic well testing data (Robinson & Noble, 1996) indicate that water levels in Tennis Court wells 1 and 2 respond to Borst Park wellfield pumping (and vice-versa) and Chehalis River water level fluctuations.

4.3 Riverside Park

Figure 12 is an elevation cross section comparing water levels from the Riverside Well and the Skookumchuck River (which is 22 feet away from the well) developed as part of Centralia's GWI evaluation study (Centralia Utilities, 1998). On March 31, 1998 the groundwater elevation in the Riverside well was approximately 5.2 feet lower than the Skookumchuck River, indicating the river was losing at that time.

Testing data from the Riverside Well is not available, but Centralia operations water level data indicate that under pumping conditions groundwater is expected to consistently flow away from the river to the well (Robinson & Noble, 1992a). Additionally, based on prior testing DOH classified the Riverside Well as groundwater in hydraulic connection with surface water (similar to the Borst Park wellfield), and future potable supply from this well will require CT6 disinfection. Review of the well's geologic log indicates that roughly seven feet of silty sand and gravel is present between the Skookumchuck River bottom and the more permeable COGA sediments.

4.4 WWTP

Based on groundwater flow paths and proximity to the Chehalis River, it is likely that pumping wells at the WWTP and in its vicinity will predominantly impact the Chehalis River. If future pumping wells are installed at the WWTP in close proximity (within 200 feet) of the Chehalis River, they will likely receive similar GWI designations as the Borst Park and Riverside wells and require a CT6 treatment facility. If wells are installed closer to the WWTP they would not likely require CT6 or filtration treatment, and would capture groundwater that otherwise discharges to the Chehalis River (similar to the Tennis Court wells).

5 Planned Wellfield Development and Expected Yields

The Cities water right applications are intended to help meet each City's respective 50-year demand. Because the Cities will grow into the proposed water right over several decades, we understand that they plan to develop additional wellfield capacity using a phased approach. The initial phase of development is planned for Borst Park, where Centralia has significant land holdings and existing wellfield infrastructure. Centralia rehabilitated and tested Borst Park wells 1 and 2 in fall 2022 to assess current capacity and plans to install additional wells in the Borst Park area as demand increases. Future water-level monitoring and operations data collected from the Borst Park wellfield vicinity will be used to refine target pumping rates, assess future production well locations (as discussed in **Appendix C**), and to evaluate likely treatment requirements[5].

If long-term operations data suggest that limited additional yield is available in the Borst Park area (which currently is not believed to be the case), the Cities would pursue additional characterization and/or testing at the Riverside Park or WWTP properties to confirm expected capacities.

5.1 Borst Park Wells 1 & 2 Expected Yields

Following redevelopment and testing in 2022, the recommended target pumping rates for Borst Park Well 1 and 2 are 600 gpm and 1,200 gpm respectfully. These recommended rates are based on projections from a relatively short-term (24-hour) aquifer test. Due to potential drawdown limitations at both wells during low-water periods, active monitoring of wellfield pumping rates and water levels in both the aquifer and Chehalis River are recommended. Following one year of wellfield operation Mott MacDonald recommends the Cities review of these data to optimize wellfield pumping rates and operational guidelines (as discussed in **Appendix C**). Based on current short-term test data and projections, additional production wells in close proximity (within 200 feet) of the existing Borst Park wellfield will not significantly increase its yield; locating production wells at greater spacing within the park and/or closer to the Tennis Court wellfield is expected to more effectively maximize the production capacity of the Borst Park area.

5.2 Tennis Court Area Yields

The Tennis Court wells are used routinely for municipal supply, with Tennis Court Well 1 yielding 600 gpm and Well 2 yielding 1,200 gpm. Tennis Court Well 1 was initially a test well and the 8-inch diameter casing has a perforated open interval; Tennis Court Well 2 was designed as a production well (with a 20-inch diameter stainless steel screen), and has a significantly higher yield than Well 1. With adequate well design, screen development, and well spacing, future production wells in the Tennis Court area are expected to have yields of approximately 1,000 gpm (based on the existing yield of Tennis Court Well 2).

[5] Wells installed closer to the Chehalis River and/or Fort Borst Lake will likely require CT6 treatment. Potential future treatment needs should be considered during design phases for the Borst Park wellfield CT6 treatment facility, and associated long-term infrastructure and treatment costs should be considered as part of the process for identifying future production well locations.

5.3 Riverside Park Expected Yields

When installed in 1971, the Riverside Well had a yield of 1,000 gpm and a specific capacity of 100 gpm/ft. Testing data from 1992 and 1994 indicated that the specific capacity of the well was decreasing (to 37 gpm/ft and 17 gpm/ft respectively), and yield had fallen to 700 gpm (PGG, 2016). More recent production data from this well does not exist, but based on the decreasing specific capacity trend the well likely requires rehabilitation and possibly replacement. Reasons why replacement of the Riverside Well may be warranted include the historical down-hole chlorinator (that increases corrosion potential within the well), improved well design (greater yields may be possible in a well with a larger screen diameter and slot-size), and further characterization of local subsurface conditions[6]. Based on existing information at Riverside Park and the Riverside Well's previous production capacity, the COGA in this vicinity potentially may yield between 1,000 to 2,000 gpm if future production wells are designed for efficiency; however, based on the declining yield in the Riverside Well an operations and maintenance plan with routine rehabilitation may be recommended to extend the life cycle of new well(s).

Based on current planning, the need to corroborate the expected aquifer yield at Riverside Park would not occur until full build-out is reached at the Borst Park and Tennis Court wellfields.

5.4 WWTP Expected Yields

There are limited testing or operations data for the WWTP irrigation wells. The area has previously been identified as potentially favorable for a high-capacity municipal wellfield based on high-yielding wells in area (Robinson and Noble, 1992b), large Centralia-owned tracts of land, and existing water mains in the area (PGG, 2016). Well yields between 231 and 910 gpm were estimated for seven wells in the WWTP area and are shown in **Appendix A** (Robinson and Noble, 1992b). Historic testing data from two of Centralia's WWTP area irrigation wells calculated yields of 500 gpm (at the Walsh irrigation well (Lewis County Water Conservancy Board, 2014)) and 600 gpm (at the WWTP well, **Table 1**).

Based on available information for the WWTP area, the COGA's local production capacity is high, and given its large land-area a future wellfield capable of producing 2,000 gpm could be feasible. However, controlled aquifer testing and monitoring is needed to better assess the number of wells, spacing, and sustainable yield. These tests potentially could be performed using the existing irrigation wells.

Testing or installation of wells in the WWTP area is expected to occur at a late phase in the water right build-out process, and only if development near the WWTP is deemed preferable to additional wellfield development at Borst Park or Riverside Park.

[6] A nine-foot section of sand and gravel with brownish black peat binder was identified at TW-11 at an elevation overlapping the Riverside Well's screened zone, and suggests that local aquifer geochemical conditions could contribute to the Riverside Well's observed fouling issues. Well logs for the Riverside Well and TW-11 can be found in **Appendix D**.

6 Expected Wellfield Impacts and Net Streamflow Change

Based on the groundwater flow directions, close hydraulic connection between the COGA and the Chehalis and Skookumchuck rivers, and mapped extents of the COGA and alluvial/glacio-lacustrine aquifer in the Chehalis River valley, pumping impacts from the Borst Park, Tennis Court, Riverside, and WWTP wellfields are expected to affect the Skookumchuck and Chehalis Rivers within the TransAlta water bank's mapped green zone. Therefore, pumping impacts will be mitigated through the purchase of water bank water to fully offset the pumped well volumes.

Streamflow capture (capture) is the process where groundwater-supported baseflow in a river is decreased due to well pumping. Captured water is typically groundwater that would otherwise discharge to a stream, but in cases where a well is in close proximity to a stream or a stream is losing, water can directly be removed from it. A streamflow capture analysis for the proposed wellfield areas was conducted in the computer program STRMDEPL08 (Reeves, 2008). STRMDEPL08 was developed by the USGS and allows users to apply several different analytical solutions (for stream-aquifer interactions) to estimate stream capture.

It is likely that a "skin" composed of finer grained river sediments separates the Chehalis and Skookumchuck Rivers from the COGA, and therefore within STRMDELP08 the Hunt (1999) analytical solution was applied since it simulates a partially penetrating stream with streambed resistance. Results from the capture analysis at each wellfield are discussed in the following subsections.

6.1 Borst Park Wells 1 & 2

Transmissivity and storage values calculated from 2022 Borst Park wellfield testing (**Appendix C**) were applied for streamflow capture estimates, while hydraulic conductivity and thickness values for river skin were assumed since no measurement data exist. Assumed skin hydraulic conductivity and thickness values were 3 ft/day and 2 feet respectively, and because these values are assumed rather than measured, they introduce a level of uncertainty in the capture estimate (these values have been assumed for all STRMDEPL08 analyses, unless noted otherwise). STRMDEPL08 input parameters are listed in **Table 2**.

Pumping impacts predicted by STRMDEPL08 using best-estimate values suggest that streamflow capture from the pumping wells will range from 95.6 and 97.0 percent on first day of pumping, and after one year of pumping 99.8 percent of the daily pumping rate will be captured from the Chehalis River. Percent capture curves are presented in **Figure 13**.

Several sensitivity runs were performed for Borst Park Well 2 (because it has a lower initial stream capture rate) to assess how capture rates may differ if different river skin assumptions are made. Decreasing the river skin hydraulic conductivity to 0.3 ft/day and increasing the thickness to 4 feet (both of these parameters are part of the calculated streambed conductance[7] term used in the analytical solution) results in approximately 70.5 percent of the pumped water on pumping day 1 being captured from the Chehalis River, while after one year of pumping 98.3 percent is predicted to be captured (**Table 2**). If the river skin hydraulic conductivity is increased

[7] The Hunt (1999) solution calculates stream capture using a streambed conductance term, with the following formula: Streambed Conductance = River Width x River Skin Hydraulic Conductivity / River Skin Thickness. Decreasing the river skin by a factor of 10 and increasing the thickness by a factor of two results in a streambed conductance value 20 times lower than general conductance value assumed.

to 15 ft/day, 96.8 percent of the pumped water on day 1 is estimated to come from the Chehalis River, and at one year 99.8 percent capture is estimated.

These analytical results suggest that after one year of continuous pumping at the Borst Park wellfield between 98 to 99 percent of the water pumped will likely to be captured from the Skookumchuck River or the Chehalis River downstream of their confluence. These river segments will be directly mitigated by the release of Skookumchuck River water by TransAlta.

6.2 Tennis Court Wells 1 & 2

STRMDEPL08 input parameters for Tennis Court wells 1 and 2 are listed in **Table 2**. Aquifer parameter values are based on Tennis Court well pumping test results presented in Robinson and Noble (1996), and similar to the Borst Park well analyses, streambed hydraulic conductivity and thickness values were assumed since no measured data exist.

Pumping impacts predicted by STRMDEPL08 using best-estimate values suggest that streamflow capture from the pumping wells will range from 78.8 and 90.8 percent on the first day of pumping, and after one year of pumping 98.9 to 99.5 percent of the daily pumping rate is being captured from the Chehalis River (**Table 2**, **Figure 13**). The low initial capture rate is due to the wells being significantly farther from the Chehalis River (approximately 1,600 feet) compared to Borst Park wells 1 and 2. However, after the aquifer system has equilibrated to pumping at the Tennis Court wells, similar streamflow capture rates (roughly 99 percent) are predicted.

Sensitivity runs were performed for Tennis Court Well 1 due to its lower capture rate (relative to Tennis Court Well 2), with both higher and lower streambed conductance values assumed. After one year of pumping, the sensitivity runs estimated stream capture rates between 96 and 99 percent (**Table 2**, with lower capture rates estimated for the scenario with a low streambed conductance).

6.3 Riverside Park

Review of the Riverside Well geologic log (**Appendix D**) and Skookumchuck River depths adjacent to Riverside Park indicates that a greater river skin thickness (7 feet) is potentially warranted due to the presence of a 7-foot thick silty sand and gravel deposit between the river bottom and more permeable COGA aquifer materials. **Table 2** presents input values used for the Riverside Well analysis. Because aquifer test data for the Riverside Well do not exist, the COGA transmissivity at the well was approximated based on its initial specific capacity (assuming Transmissivity = 2000 x Specific Capacity) and the COGA storage value was assumed (0.001). Because fewer measured parameters exist for the Riverside Park area, greater uncertainty is present in the estimated streamflow capture rate.

Best-estimate streamflow capture from the Skookumchuck River due to pumping from the Riverside Well is predicted by STRMDEPL08 to be 75 percent capture on the first day of pumping and 98.6 percent after one year of pumping (**Table 2**). Based on the higher degree of uncertainty associated with Riverside Well scenario input parameters, multiple sensitivity runs were performed to estimate a potential range of stream capture rates.

Sensitivity runs pursued include using an alternative transmissivity estimate (using the median COGA hydraulic conductivity value of 310 ft/day as estimated by Pitz and others (2005) multiplied by the local saturated thickness), assuming a similar storage coefficient calculated for Borst Park Well 1 (0.00013, which is the lowest calculated storage coefficient from Centralia production wells), and assuming both lower and higher river skin hydraulic conductivity values (**Table 2**). After one year of the pumping, estimated stream capture rates from the sensitivity runs ranged from 86.2 to 99.7 percent. The lowest estimated capture rate is for the scenario which assumed a low river skin hydraulic conductivity value (0.3 ft/day); this low hydraulic conductivity value in combination with both the greater assumed river skin thickness at Riverside Park (7 feet) and the Skookumchuck River being narrow (50 feet, which is approximately 1/4th to 1/7th as wide as the Chehalis River) causes the streambed conductance value of this scenario to be significantly lower than all other scenarios evaluated (including those for other wellfields).

6.4 WWTP

The well log for the WWTP irrigation well installed in 2003 (**Appendix D**) was reviewed, and compared to the Chehalis River elevation. Based on sediments observed at the WWTP well (which is approximately 2,450 feet from the Chehalis River), silty sand and gravel is present from 0 - 16 feet below ground, followed by sand and gravel to 55 feet below ground. Based on the estimated Chehalis River bottom elevation (using measurements from Borst Park), the finer grained surficial alluvium appears to be fully incised by the river. Using this interpretation, the standard river skin thickness (2 feet) was assumed, similar to Borst Park. Because aquifer test data for the WWTP well were not available to review, the COGA transmissivity at the well was approximated based on the specific capacity (assuming Transmissivity = 2000 x Specific Capacity), the COGA storage value was assumed (0.001), and the Chehalis River depth was assumed equal to its depth observed at Borst Park. Since few measured parameters exist for the WWTP area and the pumping well is far from the river (approximately 2,450 feet), greater uncertainty is present in the estimated stream impact.

Best-estimate pumping impacts predicted by STRMDEPL08 suggest that streamflow capture from the WWTP Well will be 52.2 percent on first day of pumping, and after one year of pumping 97.3 percent of the daily pumping rate will be captured from the Chehalis River (**Table 2**, **Figure 13**). Similar to the Riverside Well, multiple sensitivity runs were performed for the WWTP well to estimate a potential range of stream capture rates.

Sensitivity runs pursued include using an alternative transmissivity estimate (using the median COGA hydraulic conductivity value from Pitz and others (2005) multiplied by the local saturated thickness), assuming a similar storage coefficient as was calculated for Borst Park Well 1 (0.00013), and assuming both lower and higher river skin hydraulic conductivity values (**Table 2)**. After one year of the pumping, estimated stream capture rates from the sensitivity runs ranged from 96.7 to 99.0 percent. All WWTP stream capture estimates following one day of pumping are relatively low (44 to 81.8 percent) and are due to the greater distance between the pumping well and the Chehalis River (2,450 feet).

6.5 Net Streamflow Change Estimates

Best-estimate streamflow capture rates for each potential future wellfield area suggest that after one year of pumping, between 97.3 and 99.8 percent of the groundwater withdrawn will be captured from the Chehalis or Skookumchuck rivers; therefore 100 percent flow mitigation with Skookumchuck River water will offset the predicted pumping impacts. Empirical test data from the Borst Park wellfield indicates that limited drawdown occurs in the green zone south of the Chehalis River, and therefore with mitigation no pumping impacts or impairments are expected outside of or upstream of the water bank's green zone. Many municipal and industrial uses of pumped water will be non-consumptive (i.e. water will return to the Chehalis River following treatment, or re-enter the aquifer system through infiltration), and therefore streamflow is expected to remain the same or increase with future wellfield pumping and mitigation. Locations where significant Chehalis River return flows are expected are downstream of the Centralia and Chehalis WWTP outfalls. **Table 3** presents an approximate estimate of average annual streamflow increases by river reach for the Centralia-Chehalis area during select water right build-out time periods. Build-out time periods presented represent an initial production period (Time Period A) where the existing Borst Park wellfield provides supply of roughly 2.5 MGD, Time Period B where Centralia is at full water right build out (with a daily pumping rate of 5 MGD[8] which includes 2 MGD of industrial reserve pumping), and Time Period C where both Centralia and Chehalis are at full water right build out (with a daily pumping rate of 8 MGD). Because the timeframe over which Centralia and Chehalis will grow into their water rights and reach full build out will overlap, the assumption that Time Period B will occur prior to and independently of Chehalis growing into its water right is a simplification.

Figure 14 is a map depicting the river reaches and their estimated streamflow gains for the water right build-out time periods discussed above and presented in **Table 3**. Based on the general assumptions discussed above and in **Table 3**, approximately 1.8 to 5.8 cfs of increased streamflow on the Chehalis River downstream of the Centralia WWTP is estimated for the different time periods in the water right build-out process, while up to approximately 2.2 cfs of additional streamflow is estimated to occur downstream of the Chehalis WWTP.

[8] For simplicity, pumping during Time Periods B and C is assumed to come from the Borst Park area. The footnotes of Table 3 discuss general impacts tied to simplifying assumptions made.

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Table 1. City of Centralia Water Supply Well Information

Well Name/Location	Well Status	Date Drilled	Borehole Depth, ft-bgs	Well Depth, ft-bgs	Well Diameter, in	Screen Top, ft-bgs	Screen Bottom, ft-bgs	Screen Opening Type	Open Interval Diameter, in	Specific Cpacity when Installed, gpm/ft	Transmissivity, gpd/ft	Storage Coefficient	Current Capacity, gpm	Preliminary Rated Capacity at Install, gpm
Fords Prairie Well No. 1	Active	2000	70	70	16	40.5	61	0.125 in-SS	14	113	1,350,000	0.030	1000	1000
Fords Prairie Well No. 2	Active	2001	66.5	66.5	16	39.5	61	0.100 in-SS	16	88	700,000	0.030	800	800
Eshom Street Well 1 (Well 9)	Active	1960	69.5	69.5	12	44	69.5	0.100 in-SS	10	477	> 1,000,000		1200	1350
Tennis Court Well No. 1	Active	1994	87	87	8	55	75	Mills knife 1.5" x 1/8", 6 per foot	8	117	266,000	0.00150	600	500
Tennis Court Well No. 2	Active	1996	69	68.4	20	51	63.5	0.100 in-SS	20	124	208,000	0.00023	1200	1300
Riverside Well (Well 11)	Inactive	1971	78.7	78.7	20	47.9	78.66	0.080 in-SS	12	100			700~	1000
Borst Park Well 1	Inactive	1993	72	56	14	38	53	0.060 in-SS	14	66	53,000	0.00013	600	800
Borst Park Well 2	Inactive	1993	65	62.8	16	40	55	0.100 in-SS	14	108	82,500	0.00130	1200	1000
Wastewater Treatment Plant Well	Irrigation	2003	70	60	8	45	55	0.100 in-SS	8	28			600*	400

Notes:

~Well capacity from DOH Sentry Database

*Estimated well capacity by PGG, 2016

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Table 2. Pumping Well Streamflow Capture Estimates

Well Location	Transmissivity (gpd/ft)	Storage Coefficient	Distance to River (ft)	River Width (ft)	River Depth (ft)	Pumping Rate (gpm)	River Skin Hydraulic Conductivity (ft/d)*	River Skin Thickness (ft)*	Streamflow Capture, Day 1	Streamflow Capture, Day 365
Borst Park 1	**53,000**	**0.00013**	**340**	**190**	**14**	**600**	***3***	***2***	**97.0%**	**99.8%**
Borst Park 2	**82,500**	**0.0013**	**150**	**190**	**14**	**1200**	***3***	***2***	**95.6%**	**99.8%**
BP-2 Sensitivity 1	82,500	0.0013	150	190	14	1200	*0.3*	*4*	70.5%	98.3%
BP-2 Sensitivity 2	82,500	0.0013	150	190	14	1200	*15*	*2*	96.8%	99.8%
Tennis Court 1	**266,000**	**0.0015**	**1600**	**190**	**14**	**600**	***3***	***2***	**78.8%**	**98.9%**
TC-1 Sensitivity 1	266,000	0.0015	1600	190	14	600	*0.3*	*4*	43.5%	96.0%
TC-1 Sensitivity 2	266,000	0.0015	1600	190	14	600	*15*	*2*	81.1%	99.0%
Tennis Court 2	**208,000**	**0.00023**	**1600**	**190**	**14**	**1200**	***3***	***2***	**90.8%**	**99.5%**
Riverside	***200,000***	***0.001***	**22**	**50**	**3**	**1000**	***3***	***7***	**75.0%**	**98.6%**
Riv. Sensitivity 1	*133,795*	*0.001*	22	50	3	1000	*3*	*7*	78.9%	98.8%
Riv. Sensitivity 2	*200,000*	*0.00013*	22	50	3	1000	*3*	*7*	90.2%	99.5%
Riv. Sensitivity 3	*200,000*	*0.001*	22	50	3	1000	*0.3*	*7*	19.6%	86.2%
Riv. Sensitivity 4	*200,000*	*0.001*	22	50	3	1000	*15*	*7*	94.3%	99.7%
WWTP	***56,140***	***0.001***	**2450**	**350**	***14***	**400**	***3***	***2***	**52.2%**	**97.3%**
WWTP Sensitivty 1	*56,140*	*0.00013*	2450	350	*14*	400	*3*	*2*	81.8%	99.0%
WWTP Sensitivty 2	*67,245*	*0.001*	2450	350	*14*	400	*3*	*2*	55.8%	97.6%
WWTP Sensitivty 3	*56,140*	*0.001*	2450	350	*14*	400	*0.3*	*4*	44.0%	96.7%
WWTP Sensitivty 4	*56,140*	*0.001*	2450	350	*14*	400	*15*	*2*	52.6%	97.4%

Notes:

Italicized input paramters are assumed values.

Bold row entries apply best-estimate aquifer and stream parameters for a given pumping well.

Non-bolded row entries represent sensititivy runs. Input values changed for each sensitivity run (relative to the best-estimate run) are highlighted.

*The Hunt (1999) analytical solution calculates streamflow capture using a streambed conductance term, where

Streambed Conductance = River Width x River Skin Hydraulic Conductivity / River Skin Thickness

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Table 3. Net Streamflow Change Estimates with Future Wellfield Pumping and Mitigation

		Time Period A					Time Period B					Time Period C				
		City of Centralia Intiial Pumping Phase Daily Pumping Rate = 2.5 MGD					City of Centralia Full Build Out Pumping Daily Pumping Rate = 5 MGD					Scenario B + City of Chehalis Full Build Out Pumping Daily Pumping Rate = 8 MGD				
River Reach (Number and Name)	**Reach Description**	Cumulative Depletion (gpm)	Cumulative Mitigation (gpm)	Cumulative Return Flow from WWTPs[3] (gpm)	Net Change in Streamflow[4] (gpm)	**Net Change in Streamflow[4] (cfs)**	Cumulative Depletion (gpm)	Cumulative Mitigation (gpm)	Cumulative Return Flow from WWTPs[3] (gpm)	Net Change in Streamflow[4] (gpm)	**Net Change in Streamflow[4] (cfs)**	Cumulative Depletion (gpm)	Cumulative Mitigation (gpm)	Cumulative Return Flow from WWTPs[3] (gpm)	Net Change in Streamflow[4] (gpm)	**Net Change in Streamflow[4] (cfs)**
1: Skookumchuck River	Direct streamflow mitigation occurs on this reach; 100% of wellfield pumping impacts are assumed to occur on this reach[1]; receives no WWTP return flow	-1736	1736	0	0	**0**	-3472	3472	0	0	**0**	-5556	5556	0	0	**0**
2: Chehalis River, Chehalis WWTP to Skookumchuck River Confluence	Streamflow mitigation does not occur on this reach; wellfield pumping impacts do not occur on this reach outside of the green zone; receives return flow from the upstream Chehalis WWTP	0	0	0	0	**0**	0	0	0	0	**0**	0	0	979	979	**2.2**
3: Chehalis River, Skookumchuck River Confluence to Centralia WWTP	Streamflow mitigation occurs upstream of and on this reach with Skookumchuck River flows; wellfield pumping impacts occur on this reach[1]; receives return flow from the upstream Chehalis WWTP	-1736	1736	0	0	**0**	-3472	3472	0	0	**0**	-5556	5556	979	979	**2.2**
4: Chehalis River, Downstream of Centralia WWTP	Streamflow mitigation occurs upstream of and on this reach with Skookumchuck River flows; wellfield pumping impacts may occur in Time Period B or C on this reach[2]; receives return flow from the upstream Centralia and Chehalis WWTPs	-1736	1736	816	816	**1.8**	-3472	3472	1632	1632	**3.6**	-5556	5556	2611	2611	**5.8**

Notes

MGD = million gallons per day; gpm = gallons per minute; cfs = cubic feet per second; WWTP = Wastewater Treatment Plant

[1] Reach 1 and portions of Reach 3 will likely see greater streamflow increases than approximated by this estimate since *all* pumping impacts are assumed to occur along their entire reach lengths. In actuality, portions of these reaches will have greater streamflow gains since pumping-induced streamflow capture will accumulate incrementally along the reaches.

[2] Streamflow capture is expected to occur on Reach 4 if the WWTP wellfield is developed, however the estimated net streamflow for Reach 4 would not differ (fewer upstream impacts would occur than assumed by the current approximation, and therefore mitigation water to offset Reach 4 impacts would be present).

[3] WWTP return flows were estimated by comparing City of Centralia monthly WWTP effluent flow volumes with monthly wellfield pumping volumes between 2019 and 2021. From this analysis, a 47% average return flow has been assumed, based on monthly flows from July and August. This assumed year-round ratio is conservative since it is based on summer pumping when disproportionate irrigation demand is present (irrigation water does not return to the WWTP and for this analysis was not assumed to enter the aquifer either). System leakage is assumed to infiltrate to the aquifer, and therefore is included in the 47% return flow value. City of Chehalis return flow rates are assumed equal to Centralia return flow rates for this approximation.

[4] Net Change in Streamflow = Cumulative Reach Depletion + Cumulative Reach Mitigation + Cumulative WWTP Return Flow

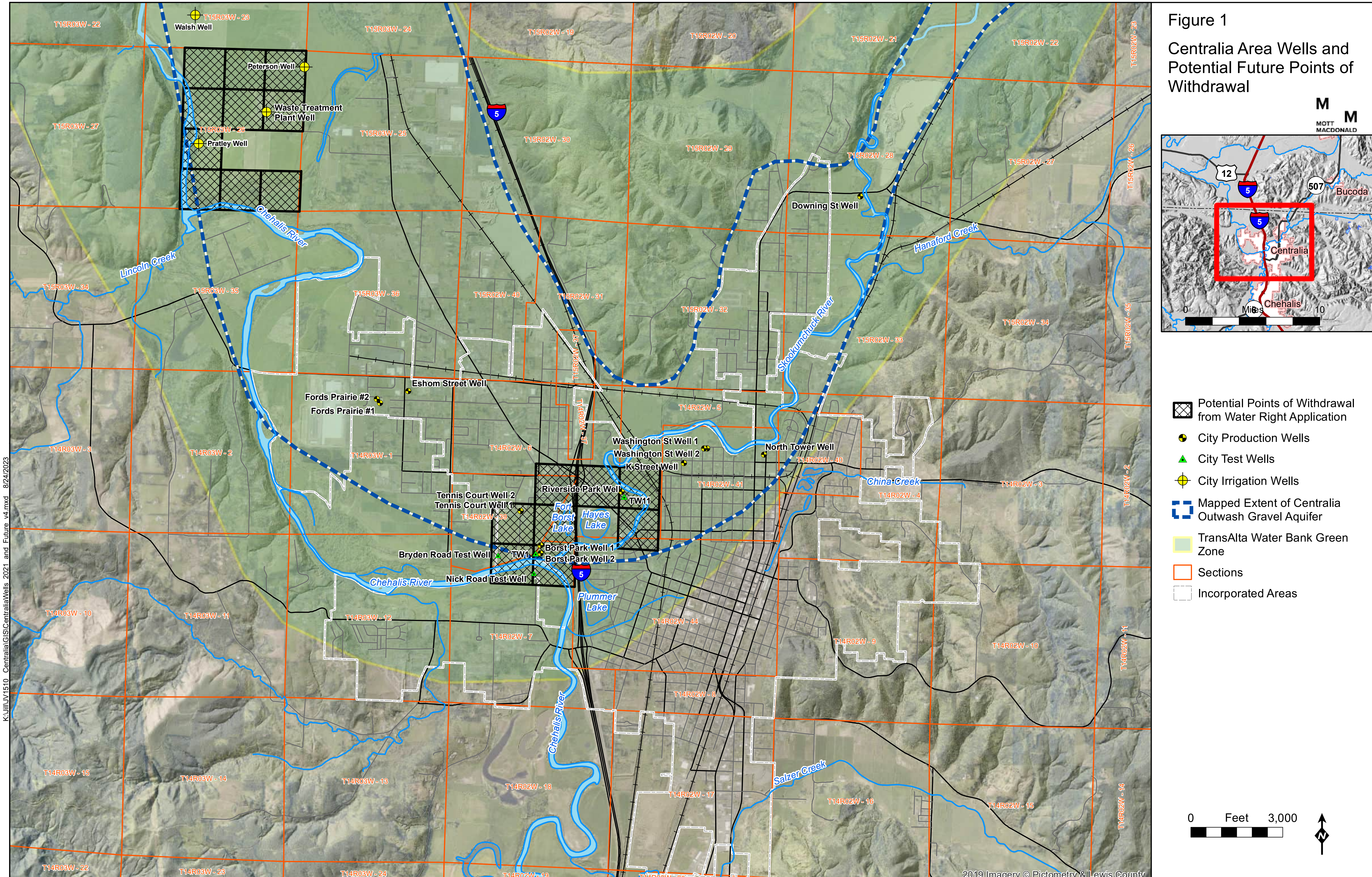
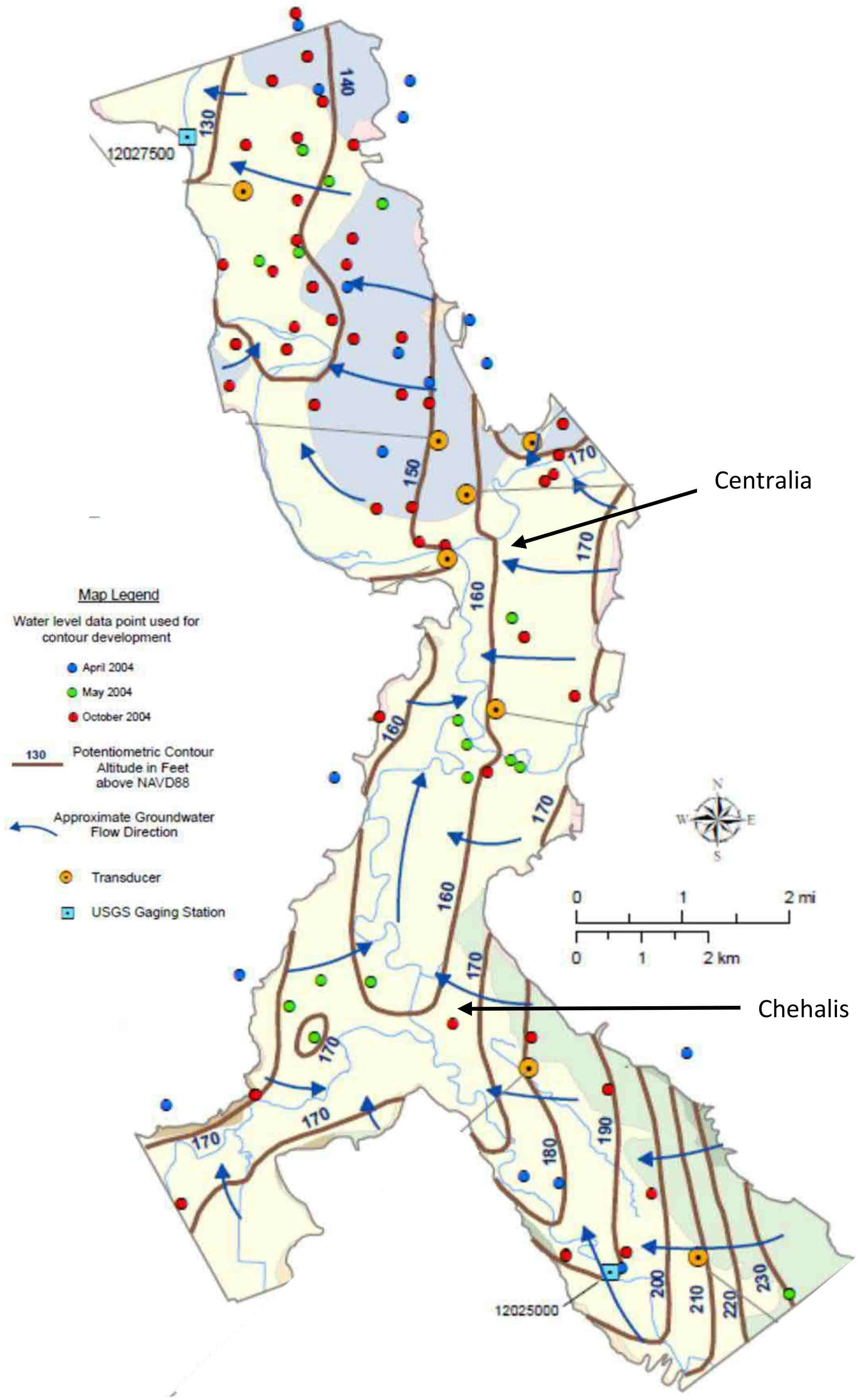


Figure 1

Centralia Area Wells and Potential Future Points of Withdrawal



Notes:

-Figure is from Plate C of Pitz and others (2005)

Figure 2

Upper Chehalis River Valley Groundwater Elevations

City of Centralia

507107008

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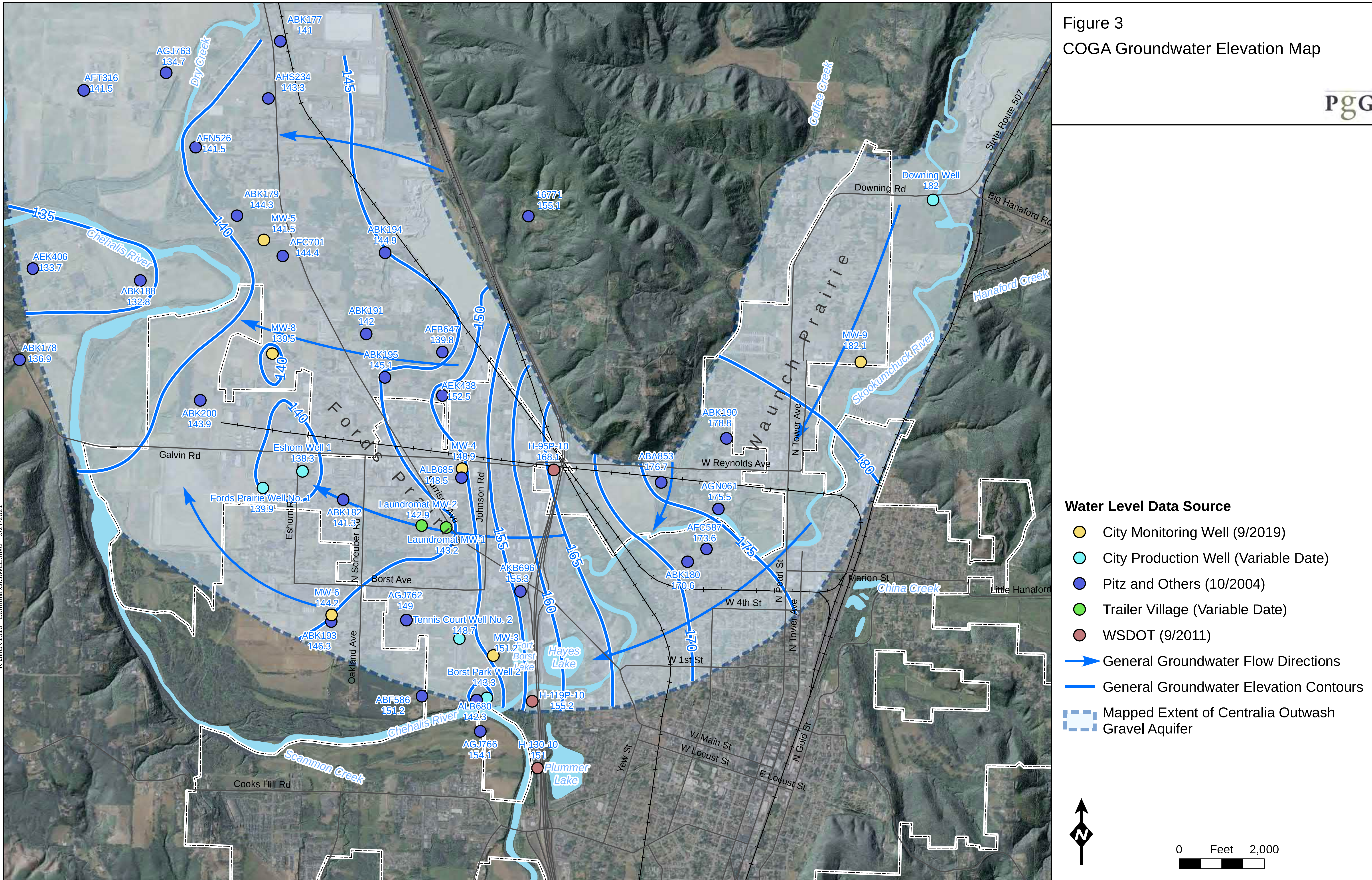

Figure 3
COGA Groundwater Elevation Map

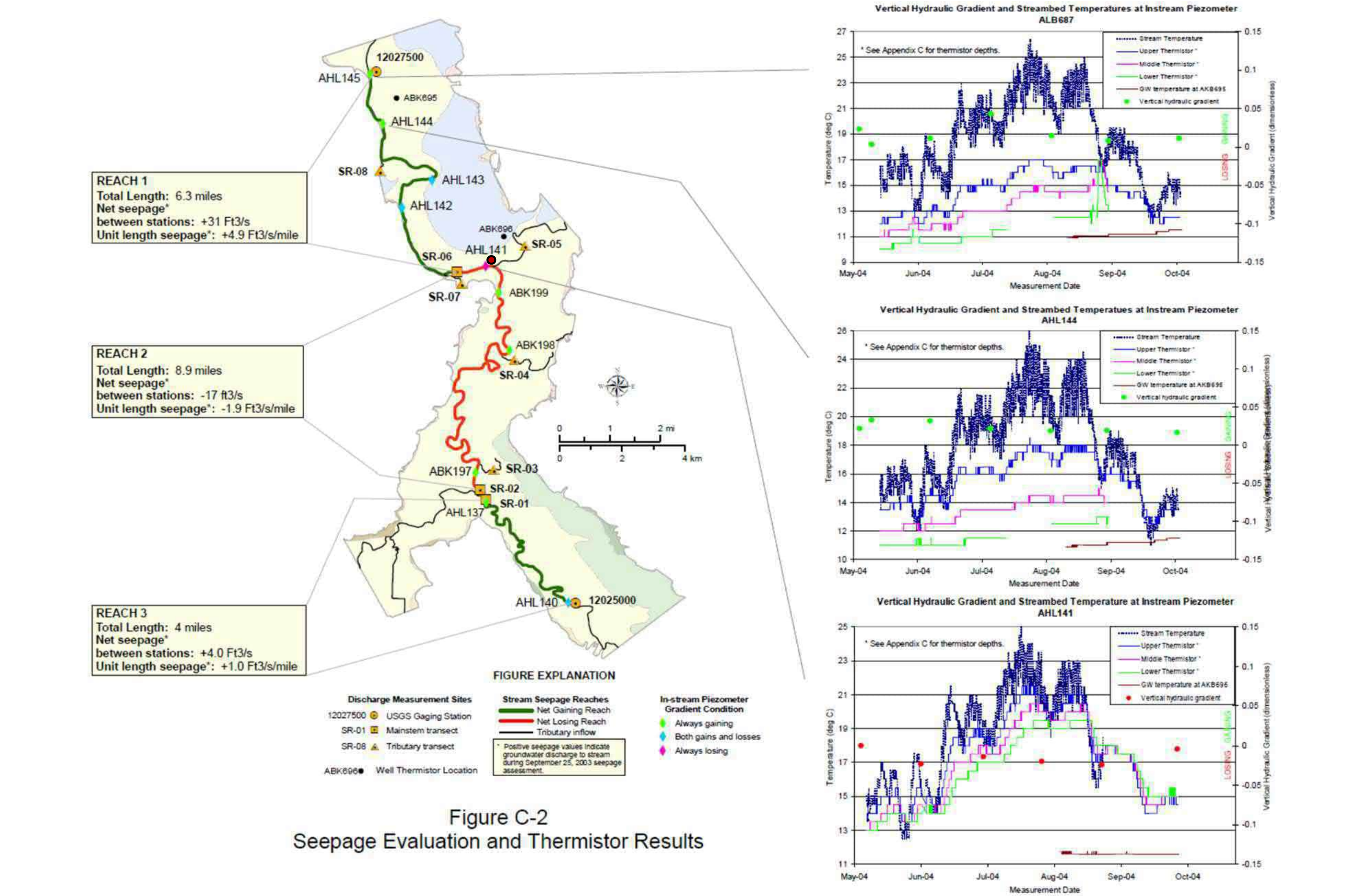

Figure C-2
Seepage Evaluation and Thermistor Results

Notes: ● Borst Park Wellfield

-Seepage run measurements occurred on September 25, 2003

-Figure is from Plate C of Pitz and others (2005)

Figure 4

Ecology Seepage Run & Thermistor Data

City of Centralia
507107008

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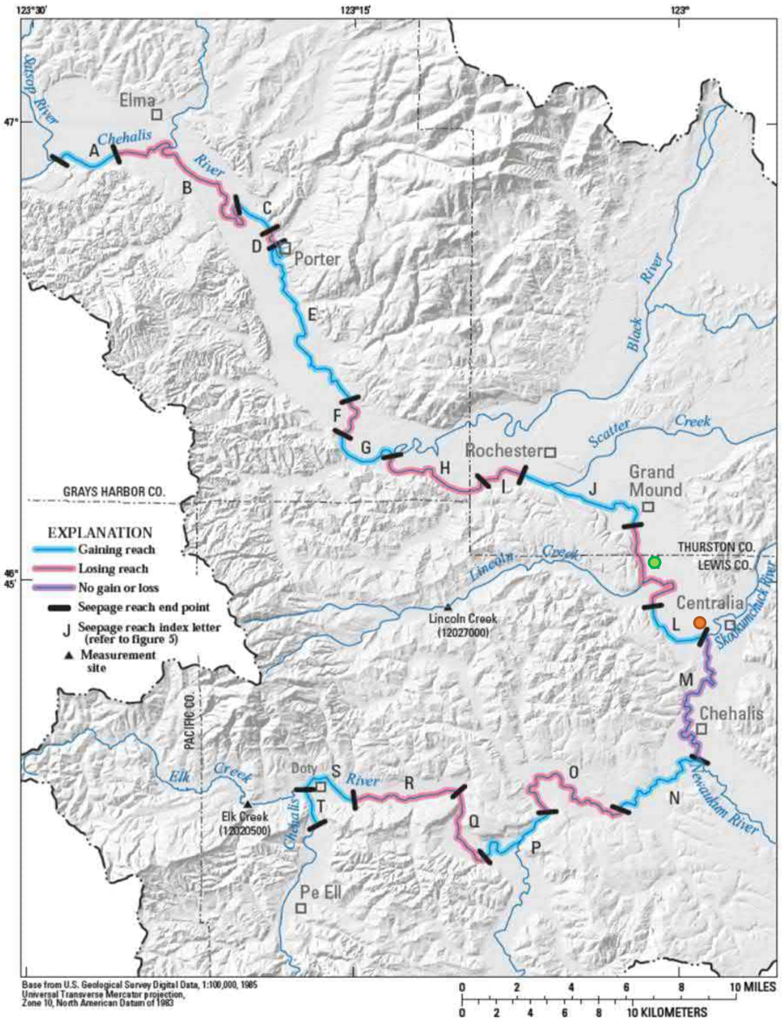

Figure 4. Discharge gains and losses in reaches along the Chehalis River, Washington.

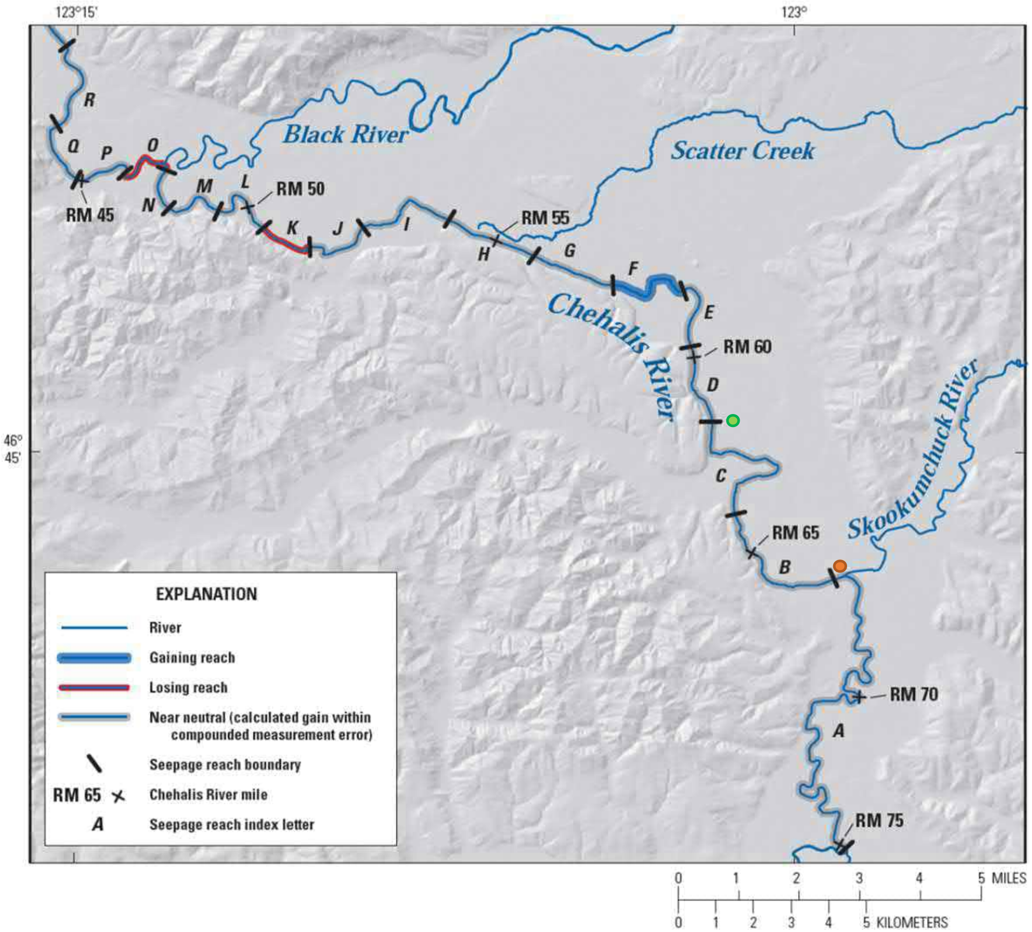

Figure 8. Streamflow gaining, losing, and near-neutral reaches, central Chehalis River Basin, southwestern Washington, August 2010.

Notes:

- ● Borst Park Wellfield
- ● Centralia WWTP

-September 2007 seepage run data (presented on the left) is from Ely and others (2008).

-August 2010 seepage run data is from Gendaszek (2011).

Figure 5
USGS Seepage Run Data
Chehalis River

City of Centralia
507107008

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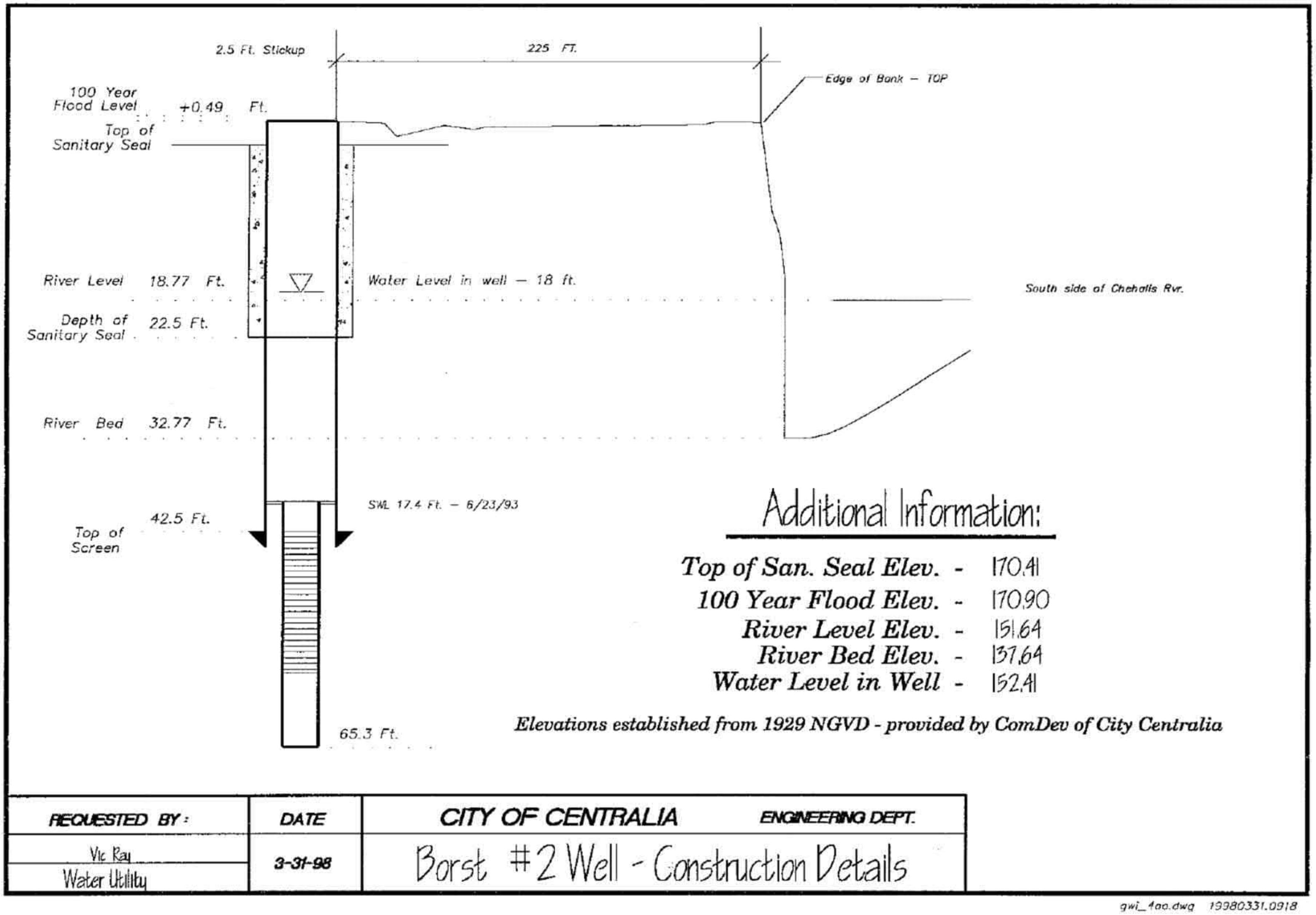

Notes:

-Figure is from Centralia Utilities (1998)

Figure 6

Borst Park Well 2 Topographic Cross Section

City of Centralia
507107008

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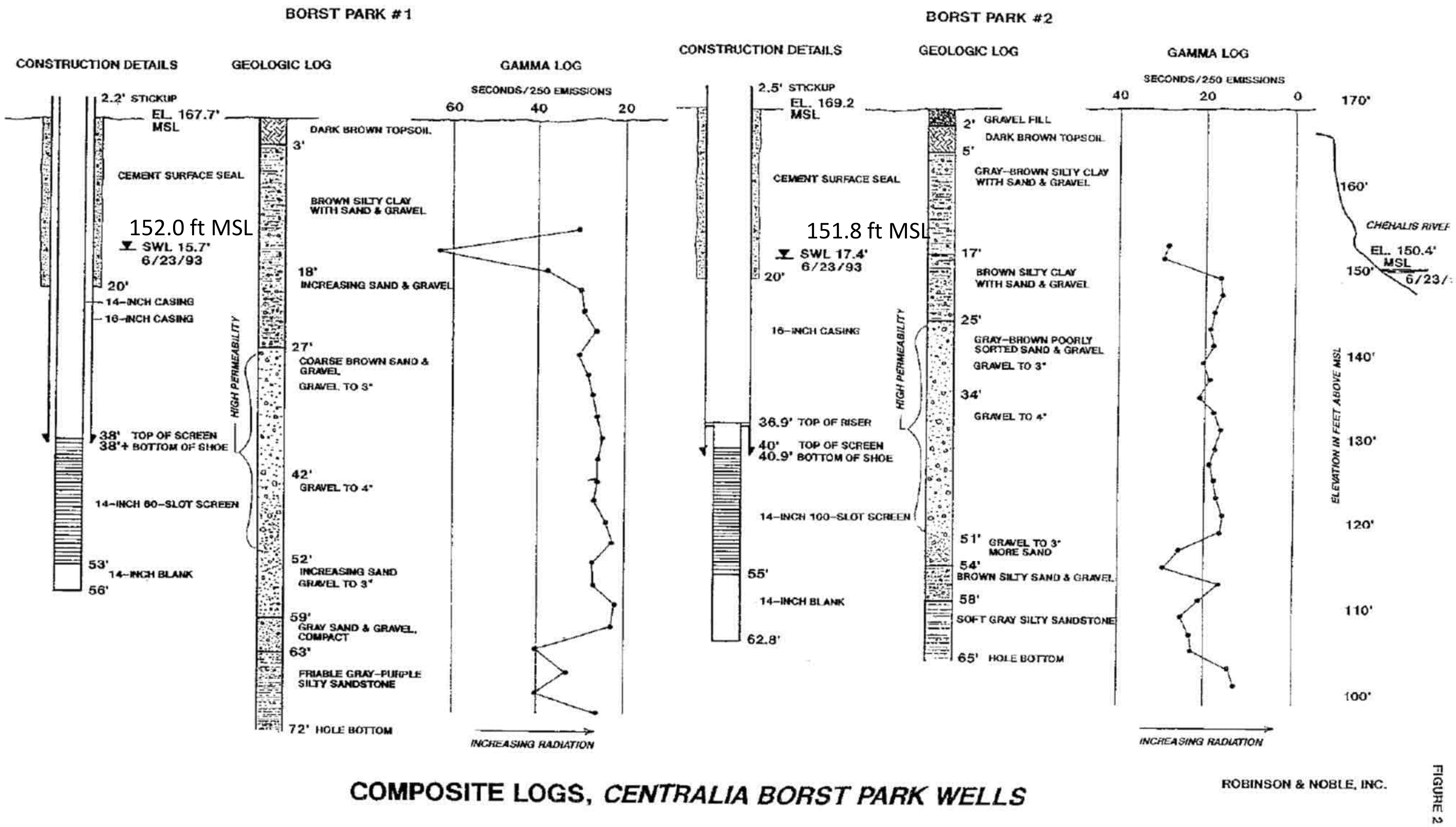

Notes:

-Figure is from Robinson & Noble (1993)

Figure 7

Borst Park Well 1 and 2 Construction Log with Chehalis River Comparison

City of Centralia
507107008

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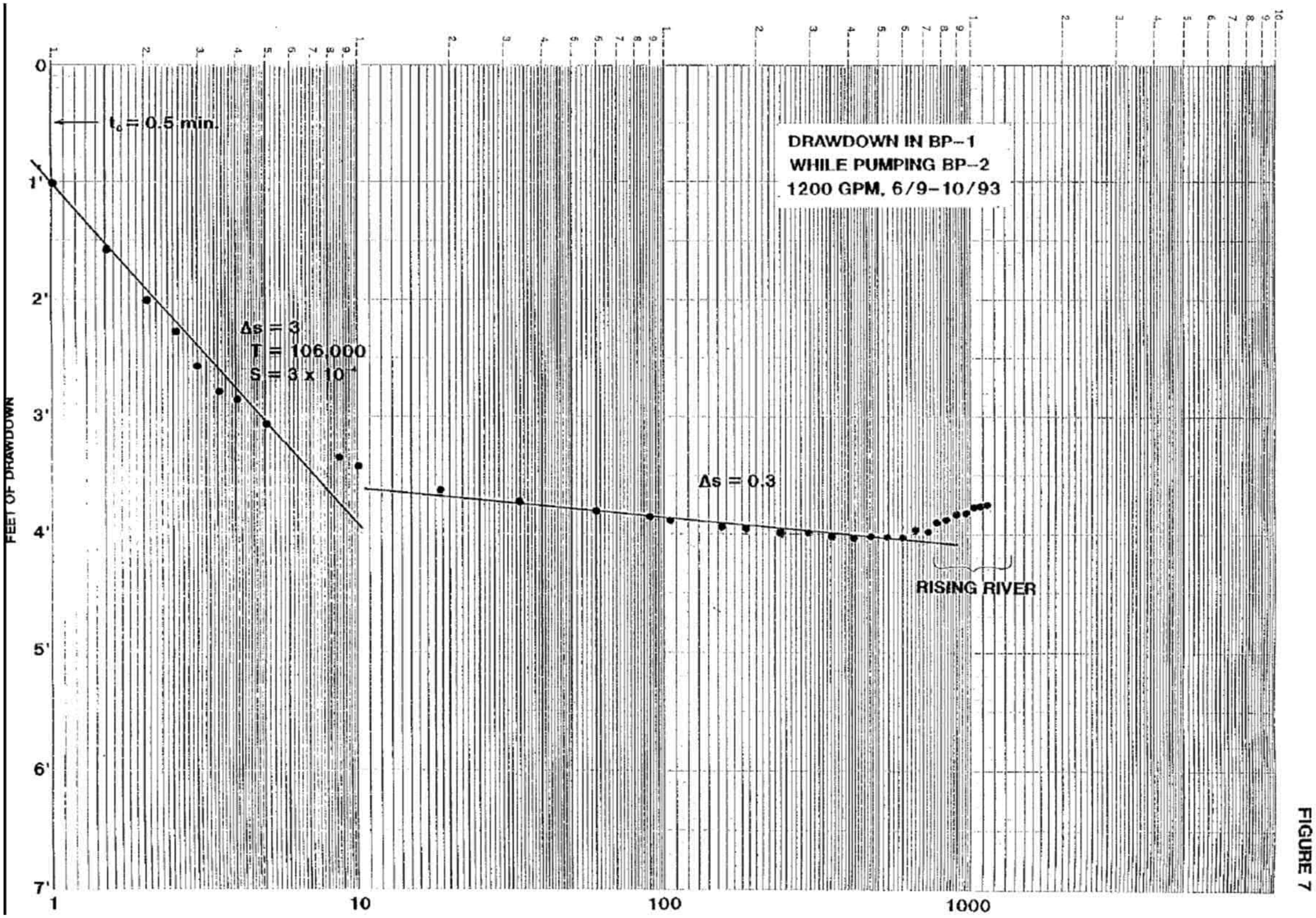

Notes:

-Figure is from Robinson & Noble (1993) for the initial testing of Borst Park wells 1 & 2.

Figure 8

Borst Park Well 1 Drawdown

City of Centralia
507107008

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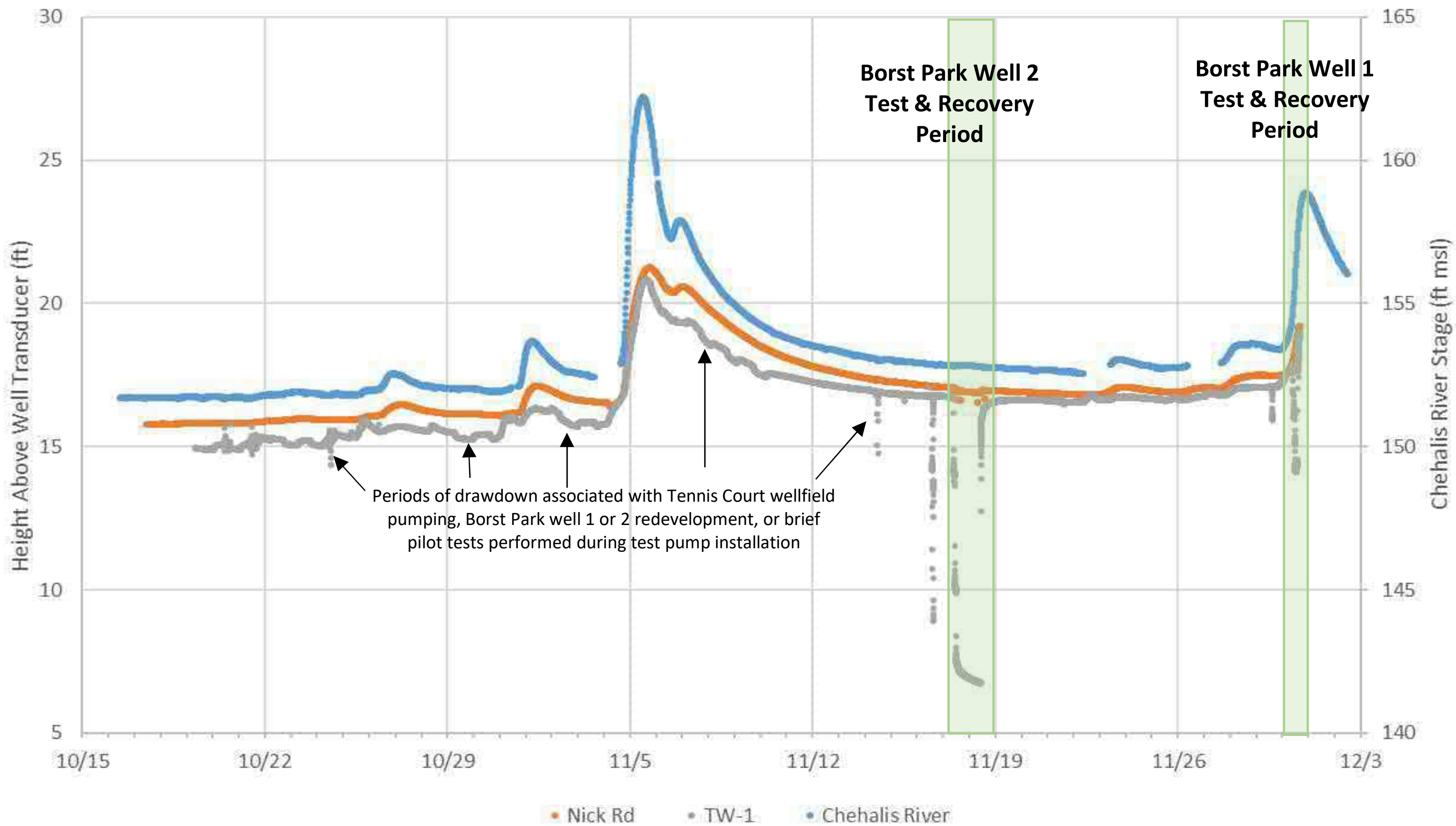

<u>Notes:</u>

-Chehalis River stage data were downloaded from the Lewis County Rivers website (https://rivers.lewiscountywa.gov/#/12025500) and are measured at the Mellen St Bridge.

Figure 9

2022 Borst Park Wellfield Area Water Level Monitoring Data

City of Centralia
507107008

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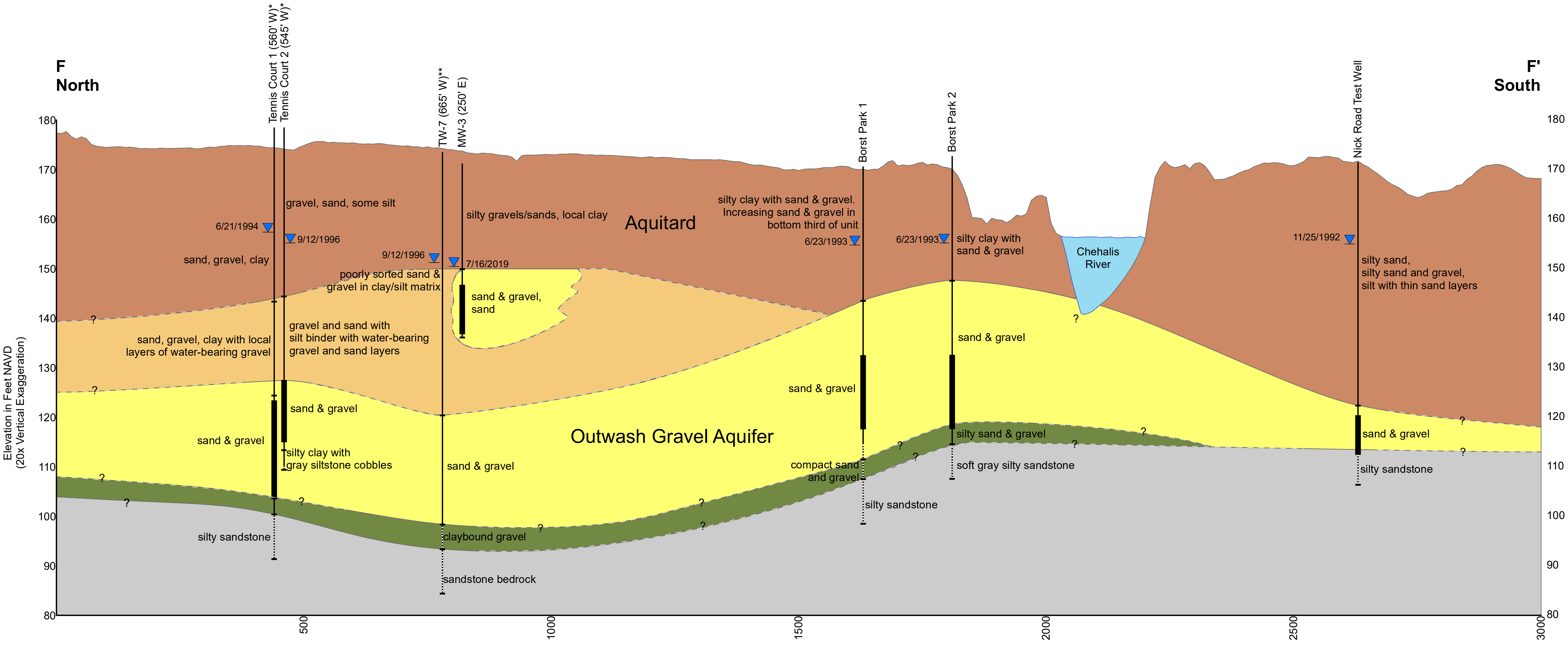
Figure 10

Borst Park
Cross Section Alignment

City Production Wells
City Test Wells
Monitoring Wells
Cross Section Alignment

0 Feet 500

K:\Jill\JV1510 Centralia\GIS\CentraliaWells 2023 Xsection.mxd 2/16/2023



* Tennis Court Wells 1 and 2 are approximately 15 feet apart from one another but Tennis Court Well 1 encountered bedrock approximately 9 feet deeper than Tennis Court Well 2. Generalized bedrock contracts are plotted for this area, and significant variability in local bedrock surface depth is therefore expected.

** A well log for TW-7 is not available and its plotted contacts are based on a generalized hydrogeologic cross section from Robinson & Noble (1993).

Figure 11

Borst Park Area Hydrogeologic Cross Section, City of Centralia

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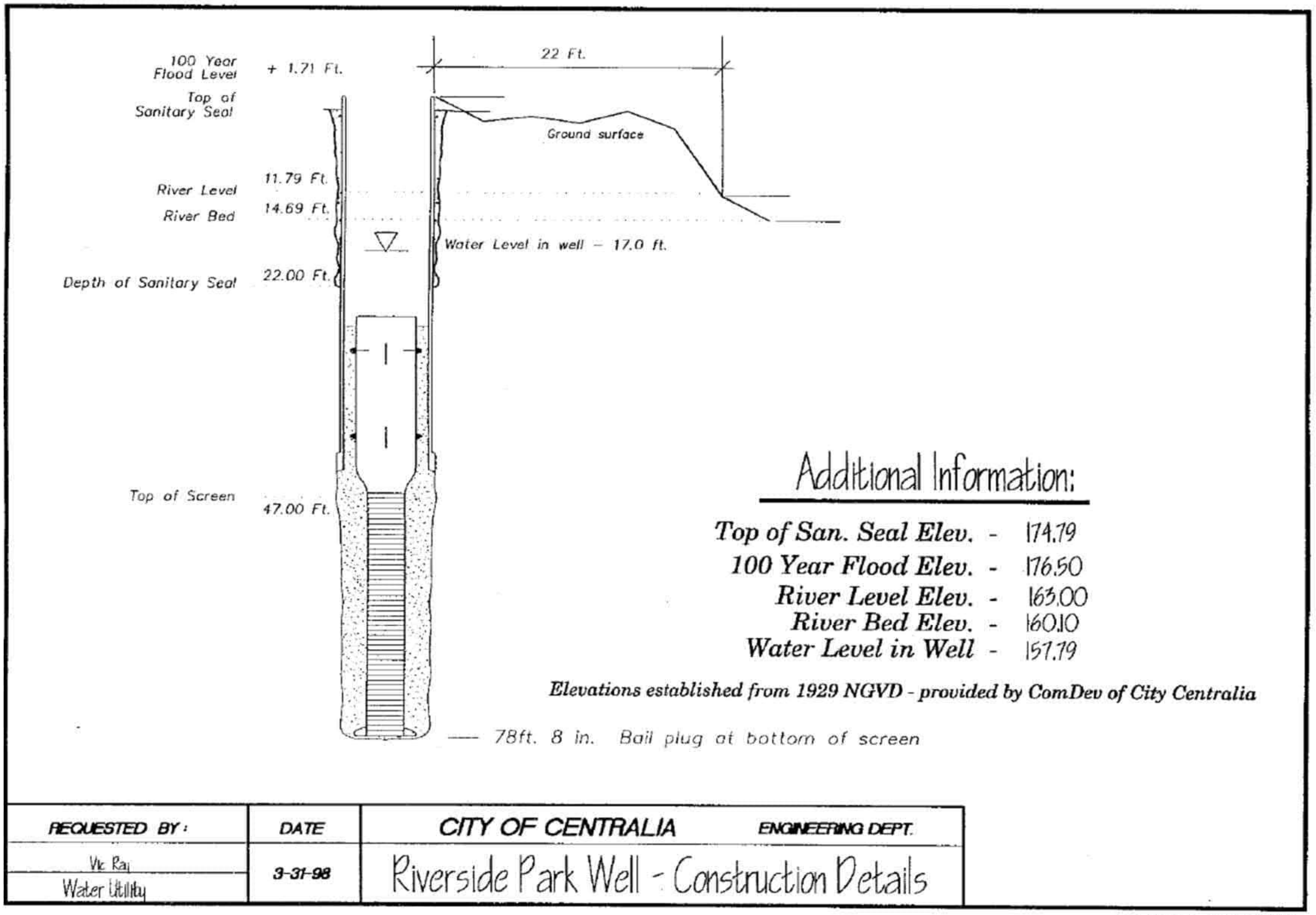

Notes:

-Figure is from Centralia Utilities (1998)

Figure 12

Riverside Park Well Topographic Cross Section

City of Centralia
507107008

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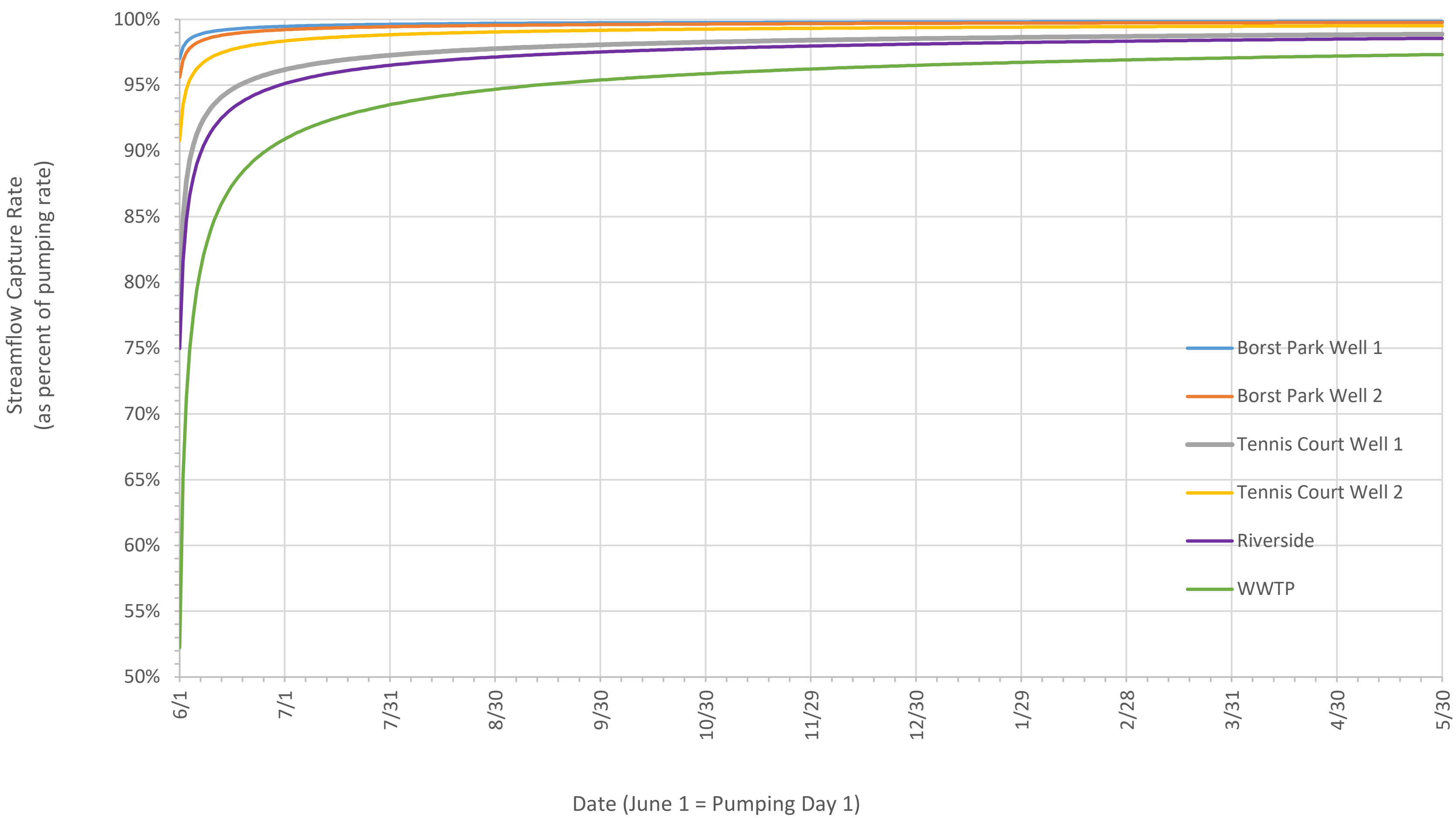

Figure 13
Best-Estimate Daily Streamflow Capture Rates for One Year of Pumping

City of Centralia
507107008

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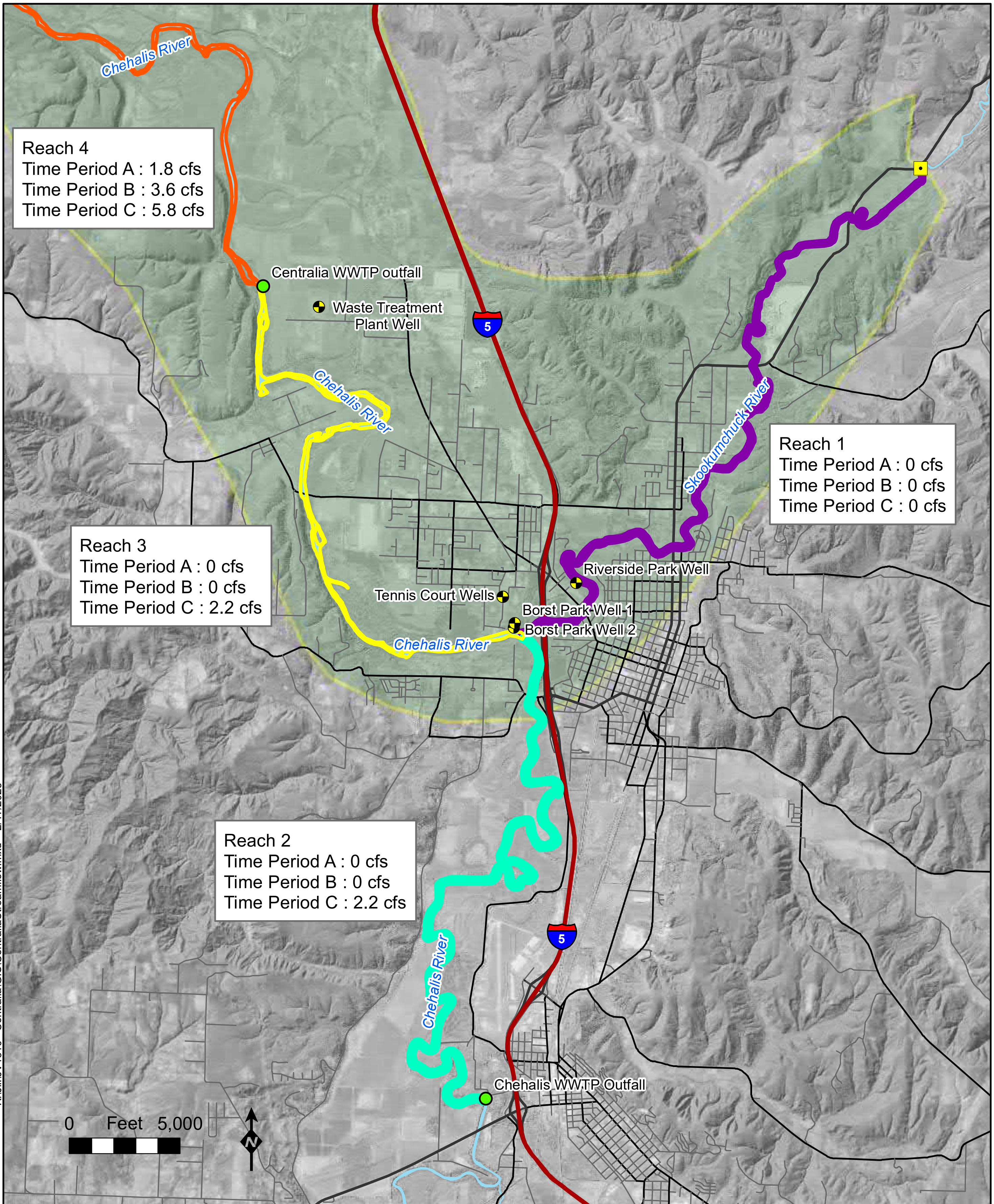

City Production Wells
WWTP Outfalls
TransAlta Water Bank Green Zone
TransAlta Point of Diversion

Reach*
1
2
3
4

*Refer to Table 3 and report Section 6.5 for calculation details.

Figure 14

Estimated Net Streamflow Change for Select Water Right Build Out Time Periods

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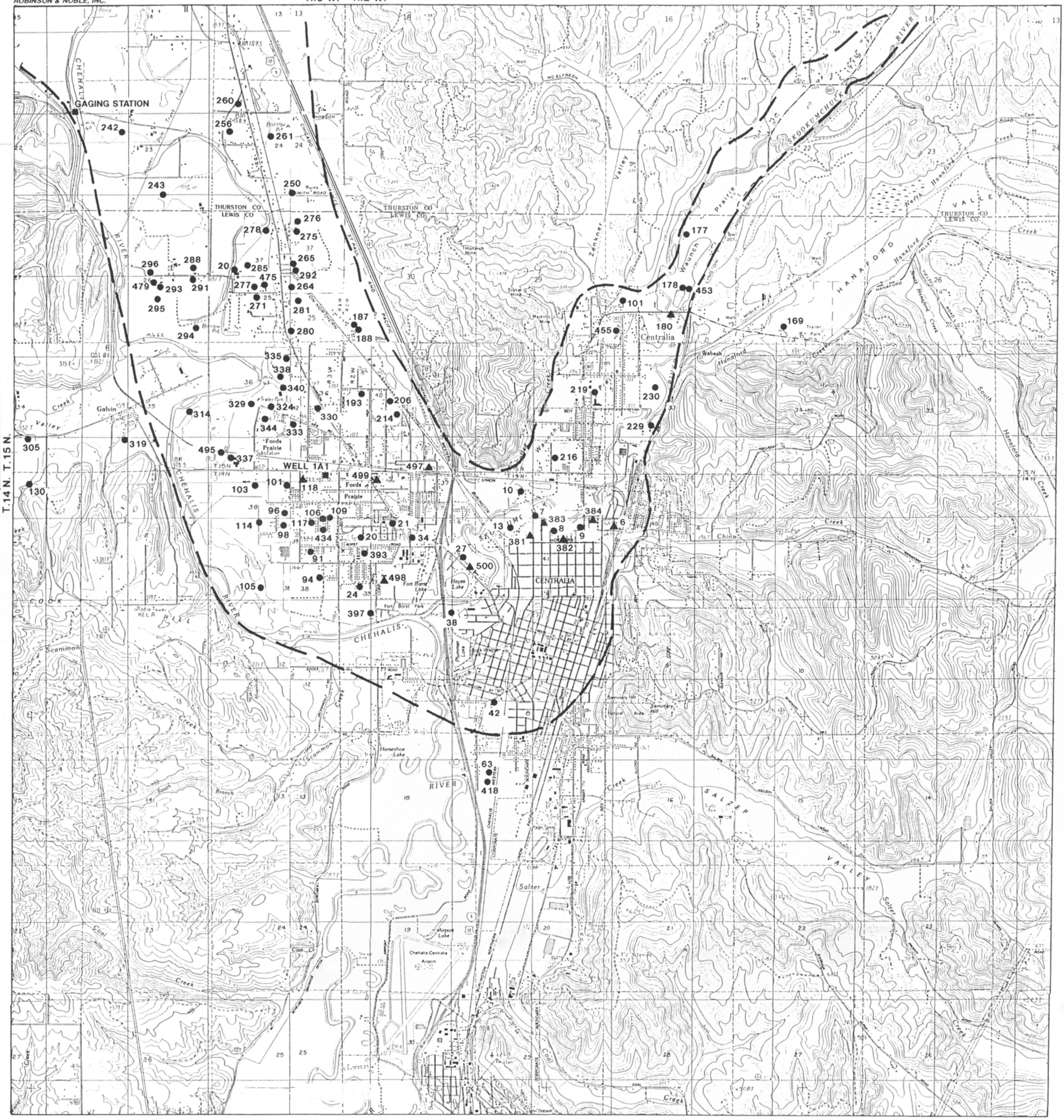
Appendix A.
Attachments from Robinson & Noble, 1992b

ROBINSON & NOBLE, INC. PLATE 1



BASE MAP TAKEN FROM USGS 7.5 SERIES

SCALE 1:24000

LEGEND

BOUNDARY OF GLACIAL OUTWASH AQUIFER

● RECORDED WELL: POTENTIAL YIELD > 200 GPM (LISTED IN TABLE 1)

▲ CITY OF CENTRALIA WELLS

■ WELL 14/3W-1A1 (USGS REFERENCE WELL -- SEE TEXT)

Attachment 1. *CITY OF* **CENTRALIA**

PRINCIPAL AQUIFER AREA SHOWING WELLS GREATER THAN 200 GPM

Table 1:
Wells with Potential Yield of >= 200 GPM

Ref#	Local #	Owner	Depth	SWL	Q/s	Pot. Yield
006	14N/02W-04E	NORTH PACIFIC RR	57	36.0	33.3	462
007	14N/02W-05F	LAURILA	93	17.0	18.4	926
008	14N/02W-05G	LAURILA	88	17.0	26.6	>1000
009	14N/02W-05H	LAURILA	72	17.0	17.8	647
010	14N/02W-05C	COLEMAN	57	13.0	10.0	290
013	14N/02W-05F	BANICK	59	16.0	20.0	567
020	14N/02W-06E	MTN VIEW CEMETERY	51	24.6	90.0	>1000
021	14N/02W-06F	COLUCCIO	80	65.0	35.0	346
024	14N/02W-06N	GRAINGER	56	12.0	15.0	435
027	14N/02W-06J	CENTRALIA SCHOOLS	65	15.0	172.4	>1000
034	14N/02W-06G	BOYER	51	18.0	60.0	>1000
038	14N/02W-07A	GIROU	40	20.0	40.0	528
042	14N/02W-08N	HOERLING	53	15.0	46.0	>1000
063	14N/02W-17E	GRIFFITH	53	12.0	11.6	315
084	14N/02W-25Q	BANIC, J	55	23.5	21.3	443
091	14N/03W-01K	ROBBINS, C	50	16.5	33.3	737
094	14N/03W-01R	GOODMAN, T E	52	15.0	13.3	325
096	14N/03W-01K	BIERWARD, F	49	16.5	34.0	729
098	14N/03W-01K	ZUBER & GIBSON	50	25.0	20.0	330
101	14N/03W-01B	STEELHAMMER, F H	47	24.0	48.0	380
103	14N/03W-01C	LEPRECHAUN	61	12.0	116.6	>1000
105	14N/03W-01P	COLEY, R	47	25.0	20.0	290
106	14N/03W-01H	GRILL, G	51	20.0	12.0	249
109	14N/03W-01H	JOHNSON, G	50	14.7	12.0	279
114	14N/03W-01F	ROBBINS, C	50	16.5	33.3	737
117	14N/03W-01H	JOHNSON, G	50	14.7	12.0	279
118	14N/03W-01B	CENTRALIA	69	19.0	200.0	>1000
130	14N/03W-03B	BECK, W	170	28.0	6.0	396
169	15N/02W-27P	STUEWE, H	39	7.0	12.0	205
177	15N/02W-28B	HILPERT, H	54	15.0	30.0	772
178	15N/02W-28K	ALBAUGH, J	40	11.0	20.0	382
180	15N/02W-28P	CENTRALIA	142	11.3	16.2	950
181	15N/02W-28M	ETTER, F J	98	35.0	11.2	362
185	15N/02W-29J	JOHNSON, S	56	26.0	23.3	308
187	15N/02W-30N	DULIN, L T	30	20.0	50.0	330
188	15N/02W-30N	PATTEE, A L	55	20.0	25.0	330
193	15N/02W-31E	ALMY, M A	57	17.0	11.6	308
206	15N/02W-31F	CUMMINS, R	56	15.0	15.0	405
214	15N/02W-31L	SCOTT, D	50	22.0	40.0	739
216	15N/02W-32Q	NYMAN, H	60	6.0	12.5	445
219	15N/02W-32H	PARRISH, T	59	3.0	11.5	427
229	15N/02W-33L	AGNEW, S J	80	9.0	80.0	>1000
230	15N/02W-33F	CHURCHILL, N J	53	17.0	14.2	339
242	15N/03W-23F	WHITTAKER, G A	55	14.0	29.3	716
243	15N/03W-23Q	SORENSEN, E M	30	10.0	1000.0	>1000
250	15N/03W-24Q	SMITH, C A	45	22.0	80.0	>1000
256	15N/03W-24E	HANCOCK, C	60	25.0	45.0	891
260	15N/03W-24D	NICHOLS, F	59	18.0	50.0	>1000

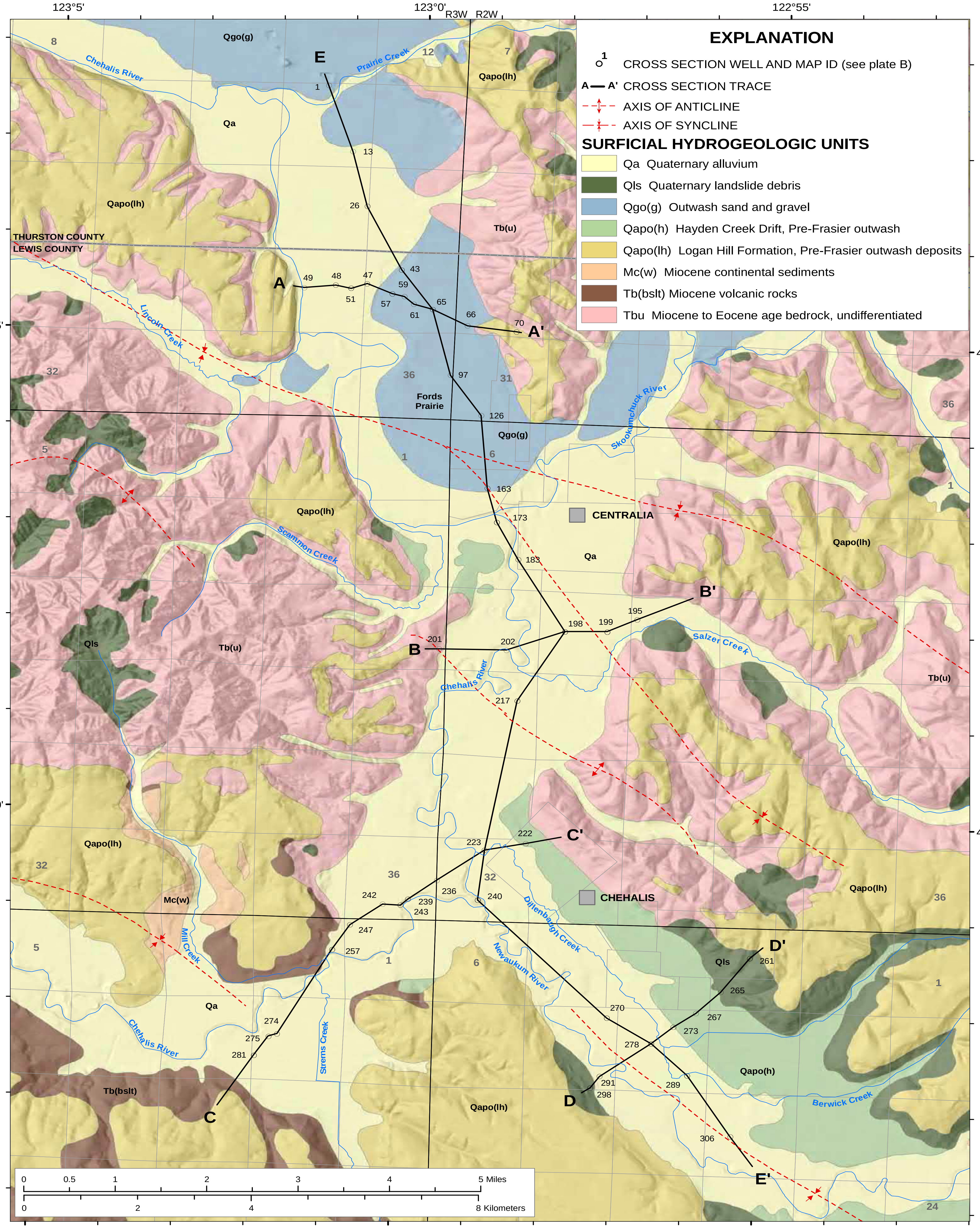
Depth = well depth, feet below surface
SWL = static water level, feet below surface
Q/s = specific capacity, gpm/ft of drawdown
Pot. yield = potential yield, in gpm

Table 1 (cont.)

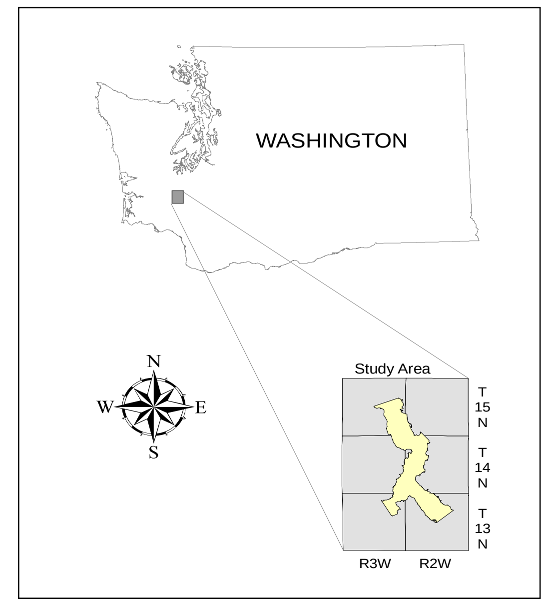
Ref#	Local #	Owner	Depth	SWL	Q/s	Pot. Yield
261	15N/03W-24F	HERSHMAN, J	50	25.0	20.0	330
262	15N/03W-25E	NORQUIST, P	61	25.0	25.0	594
264	15N/03W-25K	JOHNSON, K	55	20.0	60.0	>1000
265	15N/03W-25G	ALBAUGH, P	50	18.0	30.0	633
271	15N/03W-25L	CAIN, V F	69	17.0	50.0	>1000
272	15N/03W-25G	MYHR, S	75	23.0	12.0	380
275	15N/03W-25B	BISHOP, B C	80	22.0	100.0	>1000
276	15N/03W-25B	JOHNSON, R R	46	21.0	14.0	231
277	15N/03W-25L	DAVIS, M L	75	24.0	60.0	>1000
278	15N/03W-25C	BANK, B	80	22.0	25.0	858
280	15N/03W-25Q	SEROSHEK, L	49	18.6	18.3	373
281	15N/03W-25K	DAMME, R P	50	22.0	60.0	>1000
285	15N/03W-25F	PETERSON, L	61	27.0	30.0	673
288	15N/03W-26H	TICKNOR, R C	60	10.0	33.3	572
291	15N/03W-26H	WATSON, F H	35	15.0	17.5	231
293	15N/03W-26K	TEETER, C	53	9.0	60.0	910
294	15N/03W-26R	QUARNSTROM, R G	60	8.0	20.0	686
295	15N/03W-26K	PRATLEY, H L	42	8.0	20.0	290
296	15N/03W-26G	PERKS, G	49	21.0	25.0	462
298	15N/03W-27C	WOOD, G	70	25.0	16.0	475
302	15N/03W-33L	TRAMMELL, B	62	37.0	18.0	297
305	15N/03W-34K	MOHR, L	120	11.0	18.0	344
314	15N/03W-35H	BUSEK, D	35	18.0	50.0	561
317	15N/03W-35L	BLACK, S	36	17.0	20.0	250
324	15N/03W-36L	JOHNSON, K	50	22.0	12.5	231
329	15N/03W-36F	SWOPE, C G	63	23.0	25.0	660
330	15N/03W-36H	STEVENS, J	66	18.0	10.0	316
333	15N/03W-36K	REISINGER, C	54	20.0	31.2	577
335	15N/03W-36B	COLUCCIO, RP	80	28.0	16.6	572
337	15N/03W-36N	STEELHAMMER, P M	43	18.0	120.0	>1000
338	15N/03W-36B	STEELHAMMER, P M	58	12.0	20.0	435
340	15N/03W-36G	ZANDECKI, J	50	15.0	25.0	577
344	15N/03W-36L	SWOPE, C G	63	20.0	15.0	425
357	14N/01W-26B	CHARLES NUGENT	84	10.0	12.0	586
381	14N/02W-05F1	CITY OF CENTRALIA	90	15.0	28.3	467
382	14N/02W-05G1	CITY OF CENTRALIA	84	13.0	14.4	277
383	14N/02W-05G2	CITY OF CENTRALIA	88	15.0	48.8	838
384	14N/02W-05H1	CITY OF CENTRALIA	68	11.0	23.6	498
393	14N/02W-06M4	E.E. SIEMERS	49	15.4	20.0	443
397	14N/02W-07C2	B. HARTMAN	51	30.0	20.0	277
418	14N/02W-17E1	L SANTEE	50	8.8	11.6	317
434	14N/03W-01H1	A. OSBORN	57	34.0	257.5	>1000
453	15N/02W-28K1	L. ALBOUGH	27	11.0	81.8	864
455	15N/02W-28N4	D.O. CODEY	36	9.0	100.0	>1000
475	15N/03W-25L3	E.L. TICKNOR	52	24.7	140.0	>1000
479	15N/03W-26K3	I. MATHENY	53	18.7	60.0	526
483	15N/03W-34C1	E.S. ANDREWS	103	5.0	17.0	>1000
495	15N/03W-36N1	P. NIX	65	13.0	120.0	>1000
497	14N/02W-06B	CITY OF CENTRALIA	87	13.2	?	>200?
498	14N/02W-06J	CITY OF CENTRALIA	81	19.5	?	>200?
499	14N/03W-06C	CITY OF CENTRALIA	96	18.4	24.5	674
500	14N/02W-05M	CITY OF CENTRALIA	80	11.8	100.0	>1000

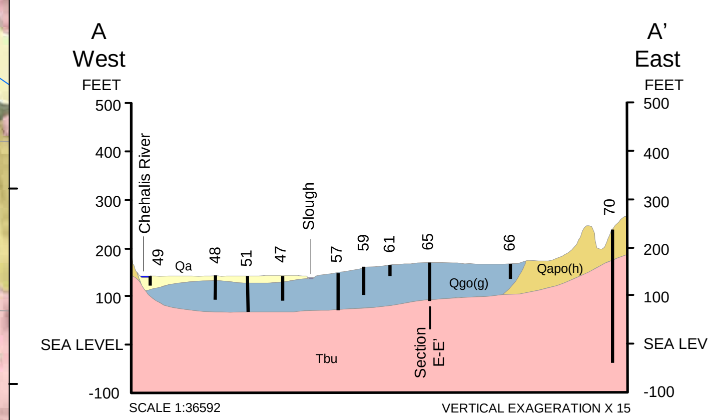
Depth = well depth, feet below surface
SWL = static water level, feet below surface
Q/s = specific capacity, gpm/ft of drawdown
Pot. yield = potential yield, in gpm

Appendix B.
Hydrogeologic Data Plate from Pitz and Others, 2005



Base from U.S. Geological Survey Digital Data; 1:100,000
Hillshade-modified from 30-meter USGS digital elevation model data; 1:100,000
Surficial geology-modified from Logan, 1987; Schasse, 1987; and Walsh et al, 1987; 1:100,000

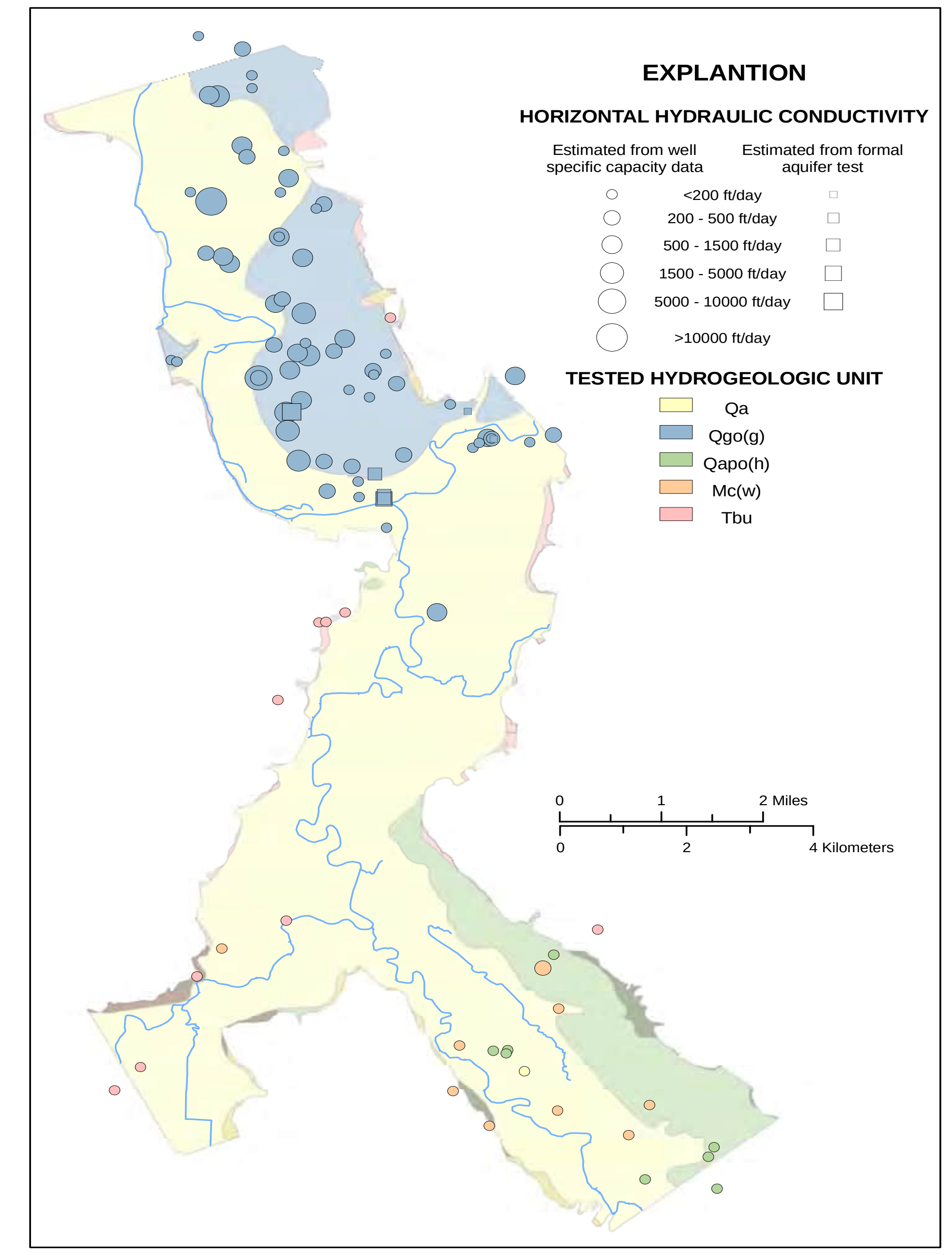


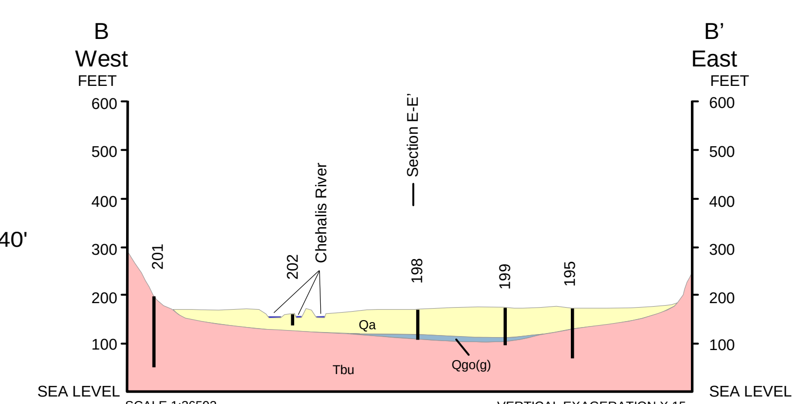


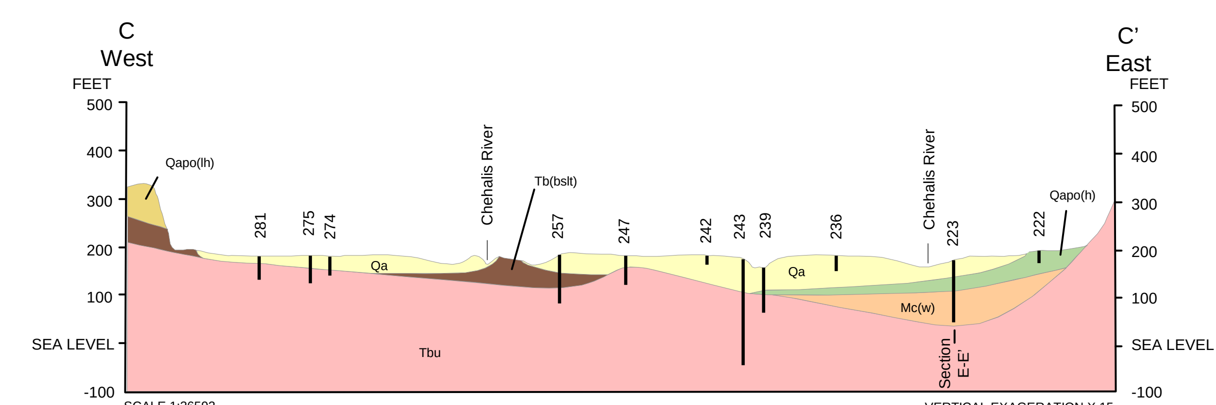
HYDROGEOLOGIC UNIT CHARACTERISTICS

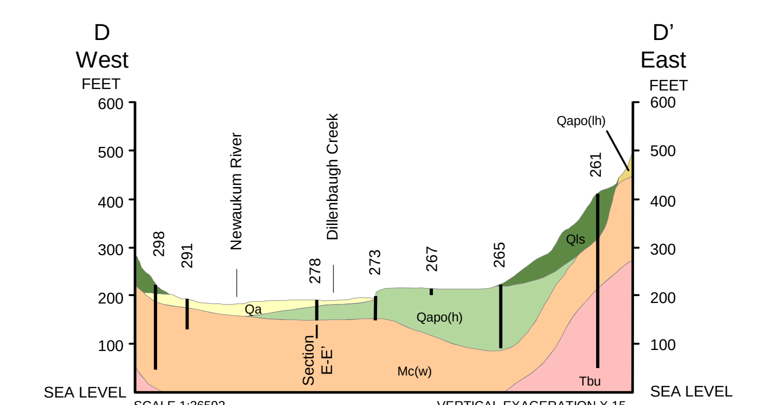
Period	Epoch	Geologic Unit	Hydrogeologic Unit	Lithology and hydrologic characteristics of hydrogeologic units	Hydrogeologic unit, thickness range (and average) (feet)	Number of inventoried wells fully penetrating unit
Quaternary	Holocene	Alluvium	Qa	Broadly distributed accumulations of clay, silt, sand, and fine gravel deposited within stream channels and upon area flood plains by modern rivers. Fine grained glacio-lacustrine deposits of Vashon age are difficult to distinguish from, and are therefore included with this unit south of the Skookumchuck/Chehalis River confluence. The coarser sand and gravel fractions of this unit may be a productive aquifer where saturated.	1 to 80 (22)	101
		Landslide deposits	Qls	Typically unstratified, poorly sorted, and often hummocky appearing deposits of clay, silt, sand, gravel and soil, with occasional larger cohesive blocks that slumped or were otherwise disturbed through mass wasting processes. This unit is widely distributed along the foothills of the Newaukum river valley and within the uplands bordering the Chehalis river valley.	52 to 98	2
	Pleistocene	Outwash gravels and sand, Vashon Stade of Frasier Glaciation Penultimate Drift, Pre-Frasier, (Lea, 1984) Pre-Frasier drift, undifferentiated	Qgo(g)	The principal aquifer unit within the Chehalis and Skookumchuck River valley bottoms north of Salzer Creek. Unit comprised of poorly to well sorted deposits of coarse to medium gravel and sand, cobbles, and occasional boulders, with localized accumulations of interstitial silt or clay. The upper portion of the unit is generally fresh and little weathered while the lower portion may be iron stained and locally weakly cemented. A thin discontinuous till(?) layer is present between the upper and lower portions of the unit in some wells.	6 to 91 (56)	28
		Hayden Creek drift	Qapo(h)	Widely distributed aquifer unit within the Chehalis and Newaukum River valleys generally south of Salzer Creek. Unit composed of poorly sorted weathered to relatively un-weathered sand, gravel, and occasional cobbles, locally cemented, in a matrix of yellow-brown to yellow-green-gray silt or clay. Iron staining of gravel and sand common. The gravel is generally well rounded and is composed of local volcanic rock types.	19 to >134 (37)	32
		Logan Hill Formation	Qapo(lh)	Widely distributed unit that caps many of the western and eastern foothills bordering the major river valleys of the study area. Comprised of yellow-gray to yellow-brown sand and gravel of local origin, often cemented, with interspersed sand and clay lenses. The upper surface of this unit is often deeply weathered to a red or red-brown clay soil. Where saturated, the less weathered basal sands and gravels can be an important aquifer.	19 to 76 (57)	5
Tertiary	Eocene to Miocene	Wilkes(?) Formation (Miocene)	Mc(w)	Widely distributed deposits of thinly bedded to massive blue-gray to blue-green clay with lenses of silt or fine sand and occasional plant and/or carbonized wood fragments, that overlie bedrock deposits throughout much of the Chehalis and Newaukum River valleys south of Salzer Creek. The thicker sand interbeds may contain appreciable quantities of confined, often poor-quality groundwater. Fine grained glacio-lacustrine deposits of Vashon age are difficult to distinguish from, and are therefore lumped with this unit in some areas.	8 to >364 (176)	6
		Columbia River Basalt Group (Miocene)	Tb(bslt)	Typically massive but locally vesicular or jointed, fine grained to finely porphyritic black to dark gray basalt. When exposed to weathering the upper surface of this unit is often reduced to reddish-brown clay soil. May yield small but usable quantities of water where fractured.	4 to 59 (25)	4
		Astoria Formation (Miocene) Lincoln Creek Formation (Oligocene) Skookumchuck Formation (Eocene)	Tbu	Marine, brackish water, and freshwater sandstones, siltstones, shales, claystones, and conglomerate beds (locally interbedded with basalt, tuff, or other volcanic rock types), that underlie the surrounding foothills and form the basal confining unit for the study area. The marine facies often contain fossil shells while the non-marine deposits contain appreciable coal seams and wood fragments. This unit is generally consolidated and produces little water, although secondary fractures may yield small but usable quantities of often poor quality water to wells.	Unknown	None

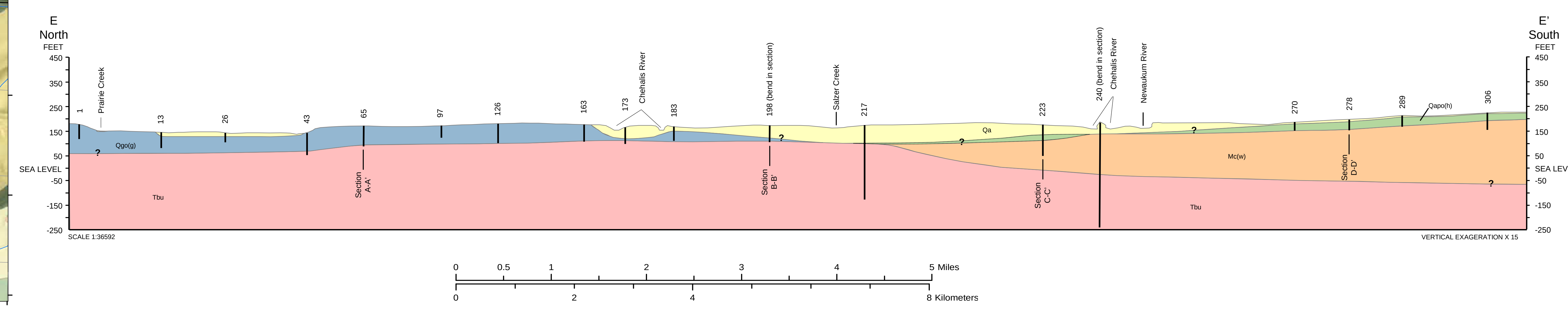
HYDRAULIC CONDUCTIVITY DISTRIBUTION BY WELL











Attachment 2. HYDROGEOLOGY, HYDROGEOLOGIC CROSS SECTIONS, AND HYDRAULIC CONDUCTIVITY DISTRIBUTION, CENTRALIA-CHEHALIS AREA, LEWIS AND THURSTON COUNTIES, WASHINGTON

By

Charles F. Pitz, Kirk A. Sinclair, and Adam J. Oestreich

Appendix C. 2022 Borst Park Wells 1 and 2 Rehabilitation and Testing Results

MOTT MACDONALD

Andy Oien
City of Centralia Public Works
110 North Tower Avenue
Centralia, WA 98531

Our Reference
507107008

Mott MacDonald
1601 5th Avenue
Suite 800
Seattle
WA 98101
United States of America

mottmac.com

Borst Park Wells 1 and 2 Rehabilitation & Testing Results
City of Centralia

February 16, 2023

Dear Mr. Oien,

This letter documents results of the redevelopment and testing of the City of Centralia's (the City) Borst Park Wells 1 and 2. The Borst Park wells were installed in 1993 and used for municipal water supply until roughly 2000, when they were determined by the Washington State Department of Health (DOH) to be groundwater in hydraulic connection with surface water. This designation requires additional disinfection treatment, and therefore following this designation the wells have remained idle.

To support future growth, the City has recently applied for additional groundwater rights in the Borst Park area (water rights application G2-30763) and wants to better understand the current capacity of Borst Park Wells 1 and 2. Figure 1 shows the location of the Borst Park wells, and Figure 2 is their combined well log. When installed, initial well testing identified a strong hydraulic connection between the source aquifer and the Chehalis River, and recommended operational pumping rates were between 800 (Borst Park Well 1) and 1000 gpm (Borst Park Well 2) (Robinson and Noble, 1993). In September 1994 the recommended pumping rate for BP-1 was revised to between 500 and 800 gpm following an initial operation period where both BP-1 and BP-2 were pumped at 1000 gpm (Robinson and Noble, 1994).

To understand the Borst Park wellfield's present-day capacity, both wells were redeveloped and step-rate tested in 2022 to define their current yields in comparison to prior yields. The final pumping step of the Borst Park Well 2 test continued at a constant rate for an additional 21.5 hours to further define the local river-aquifer relationship. The following letter summarizes findings from the 2022 redevelopment and testing work performed at the Borst Park wellfield. This work was performed, and this report prepared using generally accepted hydrogeologic practices used at this time and in this vicinity for exclusive application to the study area and for the exclusive use the City of Centralia. This is in lieu of other warranties, express or implied.

1 Source Well Redevelopment

Holt Services was hired to redevelop and test both Borst Park Well 1 (BP-1) and Borst Park Well 2 (BP-2). Redevelopment of the wells occurred between October 17 and October 28, 2022. Prior to redevelopment, Holt Services removed the existing pump from each well and downhole-video logged both wells to document their condition (video-log summaries are included in Attachment 1). Varying degrees of plugging were observed in both well screens along with substantial sedimentation in the tailpipes; however, significant structural degradation was not observed[1], and therefore redevelopment was pursued.

A cable-tool drill rig was used to redevelop both wells and applied brushing, swabbing, and surging techniques. Redevelopment generally consisted of brushing to loosen and remove particulate matter inside the well screen and casing, followed by swabbing and surging to agitate and dislodge fine-grained materials from the well screen and surrounding formation. Swabbing and surging of the well screens generally occurred over 2-foot intervals and continued until each interval no longer produced significant sand or fine-grained material. In total, approximately 24 hours of surging and redevelopment occurred on each well.

2 Source Well Testing Approach

Well testing was performed in a manner consistent with the aquifer test plan (Mott MacDonald, 2022)[2], which should be referred to for additional details and procedural information. In summary, the following test approach was applied:

1. Baseline water level monitoring occurred from October 16 to November 17 during well redevelopment and prior to aquifer testing. During this monitoring period water levels at TW-1 (a test well approximately 16 feet away from BP-2) and the Nick Road Test Well were monitored primarily by transducer, while Chehalis River stage data from the Mellen Street Bridge were downloaded from the Lewis County Rivers website. These monitoring locations are shown in Figure 1, and Figure 3 presents water level measurements for these locations during the baseline monitoring period and later test periods. Because BP-1 and BP-2 were either actively being redeveloped prior to testing or had test pumps being installed/removed, the wells were mostly inaccessible during the baseline monitoring and therefore have shorter background water level monitoring periods.
2. BP-2 was step-rate tested for three hours on November 17, with each step occurring for approximately one hour. Pumping rates for the three different steps were 380, 834, and 1085 gpm. The purpose of the step-rate test was to measure well yield and drawdown at BP-2 post-redevelopment for comparison against values measured when the well was installed. The final

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[1] An initial video-log interpretation of a hole possibly being present in the casing of BP-1 at 36.4 feet below top of casing was later deemed inaccurate since the well did not produce coarse-grained material during initial and subsequent brushing and surging.

[2] Minor field modifications made to the test plan include test discharge water being conveyed to a silt and clay-bottomed swale east of the wells draining to the Chehalis River, and that some water quality samples initially proposed for sampling (including alkalinity, the inorganic chemical panel, and PFAS) were not collected.

1085 gpm pumping step continued at a constant rate for an additional 21.5 hours (yielding a total pumping duration of 24.5 hours) to further characterize aquifer hydraulic properties and the local river-aquifer relationship[3]. Water level monitoring occurred at the three baseline monitoring locations and at BP-1 and BP-2 during the test. Water quality samples were collected from BP-2 at the end of the constant-rate pumping period.

3. Water level recovery data were collected following the BP-2 aquifer test at each well monitored until at least 95% of drawdown recovery was achieved.
4. Pre-test water level data were collected from the three baseline monitoring locations prior to the BP-1 well test.
5. BP-1 was step-rate tested for three hours on November 30th, with each step occurring for approximately one hour. Tested pumping rates were 398, 619, and 816 gpm. Pumping at the final rate of the step test was continued for an additional 1.3 hours, resulting in a total pumping duration of 4.3 hours. A longer duration constant-rate test was not performed at BP-1 since its primary redevelopment objective was defining its current production capacity rather than broader aquifer characterization in the Borst Park wellfield area (which was assessed by Robinson and Noble (1993) and the 2022 BP-2 aquifer test). For the BP-1 step-rate test, water level monitoring occurred at the three baseline monitoring locations, BP-2, and the pumping well. Water quality samples were collected from BP-1 at the end of the step-rate test.
6. Water level recovery data were collected following the BP-1 step-rate test at each well monitored until at least 95% of drawdown recovery was achieved.

3 Aquifer Test Results

Water level data corrections, drawdown plots, estimated aquifer hydraulic parameters, and chemistry data for each test are presented in the following subsections.

3.1 Borst Park Well 2 Aquifer Test Summary and Data Corrections

The BP-2 step-rate and constant-rate test occurred from November 17 to 18, 2022, when the stage of the Chehalis River was relatively stable. Water level transducer data were corrected to remove barometric trends and compared to manual measurements to verify their accuracy. Figure 4 presents drawdown data from BP-2, BP-1, and TW-1 during the pumping and recovery period of the BP-2 well test. Though aquifer water levels were slowly decreasing during the BP-2 test period (in conjunction with the Chehalis River, Figure 3), the magnitude of pumping-induced drawdown at BP-2, BP-1, and TW-1 greatly exceeded the background water level trend (by a range of approximately 6 to 10 feet); therefore no background water level trend corrections were made for these wells.

Figure 5 plots drawdown and specific capacity[4] values measured during at BP-2 during the step-rate test, and compares them to previously measured values from

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[3] Aquifer testing and analysis occurred for both BP-2 and BP-1 in 1993. Prior testing included step-rate tests on both wells, a 22-hour constant rate test at BP-2, and a 4-hour constant rate test at BP-1 (Robinson and Noble, 1993). Both constant rate tests documented a significant decrease in the rate of drawdown (likely due to river boundary effects) within 20 minutes or less of the start of pumping.

[4] Specific capacity for a pumping well equals its pumping rate (in gpm) divided by its drawdown (in feet). Specific capacity values vary with pumping rate and with duration of pumping.

1993. The 2022 observed drawdown and specific capacity values are similar to the 1993 values, indicating that redevelopment was successful and BP-2 should have a similar production capacity as when it was installed.

Figure 6 presents observed water level and drawdown data from the Nick Road Test Well during the BP-2 test. Pre- and post-test water levels from the Nick Road well indicate a slowly decreasing background water level trend was also occurring at this well. However, because only a limited amount of pumping drawdown was observed at the well, a linear correction was performed to remove the background water-level trend from the Nick Road Test Well's drawdown data. The lower plot on Figure 6 graphs the corrected drawdown data for the test well.

3.2 Borst Park 1 Step-Rate Test Summary and Data Corrections

The BP-1 step-rate test occurred on November 30, 2022, when the stage of the Chehalis River was increasing due to a significant storm event (Figure 3). Water level transducer data were corrected to remove barometric trends and compared to manual measurements to verify their accuracy. Due to rapidly rising aquifer water levels during the test period, linear trend corrections were applied to BP-1 and BP-2 drawdown data. Figure 7 presents an example plot of the linear background trend observed at BP-2 well before and after the test period, as well as corrected and uncorrected drawdown data for BP-1 and BP-2.

Trend-corrected drawdown data for BP-1 were used to calculate its 2022 specific capacity values. Figure 8 compares 1993 drawdown and specific capacity values for BP-1 with calculated 2022 values. The 2022 values are similar to the 1993 values, which indicate that redevelopment was successful and BP-1 should have a similar yield as when it was installed.

No drawdown was observed at the Nick Road Test Well during the BP-1 step-rate test; this could potentially be due to the well being farther from BP-1 than BP-2, BP-1 being pumped at a lower rate than BP-2, and/or that the strong river-rising condition during the BP-1 test prevented drawdown from extending past the Chehalis River.

3.3 Aquifer Test Data Analysis

Pumping rate and corrected drawdown data from BP-1, BP-2, and TW-1 were entered into the commercial software package Aqtesolv to estimate aquifer parameter values. Aqtesolv provides technically valid aquifer parameter analysis for both step-rate tests and step-rate tests that transition into constant-rate tests, and enables test data to be evaluated using multiple analytical solutions for aquifer test data. If an analytical solution that applies reasonable aquifer parameters closely matches observed test data, a higher degree of confidence is associated with predictions made with the solution. Because prior testing characterized the aquifer as confined with a river connection, analytical solutions for confined and leaky confined aquifers that can incorporate river boundary effects were selected for aquifer parameter estimation.

Table 1 presents aquifer parameter values estimated using several analytical solutions which apply a variety of assumptions regarding aquifer boundary conditions. Ideally, one analytical solution and parameter set would closely match drawdown data from both the BP-2 and BP-1 tests. Figure 9 presents best-fit solution matches for the BP-1 and BP-2 tests. For the BP-1 test, the Dougherty-Babu solution for a confined aquifer with a river boundary condition yields the best match between predicted drawdown (solid lines) and observed drawdown (symbols), with a transmissivity value of 53,000 gpd/ft and storage coefficient of

0.00013. However, this solution did not appropriately match drawdown at BP-1 during the first and second pumping steps, and was not the best-fit solution for drawdown data from the BP-2 test. BP-2 test data were best matched by the Moench leaky aquifer solution with a river boundary condition (with a calculated transmissivity of 82,500 gpd/ft and a storage coefficient of 0.0013); however, this solution does not reasonably match the observed drawdown that occurred at BP-1 during the BP-2 test. Therefore, it appears that sufficient local aquifer heterogeneity is present and/or existing analytical solutions do not adequately capture the complexity of the local stream-aquifer relationship to allow for one analytical solution and parameter set to apply.

Because of this, the range of transmissivity and storage parameters presented in Table 1 reflect the potential range of reasonable aquifer parameter values for the Borst Park well field area. Best-fit solutions and their parameter values are highlighted in Table 1. Prior transmissivity and storage estimates from the 1993 well testing are also included in Table 1, and likely have higher transmissivity estimates because neither leakage or river boundary effects are incorporated into the analytical solution previously applied.

3.4 Chemistry Data

Laboratory water quality sampling results for BP-1 and BP-2 are attached in Appendix 1. Both wells were sampled for the following constituents (and analyzed by a state-accredited lab) unless otherwise noted:

- Coliform Bacteria
- Complete Volatile Organic Chemicals
- Gross Alpha and Radium 228 Radionuclides (at BP-2)
- Complete Synthetic Organic Chemicals
- Herbicides and Pesticides
- Ammonia
- Total Organic Carbon

No drinking water quality exceedances were detected, with the exception of the BP-2 coliform bacteria sample. Coliform was detected at a concentration of 3 CFU/100 mL in this sample, which exceeds the state water quality criteria of 0 CFU/100 mL. Unintentional coliform contamination can easily occur during sampling, as accidental contact between the interior of the bottle or its lid with any surface (the sample tube, a gloved hand, a grass blade, etc) can cause it. A review of field sampling protocols found that the test pump, its drop-pipe, and the end of the sample tube were disinfected prior to sampling, however the nozzle that the sample tube connected to was not. Therefore, the positive coliform detection is most likely due to sampling error.

4 Wellfield Drawdown Assessment

Because a single aquifer parameter set representative of the Borst Park well field area was not identified, estimates of future drawdown used to define a target well field yield were calculated using drawdown curve extrapolation and the principle of superposition.

Corrected drawdown curves from Figures 4, 7, and 9 were extrapolated to 100 days to estimate the likely amount of drawdown at the pumping wells if they are pumped simultaneously for 100 days. For each well, the maximum extrapolated 100-day drawdown estimate was assumed[5]. Based on the proximity of the well field to the Chehalis River and its documented hydraulic connection, we assume that after 100 days of pumping no additional drawdown occurs (potentially due to a high-flow river event, aquitard leakage, and/or seasonal aquifer recharge).

Table 2 presents drawdown estimates at Borst Park Wells 1 and 2 for several scenarios where a seasonal low water table condition[6] is assumed and both wells are pumping together. A brief summary of each projected future scenario and its associated assumptions follows:

- Scenario 1 assumes BP-1 and BP-2 are pumped together at their tested rates (816 and 1085 gpm) for 1 day. Drawdown due to BP-1 pumping was extrapolated from 4.5 hours to 1 day to estimate the 1-day specific capacity at BP-1 and the 1-day specific drawdown[7] at BP-2. The reserve water height above each well screen (from the second to last row of the table) is predicted to be 0 feet at BP-1 and 3.1 feet at BP-2.
- Scenario 2 assumes BP-1 and BP-2 are pumped together at their tested rates (816 and 1085 gpm) continuously for 100 days. Pumping well drawdown and interference drawdown values for 100 days were conservatively estimated through curve extrapolation, causing the assumed specific capacity and specific drawdown values to change relative to Scenario 1. When both wells are pumped at their tested rates for 100 days during a low-water condition, the predicted BP-1 pumping water level is below the top of its screen, and therefore this pumping combination is not considered sustainable.
  Though not presented in Table 2, future drawdown at the Nick Road Test Well was also estimated for Scenario 2 through curve extrapolation (using the corrected drawdown curve presented in Figure 6). If BP-2 is assumed to pump alone at 1085 gpm for 100 days, 0.15 feet of drawdown is projected at the Nick Road Test Well. Though drawdown was not observed at the Nick Road well during the BP-1 step-rate test, a conservative estimate of its drawdown with both BP-1 and BP-2 pumping would be 0.3 feet (twice the projected drawdown of BP-2 pumping alone). This small amount of expected drawdown south of the Chehalis River indicates that wellfield pumping impacts primarily occur north of the river, and that river losses (and/or aquitard leakage) will limit the upstream propagation of drawdown.
- Scenario 3 applies 100-day specific capacity and specific drawdown values for BP-1 and BP-2, but assumes different pumping rates from Scenario 2. The pumping rate of BP-1 was assumed to be 600 gpm while BP-2 was assumed to be 1200 gpm. Because drawdown does not extend into either

[5] Greater projected drawdown values were obtained with extrapolation of the observed drawdown curves (Figures 4 and 7) compared to the analytical solution curves that incorporate late-time river boundary or leakage effects (Figure 9).

[6] Seasonal low water levels for BP-1 and BP-2 are assumed to be 19.5 and 22.5 feet bgs, which were their approximate depths to water on October 17, 2022. Chehalis River stage data between October 2007 and October 2022 from the USGS Grand Mound monitoring station were reviewed, and the lowest historical stages occurred in October 2007 and October 2022. All other years had minimum stage values at least 0.6 feet higher. Therefore, October 2022 aquifer water levels likely represent a conservative seasonal low water table condition, and possibly a historically low condition. For comparison, water levels at BP-1 and BP-2 at the start of the BP-2 aquifer test were approximately 1.8 feet higher than the October 2022 water levels.

[7] Specific drawdown equals the feet of drawdown observed in an observation well divided by the pumping well’s pumping rate (in gpm).

well screen, this scenario suggests a sustainable wellfield yield is approximately 1800 gpm. However, at these pumping rates the predicted amount of reserve drawdown (0.2 and 1.2 feet) above the screen tops is small.

- Scenario 4 applies 100-day specific capacity and specific drawdown values for BP-1 and BP-2 and assumes that a third hypothetical production well is installed in their vicinity (within roughly 200 feet of the existing wells). The hypothetical production well is assumed to have the same yield and drawdown characteristics as BP-2. Pumping rates between the three wells were then adjusted to estimate a maximum likely yield for the wellfield if a third well is installed. The predicted yield for the hypothetical wellfield is 2100 gpm, suggesting only a marginal gain in yield is likely if a third production well is installed in close proximity to the existing wells.

Based on existing data and conservative drawdown assumptions, initial target pumping rates for the Borst Park wellfield are 600 gpm at BP-1 and 1200 gpm at BP-2. This total wellfield yield (1800 gpm) is similar to the range recommended in 1994 (1500 to 1800 gpm), though individual well pumping rates differ. Although conservative assumptions have been incorporated into the drawdown analysis above, the low reserve water height estimated for Scenario 3 and previous drawdown issues mentioned in documentation from the wellfield's production period suggest that an operationally cautious approach is warranted until sufficient production data exists to better define the wellfield's sustainable yield.

5 Recommendations

Assuming that the City's water right application is approved, a CT6 treatment facility will be required before Borst Park wellfield water can be used for municipal supply. Because current projections suggest that drawdown could be limited during seasonal low-water conditions, a robust data collection system (where water levels and pumping rates in both wells are continuously monitored via SCADA) is recommended along with river stage monitoring. The proposed monitoring system would record pumping-well drawdown data over a longer duration and broader array of hydrologic conditions (both seasonally and with respect to river stage) than the existing 24-hour test data provides, with the intent being that the data are used to optimize the long-term operational capacity of the wellfield. Because individual well pumping rates potentially will require adaptive adjustments and could vary seasonally, we recommend the well pumps are equipped with programable variable frequency drives so pumping rates can be tested and modified as necessary to optimize yield. Inclusion of water level and pumping data from the Tennis Court wellfield (located approximately 1400 feet north-northwest of BP-2, and which the City currently monitors with SCADA) would be beneficial to this analysis since some interference drawdown between the two wellfields is known to occur[8]. Following approximately 12 months of wellfield operation, review and analysis of monitoring system data should be performed to assess wellfield yield and to identify wellfield operational guidelines (such as how much reserve water buffer should be present during pumping, if certain seasonal or river conditions merit different operational protocols/approaches, or if overlap between active pumping periods at the Tennis Court and Borst Park wellfields requires consideration due to interference drawdown effects). It is possible that the wellfield sustainable yield and operational

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[8] The initial aquifer test at the Tennis Court wellfield documented 0.75 feet of drawdown at the Borst Park wellfield (Robinson and Noble, 1996); during the 2022 BP-1 and BP-2 well and aquifer tests, SCADA water level data from the Tennis Court wellfield indicated up to 0.5 feet of drawdown occurred.

guidelines defined after one year of operations may require subsequent reanalysis and revision once multiple years of operations data exist.

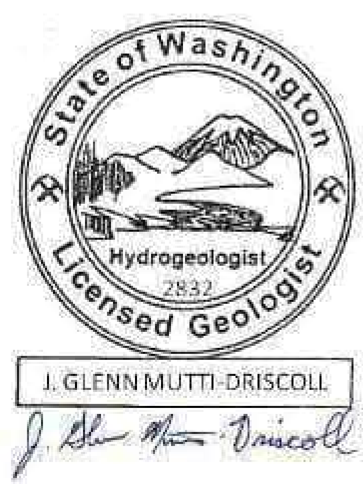
The monitoring system and analysis described above would also likely help with identifying favorable future pumping well locations in the Borst Park area. Water level monitoring from other City-owned wells in the Borst Park vicinity could also potentially assist with this assessment. Based on hypothetical yield estimates for the Borst Park wellfield with three pumping wells (Scenario 4 of Table 2), our current understanding is that future wells are likely have greater yields if they are located farther away (ie 500 feet or more) from the existing Borst Park wellfield.

6 Closing

We hope that this summary letter meets the City’s needs. Should you have any questions or need anything further, please contact us.

Sincerely,

Mott MacDonald



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Project Hydrogeologist

(206) 487-1310

jglenn.mutti-driscoll@mottmac.com

7 References

Mott MacDonald, 2022. DRAFT Aquifer Test Plan City of Centralia Borst Park Wells 1 & 2. Letter report addressed to Connor Lockwood at the Washington State Department of Health. October 22, 2022.

Robinson & Noble, 1993. Construction and Testing of Borst Park Production Wells 1 and 2, City of Centralia. Consultant’s report to City of Centralia. October, 1993.

Robinson & Noble, 1994. Findings from 1994 Drilling Program for the City of Centralia. Consultant’s report to the City of Centralia. September, 1994.

Robinson & Noble, 1996. Construction and Testing of the Tennis Court Production Well for the City of Centralia. Consultant’s report to City of Centralia. October, 1996.

Table 1. Estimated Aquifer Parameters for Borst Park Wells 1 and 2

Pumping Well	Solution	Aquifer Type	River Boundary Assumed?	T (gpd/ft)	Storage	SW	1/b' (ft^{-1})	B'/r (ft^{-1})	Comment
Borst Park Well 1	Moench	Leaky	Yes	47,500	4.1E-05	-3.5	3.5E-02	3.2E-02	BP-2 good fit, BP-1 fit poor
	Moench	Leaky	No	42,200	2.6E-04	-5	4.5E-01	3.9E-01	BP-2 reasonable fit, BP-1 poor fit
	Dougherty-Babu	**Confined**	**Yes**	**53,000**	**1.3E-04**	**-4.35**	**NA**	**NA**	**Good fit for both BP-1 and BP-2 in late-time**
	Dougherty-Babu	Confined	No	80,500	4.4E-04	-3.825	NA	NA	Reasonable drawdown magnitude for BP-1, late-time curve too steep for reasonable future projection.
	Cooper-Jacob	Confined	NA	129,000	4.0E-05	NA	NA	NA	Aquifer parameters from 1993 test, fit to first 10 minutes of pumping/recovery
Borst Park Well 2	**Moench**	**Leaky**	**Yes**	**82,500**	**1.3E-03**	**0**	**1.6E-03**	**3.1E-03**	**Best analytical solution fit for late-time test data. Good fit for TW-1, BP-1 fit poor.**
	Moench	Leaky	No	82,500	1.3E-03	0	3.6E-03	5.8E-03	Reasonable fit for TW-1, poor fit for BP-1. TW-1 late-time solution drawdown curve too flat for reasonable future projection.
	Dougherty-Babu	Confined	Yes	49,700	5.7E-04	-5	NA	NA	Reasonable fit for TW-1 and BP-1, late-time drawdonwn curves flatten too much for reasonable future projection.
	Dougherty-Babu	Confined	No	207,000	1.0E-05	-3.8	NA	NA	Worst solution fit for BP-2 test data, late-time drawdown curve too steep for reasonable future projection.
	Cooper-Jacob	Confined	NA	180,000	5.0E-04	NA	NA	NA	Aquifer parameters from 1993 test, fit to first 10 minutes of pumping/recovery

Notes:

[green highlight] Highlighted and bolded rows represent best-fit parameter sets and analytical solutions for each pumping well.

NA = Not Applicable because analytical solution does not calculate parameter and/or the boundary condition assumption is not incorporated in the solution

T = transmissivity

B'/r = aquitard leakage parameter 2

SW = wellbore skin factor (dimensionless)

1/b' = aquitard leakage parameter 1

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Table 2. Projected Borst Park Wellfield Pumping and Drawdown Scenarios

	Scenario 1		Scenario 2		Scenario 3		Scenario 4		
	2022 Interference Drawdown Projection, Day 1		2022 Interference Drawdown Projection, Day 100		2022 Target Pumping Rate Calculation, Day 100		Hypothetical 3-Well Pumping Rate Calculation (Day 100, Well 3 assumed a twin of BP-2)		
	BP-1	BP-2	BP-1	BP-2	BP-1	BP-2	BP-1	BP-2	BP-2 Twin
Seasonal Low Static Water Level (ft bgs)[1]	19.53	22.46	19.53	22.46	19.53	22.46	19.53	22.46	22.46
Top of screen (ft bgs)	38	40	38	40	38	40	38	40	40
Available Drawdown above Top of Screen (ft)	18.47	17.54	18.47	17.54	18.47	17.54	18.47	17.54	17.54
Pumping Rate (gpm)	816	1085	816	1085	600	1200	300	900	900
Specific Capacity (gpm/ft)[2]	69	106	63	92	63	92	63	92	92
Drawdown in pumping well (ft)	11.8	10.2	12.9	11.8	9.5	13.0	4.7	9.7	9.7
Specific Drawdown (ft/gpm)[3]	0.0061	0.0052	0.0073	0.0055	0.0073	0.0055	0.0073	0.0055	0.0055
Interference Drawdown from Other Pumping Well(s) (ft)	6.7	4.3	7.9	4.5	8.7	3.3	13.1	6.6	6.6
Reserve Water Height (ft above Top of Screen)	0.0	3.1	-2.3	1.3	0.2	1.2	0.6	1.2	1.2
Total Wellfield Pumping (gpm)	1901		1901		1800		2100		

Notes:

[1] Approximate depth to water on 10/17/22

[2] Specific Capacity = Pumping Rate (gpm) / Pumping Drawdown (ft)

[3] Specific Drawdown = Drawdown in Observation Well (ft) / Pumping Well Pumping Rate (gpm)

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Notes:

-Figure is adapted from Google Earth.

Figure 1

Borst Park Wellfield Vicinity

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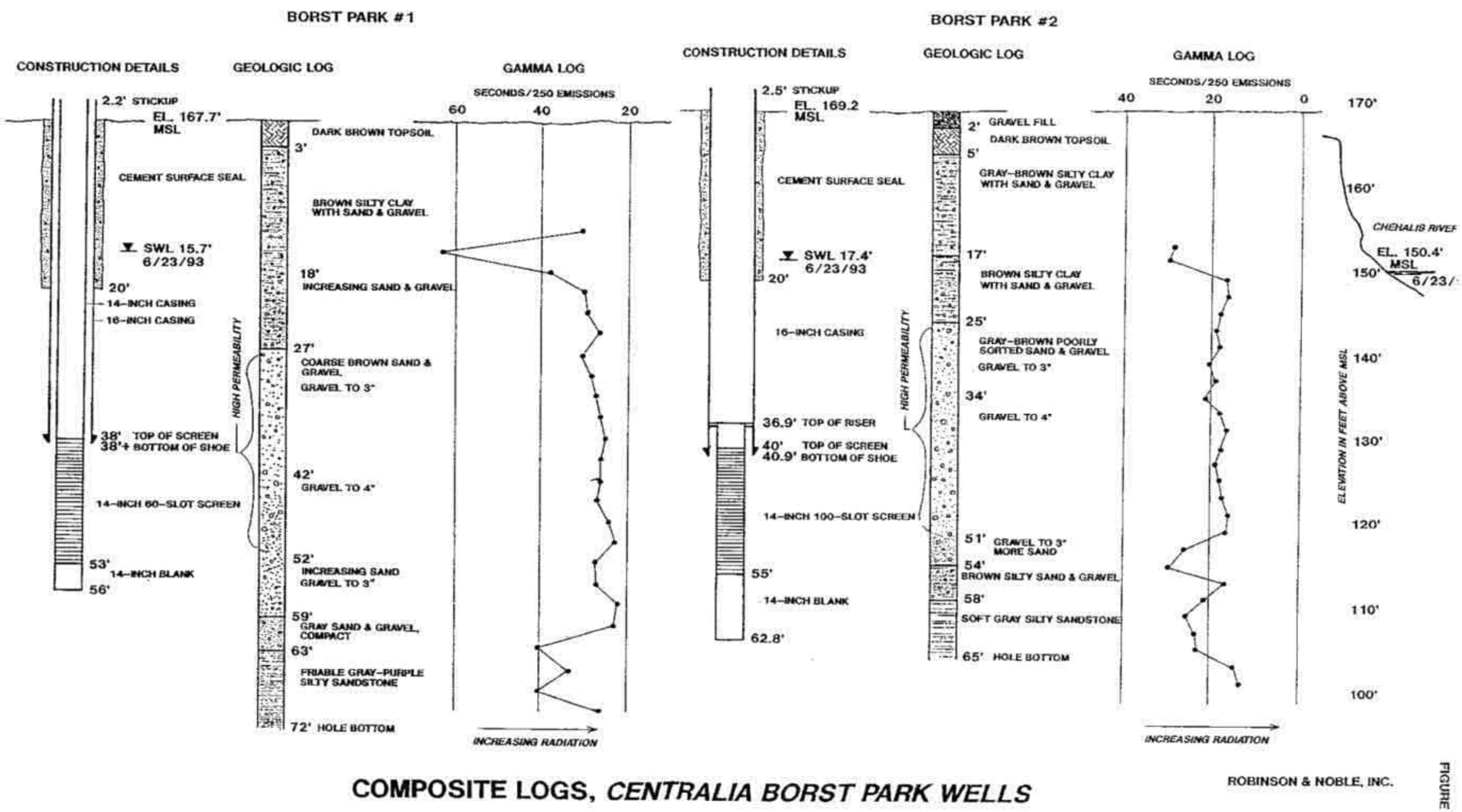

Notes:

-Figure is from Robinson and Noble (1993)

Figure 2
Borst Park Well 1 and 2 Construction Log

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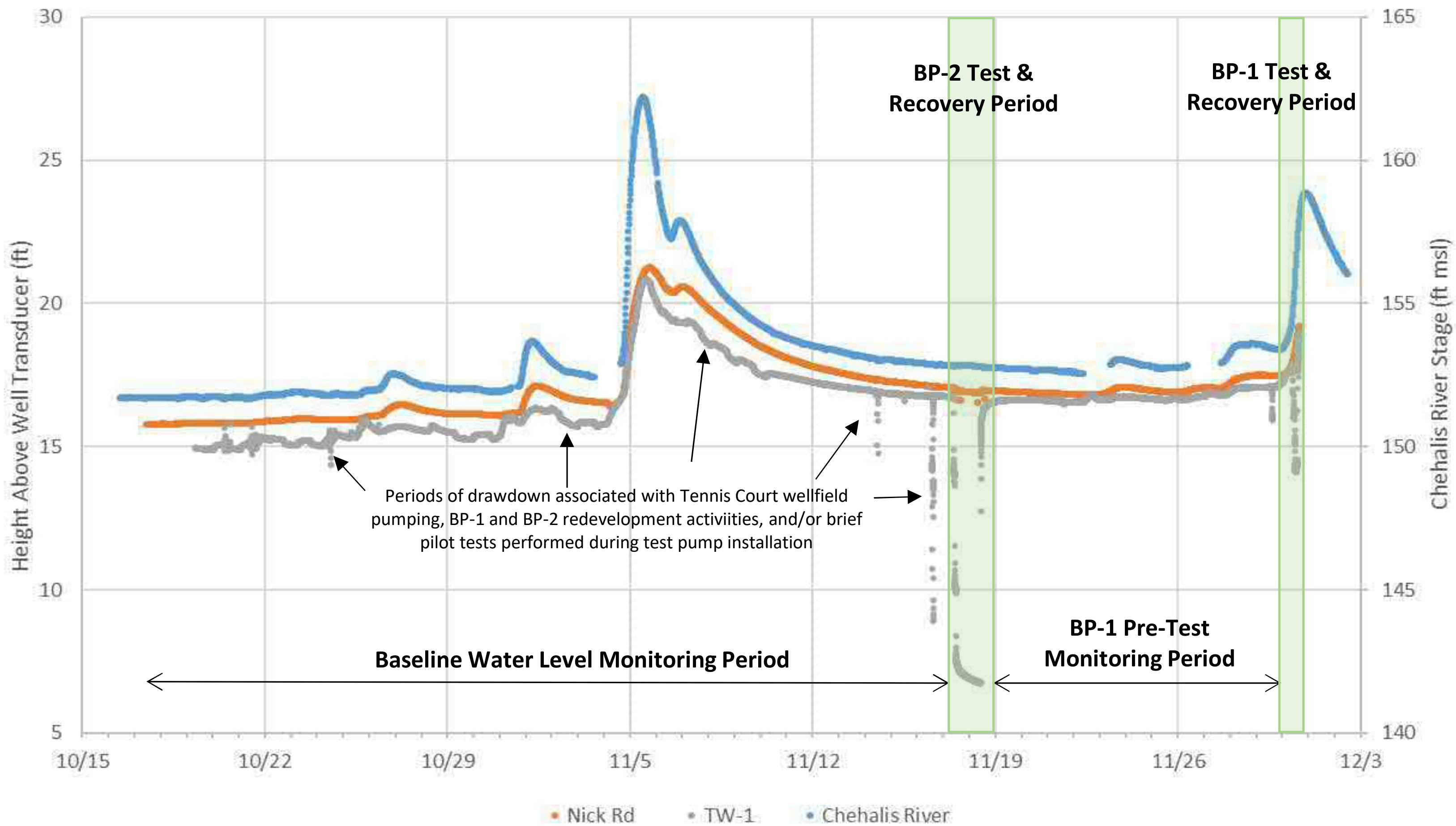

Notes:

-Chehalis River stage data were downloaded from the Lewis County Rivers website (https://rivers.lewiscountywa.gov/#/12025500) and are measured at the Mellen St Bridge.

Figure 3
Water Level Data from Baseline Monitoring Points

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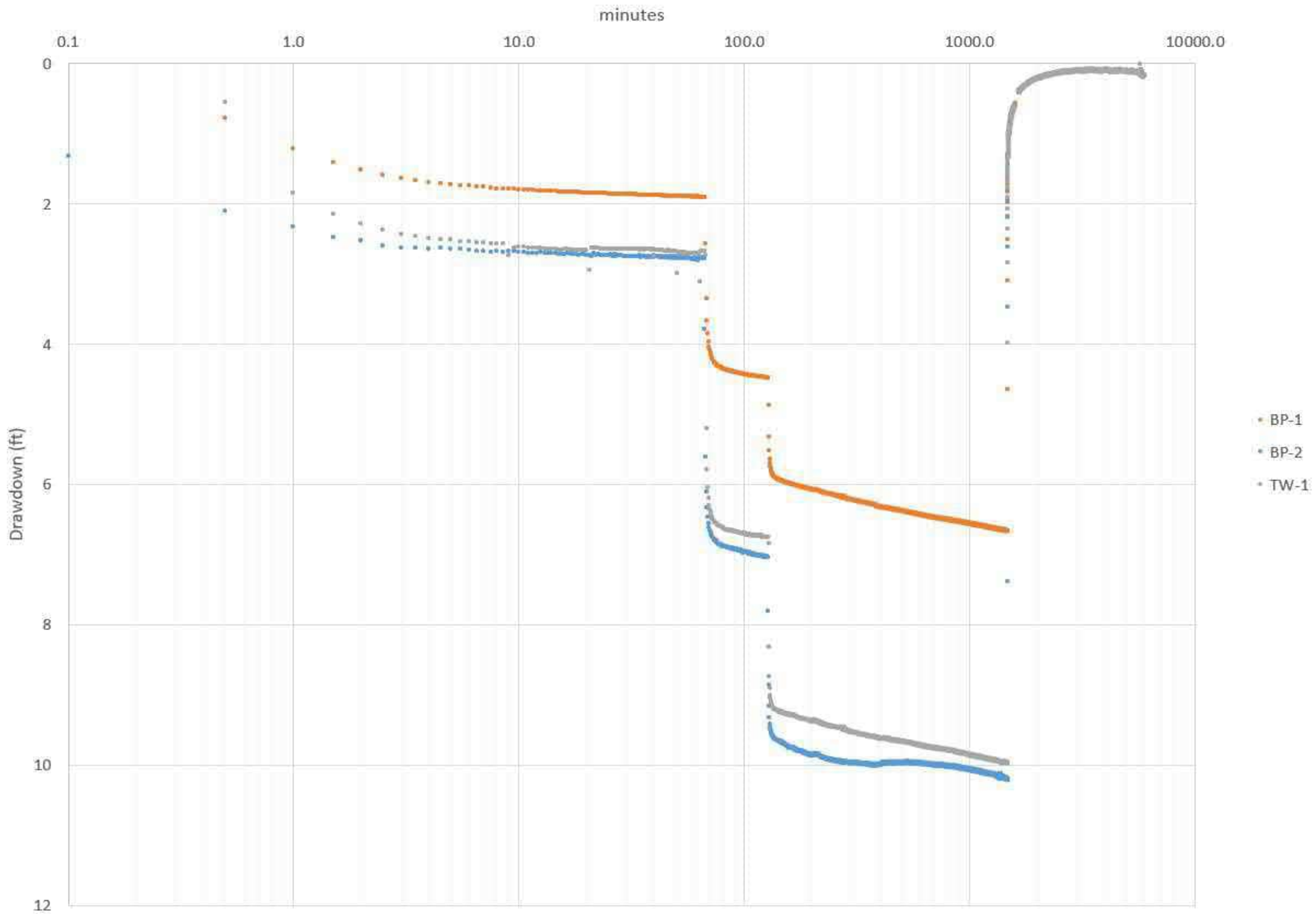

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Figure 4
Observed Drawdown,
Borst Park Well 2 Test

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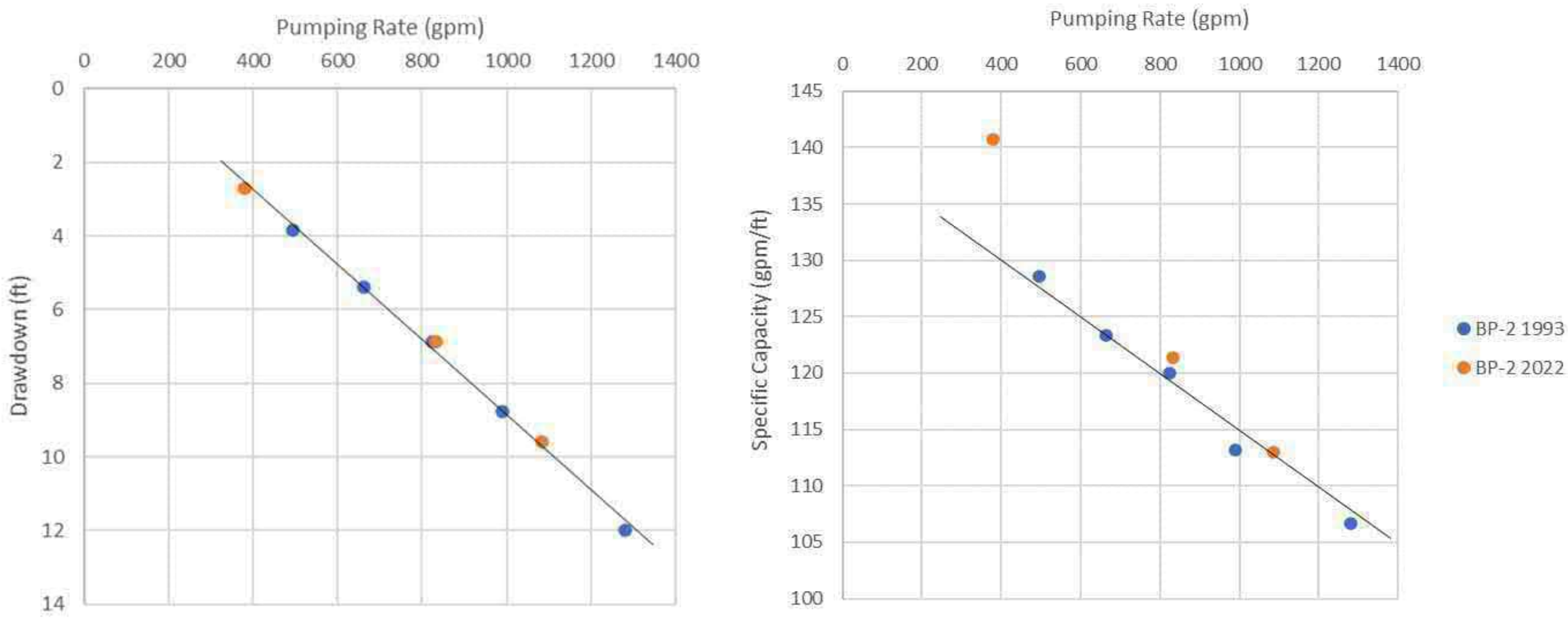

Notes:

-Plotted drawdown and specific capacity values were measured 15-minutes into each pumping step

Figure 5
Borst Park Well 2 Step-Rate Test Data Comparison

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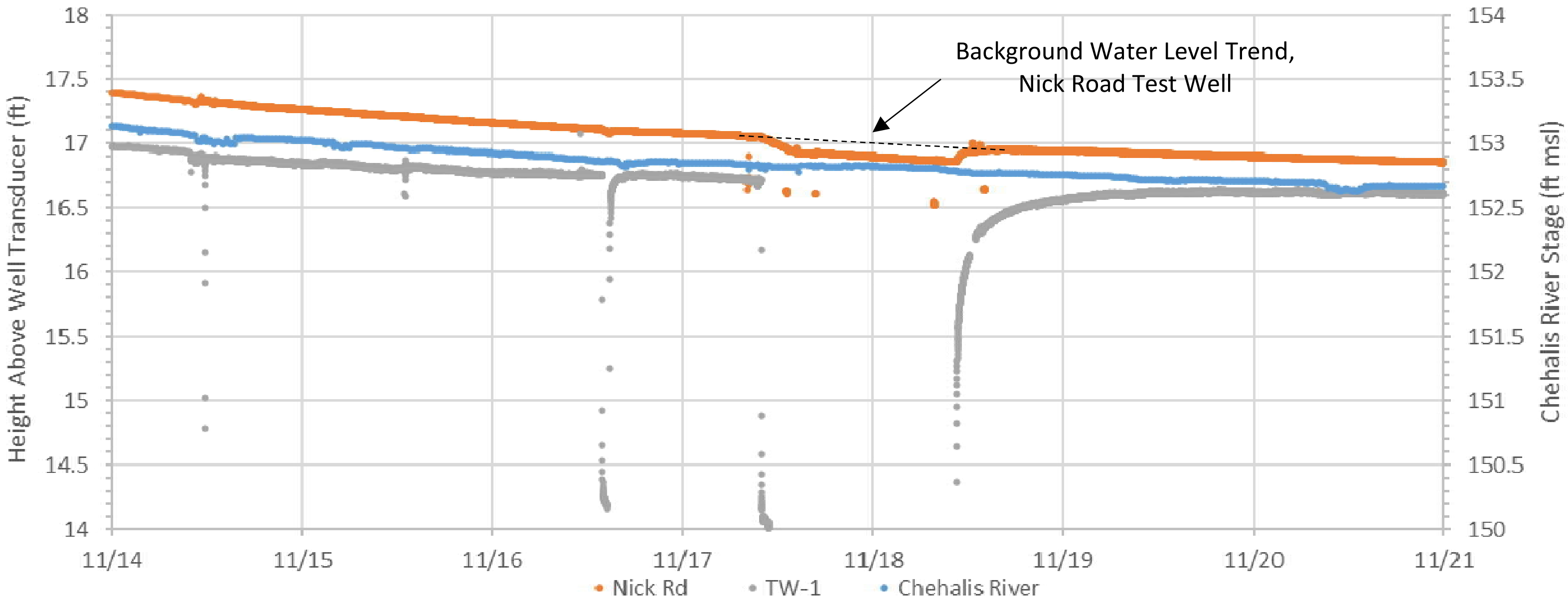

Notes:

Figure 6

Nick Road Test Well Water Level & Drawdown, Borst Park Well 2 Test

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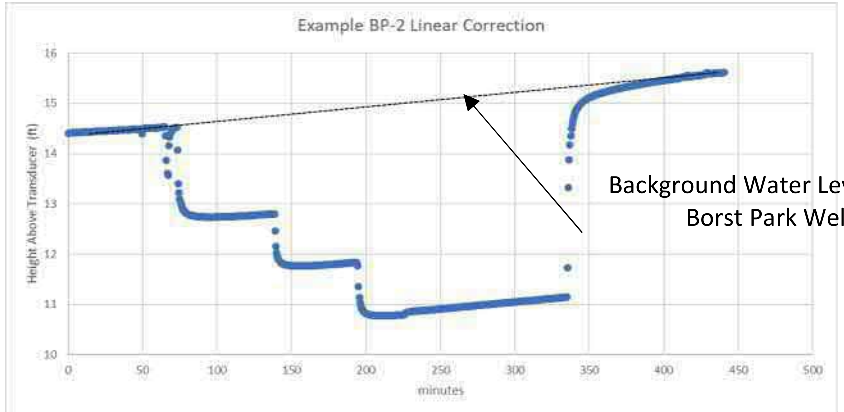

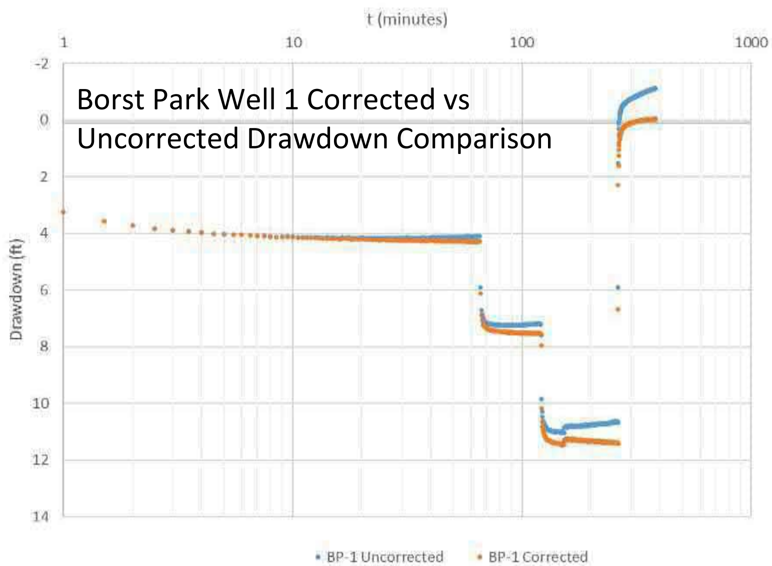

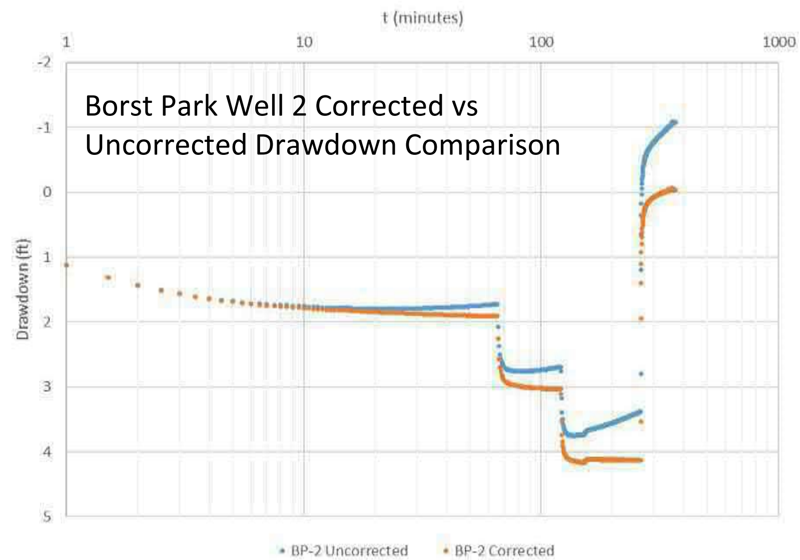

Notes:

Figure 7

Background Water Level Trend Corrections,

Borst Park Well 1 Step-Rate Test

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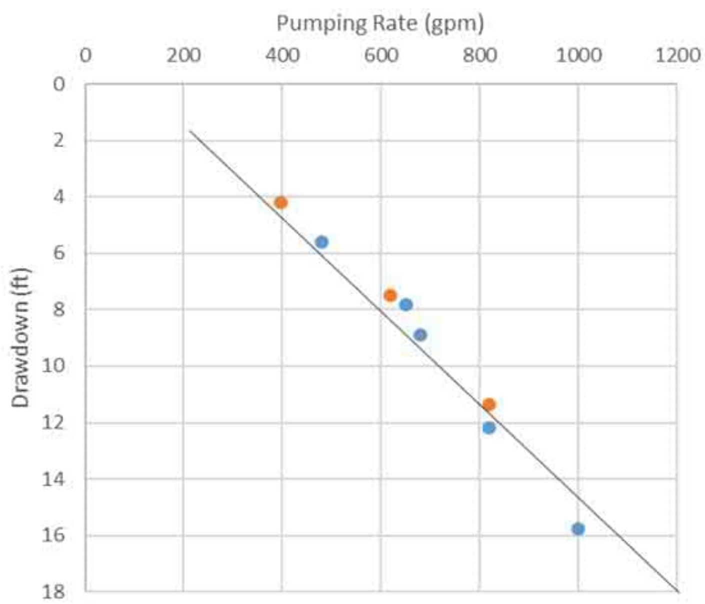

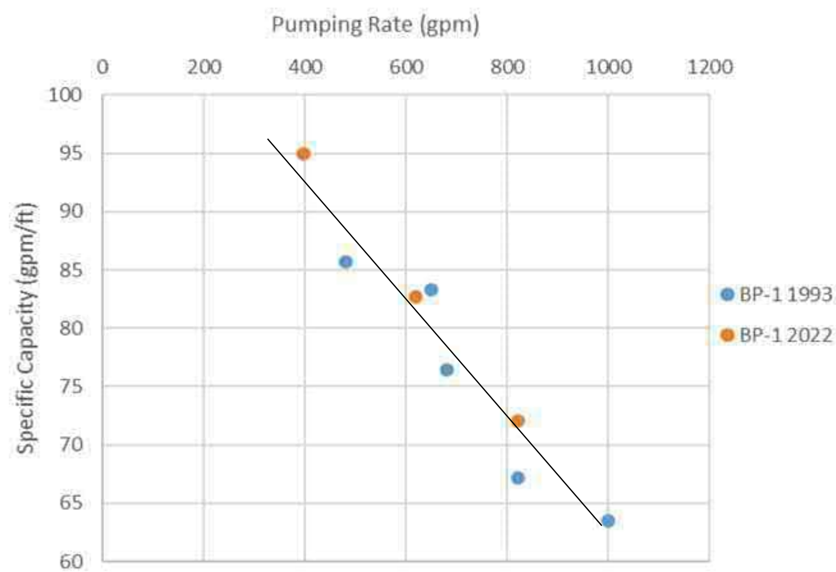

Notes:

-Plotted drawdown and specific capacity values were measured 15-minutes into each pumping step

Figure 8
Borst Park Well 1 Step-Rate Test Data Comparison

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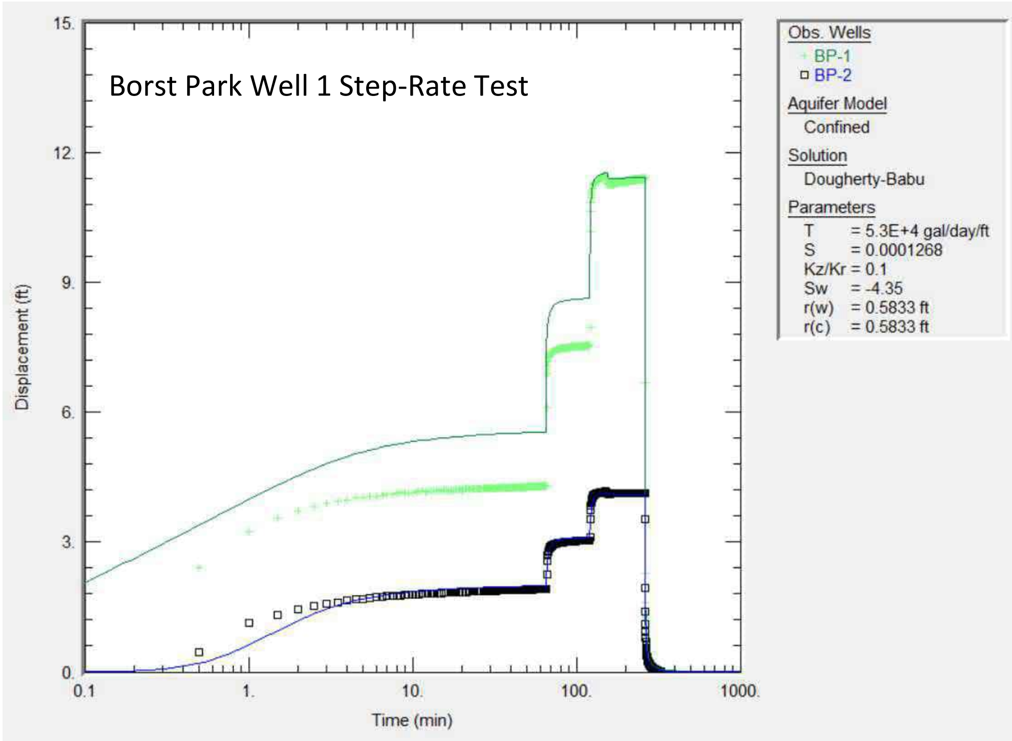
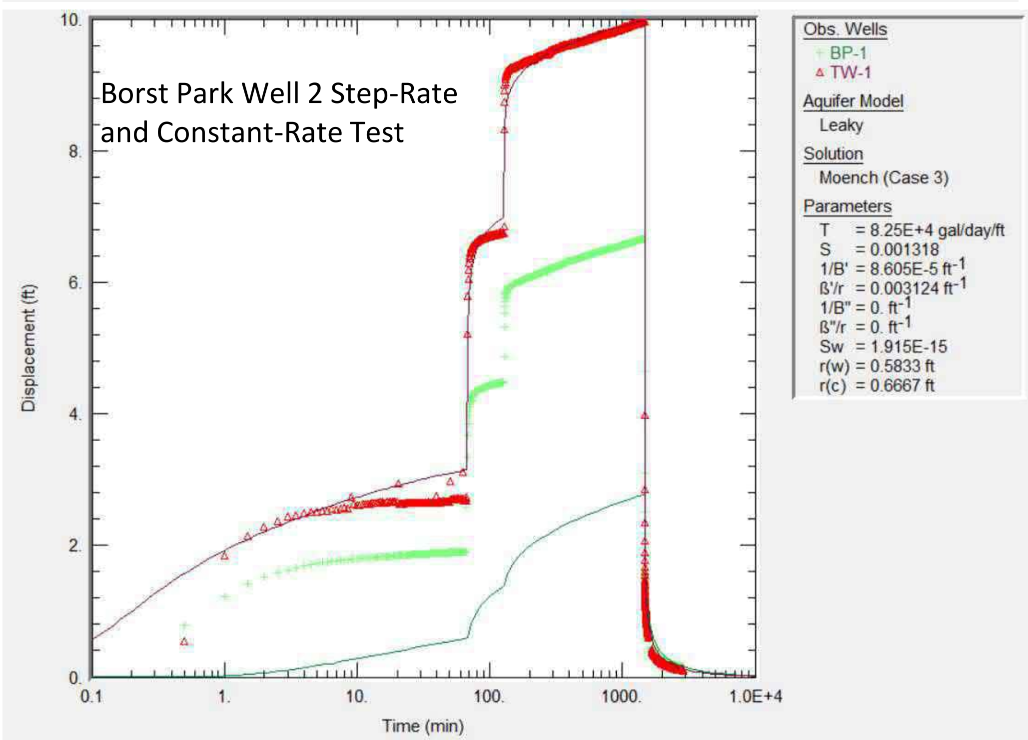




Notes:

Symbols represent observed drawdown values, solid lines are drawdown curves predicted by the analytical solution.

For the Borst Park Well 2 test only TW-1 and BP-1 are plotted. TW-1 is 12-feet away from BP-2, and has a similar and more consistant late-time drawdown slope than BP-2 (Figure 4).

Figure 9
Best-Fit Aquifer Test Analytical Solution Matches

City of Centralia
507107008

MOTT MACDONALD

Attachments:

Well Video Log Summaries

Laboratory Water Quality Reports

550 Elizabeth Street
Waukesha, WI 53186
800-234-7205
www.ariesindustries.com

Wellbore Inspection Report

Asset Information

Well ID:	Borst Park Well #1
Well Diameter:	14.0 in
Well Type:	Water Supply
Well Owner:	Borst Park
Perforations:	
Perforation Interval:	
Asset Notes:	

Casing

	1	2
Material:	Steel	Stainless Steel
Diameter:	14.0 in	14.0 in
Depth:		

Location

GPS Latitude:	
GPS Longitude:	
Location / Address:	Centralia

Project Information

Client:	Borst Park
Client Address:	
Job:	Borst Park Well #1
Invoice / PO:	

Inspection Information

Date:	25-Oct-2022 8:20 AM
Weather:	Overcast
Operator:	Joe Rounds
Reason for Survey:	Specific Issue (Video Required)
Vehicle / Camera:	
Zero Point / Datum:	
Static Water Level:	
Downview Offset:	
Casing Buildup:	
Inspection Notes:	

Schematic View

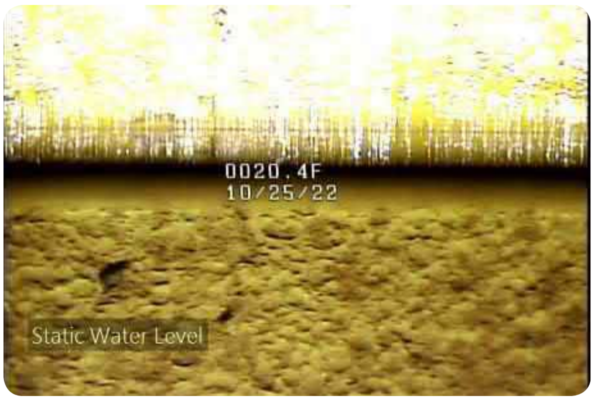
Borst Park Well #1

Feet	Span	Severity	Description	Comment
0000.0			Sideview - Zero Datum	
			End of Survey	Side view zero datum
0020.4			Static Water Level	
0036.4			Hole	Potential hole?
0037.3			Event	Looking down on top of screen
0039.5			Event	Top of screen weld
0043.5			Event	Screen clogged
0044.5			Event	Screen clogged
0045.2			Event	Screen clogged no ribs
0046.2			Event	Screen clogged no ribs
0047.4			Event	Bottom of well. Debris in bottom.

Snapshots

End of Survey | Side view zero datum

Sideview - Zero Datum

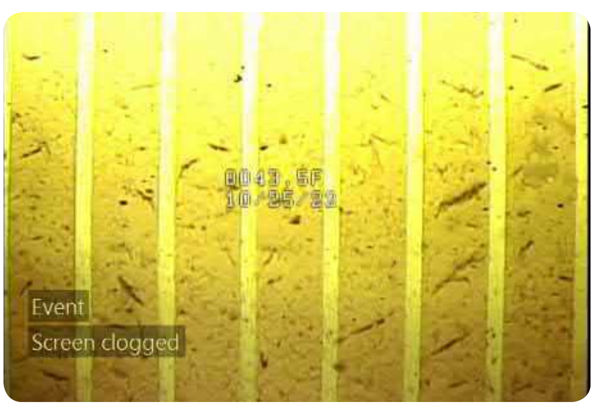


Static Water Level

Hole | Potential hole?

Event | Looking down on top of screen

Event | Top of screen weld



Event | Screen clogged

Event | Screen clogged

Snapshots (continued)

Event | Screen clogged no ribs

Event | Screen clogged no ribs

Event | Bottom of well. Debris in bottom.

550 Elizabeth Street
Waukesha, WI 53186
800-234-7205
www.ariesindustries.com

Wellbore Inspection Report

Asset Information

Well ID:	Borst Park #2 (River)
Well Diameter:	16.0 in
Well Type:	Water Resource
Well Owner:	Borst
Perforations:	
Perforation Interval:	
Asset Notes:	

Casing

	1	2
Material:	Steel	Stainless Steel
Diameter:	16.0 in	14.0 in
Depth:		

Location

GPS Latitude:	
GPS Longitude:	
Location / Address:	Borst Park Centralia

Project Information

Client:	Borst Park
Client Address:	
Job:	Borst Park, Well # 2
Invoice / PO:	

Inspection Information

Date:	19-Oct-2022 8:30 AM
Weather:	Foggy
Operator:	Patrick J DiPiro
Reason for Survey:	Specific Issue (Video Required)
Vehicle / Camera:	
Zero Point / Datum:	
Static Water Level:	
Downview Offset:	
Casing Buildup:	
Inspection Notes:	

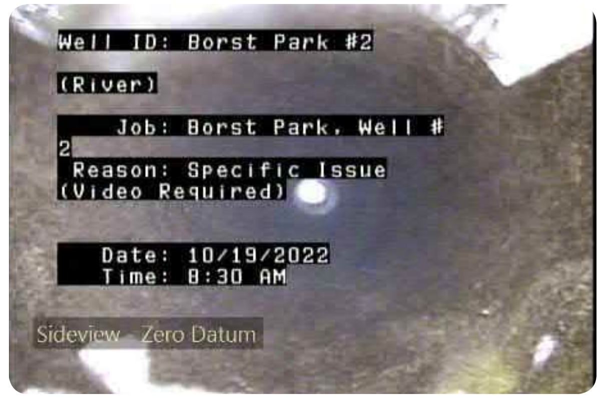
Schematic View

Borst Park #2 (River)

Feet	Span	Severity	Description	Comment
0000.0			Sideview - Zero Datum End of Survey	
0022.6			Static Water Level	
0038.0			Joint	
0040.5			Event	Joint for Stainless Steel Screen
0042.1			Event	Build up on screen
0048.6			Joint	
0053.3			Event	Heavy screen build up
0055.0			Event	Debris inside screen (hard to tell what it is, PVC maybe
0055.7			Event	Bottom of well (logs said 62.8 ft to bottom so around 7 feet of build up present at the bottom)

Snapshots

End of Survey



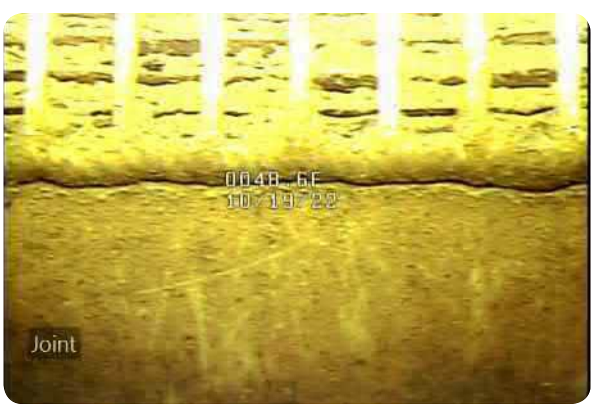
Sideview - Zero Datum

Static Water Level

Joint

Event | Joint for Stainless Steel Screen

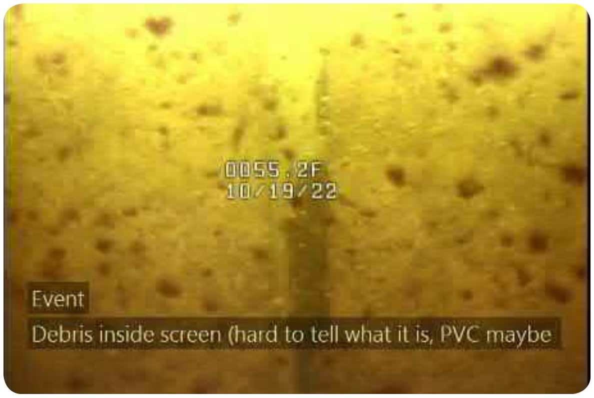
Event | Build up on screen



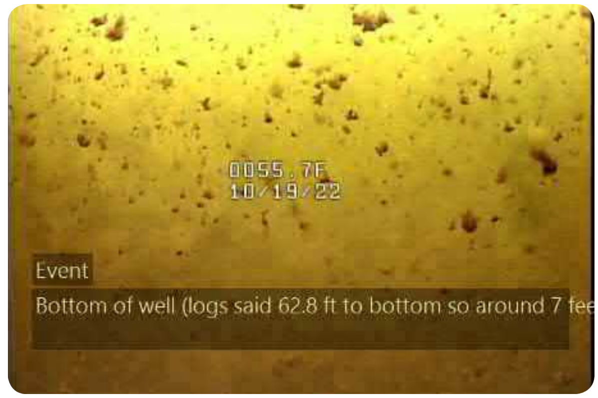
Joint

Event | Heavy screen build up

Snapshots (continued)



Event | Debris inside screen (hard to tell what it is, PVC maybe



Event | Bottom of well (logs said 62.8 ft to bottom so around 7 feet of build up present at the bottom)

WATER MANAGEMENT LABORATORIES INC.

Chain of Custody

1515 80th St E Tacoma, WA 98404 | (253) 531 - 3121 | customerservice@watermanagementlabs.com

Lab Use | Preserved? Yes / No | 1.0 | Seal? Yes / No

Dept: Micro | Inorg X | Org | Intact? Yes No

Te

MCK0782

Due: 12/09/22

Sample #	# of Bottles	Water	Waste	Other	Date Sampled	Time Sampled	Sampled By	Sample Identification	Ra 228	Gross Alpha							
1	2	X			11-8-22	10:10 AM	Jim Schmuke	08993735	X	X							
2	2	X			11-4-22	10:00 AM	Armin Wahanik	08993736	X	X							
3	2	X			11-17-22	11:40AM	Hirotaka Nakamura	Lunn Water Assn. 08993738	X	X							
4	2	X			11-18-22	9:45AM	Charlie E.W.	Centralia Water 08993739	X	X							
5	2	X			11-18-22	10:45AM	JHL	Meridian terrace MHP 08993740	X	X							
6																	
7																	
8																	
9																	
10																	

Company Name: WATER MANAGEMENT LABORATORIES, INC

Company Address: 1515 - 80th St. E. TACOMA WA 98404

Report to: CHRISTA GARRETTSON

Phone: 253-531-3121

chem@watermanagementlabs.com

Remarks:

Printed Name	Signature	Company	Date / Time
Cheyenne Garrett	[signature]	Anatek	11-23-22 9:43

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 883-2839 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - email spokane@anateklabs.com

Client: Centralia Water
Address: 1515 80th St. E
Tacoma, WA 98404
Attn: Water Management

Work Order: MCK0782
Project: 08993739
Reported: 1/31/2023 08:14

Analytical Results Report

System ID# 12200D
Reference Number: MCK0782-01
Multiple Source Nos:
Date Received: 11/23/22 09:43
Sample Location: 08993739 (Borst Park Well #2)
Matrix: Drinking Water

System Name: Centralia Water
Collect Date: 11/18/22 09:45
Sample Type: PT/R
Sample Purpose: O - Other

DOH Source #: 11
County: Lewis

Lab/Sample Number: 112-78201

Radionuclides

DOH #	Analyte	Result	Units	LRL	SDRL	Trigger	MCL	Analyzed	Analyst	Method	Qualifier
0165	Gross alpha	<3.00 ± 0.653	pCi/L	3.00 *MDA:3.00*	3		15	12/17/22 11:09	BA	EPA 900.0	U
0166	Radium 228	<0.186 ± 0.353	pCi/L	1.00 *MDA:0.186*	1		5	1/23/23 10:15	BA	EPA 904.0	U

Authorized Signature,

Justin Doty For Todd Taruscio, Laboratory Manager

R16	The RPD calculation for QC samples does not include the activity uncertainty. If included in the calculation, the RPD is within method acceptance limits.
U	Compound was analyzed for but not detected
LRL	Lab Reporting Limit
SDRL	State Detection Reporting Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
SAL	State Action Level
*	Not a certified analyte
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was spiked or duplicated.

WATER MANAGEMENT LABORATORIES INC.
1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Chemistry - Report of Analysis

Date Collected: 11-18-2022	System Group Type: (circle one) (A) B Other
Water System ID Number: 12200D	System Name: Centralia Water
Lab Number / Sample Number: 089 / 08889	County: Lewis
Sample Location: Borst Park Well 2	Source Number(s): (list all sources if blended or composited) S11
Sample Purpose: (check appropriate box) ☐ RC - Routine/Compliance (satisfies monitoring requirements) ☐ C - Confirmation (confirmation of chemical result)* ☒ I - Investigative (does not satisfy monitoring requirements) ☐ O - Other (specify - does not satisfy monitoring requirements)	Date Received: 11-18-2022 Date Reported: 12-06-2022 Supervisor Initials: RL
Sample Composition: (check appropriate box) ☒ S - Single Source ☐ B - Blended (list source numbers in "Source Number" field) ☐ C - Composite (list source numbers in "Source Number" field) ☐ D - Distribution Sample	Sample Type: (check one) ☒ Pre-treatment/Untreated (Raw) ☐ Post-treatment (Finished) ☐ Unknown or Other Sample Collected by: Charlie C / E. Wrobleski Phone Number: 360-330-7512
Send Report & Bill to: City of Centralia 1100 North Tower Avenue Centralia WA 98531	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
--	Ammonia Nitrogen	--	<0.050	0.050	--	--	mg/L	--	11-22-2022	4500NH3F/CP
0421	Total Organic Carbon	--	0.49	0.7	--	--	mg/L	--	11-21-2022	5310C/SS

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No exisiting value.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote addtional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

mg/L: milligrams per liter or parts per million.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS

WATER MANAGEMENT LABORATORIES INC.
1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Volatile Organic Compounds
Report of Analysis

Date Collected: 11-18-2022	System Group Type: (circle one) (A) B Other
Water System ID Number: 12200D	System Name: Centralia Water
Lab Number / Sample Number: 089 / 08889	County: Lewis
Sample Location: Borst Park Well 2	Source Number(s): (list all sources if blended or composited) S11
Sample Purpose: (check appropriate box) ☐ RC - Routine/Compliance (satisfies monitoring requirements) ☐ C - Confirmation (confirmation of chemical result)* ☒ I - Investigative (does not satisfy monitoring requirements) ☐ O - Other (specify - does not satisfy monitoring requirements)	Date Received: 11-18-2022 Date Analyzed: 11-21-2022 Date Reported: 12-06-2022 Supervisor Initials: RL
Sample Composition: (check appropriate box) ☒ S - Single Source ☐ B - Blended (list source numbers in "Source Number" field) ☐ C - Composite (list source numbers in "Source Number" field) ☐ D - Distribution Sample	Sample Type: (check one) ☒ Pre-treatment/Untreated (Raw) ☐ Post-treatment (Finished) ☐ Unknown or Other Sample Collected by: Charlie C / E. Wrobleski Phone Number: 360-330-7512
Send Report & Bill to: City of Centralia 1100 North Tower Avenue, Centralia WA 98531	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0045	Vinyl chloride	--	ND	0.5	0.5	2	µg/L	No	524.2/RL
0046	1,1- Dichloroethylene	--	ND	0.5	0.5	7	µg/L	No	524.2/RL
0047	1,1,1 Trichloroethane	--	ND	0.5	0.5	200	µg/L	No	524.2/RL
0048	Carbon tetrachloride	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0049	Benzene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0050	1,2 Dichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0051	Trichloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0052	Para-dichlorobenzene	--	ND	0.5	0.5	75	µg/L	No	524.2/RL
0056	Dichloromethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0057	trans-1,2-Dichloroethylene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0060	cis- 1,2-Dichloroethylene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0063	1,2- Dichloropropane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0066	Toluene	--	ND	0.5	0.5	1000	µg/L	No	524.2/RL
0067	1,1,2-Trichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0068	Tetrachloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0071	Monochlorobenzene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0073	Ethylbenzene	--	ND	0.5	0.5	700	µg/L	No	524.2/RL
0076	Styrene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0084	Ortho-Dichlorobenzene	--	ND	0.5	0.5	600	µg/L	No	524.2/RL
0095	1,2,4- Trichlorobenzene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0160	Total Xylenes	--	ND	0.5	0.5	10000	µg/L	No	524.2/RL
0074	m/p Xylenes (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0075	o- Xylene (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0027	Chloroform	--	ND	0.5	--	--	µg/L	--	524.2/RL

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0028	Bromodichloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0029	Dibromochloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0030	Bromoform	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0031	Total Trihalomethanes	--	ND	--	--	80	µg/L	No	524.2/RL
0053	Chloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0054	Bromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0058	1,1 Dichloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0072	1,1,1,2-Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0078	Bromobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0079	1,2,3- Trichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0081	O-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0085	Trichlorofluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0086	Bromochloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0089	1,3,5- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0091	1,2,4- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0092	sec- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0093	p- Isopropyltoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0094	n- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0096	Naphthalene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0104	Dichlorodifluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0154	1,3 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0055	Chloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0059	2,2 Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0062	1,1 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0064	Dibromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0070	1,3- Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0080	1,1,2,2 Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0082	P-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0083	m- Dichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0087	Isopropylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0088	n- Propylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0090	tert- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0097	Hexachlorobutadiene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0098	1,2,3 Trichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0427	EDB (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0428	DBCP (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
N/A	MTBE	--	ND	0.5	0.5	--	µg/L	--	524.2/RL

Lab Number / Sample Number: 089 / 08889

Volatile Organic Compounds (cont)

LAB COMMENTS

* **Confirmation:**Include the original lab number, sample number, and collection date of original sample in either comment section.

Analysis for EDB and DBCP is screening only. Detections of EDB and DBCP are confirmed using the fumigant test panel.

--No exisiting value.

µg/L:micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER:A symbol or letter to denote addtional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL:(Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL:(State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

WATER MANAGEMENT LABORATORIES INC.
1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Volatile Organic Compounds
Report of Analysis

Date Collected: 11-30-2022	System Group Type: (circle one) (A) B Other
Water System ID Number: 12200D	System Name: Centralia Water
Lab Number / Sample Number: 089 / 09044	County: Lewis
Sample Location: Borst Park Well #1	Source Number(s): (list all sources if blended or composited) S10
Sample Purpose: (check appropriate box) ☐ RC - Routine/Compliance (satisfies monitoring requirements) ☐ C - Confirmation (confirmation of chemical result)* ☒ I - Investigative (does not satisfy monitoring requirements) ☐ O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-01-2022 Date Analyzed: 12-07-2022 Date Reported: 12-14-2022 Supervisor Initials: RL
Sample Composition: (check appropriate box) ☒ S - Single Source ☐ B - Blended (list source numbers in "Source Number" field) ☐ C - Composite (list source numbers in "Source Number" field) ☐ D - Distribution Sample	Sample Type: (check one) ☒ Pre-treatment/Untreated (Raw) ☐ Post-treatment (Finished) ☐ Unknown or Other Sample Collected by: EAW Phone Number: 360-330-7512
Send Report & Bill to: City of Centralia 1100 North Tower Avenue, Centralia WA 98531	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0045	Vinyl chloride	--	ND	0.5	0.5	2	µg/L	No	524.2/RL
0046	1,1- Dichloroethylene	--	ND	0.5	0.5	7	µg/L	No	524.2/RL
0047	1,1,1 Trichloroethane	--	ND	0.5	0.5	200	µg/L	No	524.2/RL
0048	Carbon tetrachloride	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0049	Benzene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0050	1,2 Dichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0051	Trichloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0052	Para-dichlorobenzene	--	ND	0.5	0.5	75	µg/L	No	524.2/RL
0056	Dichloromethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0057	trans-1,2-Dichloroethylene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0060	cis- 1,2-Dichloroethylene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0063	1,2- Dichloropropane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0066	Toluene	--	ND	0.5	0.5	1000	µg/L	No	524.2/RL
0067	1,1,2-Trichloroethane	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0068	Tetrachloroethylene	--	ND	0.5	0.5	5	µg/L	No	524.2/RL
0071	Monochlorobenzene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0073	Ethylbenzene	--	ND	0.5	0.5	700	µg/L	No	524.2/RL
0076	Styrene	--	ND	0.5	0.5	100	µg/L	No	524.2/RL
0084	Ortho-Dichlorobenzene	--	ND	0.5	0.5	600	µg/L	No	524.2/RL
0095	1,2,4- Trichlorobenzene	--	ND	0.5	0.5	70	µg/L	No	524.2/RL
0160	Total Xylenes	--	ND	0.5	0.5	10000	µg/L	No	524.2/RL
0074	m/p Xylenes (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0075	o- Xylene (MCL for Total)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0027	Chloroform	--	ND	0.5	--	--	µg/L	--	524.2/RL

DOH#	ANALYTE	DATA QUALIFIER	RESULTS	SDRL	TRIGGER	MCL	UNITS	EXCEEDS MCL?	METHOD/ INITIALS
0028	Bromodichloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0029	Dibromochloromethane	--	ND	0.5	--	--	µg/L	--	524.2/RL
0030	Bromoform	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0031	Total Trihalomethanes	--	ND	--	--	80	µg/L	No	524.2/RL
0053	Chloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0054	Bromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0058	1,1 Dichloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0072	1,1,1,2-Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0078	Bromobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0079	1,2,3- Trichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0081	O-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0085	Trichlorofluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0086	Bromochloromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0089	1,3,5- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0091	1,2,4- Trimethylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0092	sec- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0093	p- Isopropyltoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0094	n- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0096	Naphthalene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0104	Dichlorodifluoromethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0154	1,3 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0055	Chloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0059	2,2 Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0062	1,1 Dichloropropene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0064	Dibromomethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0070	1,3- Dichloropropane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0080	1,1,2,2 Tetrachloroethane	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0082	P-Chlorotoluene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0083	m- Dichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0087	Isopropylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0088	n- Propylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0090	tert- Butylbenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0097	Hexachlorobutadiene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0098	1,2,3 Trichlorobenzene	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0427	EDB (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
0428	DBCP (screening)	--	ND	0.5	0.5	--	µg/L	--	524.2/RL
N/A	MTBE	--	ND	0.5	0.5	--	µg/L	--	524.2/RL

Lab Number / Sample Number: 089 / 09044

Volatile Organic Compounds (cont)

LAB COMMENTS

* **Confirmation:**Include the original lab number, sample number, and collection date of original sample in either comment section.

Analysis for EDB and DBCP is screening only. Detections of EDB and DBCP are confirmed using the fumigant test panel.

--No exisiting value.

µg/L:micrograms per liter or parts per billion.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER:A symbol or letter to denote addtional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL:(Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

RESULT: The laboratory reported result.

SDRL:(State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

WATER MANAGEMENT LABORATORIES INC.
1515 80th St E, Tacoma, WA 98404

COLIFORM BACTERIA ANALYSIS FORM

Date Sample Collected	Time Sample Collected	County
11 / 18 / 20 (Month Day Year)	9:45 ☒ AM ☐ PM	Lewis

Type of Water System (check only one box)
☒ Group A ☐ Group B ☐ Other____

Group A and Group B Systems – Provide from Water Facilities Inventory (WFI):
ID# 12200D
System Name: Centralia Water
Contact Person: Charlie
Day Phone: (360) 330-7512 Cell Phone: (360) 520-0734
Eve. Phone: ( )
Email:
Send results to: (Print full name, address and zip code)
1100 N. Tower
Centralia WA 98531

SAMPLE INFORMATION

Sample collected by (name): Charlie / E. WROBLESKI
Specific location where sample collected: CHAMBER
Borst Park Well #2
Special instructions or comments:

Type of Sample (select only one type of sample from types 1 through 5 below)

1. ☐ Routine Distribution Sample (A/P)
Chlorinated: Yes____ No____
Chlorine Residual: Total____ Free____

2. ☐ Repeat Sample (A/P)
(from distribution system after unsat. routine)
Unsatisfactory routine lab number:
Unsatisfactory routine collect date: ___/___/___
Chlorinated: Yes____ No____
Chlorine Residual: Total____ Free____

3. Ground Water Rule Source Sample
S | |
☐ Triggered (A/P)
☐ Assessment (A/P)

4. Surface or GWI Raw Source Water Sample (Enumeration) S | |
☒ E. coli ☐ Fecal Filtered Yes____ No____

5. ☒ Sample Collected for Information Only:

LAB USE ONLY DRINKING WATER RESULTS LAB USE ONLY

☐ Unsatisfactory Total Coliform Present and
☐ E.coli present ☐ E.coli absent
☐ Satisfactory

Bacterial Density Results: Total Coliform 3 /100ml. E.coli <1 /100ml.
Fecal Coliform____/100ml. HPC____/1 ml.

Replacement Sample Required: ☐ TNTC ☐ Sample too old
☐ Sample Volume ☐ Damaged Container ☐____

Date/Time Received: 11-18-22 9:40 CC
Lab Reference Number: MMO Q1 18
Receipt Temp C°: AM
Method Code:
Date Reported to DOH: 11-22-22
Lab Use Only:
DOH Lab-Sample# 089 33800

DOH Form 331-319 (effective 06/17) - If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater

WATER MANA LABORATORIES INC. 34364

1515 80th St E, Tacoma, WA 98404

COLIFORM BACTERIA ANALYSIS FORM

Date Sample Collected	Time Sample Collected	County
11/30/22 (Month Day Year)	14 15 ☐ AM ☒ PM	Lewis

Type of Water System (check only one box)

☒ Group A ☐ Group B ☐ Other______

Group A and Group B Systems – Provide from Water Facilities Inventory (WFI):

ID# 12200D

System Name: Centralia Water

Contact Person: Charlie

Day Phone: (360) 330-7512 Cell Phone: ( )

Email: Eve. Phone: ( )

Send results to: (Print full name, address and zip code)

1100 N. Tower

Centralia Water

SAMPLE INFORMATION

Sample collected by (name): Emmy

Specific location where sample collected: BP1 S-10

Special instructions or comments:

Type of Sample (select only **one** type of sample from types 1 through 5 below)

1. ☒ **Routine Distribution Sample (A/P)**
   Chlorinated: Yes______ No ☒
   Chlorine Residual: Total____ Free____

2. ☐ **Repeat Sample (A/P)**
   (from distribution system after unsat. routine)
   Unsatisfactory routine lab number:
   ___ ___ ___ - ___ ___ ___ ___ ___
   Unsatisfactory routine collect date:
   ____/____/____
   Chlorinated: Yes______ No______
   Chlorine Residual: Total_____ Free_____

3. **Ground Water Rule Source Sample**
   S | | |
   ☐ Triggered (A/P)
   ☐ Assessment (A/P)

4. **Surface or GWI Raw Source Water Sample** (Enumeration) S | | |
   ☐ *E. coli* ☐ Fecal Filtered Yes____ No____

5. ☒ Sample Collected for **Information Only:**

LAB USE ONLY **DRINKING WATER RESULTS** LAB USE ONLY

☐ **Unsatisfactory** Total Coliform Present and ☒ **Satisfactory**

☐ *E.coli* present ☐ *E.coli* absent

Bacterial Density Results: Total Coliform__________/100ml. *E.coli*__________/100ml.

Fecal Coliform__________/100ml. HPC__________/1 ml.

Replacement Sample Required: ☐ TNTC ☐ Sample too old

☐ Sample Volume ☐ Damaged Container ☐ __________

Date/Time Received: 12-1-22 7:10 PM ND	Lab Reference Number CPP6
Receipt Temp C°: 7	Method Code: SM 9223B
Date Reported to DOH 12-6-22 MK	Lab Use Only: R
DOH Lab-Sample# 089 34364	

WATER MANAGEMENT LABORATORIES INC.

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Chemistry - Report of Analysis

Date Collected: 12-02-2022	System Group Type: (circle one) (A) B Other
Water System ID Number: 12200D	System Name: Centralia Water Dept.
Lab Number / Sample Number: 089 / 09180	County: Lewis
Sample Location: Chehalis River	Source Number(s): (list all sources if blended or composited)
Sample Purpose: (check appropriate box) ☐ RC - Routine/Compliance (satisfies monitoring requirements) ☐ C - Confirmation (confirmation of chemical result)* ☒ I - Investigative (does not satisfy monitoring requirements) ☐ O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-08-2022 Date Reported: 12-15-2022 Supervisor Initials: RL
Sample Composition: (check appropriate box) ☐ S - Single Source ☐ B - Blended (list source numbers in "Source Number" field) ☐ C - Composite (list source numbers in "Source Number" field) ☐ D - Distribution Sample	Sample Type: (check one) ☒ Pre-treatment/Untreated (Raw) ☐ Post-treatment (Finished) ☐ Unknown or Other Sample Collected by: Charlie Phone Number: 360-330-7512
Send Report & Bill to: City of Centralia 1100 North Tower Avenue Centralia WA 98531	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
0019	Fluoride	--	<0.05	0.2	2.0	4.0	mg/L	No	12-09-2022	300.0/CP

NOTES:

* **Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No exisiting value.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote addtional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

mg/L: milligrams per liter or parts per million.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS

WATER MANAGEMENT LABORATORIES INC.

1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

Chemistry - Report of Analysis

Date Collected: 11-30-2022	System Group Type: (circle one) (A) B Other
Water System ID Number: 12200D	System Name: Centralia Water
Lab Number / Sample Number: 089 / 09046	County: Lewis
Sample Location: Borst Park Well 1	Source Number(s): (list all sources if blended or composited) S10
Sample Purpose: (check appropriate box) ☐ RC - Routine/Compliance (satisfies monitoring requirements) ☐ C - Confirmation (confirmation of chemical result)* ☒ I - Investigative (does not satisfy monitoring requirements) ☐ O - Other (specify - does not satisfy monitoring requirements)	Date Received: 12-01-2022 Date Reported: 12-22-2022 Supervisor Initials:
Sample Composition: (check appropriate box) ☒ S - Single Source ☐ B - Blended (list source numbers in "Source Number" field) ☐ C - Composite (list source numbers in "Source Number" field) ☐ D - Distribution Sample	Sample Type: (check one) ☒ Pre-treatment/Untreated (Raw) ☐ Post-treatment (Finished) ☐ Unknown or Other Sample Collected by: EAW Phone Number: 360-330-2512
Send Report & Bill to: City of Centralia 1100 North Tower Avenue Centralia WA 98531	Comments:

ANALYTICAL RESULTS

DOH#	ANALYTE	DATA QUALIFIER	RESULT	SDRL	TRIGGER	MCL	UNITS	EXCEED MCL?	DATE ANALYZED	METHOD/ INITIALS
--	Ammonia Nitrogen	--	<0.050	0.050	--	--	mg/L	--	12-07-2022	4500NH3F/CP
0421	Total Organic Carbon	--	0.55	0.7	--	--	mg/L	--	12-07-2022	5310C/CP

NOTES:

*** Confirmation:** Include the original lab number, sample number, and collection date of original sample in either comment section.

-- No exisiting value.

ANALYTE: The name of an analyte being tested for.

DATA QUALIFIER: A symbol or letter to denote addtional information about the result.

DOH#: Department assigned analyte number.

EXCEED MCL: (Maximum Contamination Level): Marked if the contaminant amount exceeds the MCL under chapters 246-290 and 246-291 WAC. Please contact the department's drinking water regional office in your area to determine follow-up actions.

METHOD/INITIALS: Analytical method used. / Initials of the analyst that performed the analysis.

mg/L: milligrams per liter or parts per million.

RESULT: The laboratory reported result.

SDRL: (State Detection Reporting Limit): The minimum reportable detection of an analyte as established by the Department of Health

TRIGGER: The department's drinking water response level. Systems with contaminants detected at concentrations in excess of this level may be required to take additional samples or monitor more frequently. Please contact the department's drinking water regional office in your area for further information.

LAB COMMENTS

EDGE ANALYTICAL

Burlington, WA Corporate Laboratory (a)
1620 S Walnut St - Burlington, WA 98233 - 800.755.9295 - 360 757 1400

Bellingham, WA Microbiology (b)
805 Orchard Dr Ste 4 - Bellingham, WA 98225 - 360 715 1212

Portland, OR Microbiology/Chemistry (c)
9725 SW Commerce Cir Ste A2 - Wilsonville, OR 97070 - 503 682 7802

Corvallis, OR Microbiology/Chemistry (d)
1100 NE Circle Blvd, Ste 130 - Corvallis, OR 97330 - 541 753 4946

Bend, OR Microbiology (e)
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541 639 8425

NELAP ACCREDITED TNI LABORATORY

HERBICIDES IN DRINKING WATER

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-38553
Project: 08993737

Date Collected: 11/18/22 09:45
System ID Number: **12200D**
Lab Number: 046-75964
Sample Location: Borst Park Well #2
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 515_221201
Approved By: pdm
Authorized By: [signature]

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID:
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 11
Multiple Sources:
Date Received: 11/23/2022 10:56:00
Date Analyzed: 12/16/22
Date: Reported: 12/29/22
Sample Type: B - Before treatment
Sample Collected By: Charlie/ E,Wroblesli
Sampler Phone: 3603307512

EPA Method 515.4 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	EPA Regulated									
37	2,4 - D	ND	ug/L	0.1	0.1	70	a		BFR	
38	2,4,5 - TP (SILVEX)	ND	ug/L	0.2	0.2	50	a		BFR	
134	PENTACHLOROPHENOL	ND	ug/L	0.04	0.04	1	a		BFR	
137	DALAPON	ND	ug/L	1	1	200	a		BFR	
139	DINOSEB	ND	ug/L	0.2	0.2	7	a		BFR	
140	PICLORAM	ND	ug/L	0.1	0.1	500	a		BFR	
	Other									
138	DICAMBA	ND	ug/L	0.2	0.2		a		BFR	
225	DCPA (ACID METABOLITES)	ND	ug/L	0.1	0.1		a		BFR	
135	2,4 DB	ND	ug/L	1.0	1.0		a		BFR	
136	2,4,5 - T	ND	ug/L	0.4	0.4		a		BFR	
220	BENTAZON	ND	ug/L	0.5	0.5		a		BFR	
221	DICHLORPROP	ND	ug/L	0.5	0.5		a		BFR	
223	ACIFLUORFEN	ND	ug/L	2.0	2.0		a		BFR	
226	3,5 - DICHLOROBENZOIC ACID	ND	ug/L	0.5	0.5		a		BFR	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.

FORM: cSOC.rpt

EDGE ANALYTICAL

Burlington, WA *Corporate Laboratory (a)* 1620 S Walnut St · Burlington, WA 98233 · 800.755.9295 · 360 757 1400
Bellingham, WA *Microbiology (b)* 805 Orchard Dr Ste 4 · Bellingham, WA 98225 · 360 715 1212
Portland, OR *Microbiology/Chemistry (c)* 9725 SW Commerce Cr Ste A2 · Wilsonville, OR 97070 · 503 682 7802
Corvallis, OR *Microbiology/Chemistry (d)* 1100 NE Circle Blvd. Ste 130 · Corvallis, OR 97330 · 541 753 4946
Bend, OR *Microbiology (e)* 20332 Empire Blvd Ste 4 · Bend, OR 97701 · 541 639 8425

NELAP ACCREDITED TNI LABORATORY

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-38553
Project: 08993737

Date Collected: 11/18/22 09:45
System ID Number: **12200D**
Lab Number: 046-75964
Sample Location: Borst Park Well #2
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 525_221201
Approved By: pdm
Authorized By: [signature]

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID:
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 11
Multiple Sources:
Date Received: 11/23/2022 10:56:00
Date Analyzed: 12/02/22
Date: Reported: 12/29/22
Sample Type: B - Before treatment
Sample Collected By: Charlie/ E,Wroblesli
Sampler Phone: 3603307512

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	EPA Regulated									
33	ENDRIN	ND	ug/L	0.01	0.01	2	a		MA	
34	LINDANE (BHC - GAMMA)	ND	ug/L	0.02	0.02	0.2	a		MA	
35	METHOXYCHLOR	ND	ug/L	0.1	0.1	40	a		MA	
117	ALACHLOR	ND	ug/L	0.2	0.2	2	a		MA	
119	ATRAZINE	ND	ug/L	0.1	0.1	3	a		MA	
120	BENZO(A)PYRENE	ND	ug/L	0.02	0.02	0.2	a		MA	
124	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	ND	ug/L	0.6	0.6	400	a		MA	
125	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	ND	ug/L	0.6	0.6	6	a		MA	
126	HEPTACHLOR	ND	ug/L	0.04	0.04	0.4	a		MA	
127	HEPTACHLOR EPOXIDE	ND	ug/L	0.02	0.02	0.2	a		MA	
128	HEXACHLOROBENZENE	ND	ug/L	0.1	0.1	1	a		MA	
129	HEXACHLOROCYCLO-PENTADIENE	ND	ug/L	0.1	0.1	50	a		MA	
133	SIMAZINE	ND	ug/L	0.07	0.07	4	a		MA	
	EPA Unregulated									
118	ALDRIN	ND	ug/L	0.1	0.1		a		MA	
121	BUTACHLOR	ND	ug/L	0.4	0.4		a		MA	
123	DIELDRIN	ND	ug/L	0.1	0.1		a		MA	
130	METOLACHLOR	ND	ug/L	1.0	1.0		a		MA	
131	METRIBUZIN	ND	ug/L	0.2	0.2		a		MA	
132	PROPACHLOR	ND	ug/L	0.1	0.1		a		MA	
254	FLUORENE	ND	ug/L	0.2	0.2		a		MA	
179	BROMACIL	ND	ug/L	0.2	0.2		a		MA	
	State Unregulated - Other									
190	TERBACIL	ND	ug/L	0.1			a		MA	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.

FORM: cSOC.rpt

EDGE ANALYTICAL

Reference Number: 22-38553
Lab Number: 046-75964
Report Date: 12/29/22 9:22

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
208	EPTC	**ND**	ug/L	0.1			a		MA	
218	MOLINATE	**ND**	ug/L	0.1			a		MA	
232	4,4-DDD	**ND**	ug/L	0.1			a		MA	
233	4,4-DDE	**ND**	ug/L	0.1			a		MA	
234	4,4-DDT	**ND**	ug/L	0.1			a		MA	
261	DIMETHYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
243	TRIFLURALIN	**ND**	ug/L	0.1			a		MA	
244	ACENAPHTHYLENE	**ND**	ug/L	0.2			a		MA	
246	ANTHRACENE	**ND**	ug/L	0.2			a		MA	
247	BENZO(A)ANTHRACENE	**ND**	ug/L	0.2			a		MA	
248	BENZO(B)FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
250	BENZO(K)FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
251	CHRYSENE	**ND**	ug/L	0.2			a		MA	
253	FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
256	PHENANTHRENE	**ND**	ug/L	0.2			a		MA	
257	PYRENE	**ND**	ug/L	0.2			a		MA	
258	BENZYL BUTYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
259	DI-N-BUTYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
260	DIETHYL PHTHALATE	**ND**	ug/L	1.0			a		MA	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.

EDGE ANALYTICAL

Burlington, WA *Corporate Laboratory (a)*
1620 S Walnut St · Burlington, WA 98233 · 800.755.9295 · 360 757 1400

Bellingham, WA *Microbiology (b)*
805 Orchard Dr Ste 4 - Bellingham, WA 98225 · 360 715 1212

Portland, OR *Microbiology/Chemistry (c)*
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Corvallis, OR *Microbiology/Chemistry (d)*
1100 NE Circle Blvd, Ste 130 · Corvallis, OR 97330 · 541 753 4946

Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 · 541 639 8425

NELAP ACCREDITED LABORATORY TNI

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-38553
Project: 08993737

Date Collected: 11/18/22 09:45
System ID Number: **12200D**
Lab Number: 046-75964
Sample Location: Borst Park Well #2
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 508_221201
Approved By: pdm
Authorized By:

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID:
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 11
Multiple Sources:
Date Received: 11/23/2022 10:56:00
Date Analyzed: 12/01/22
Date: Reported: 12/29/22
Sample Type: B - Before treatment
Sample Collected By: Charlie/ E,Wroblesli
Sampler Phone: 3603307512

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	PCBs/Toxaphene									
36	TOXAPHENE .	**ND**	ug/L	1	1	3	a		MA	
122	CHLORDANE, TECHNICAL	**ND**	ug/L	0.2	0.2	2	a		MA	
	EPA Unregulated									
173	AROCLOR 1221	**ND**	ug/L	20	20		a		MA	
174	AROCLOR 1232	**ND**	ug/L	0.5	0.5		a		MA	
175	AROCLOR 1242	**ND**	ug/L	0.3	0.3		a		MA	
176	AROCLOR 1248	**ND**	ug/L	0.1	0.1		a		MA	
177	AROCLOR 1254	**ND**	ug/L	0.1	0.1		a		MA	
178	AROCLOR 1260	**ND**	ug/L	0.2	0.2		a		MA	
180	AROCLOR 1016	**ND**	ug/L	0.08	0.08		a		MA	
153	PCBS (Total Aroclors)	**ND**	ug/L	0.2		0.5	a		MA	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.

FORM: cSOC.rpt

EDGE ANALYTICAL

QUALITY CONTROL REPORT
SURROGATE REPORT

Reference Number: 22-38553
Report Date: 12/29/22

Lab No	Analyte	Result	Qualifier	Units	Method	Limit
508_221201						
75964	TETRACHLORO-M-XYLENE (SURR)	83		%	508.1	Acceptance Limits 70%-130%
515_221201						
75964	2,4 - DCAA (SURR)	83		%	515.4	Acceptance Range is 70 - 130%
525_221201						
75964	1,3-DIMETHYL-2-NITROBENZENE (Surr)	95		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	102		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)*	99		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	100		%		Acceptance Range is 70% to 130%

*Notation:

A surrogate is a pure compound added to a sample in the laboratory just before processing so that the overall efficiency of a meA surrogate is a pure compound added to a sample in the l

The Acceptance Limits (or Control Limits) approximate a 99% confidence interval around the mean recovery.

EDGE ANALYTICAL

Reference Number: **22-38553**
Report Date: 12/29/2022

SAMPLE DEPENDENT
QUALITY CONTROL REPORT
Duplicate, Matrix Spike/Matrix Spike Duplicate and Confirmation Result Report

Laboratory Fortified Matrix (MS)

Batch/CAS	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits*	%RPD	Limits*	QC Qualifier	Type	Comments
525_221201															
81-20-9	75016	1,3-DIMETHYL-2-NITROBENZENE (Surr94		95			%		**NA**	70-130	**NA**	0-20		LFM	
72-54-8	75016	4,4-DDD	ND	1.38		1	ug/L	138	**NA**	70-130	**NA**	0-20	M1	LFM	
50-29-3	75016	4,4-DDT	ND	1.62		1	ug/L	162	**NA**	70-130	**NA**	0-20	HR	LFM	
208-96-8	75016	ACENAPHTHYLENE	ND	0.80		1	ug/L	**80**	**NA**	70-130	**NA**	0-20		LFM	
15972-60-8	75016	ALACHLOR	ND	2.42		2	ug/L	**121**	**NA**	70-130	**NA**	0-20		LFM	
309-00-2	75016	ALDRIN	ND	0.78		1	ug/L	**78**	**NA**	70-130	**NA**	0-20		LFM	
120-12-7	75016	ANTHRACENE	ND	0.86		1	ug/L	**86**	**NA**	70-130	**NA**	0-20		LFM	
1912-24-9	75016	ATRAZINE	ND	2.14		2	ug/L	**107**	**NA**	70-130	**NA**	0-20		LFM	
56-55-3	75016	BENZO(A)ANTHRACENE	ND	1.10		1	ug/L	**110**	**NA**	70-130	**NA**	0-20		LFM	
50-32-8	75016	BENZO(A)PYRENE	ND	1.14		1	ug/L	**114**	**NA**	70-130	**NA**	0-20		LFM	
205-99-2	75016	BENZO(B)FLUORANTHENE	ND	1.16		1	ug/L	**116**	**NA**	70-130	**NA**	0-20		LFM	
207-08-9	75016	BENZO(K)FLUORANTHENE	ND	0.98		1	ug/L	**98**	**NA**	70-130	**NA**	0-20		LFM	
85-68-7	75016	BENZYL BUTYL PHTHALATE	ND	1.27		1	ug/L	**127**	**NA**	70-130	**NA**	0-20		LFM	
314-40-9	75016	BROMACIL	ND	1.20		1	ug/L	**120**	**NA**	70-130	**NA**	0-20		LFM	
23184-66-9	75016	BUTACHLOR	ND	1.36		1	ug/L	136	**NA**	70-130	**NA**	0-20	M1	LFM	
218-01-9	75016	CHRYSENE	ND	0.86		1	ug/L	**86**	**NA**	70-130	**NA**	0-20		LFM	
103-23-1	75016	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	ND	1.14		1	ug/L	**114**	**NA**	70-130	**NA**	0-20		LFM	
117-81-7	75016	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP	ND	1.38		1	ug/L	138	**NA**	70-130	**NA**	0-20	M1	LFM	
60-57-1	75016	DIELDRIN	ND	0.98		1	ug/L	**98**	**NA**	70-130	**NA**	0-20		LFM	
84-66-2	75016	DIETHYL PHTHALATE	ND	1.03		1	ug/L	**103**	**NA**	70-130	**NA**	0-20		LFM	
131-11-3	75016	DIMETHYL PHTHALATE	ND	0.96		1	ug/L	**96**	**NA**	70-130	**NA**	0-20		LFM	
84-74-2	75016	DI-N-BUTYL PHTHALATE	ND	1.10		1	ug/L	**110**	**NA**	70-130	**NA**	0-20		LFM	
72-20-8	75016	ENDRIN	ND	1.53		1	ug/L	153	**NA**	70-130	**NA**	0-20	M1	LFM	
759-94-4	75016	EPTC	ND	1.05		1	ug/L	**105**	**NA**	70-130	**NA**	0-20		LFM	
206-44-0	75016	FLUORANTHENE	ND	1.05		1	ug/L	**105**	**NA**	70-130	**NA**	0-20		LFM	
86-73-7	75016	FLUORENE	ND	0.98		1	ug/L	**98**	**NA**	70-130	**NA**	0-20		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

Laboratory Fortified Matrix (MS)

Batch/CAS	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits*	%RPD	Limits*	QC Qualifier	Type	Comments
76-44-8	75016	HEPTACHLOR	ND	1.58		1	ug/L	158	**NA**	70-130	**NA**	0-20	M1	LFM	
1024-57-3	75016	HEPTACHLOR EPOXIDE	ND	0.99		1	ug/L	**99**	**NA**	70-130	**NA**	0-20		LFM	
118-74-1	75016	HEXACHLOROBENZENE	ND	0.99		1	ug/L	**99**	**NA**	70-130	**NA**	0-20		LFM	
77-47-4	75016	HEXACHLOROCYCLO-PENTADIENE	ND	1.35		1	ug/L	135	**NA**	70-130	**NA**	0-20	M1	LFM	
58-89-9	75016	LINDANE (BHC - GAMMA)	ND	1.06		1	ug/L	**106**	**NA**	70-130	**NA**	0-20		LFM	
72-43-5	75016	METHOXYCHLOR	ND	1.64		1	ug/L	164	**NA**	70-130	**NA**	0-20	M1	LFM	
51218-45-2	75016	METOLACHLOR	ND	1.30		1	ug/L	**130**	**NA**	70-130	**NA**	0-20		LFM	
21087-64-9	75016	METRIBUZIN	ND	1.02		1	ug/L	**102**	**NA**	70-130	**NA**	0-20		LFM	
2212-67-1	75016	MOLINATE	ND	1.03		1	ug/L	**103**	**NA**	70-130	**NA**	0-20		LFM	
85-01-8	75016	PHENANTHRENE	ND	0.96		1	ug/L	**96**	**NA**	70-130	**NA**	0-20		LFM	
1918-16-7	75016	PROPACHLOR	ND	1.26		1	ug/L	**126**	**NA**	70-130	**NA**	0-20		LFM	
129-00-0	75016	PYRENE	ND	0.94		1	ug/L	**94**	**NA**	70-130	**NA**	0-20		LFM	
122-34-9	75016	SIMAZINE	ND	1.01		1	ug/L	**101**	**NA**	70-130	**NA**	0-20		LFM	
5902-51-2	75016	TERBACIL	ND	1.35		1	ug/L	135	**NA**	70-130	**NA**	0-20	M1	LFM	
1582-09-8	75016	TRIFLURALIN	ND	1.36		1	ug/L	136	**NA**	70-130	**NA**	0-20	M1	LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

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EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Laboratory Fortified Blank

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
508_221201	0	CHLORDANE, TECHNICAL	0.21	0.2	ug/L	508.1	105	70-130		LFB	
515_221201	0	2,4,5 - T	0.464	0.5	ug/L	515.4	93	70-130		LFB	
	0	DCPA (ACID METABOLITES)	0.465	0.5	ug/L	515.4	93	70-130		LFB	
	0	DICAMBA	0.535	0.5	ug/L	515.4	107	70-130		LFB	
	0	2,4 - D	0.477	0.5	ug/L	515.4	95	70-130		LFB	
	0	2,4,5 - TP (SILVEX)	0.460	0.5	ug/L	515.4	92	70-130		LFB	
	0	DINOSEB	0.471	0.5	ug/L	515.4	94	70-130		LFB	
	0	PENTACHLOROPHENOL	0.474	0.5	ug/L	515.4	95	70-130		LFB	
	0	PICLORAM	0.440	0.5	ug/L	515.4	88	70-130		LFB	
	1	2,4 DB	2.4	2.5	ug/L	515.4	96	70-130		LFB	
	1	2,4,5 - T	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	3,5 - DICHLOROBENZOIC ACID	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	ACIFLUORFEN	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	BENTAZON	2.4	2.5	ug/L	515.4	96	70-130		LFB	
	1	DCPA (ACID METABOLITES)	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	DICAMBA	2.4	2.5	ug/L	515.4	96	70-130		LFB	
	1	DICHLORPROP	2.4	2.5	ug/L	515.4	96	70-130		LFB	
	1	2,4 - D	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	2,4,5 - TP (SILVEX)	2.4	2.5	ug/L	515.4	96	70-130		LFB	
	1	DALAPON	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	DINOSEB	2.5	2.5	ug/L	515.4	100	70-130		LFB	
	1	PENTACHLOROPHENOL	2.6	2.5	ug/L	515.4	104	70-130		LFB	
	1	PICLORAM	2.6	2.5	ug/L	515.4	104	70-130		LFB	
525_221201	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	93		%	525.2		70-130		LFB	
	0	4,4-DDD	1.18	1	ug/L	525.2	118	70-130		LFB	
	0	4,4-DDT	1.33	1	ug/L	525.2	133	70-130	HR	LFB	
	0	ACENAPHTHYLENE	0.73	1	ug/L	525.2	73	70-130		LFB	
	0	ANTHRACENE	0.75	1	ug/L	525.2	75	70-130		LFB	
	0	BENZO(A)ANTHRACENE	0.96	1	ug/L	525.2	96	70-130		LFB	
	0	BENZO(B)FLUORANTHENE	0.99	1	ug/L	525.2	99	70-130		LFB	
	0	BENZO(K)FLUORANTHENE	0.96	1	ug/L	525.2	96	70-130		LFB	
	0	BENZYL BUTYL PHTHALATE	1.13	1	ug/L	525.2	113	70-130		LFB	
	0	CHRYSENE	0.85	1	ug/L	525.2	85	70-130		LFB	
	0	DIETHYL PHTHALATE	0.98	1	ug/L	525.2	98	70-130		LFB	
	0	DIMETHYL PHTHALATE	0.95	1	ug/L	525.2	95	70-130		LFB	
	0	DI-N-BUTYL PHTHALATE	1.03	1	ug/L	525.2	103	70-130		LFB	
	0	EPTC	0.96	1	ug/L	525.2	96	70-130		LFB	
	0	FLUORANTHENE	0.99	1	ug/L	525.2	99	70-130		LFB	
	0	MOLINATE	0.93	1	ug/L	525.2	93	70-130		LFB	
	0	PHENANTHRENE	0.92	1	ug/L	525.2	92	70-130		LFB	
	0	PYRENE	0.89	1	ug/L	525.2	89	70-130		LFB	
	0	TERBACIL	1.15	1	ug/L	525.2	115	70-130		LFB	
	0	TRIFLURALIN	1.03	1	ug/L	525.2	103	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Laboratory Fortified Blank											
525_221201	0	ALDRIN	0.70	1	ug/L	525.2	70	70-130		LFB	
	0	BROMACIL	1.04	1	ug/L	525.2	104	70-130		LFB	
	0	BUTACHLOR	1.18	1	ug/L	525.2	118	70-130		LFB	
	0	DIELDRIN	0.92	1	ug/L	525.2	92	70-130		LFB	
	0	FLUORENE	0.93	1	ug/L	525.2	93	70-130		LFB	
	0	METOLACHLOR	1.10	1	ug/L	525.2	110	70-130		LFB	
	0	METRIBUZIN	0.89	1	ug/L	525.2	89	70-130		LFB	
	0	PROPACHLOR	1.05	1	ug/L	525.2	105	70-130		LFB	
	0	ALACHLOR	2.27	2	ug/L	525.2	114	70-130		LFB	
	0	ATRAZINE	2.26	2	ug/L	525.2	113	70-130		LFB	
	0	BENZO(A)PYRENE	0.95	1	ug/L	525.2	95	70-130		LFB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	1.00	1	ug/L	525.2	100	70-130		LFB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	1.19	1	ug/L	525.2	119	70-130		LFB	
	0	ENDRIN	1.12	1	ug/L	525.2	112	70-130		LFB	
	0	HEPTACHLOR	1.25	1	ug/L	525.2	125	70-130		LFB	
	0	HEPTACHLOR EPOXIDE	0.90	1	ug/L	525.2	90	70-130		LFB	
	0	HEXACHLOROBENZENE	0.96	1	ug/L	525.2	96	70-130		LFB	
	0	HEXACHLOROCYCLO-PENTADIENE	0.88	1	ug/L	525.2	88	70-130		LFB	
	0	LINDANE (BHC - GAMMA)	0.92	1	ug/L	525.2	92	70-130		LFB	
	0	METHOXYCHLOR	1.25	1	ug/L	525.2	125	70-130		LFB	
	0	SIMAZINE	1.01	1	ug/L	525.2	101	70-130		LFB	

*Notation:
% Recovery = (Result of Analysis)/(True Value) * 100
NA = Indicates % Recovery could not be calculated.
Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.
FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Low-Level Lab Fortified Blank											
515_221201	0	2,4 DB	0.509	0.5	ug/L	515.4	102	50-150		LLFB	
	0	2,4,5 - T	0.105	0.1	ug/L	515.4	105	50-150		LLFB	
	0	3,5 - DICHLOROBENZOIC ACID	0.582	0.5	ug/L	515.4	116	50-150		LLFB	
	0	ACIFLUORFEN	0.484	0.5	ug/L	515.4	97	50-150		LLFB	
	0	BENTAZON	0.533	0.5	ug/L	515.4	107	50-150		LLFB	
	0	DCPA (ACID METABOLITES)	0.118	0.1	ug/L	515.4	118	50-150		LLFB	
	0	DICAMBA	0.085	0.1	ug/L	515.4	85	50-150		LLFB	
	0	DICHLORPROP	0.492	0.5	ug/L	515.4	98	50-150		LLFB	
	0	2,4 - D	0.102	0.1	ug/L	515.4	102	50-150		LLFB	
	0	2,4,5 - TP (SILVEX)	0.115	0.1	ug/L	515.4	115	50-150		LLFB	
	0	DALAPON	0.457	0.5	ug/L	515.4	91	50-150		LLFB	
	0	DINOSEB	0.100	0.1	ug/L	515.4	100	50-150		LLFB	
	0	PENTACHLOROPHENOL	0.083	0.1	ug/L	515.4	83	50-150		LLFB	
	0	PICLORAM	0.117	0.1	ug/L	515.4	117	50-150		LLFB	
	1	PENTACHLOROPHENOL	0.043	0.04	ug/L	515.4	108	50-150		LLFB	
525_221201	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	94		%	525.2		50-150		LLFB	
	0	4,4-DDD	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	4,4-DDT	0.12	0.1	ug/L	525.2	120	50-150		LLFB	
	0	ACENAPHTHYLENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	ANTHRACENE	0.07	0.1	ug/L	525.2	70	50-150		LLFB	
	0	BENZO(A)ANTHRACENE	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	BENZO(B)FLUORANTHENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	BENZO(K)FLUORANTHENE	0.07	0.1	ug/L	525.2	70	50-150		LLFB	
	0	BENZYL BUTYL PHTHALATE	0.55	0.5	ug/L	525.2	110	50-150		LLFB	
	0	CHRYSENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	DIETHYL PHTHALATE	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	DIMETHYL PHTHALATE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	DI-N-BUTYL PHTHALATE	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	EPTC	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	FLUORANTHENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	MOLINATE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	PHENANTHRENE	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	PYRENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	TERBACIL	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	TRIFLURALIN	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	ALDRIN	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	BROMACIL	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	BUTACHLOR	0.17	0.1	ug/L	525.2	170	50-150	HR	LLFB	
	0	DIELDRIN	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	FLUORENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	METOLACHLOR	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	METRIBUZIN	0.06	0.1	ug/L	525.2	60	50-150		LLFB	
	0	PROPACHLOR	0.10	0.1	ug/L	525.2	100	50-150		LLFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Low-Level Lab Fortified Blank											
525_221201	0	ALACHLOR	0.21	0.2	ug/L	525.2	105	50-150		LLFB	
	0	ATRAZINE	0.25	0.2	ug/L	525.2	125	50-150		LLFB	
	0	BENZO(A)PYRENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	0.42	0.5	ug/L	525.2	84	50-150		LLFB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	0.51	0.5	ug/L	525.2	102	50-150		LLFB	
	0	ENDRIN	0.13	0.1	ug/L	525.2	130	50-150		LLFB	
	0	HEPTACHLOR	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	HEPTACHLOR EPOXIDE	0.12	0.1	ug/L	525.2	120	50-150		LLFB	
	0	HEXACHLOROBENZENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	HEXACHLOROCYCLO-PENTADIENE	0.06	0.1	ug/L	525.2	60	50-150		LLFB	
	0	LINDANE (BHC - GAMMA)	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	METHOXYCHLOR	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	SIMAZINE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

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FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Method Blank											
508_221201	0	AROCLOR 1016	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1221	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1232	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1242	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1248	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1254	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1260	ND		ug/L	508.1		0-0		MB	
	0	CHLORDANE, TECHNICAL	ND		ug/L	508.1		0-0		MB	
	0	TOXAPHENE	ND		ug/L	508.1		0-0		MB	
515_221201	0	2,4 DB	ND		ug/L	515.4		0-0		MB	
	0	2,4,5 - T	ND		ug/L	515.4		0-0		MB	
	0	3,5 - DICHLOROBENZOIC ACID	ND		ug/L	515.4		0-0		MB	
	0	ACIFLUORFEN	ND		ug/L	515.4		0-0		MB	
	0	BENTAZON	ND		ug/L	515.4		0-0		MB	
	0	DCPA (ACID METABOLITES)	ND		ug/L	515.4		0-0		MB	
	0	DICAMBA	ND		ug/L	515.4		0-0		MB	
	0	DICHLORPROP	ND		ug/L	515.4		0-0		MB	
	0	2,4 - D	ND		ug/L	515.4		0-0		MB	
	0	2,4,5 - TP (SILVEX)	ND		ug/L	515.4		0-0		MB	
	0	DALAPON	ND		ug/L	515.4		0-0		MB	
	0	DINOSEB	ND		ug/L	515.4		0-0		MB	
	0	PENTACHLOROPHENOL	ND		ug/L	515.4		0-0		MB	
	0	PICLORAM	ND		ug/L	515.4		0-0		MB	
525_221201	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	93		%	525.2		70-130		MB	
	0	4,4-DDD	ND		ug/L	525.2		0-0		MB	
	0	4,4-DDE	ND		ug/L	525.2		0-0		MB	
	0	4,4-DDT	ND		ug/L	525.2		0-0		MB	
	0	ACENAPHTHYLENE	ND		ug/L	525.2		0-0		MB	
	0	ANTHRACENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(A)ANTHRACENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(B)FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(K)FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	BENZYL BUTYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	CHRYSENE	ND		ug/L	525.2		0-0		MB	
	0	DIETHYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	DIMETHYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	DI-N-BUTYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	EPTC	ND		ug/L	525.2		0-0		MB	
	0	FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	MOLINATE	ND		ug/L	525.2		0-0		MB	
	0	PHENANTHRENE	ND		ug/L	525.2		0-0		MB	
	0	PYRENE	ND		ug/L	525.2		0-0		MB	
	0	TERBACIL	ND		ug/L	525.2		0-0		MB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-38553**
Report Date: 12/29/22

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Method Blank											
525_221201	0	TRIFLURALIN	ND		ug/L	525.2		0-0		MB	
	0	ALDRIN	ND		ug/L	525.2		0-0		MB	
	0	BROMACIL	ND		ug/L	525.2		0-0		MB	
	0	BUTACHLOR	ND		ug/L	525.2		0-0		MB	
	0	DIELDRIN	ND		ug/L	525.2		0-0		MB	
	0	FLUORENE	ND		ug/L	525.2		0-0		MB	
	0	METOLACHLOR	ND		ug/L	525.2		0-0		MB	
	0	METRIBUZIN	ND		ug/L	525.2		0-0		MB	
	0	PROPACHLOR	ND		ug/L	525.2		0-0		MB	
	0	ALACHLOR	ND		ug/L	525.2		0-0		MB	
	0	ATRAZINE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(A)PYRENE	ND		ug/L	525.2		0-0		MB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	ND		ug/L	525.2		0-0		MB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	ND		ug/L	525.2		0-0		MB	
	0	ENDRIN	ND		ug/L	525.2		0-0		MB	
	0	HEPTACHLOR	ND		ug/L	525.2		0-0		MB	
	0	HEPTACHLOR EPOXIDE	ND		ug/L	525.2		0-0		MB	
	0	HEXACHLOROBENZENE	ND		ug/L	525.2		0-0		MB	
	0	HEXACHLOROCYCLO-PENTADIENE	ND		ug/L	525.2		0-0		MB	
	0	LINDANE (BHC - GAMMA)	ND		ug/L	525.2		0-0		MB	
	0	METHOXYCHLOR	ND		ug/L	525.2		0-0		MB	
	0	SIMAZINE	ND		ug/L	525.2		0-0		MB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

Qualifier Definitions

Reference Number: 22-38553
Report Date: 12/29/22

Qualifier	Definition
HR	High QCS recovery due to increased detector response No sample dectections, therefore, no further action taken for this analysis set.
M1	Matrix spike recovery was high; the associated blank spike recovery was acceptable. Matrix bias indicated.

Note: Some qualifier definitions found on this page may pertain to results or QC data which are not printed with this report.

EDGE ANALYTICAL

Burlington, WA *Corporate Laboratory (a)*
1620 S Walnut St - Burlington, WA 98233 - 800.755.9295 - 360.757.1400

Bellingham, WA *Microbiology (b)*
805 Orchard Dr Ste 4 - Bellingham, WA 98225 - 360.715.1212

Portland, OR *Microbiology/Chemistry (c)*
9725 SW Commerce Cr Ste A2 - Wilsonville, OR 97070 - 503.682.7802

Corvallis, OR *Microbiology/Chemistry (d)*
1100 NE Circle Blvd. Ste 130 - Corvallis, OR 97330 - 541.753.4946

Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

HERBICIDES IN DRINKING WATER

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-39568
Project: 08993746

Date Collected: 11/30/22 14:15
System ID Number: **12200D**
Lab Number: 046-77801
Sample Location: Borst Park Well #1
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 515_221213
Approved By: nml,pdm
Authorized By: [signature]

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID: 08993746
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 10
Multiple Sources:
Date Received: 12/6/2022 10:48:00A
Date Analyzed: 12/16/22
Date: Reported: 1/20/23
Sample Type: B - Before treatment
Sample Collected By: EAW
Sampler Phone: 360-330-2512

EPA Method 515.4 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	EPA Regulated									
37	2,4 - D	**ND**	ug/L	0.1	0.1	70	a		BFR	
38	2,4,5 - TP (SILVEX)	**ND**	ug/L	0.2	0.2	50	a		BFR	
134	PENTACHLOROPHENOL	**ND**	ug/L	0.04	0.04	1	a		BFR	
137	DALAPON	**ND**	ug/L	1	1	200	a		BFR	
139	DINOSEB	**ND**	ug/L	0.2	0.2	7	a		BFR	
140	PICLORAM	**ND**	ug/L	0.1	0.1	500	a		BFR	
	Other									
138	DICAMBA	**ND**	ug/L	0.2	0.2		a		BFR	
225	DCPA (ACID METABOLITES)	**ND**	ug/L	0.1	0.1		a		BFR	
135	2,4 DB	**ND**	ug/L	1.0	1.0		a		BFR	
136	2,4,5 - T	**ND**	ug/L	0.4	0.4		a		BFR	
220	BENTAZON	**ND**	ug/L	0.5	0.5		a		BFR	
221	DICHLORPROP	**ND**	ug/L	0.5	0.5		a		BFR	
223	ACIFLUORFEN	**ND**	ug/L	2.0	2.0		a		BFR	
226	3,5 - DICHLOROBENZOIC ACID	**ND**	ug/L	0.5	0.5		a		BFR	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.
FORM: cSOC.rpt

EDGE ANALYTICAL

Burlington, WA *Corporate Laboratory (a)*
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1100 NE Circle Blvd, Ste 130 - Corvallis, OR 97330 - 541.753.4946
Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-39568
Project: 08993746

Date Collected: 11/30/22 14:15
System ID Number: **12200D**
Lab Number: 046-77801
Sample Location: Borst Park Well #1
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 525_221213
Approved By: nml,pdm
Authorized By: [signature]

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID: 08993746
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 10
Multiple Sources:
Date Received: 12/6/2022 10:48:00A
Date Analyzed: 12/15/22
Date: Reported: 1/20/23
Sample Type: B - Before treatment
Sample Collected By: EAW
Sampler Phone: 360-330-2512

EPA Method 525.2 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	EPA Regulated									
33	ENDRIN	**ND**	ug/L	0.01	0.01	2	a		MA	
34	LINDANE (BHC - GAMMA)	**ND**	ug/L	0.02	0.02	0.2	a		MA	
35	METHOXYCHLOR	**ND**	ug/L	0.1	0.1	40	a		MA	
117	ALACHLOR	**ND**	ug/L	0.2	0.2	2	a		MA	
119	ATRAZINE	**ND**	ug/L	0.1	0.1	3	a		MA	
120	BENZO(A)PYRENE	**ND**	ug/L	0.02	0.02	0.2	a		MA	
124	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	**ND**	ug/L	0.6	0.6	400	a		MA	
125	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	**ND**	ug/L	0.6	0.6	6	a		MA	
126	HEPTACHLOR	**ND**	ug/L	0.04	0.04	0.4	a		MA	
127	HEPTACHLOR EPOXIDE	**ND**	ug/L	0.02	0.02	0.2	a		MA	
128	HEXACHLOROBENZENE	**ND**	ug/L	0.1	0.1	1	a		MA	
129	HEXACHLOROCYCLO-PENTADIENE	**ND**	ug/L	0.1	0.1	50	a		MA	
133	SIMAZINE	**ND**	ug/L	0.07	0.07	4	a		MA	
	EPA Unregulated									
118	ALDRIN	**ND**	ug/L	0.1	0.1		a		MA	
121	BUTACHLOR	**ND**	ug/L	0.4	0.4		a		MA	
123	DIELDRIN	**ND**	ug/L	0.1	0.1		a		MA	
130	METOLACHLOR	**ND**	ug/L	1.0	1.0		a		MA	
131	METRIBUZIN	**ND**	ug/L	0.2	0.2		a		MA	
132	PROPACHLOR	**ND**	ug/L	0.1	0.1		a		MA	
254	FLUORENE	**ND**	ug/L	0.2	0.2		a		MA	
179	BROMACIL	**ND**	ug/L	0.2	0.2		a		MA	
	State Unregulated - Other									
190	TERBACIL	**ND**	ug/L	0.1			a		MA	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.

EDGE ANALYTICAL

Reference Number: 22-39568
Lab Number: 046-77801
Report Date: 1/20/23 16:37

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
208	EPTC	**ND**	ug/L	0.1			a		MA	
218	MOLINATE	**ND**	ug/L	0.1			a		MA	
232	4,4-DDD	**ND**	ug/L	0.1			a		MA	
233	4,4-DDE	**ND**	ug/L	0.1			a		MA	
234	4,4-DDT	**ND**	ug/L	0.1			a		MA	
261	DIMETHYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
243	TRIFLURALIN	**ND**	ug/L	0.1			a		MA	
244	ACENAPHTHYLENE	**ND**	ug/L	0.2			a		MA	
246	ANTHRACENE	**ND**	ug/L	0.2			a		MA	
247	BENZO(A)ANTHRACENE	**ND**	ug/L	0.2			a		MA	
248	BENZO(B)FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
250	BENZO(K)FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
251	CHRYSENE	**ND**	ug/L	0.2			a		MA	
253	FLUORANTHENE	**ND**	ug/L	0.2			a		MA	
256	PHENANTHRENE	**ND**	ug/L	0.2			a		MA	
257	PYRENE	**ND**	ug/L	0.2			a		MA	
258	BENZYL BUTYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
259	DI-N-BUTYL PHTHALATE	**ND**	ug/L	1.0			a		MA	
260	DIETHYL PHTHALATE	**ND**	ug/L	1.0			a		MA	

NOTES:
If a compound is detected > or = to the State Reporting Level, SRL, specified increased monitoring frequencies may occur per DOH.
MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.

EDGE ANALYTICAL

Burlington, WA *Corporate Laboratory (a)*
1620 S Walnut St - Burlington, WA 98233 - 800.755.9295 • 360.757.1400

Bellingham, WA *Microbiology (b)*
805 Orchard Dr Ste 4 - Bellingham, WA 98225 - 360.715.1212

Portland, OR *Microbiology/Chemistry (c)*
9725 SW Commerce Cr Ste A2 - Wilsonville, OR 97070 - 503.682.7802

Corvallis, OR *Microbiology/Chemistry (d)*
1100 NE Circle Blvd. Ste 130 - Corvallis, OR 97330 - 541.753.4946

Bend, OR *Microbiology (e)*
20332 Empire Blvd Ste 4 - Bend, OR 97701 - 541.639.8425

SYNTHETIC ORGANIC COMPOUNDS (SOC) REPORT

Client Name: Water Management Laboratories, INC.
1515 80th Street East
Tacoma, WA 98404

Reference Number: 22-39568
Project: 08993746

Date Collected: 11/30/22 14:15
System ID Number: **12200D**
Lab Number: 046-77801
Sample Location: Borst Park Well #1
Sample Purpose: Investigative or Other
Sample Composition: Single Source
Date Extracted: 508_221213
Approved By: nml,pdm
Authorized By: [signature]
Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Field ID: 08993746
System Group Type: A
System Name: CENTRALIA UTILITIES
County: LEWIS
Source Number: 10
Multiple Sources:
Date Received: 12/6/2022 10:48:00A
Date Analyzed: 12/16/22
Date: Reported: 1/20/23
Sample Type: B - Before treatment
Sample Collected By: EAW
Sampler Phone: 360-330-2512

EPA Method 508.1 For State Drinking Water Compliance

DOH#	COMPOUNDS	RESULTS	UNITS	SRL	Trigger	MCL	Lab		Analyst	COMMENT
	PCBs/Toxaphene									
36	TOXAPHENE	**ND**	ug/L	1	1	3	a		MA	
122	CHLORDANE, TECHNICAL	**ND**	ug/L	0.2	0.2	2	a		MA	
	EPA Unregulated									
173	AROCLOR 1221	**ND**	ug/L	20	20		a		MA	
174	AROCLOR 1232	**ND**	ug/L	0.5	0.5		a		MA	
175	AROCLOR 1242	**ND**	ug/L	0.3	0.3		a		MA	
176	AROCLOR 1248	**ND**	ug/L	0.1	0.1		a		MA	
177	AROCLOR 1254	**ND**	ug/L	0.1	0.1		a		MA	
178	AROCLOR 1260	**ND**	ug/L	0.2	0.2		a		MA	
180	AROCLOR 1016	**ND**	ug/L	0.08	0.08		a		MA	
153	PCBS (Total Aroclors)	**ND**	ug/L	0.2		0.5	a		MA	

NOTES:
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MCL (Maximum Contaminant Level) maximum permissible level of a contaminant in water established by EPA; a blank MCL value indicates a level is not currently established.

Trigger Level: DOH Drinking Water Response level. Systems with compounds detected in excess of this level are required to take additional samples. Contact your regional DOH office.
ND (Not Detected): indicates that the parameter was not detected above the State Reporting Limit (SRL).
An * in front of the parameter name indicates it is not NELAP accredited but it is accredited through WSDOH or USEPA Region 10.

These test results meet all the requirements of NELAC, unless otherwise stated in writing, and relate only to these samples.
If you have any questions concerning this report contact Lawrence J Henderson, PhD, Director of Laboratories, Vice President, at the toll-free phone number above.

ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Laboratory Fortified Blank											
508_221213	0	CHLORDANE, TECHNICAL	0.18	0.2	ug/L	508.1	90	70-130		LFB	
515_221213	0	2,4,5 - T	0.396	0.5	ug/L	515.4	79	70-130		LFB	
	0	DCPA (ACID METABOLITES)	0.379	0.5	ug/L	515.4	76	70-130		LFB	
	0	DICAMBA	0.467	0.5	ug/L	515.4	93	70-130		LFB	
	0	2,4 - D	0.397	0.5	ug/L	515.4	79	70-130		LFB	
	0	2,4,5 - TP (SILVEX)	0.366	0.5	ug/L	515.4	73	70-130		LFB	
	0	DINOSEB	0.431	0.5	ug/L	515.4	86	70-130		LFB	
	0	PENTACHLOROPHENOL	0.426	0.5	ug/L	515.4	85	70-130		LFB	
	0	PICLORAM	0.352	0.5	ug/L	515.4	70	70-130		LFB	
	1	2,4 DB	2.0	2.5	ug/L	515.4	80	70-130		LFB	
	1	2,4,5 - T	2.1	2.5	ug/L	515.4	84	70-130		LFB	
	1	3,5 - DICHLOROBENZOIC ACID	2.2	2.5	ug/L	515.4	88	70-130		LFB	
	1	ACIFLUORFEN	2.0	2.5	ug/L	515.4	80	70-130		LFB	
	1	BENTAZON	1.9	2.5	ug/L	515.4	76	70-130		LFB	
	1	DCPA (ACID METABOLITES)	1.9	2.5	ug/L	515.4	76	70-130		LFB	
	1	DICAMBA	2.1	2.5	ug/L	515.4	84	70-130		LFB	
	1	DICHLORPROP	2.0	2.5	ug/L	515.4	80	70-130		LFB	
	1	2,4 - D	2.0	2.5	ug/L	515.4	80	70-130		LFB	
	1	2,4,5 - TP (SILVEX)	2.1	2.5	ug/L	515.4	84	70-130		LFB	
	1	DALAPON	2.0	2.5	ug/L	515.4	80	70-130		LFB	
	1	DINOSEB	2.2	2.5	ug/L	515.4	88	70-130		LFB	
	1	PENTACHLOROPHENOL	2.3	2.5	ug/L	515.4	92	70-130		LFB	
	1	PICLORAM	1.9	2.5	ug/L	515.4	76	70-130		LFB	
525_221213	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	101		%	525.2		70-130		LFB	
	0	4,4-DDD	1.11	1	ug/L	525.2	111	70-130		LFB	
	0	4,4-DDT	1.30	1	ug/L	525.2	130	70-130		LFB	
	0	ACENAPHTHYLENE	0.77	1	ug/L	525.2	77	70-130		LFB	
	0	ANTHRACENE	0.74	1	ug/L	525.2	74	70-130		LFB	
	0	BENZO(A)ANTHRACENE	1.03	1	ug/L	525.2	103	70-130		LFB	
	0	BENZO(B)FLUORANTHENE	1.03	1	ug/L	525.2	103	70-130		LFB	
	0	BENZO(K)FLUORANTHENE	1.01	1	ug/L	525.2	101	70-130		LFB	
	0	BENZYL BUTYL PHTHALATE	1.11	1	ug/L	525.2	111	70-130		LFB	
	0	CHRYSENE	0.87	1	ug/L	525.2	87	70-130		LFB	
	0	DIETHYL PHTHALATE	1.04	1	ug/L	525.2	104	70-130		LFB	
	0	DIMETHYL PHTHALATE	0.89	1	ug/L	525.2	89	70-130		LFB	
	0	DI-N-BUTYL PHTHALATE	1.03	1	ug/L	525.2	103	70-130		LFB	
	0	EPTC	0.97	1	ug/L	525.2	97	70-130		LFB	
	0	FLUORANTHENE	0.95	1	ug/L	525.2	95	70-130		LFB	
	0	MOLINATE	0.98	1	ug/L	525.2	98	70-130		LFB	
	0	PHENANTHRENE	0.98	1	ug/L	525.2	98	70-130		LFB	
	0	PYRENE	0.92	1	ug/L	525.2	92	70-130		LFB	
	0	TERBACIL	0.99	1	ug/L	525.2	99	70-130		LFB	
	0	TRIFLURALIN	1.00	1	ug/L	525.2	100	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Laboratory Fortified Blank

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
525_221213	0	ALDRIN	0.85	1	ug/L	525.2	85	70-130		LFB	
	0	BROMACIL	0.82	1	ug/L	525.2	82	70-130		LFB	
	0	BUTACHLOR	1.18	1	ug/L	525.2	118	70-130		LFB	
	0	DIELDRIN	1.04	1	ug/L	525.2	104	70-130		LFB	
	0	FLUORENE	0.93	1	ug/L	525.2	93	70-130		LFB	
	0	METOLACHLOR	1.11	1	ug/L	525.2	111	70-130		LFB	
	0	METRIBUZIN	0.67	1	ug/L	525.2	67	70-130	LR	LFB	
	0	PROPACHLOR	1.10	1	ug/L	525.2	110	70-130		LFB	
	0	ALACHLOR	2.19	2	ug/L	525.2	110	70-130		LFB	
	0	ATRAZINE	2.20	2	ug/L	525.2	110	70-130		LFB	
	0	BENZO(A)PYRENE	0.91	1	ug/L	525.2	91	70-130		LFB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	0.90	1	ug/L	525.2	90	70-130		LFB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	0.97	1	ug/L	525.2	97	70-130		LFB	
	0	ENDRIN	1.28	1	ug/L	525.2	128	70-130		LFB	
	0	HEPTACHLOR	1.51	1	ug/L	525.2	151	70-130	HR	LFB	
	0	HEPTACHLOR EPOXIDE	1.07	1	ug/L	525.2	107	70-130		LFB	
	0	HEXACHLOROBENZENE	1.02	1	ug/L	525.2	102	70-130		LFB	
	0	HEXACHLOROCYCLO-PENTADIENE	1.01	1	ug/L	525.2	101	70-130		LFB	
	0	LINDANE (BHC - GAMMA)	1.02	1	ug/L	525.2	102	70-130		LFB	
	0	METHOXYCHLOR	1.35	1	ug/L	525.2	135	70-130	HR	LFB	
	0	SIMAZINE	0.92	1	ug/L	525.2	92	70-130		LFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

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EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Low-Level Lab Fortified Blank

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
515_221213	0	2,4 DB	0.435	0.5	ug/L	515.4	87	50-150		LLFB	
	0	2,4,5 - T	0.088	0.1	ug/L	515.4	88	50-150		LLFB	
	0	3,5 - DICHLOROBENZOIC ACID	0.444	0.5	ug/L	515.4	89	50-150		LLFB	
	0	ACIFLUORFEN	0.342	0.5	ug/L	515.4	68	50-150		LLFB	
	0	BENTAZON	0.405	0.5	ug/L	515.4	81	50-150		LLFB	
	0	DCPA (ACID METABOLITES)	0.075	0.1	ug/L	515.4	75	50-150		LLFB	
	0	DICAMBA	0.105	0.1	ug/L	515.4	105	50-150		LLFB	
	0	DICHLORPROP	0.311	0.5	ug/L	515.4	62	50-150		LLFB	
	0	2,4 - D	0.071	0.1	ug/L	515.4	71	50-150		LLFB	
	0	2,4,5 - TP (SILVEX)	0.051	0.1	ug/L	515.4	51	50-150		LLFB	
	0	DALAPON	0.332	0.5	ug/L	515.4	66	50-150		LLFB	
	0	DINOSEB	0.071	0.1	ug/L	515.4	71	50-150		LLFB	
	0	PENTACHLOROPHENOL	0.081	0.1	ug/L	515.4	81	50-150		LLFB	
	0	PICLORAM	0.089	0.1	ug/L	515.4	89	50-150		LLFB	
	1	PENTACHLOROPHENOL	0.059	0.04	ug/L	515.4	148	50-150		LLFB	
525_221213	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	103		%	525.2		50-150		LLFB	
	0	4,4-DDD	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	4,4-DDT	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	ACENAPHTHYLENE	0.06	0.1	ug/L	525.2	60	50-150		LLFB	
	0	ANTHRACENE	0.06	0.1	ug/L	525.2	60	50-150		LLFB	
	0	BENZO(A)ANTHRACENE	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	BENZO(B)FLUORANTHENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	BENZO(K)FLUORANTHENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	BENZYL BUTYL PHTHALATE	0.99	0.5	ug/L	525.2	198	50-150	HR	LLFB	
	0	CHRYSENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	DIETHYL PHTHALATE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	DIMETHYL PHTHALATE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	DI-N-BUTYL PHTHALATE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	EPTC	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	FLUORANTHENE	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	MOLINATE	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	PHENANTHRENE	0.10	0.1	ug/L	525.2	100	50-150		LLFB	
	0	PYRENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	TERBACIL	0.07	0.1	ug/L	525.2	70	50-150		LLFB	
	0	TRIFLURALIN	0.03	0.1	ug/L	525.2	30	50-150	LR	LLFB	
	0	ALDRIN	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	BROMACIL	0.05	0.1	ug/L	525.2	50	50-150		LLFB	
	0	BUTACHLOR	0.15	0.1	ug/L	525.2	150	50-150		LLFB	
	0	DIELDRIN	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	FLUORENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	METOLACHLOR	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	METRIBUZIN	0.06	0.1	ug/L	525.2	60	50-150		LLFB	
	0	PROPACHLOR	0.10	0.1	ug/L	525.2	100	50-150		LLFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

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EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Low-Level Lab Fortified Blank

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
525_221213	0	ALACHLOR	0.16	0.2	ug/L	525.2	80	50-150		LLFB	
	0	ATRAZINE	0.18	0.2	ug/L	525.2	90	50-150		LLFB	
	0	BENZO(A)PYRENE	0.07	0.1	ug/L	525.2	70	50-150		LLFB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	0.87	0.5	ug/L	525.2	174	50-150	HR	LLFB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	1.07	0.5	ug/L	525.2	214	50-150	HR	LLFB	
	0	ENDRIN	0.15	0.1	ug/L	525.2	150	50-150		LLFB	
	0	HEPTACHLOR	0.14	0.1	ug/L	525.2	140	50-150		LLFB	
	0	HEPTACHLOR EPOXIDE	0.13	0.1	ug/L	525.2	130	50-150		LLFB	
	0	HEXACHLOROBENZENE	0.11	0.1	ug/L	525.2	110	50-150		LLFB	
	0	HEXACHLOROCYCLO-PENTADIENE	0.09	0.1	ug/L	525.2	90	50-150		LLFB	
	0	LINDANE (BHC - GAMMA)	0.13	0.1	ug/L	525.2	130	50-150		LLFB	
	0	METHOXYCHLOR	0.08	0.1	ug/L	525.2	80	50-150		LLFB	
	0	SIMAZINE	0.07	0.1	ug/L	525.2	70	50-150		LLFB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

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ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Method Blank											
508_221213	0	AROCLOR 1016	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1221	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1232	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1242	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1248	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1254	ND		ug/L	508.1		0-0		MB	
	0	AROCLOR 1260	ND		ug/L	508.1		0-0		MB	
	0	CHLORDANE, TECHNICAL	ND		ug/L	508.1		0-0		MB	
	0	TOXAPHENE	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1016	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1221	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1232	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1242	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1248	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1254	ND		ug/L	508.1		0-0		MB	
	1	AROCLOR 1260	ND		ug/L	508.1		0-0		MB	
	1	CHLORDANE, TECHNICAL	ND		ug/L	508.1		0-0		MB	
	1	TOXAPHENE	ND		ug/L	508.1		0-0		MB	
515_221213	0	2,4 DB	ND		ug/L	515.4		0-0		MB	
	0	2,4,5 - T	ND		ug/L	515.4		0-0		MB	
	0	3,5 - DICHLOROBENZOIC ACID	ND		ug/L	515.4		0-0		MB	
	0	ACIFLUORFEN	ND		ug/L	515.4		0-0		MB	
	0	BENTAZON	ND		ug/L	515.4		0-0		MB	
	0	DCPA (ACID METABOLITES)	ND		ug/L	515.4		0-0		MB	
	0	DICAMBA	ND		ug/L	515.4		0-0		MB	
	0	DICHLORPROP	ND		ug/L	515.4		0-0		MB	
	0	2,4 - D	ND		ug/L	515.4		0-0		MB	
	0	2,4,5 - TP (SILVEX)	ND		ug/L	515.4		0-0		MB	
	0	DALAPON	ND		ug/L	515.4		0-0		MB	
	0	DINOSEB	ND		ug/L	515.4		0-0		MB	
	0	PENTACHLOROPHENOL	ND		ug/L	515.4		0-0		MB	
	0	PICLORAM	ND		ug/L	515.4		0-0		MB	
525_221213	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	101		%	525.2		70-130		MB	
	0	4,4-DDD	ND		ug/L	525.2		0-0		MB	
	0	4,4-DDE	ND		ug/L	525.2		0-0		MB	
	0	4,4-DDT	ND		ug/L	525.2		0-0		MB	
	0	ACENAPHTHYLENE	ND		ug/L	525.2		0-0		MB	
	0	ANTHRACENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(A)ANTHRACENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(B)FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(K)FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	BENZYL BUTYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	CHRYSENE	ND		ug/L	525.2		0-0		MB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Reference Number: **22-39568**
Report Date: 01/20/23

Batch		Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
Method Blank											
525_221213	0	DIETHYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	DIMETHYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	DI-N-BUTYL PHTHALATE	ND		ug/L	525.2		0-0		MB	
	0	EPTC	ND		ug/L	525.2		0-0		MB	
	0	FLUORANTHENE	ND		ug/L	525.2		0-0		MB	
	0	MOLINATE	ND		ug/L	525.2		0-0		MB	
	0	PHENANTHRENE	ND		ug/L	525.2		0-0		MB	
	0	PYRENE	ND		ug/L	525.2		0-0		MB	
	0	TERBACIL	ND		ug/L	525.2		0-0		MB	
	0	TRIFLURALIN	ND		ug/L	525.2		0-0		MB	
	0	ALDRIN	ND		ug/L	525.2		0-0		MB	
	0	BROMACIL	ND		ug/L	525.2		0-0		MB	
	0	BUTACHLOR	ND		ug/L	525.2		0-0		MB	
	0	DIELDRIN	ND		ug/L	525.2		0-0		MB	
	0	FLUORENE	ND		ug/L	525.2		0-0		MB	
	0	METOLACHLOR	ND		ug/L	525.2		0-0		MB	
	0	METRIBUZIN	ND		ug/L	525.2		0-0		MB	
	0	PROPACHLOR	ND		ug/L	525.2		0-0		MB	
	0	ALACHLOR	ND		ug/L	525.2		0-0		MB	
	0	ATRAZINE	ND		ug/L	525.2		0-0		MB	
	0	BENZO(A)PYRENE	ND		ug/L	525.2		0-0		MB	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	ND		ug/L	525.2		0-0		MB	
	0	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP)	ND		ug/L	525.2		0-0		MB	
	0	ENDRIN	ND		ug/L	525.2		0-0		MB	
	0	HEPTACHLOR	ND		ug/L	525.2		0-0		MB	
	0	HEPTACHLOR EPOXIDE	ND		ug/L	525.2		0-0		MB	
	0	HEXACHLOROBENZENE	ND		ug/L	525.2		0-0		MB	
	0	HEXACHLOROCYCLO-PENTADIENE	ND		ug/L	525.2		0-0		MB	
	0	LINDANE (BHC - GAMMA)	ND		ug/L	525.2		0-0		MB	
	0	METHOXYCHLOR	ND		ug/L	525.2		0-0		MB	
	0	SIMAZINE	ND		ug/L	525.2		0-0		MB	
Quality Control Sample											
525_221213	0	1,3-DIMETHYL-2-NITROBENZENE (Surr)	97		%	525.2		70-130		QCS	
	0	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	36.7	39.1	ug/L	525.2	94	70-130		QCS	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QCIndependent4.rpt

EDGE ANALYTICAL

QUALITY CONTROL REPORT
SURROGATE REPORT

Reference Number: 22-39568
Report Date: 01/20/23

Lab No	Analyte	Result	Qualifier	Units	Method	Limit
508_221213						
77801	TETRACHLORO-M-XYLENE (SURR)	84		%	508.1	Acceptance Limits 70%-130%
515_221213						
77801	2,4 - DCAA (SURR)	72		%	515.4	Acceptance Range is 70 - 130%
525_221213						
77801	1,3-DIMETHYL-2-NITROBENZENE (Surr)	99		%	525.2	Acceptance Range is 70% to 130%
	PYRENE-D10 (Surr)	104		%		Acceptance Range is 70% to 130%
	PERYLENE-D12 (Surr)*	105		%		Acceptance Range is 70% to 130%
	TRIPHENYLPHOSPHATE (Surr)	99		%		Acceptance Range is 70% to 130%

*Notation:

A surrogate is a pure compound added to a sample in the laboratory just before processing so that the overall efficiency of a meA surrogate is a pure compound added to a sample in the la

The Acceptance Limits (or Control Limits) approximate a 99% confidence interval around the mean recovery.

EDGE ANALYTICAL

SAMPLE DEPENDENT
QUALITY CONTROL REPORT
Duplicate, Matrix Spike/Matrix Spike Duplicate and Confirmation Result Report

Laboratory Fortified Matrix (MS)

Batch/CAS	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits*	%RPD	Limits*	QC Qualifier	Type	Comments
515_221213															
94-75-7	77801	2,4 - D	ND	1.8	1.8	2.5	ug/L	**72**	**72**	70-130	**0.0**	0-20		LFM	
94-82-6	77801	2,4 DB	ND	1.8	1.7	M2 2.5	ug/L	**72**	68	70-130	**5.7**	0-20		LFM	
93-76-5	77801	2,4,5 - T	ND	1.9	1.9	2.5	ug/L	**76**	**76**	70-130	**0.0**	0-20		LFM	
93-72-1	77801	2,4,5 - TP (SILVEX)	ND	1.9	1.8	2.5	ug/L	**76**	**72**	70-130	**5.4**	0-20		LFM	
51-36-5	77801	3,5 - DICHLOROBENZOIC ACID	ND	2.0	1.8	2.5	ug/L	**80**	**72**	70-130	**10.5**	0-20		LFM	
50594-66-6	77801	ACIFLUORFEN	ND	1.9	1.8	2.5	ug/L	**76**	**72**	70-130	**5.4**	0-20		LFM	
25057-89-0	77801	BENTAZON	ND	2.0	1.9	2.5	ug/L	**80**	**76**	70-130	**5.1**	0-20		LFM	
75-99-0	77801	DALAPON	ND	2.0	1.9	2.5	ug/L	**80**	**76**	70-130	**5.1**	0-20		LFM	
E-14028	77801	DCPA (ACID METABOLITES)	ND	1.7	1.6	2.5	ug/L	68	64	70-130	**6.1**	0-20	M2	LFM	
1918-00-9	77801	DICAMBA	ND	1.9	1.8	2.5	ug/L	**76**	**72**	70-130	**5.4**	0-20		LFM	
120-36-5	77801	DICHLORPROP	ND	1.7	1.7	2.5	ug/L	68	68	70-130	**0.0**	0-20	M2	LFM	
88-85-7	77801	DINOSEB	ND	2.0	1.9	2.5	ug/L	**80**	**76**	70-130	**5.1**	0-20		LFM	
87-86-5	77801	PENTACHLOROPHENOL	ND	2.0	1.9	2.5	ug/L	**80**	**76**	70-130	**5.1**	0-20		LFM	
1918-02-1	77801	PICLORAM	ND	1.7	1.6	2.5	ug/L	68	64	70-130	**6.1**	0-20	M2	LFM	
525_221213															
81-20-9	76197	1,3-DIMETHYL-2-NITROBENZENE (Surr	101	96			%		**NA**	70-130	**NA**	0-20		LFM	
72-54-8	76197	4,4-DDD	ND	1.20		1	ug/L	**120**	**NA**	70-130	**NA**	0-20		LFM	
50-29-3	76197	4,4-DDT	ND	1.48		1	ug/L	148	**NA**	70-130	**NA**	0-20	M1	LFM	
208-96-8	76197	ACENAPHTHYLENE	ND	0.79		1	ug/L	**79**	**NA**	70-130	**NA**	0-20		LFM	
15972-60-8	76197	ALACHLOR	ND	2.45		2	ug/L	**123**	**NA**	70-130	**NA**	0-20		LFM	
309-00-2	76197	ALDRIN	ND	0.81		1	ug/L	**81**	**NA**	70-130	**NA**	0-20		LFM	
120-12-7	76197	ANTHRACENE	ND	0.87		1	ug/L	**87**	**NA**	70-130	**NA**	0-20		LFM	
1912-24-9	76197	ATRAZINE	ND	2.24		2	ug/L	**112**	**NA**	70-130	**NA**	0-20		LFM	
56-55-3	76197	BENZO(A)ANTHRACENE	ND	1.14		1	ug/L	**114**	**NA**	70-130	**NA**	0-20		LFM	
50-32-8	76197	BENZO(A)PYRENE	ND	1.15		1	ug/L	**115**	**NA**	70-130	**NA**	0-20		LFM	
205-99-2	76197	BENZO(B)FLUORANTHENE	ND	1.22		1	ug/L	**122**	**NA**	70-130	**NA**	0-20		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QC Dependent2.rpt

EDGE ANALYTICAL

Reference Number: 22-39568
Report Date: 1/20/2023

Laboratory Fortified Matrix (MS)

Batch/CAS	Sample	Analyte	Result	Spike Result	Duplicate Spike Result	Conc	Units	Percent Recovery MS	Percent Recovery MSD	Limits*	%RPD	Limits*	QC Qualifier	Type	Comments
207-08-9	76197	BENZO(K)FLUORANTHENE	ND	1.06		1	ug/L	**106**	**NA**	70-130	**NA**	0-20		LFM	
85-68-7	76197	BENZYL BUTYL PHTHALATE	ND	1.19		1	ug/L	**119**	**NA**	70-130	**NA**	0-20		LFM	
314-40-9	76197	BROMACIL	ND	1.07		1	ug/L	**107**	**NA**	70-130	**NA**	0-20		LFM	
23184-66-9	76197	BUTACHLOR	ND	1.25		1	ug/L	**125**	**NA**	70-130	**NA**	0-20		LFM	
218-01-9	76197	CHRYSENE	ND	0.94		1	ug/L	**94**	**NA**	70-130	**NA**	0-20		LFM	
103-23-1	76197	DI(2-ETHYLHEXYL)-ADIPATE(DEHA)	ND	1.19		1	ug/L	**119**	**NA**	70-130	**NA**	0-20		LFM	
117-81-7	76197	DI(2-ETHYLHEXYL)-PHTHALATE(DEHP	ND	1.23		1	ug/L	**123**	**NA**	70-130	**NA**	0-20		LFM	
60-57-1	76197	DIELDRIN	ND	1.08		1	ug/L	**108**	**NA**	70-130	**NA**	0-20		LFM	
84-66-2	76197	DIETHYL PHTHALATE	ND	1.13		1	ug/L	**113**	**NA**	70-130	**NA**	0-20		LFM	
131-11-3	76197	DIMETHYL PHTHALATE	ND	1.05		1	ug/L	**105**	**NA**	70-130	**NA**	0-20		LFM	
84-74-2	76197	DI-N-BUTYL PHTHALATE	ND	1.17		1	ug/L	**117**	**NA**	70-130	**NA**	0-20		LFM	
72-20-8	76197	ENDRIN	ND	1.36		1	ug/L	136	**NA**	70-130	**NA**	0-20	M1	LFM	
759-94-4	76197	EPTC	ND	0.99		1	ug/L	**99**	**NA**	70-130	**NA**	0-20		LFM	
206-44-0	76197	FLUORANTHENE	ND	1.11		1	ug/L	**111**	**NA**	70-130	**NA**	0-20		LFM	
86-73-7	76197	FLUORENE	ND	1.04		1	ug/L	**104**	**NA**	70-130	**NA**	0-20		LFM	
76-44-8	76197	HEPTACHLOR	ND	1.67		1	ug/L	167	**NA**	70-130	**NA**	0-20	HR	LFM	
1024-57-3	76197	HEPTACHLOR EPOXIDE	ND	1.11		1	ug/L	**111**	**NA**	70-130	**NA**	0-20		LFM	
118-74-1	76197	HEXACHLOROBENZENE	ND	1.08		1	ug/L	**108**	**NA**	70-130	**NA**	0-20		LFM	
77-47-4	76197	HEXACHLOROCYCLO-PENTADIENE	ND	1.16		1	ug/L	**116**	**NA**	70-130	**NA**	0-20		LFM	
58-89-9	76197	LINDANE (BHC - GAMMA)	ND	1.12		1	ug/L	**112**	**NA**	70-130	**NA**	0-20		LFM	
72-43-5	76197	METHOXYCHLOR	ND	1.57		1	ug/L	157	**NA**	70-130	**NA**	0-20	HR	LFM	
51218-45-2	76197	METOLACHLOR	ND	1.19		1	ug/L	**119**	**NA**	70-130	**NA**	0-20		LFM	
21087-64-9	76197	METRIBUZIN	ND	0.94		1	ug/L	**94**	**NA**	70-130	**NA**	0-20		LFM	
2212-67-1	76197	MOLINATE	ND	1.04		1	ug/L	**104**	**NA**	70-130	**NA**	0-20		LFM	
85-01-8	76197	PHENANTHRENE	ND	1.05		1	ug/L	**105**	**NA**	70-130	**NA**	0-20		LFM	
1918-16-7	76197	PROPACHLOR	ND	1.17		1	ug/L	**117**	**NA**	70-130	**NA**	0-20		LFM	
129-00-0	76197	PYRENE	ND	1.01		1	ug/L	**101**	**NA**	70-130	**NA**	0-20		LFM	
122-34-9	76197	SIMAZINE	ND	0.82		1	ug/L	**82**	**NA**	70-130	**NA**	0-20		LFM	
5902-51-2	76197	TERBACIL	ND	1.26		1	ug/L	**126**	**NA**	70-130	**NA**	0-20		LFM	
1582-09-8	76197	TRIFLURALIN	ND	1.19		1	ug/L	**119**	**NA**	70-130	**NA**	0-20		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of a analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QC Dependent2.rpt

EDGE ANALYTICAL

Qualifier Definitions

Reference Number: 22-39568
Report Date: 01/20/23

Qualifier	Definition
HR	High QCS recovery due to increased detector response No sample dectections, therefore, no further action taken for this analysis set.
LR	Low recovery can not be accounted for. However, there is adequate sensitivity to detect the compound at the MRL. No sample detections so no further action for this analysis batch.
M1	Matrix spike recovery was high; the associated blank spike recovery was acceptable. Matrix bias indicated.
M2	Matrix bias indicated, the LFB is within acceptance limits. Results for this compound is suspect as biased high.

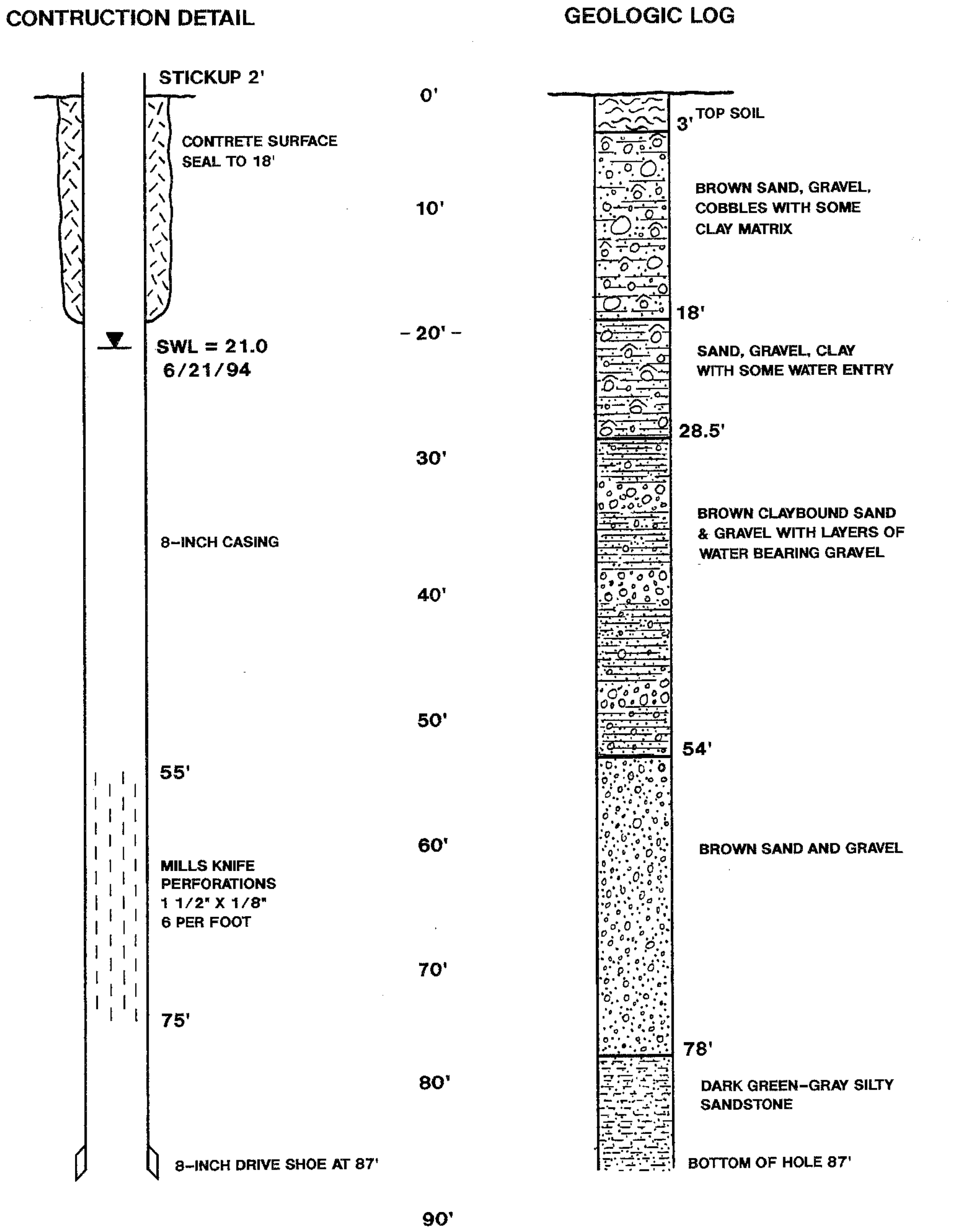
Note: Some qualifier definitions found on this page may pertain to results or QC data which are not printed with this report.

Appendix D. Well Logs From Cross Section F-F', Riverside Park, and the WWTP Well

FIGURE 2

CITY OF CENTRALIA

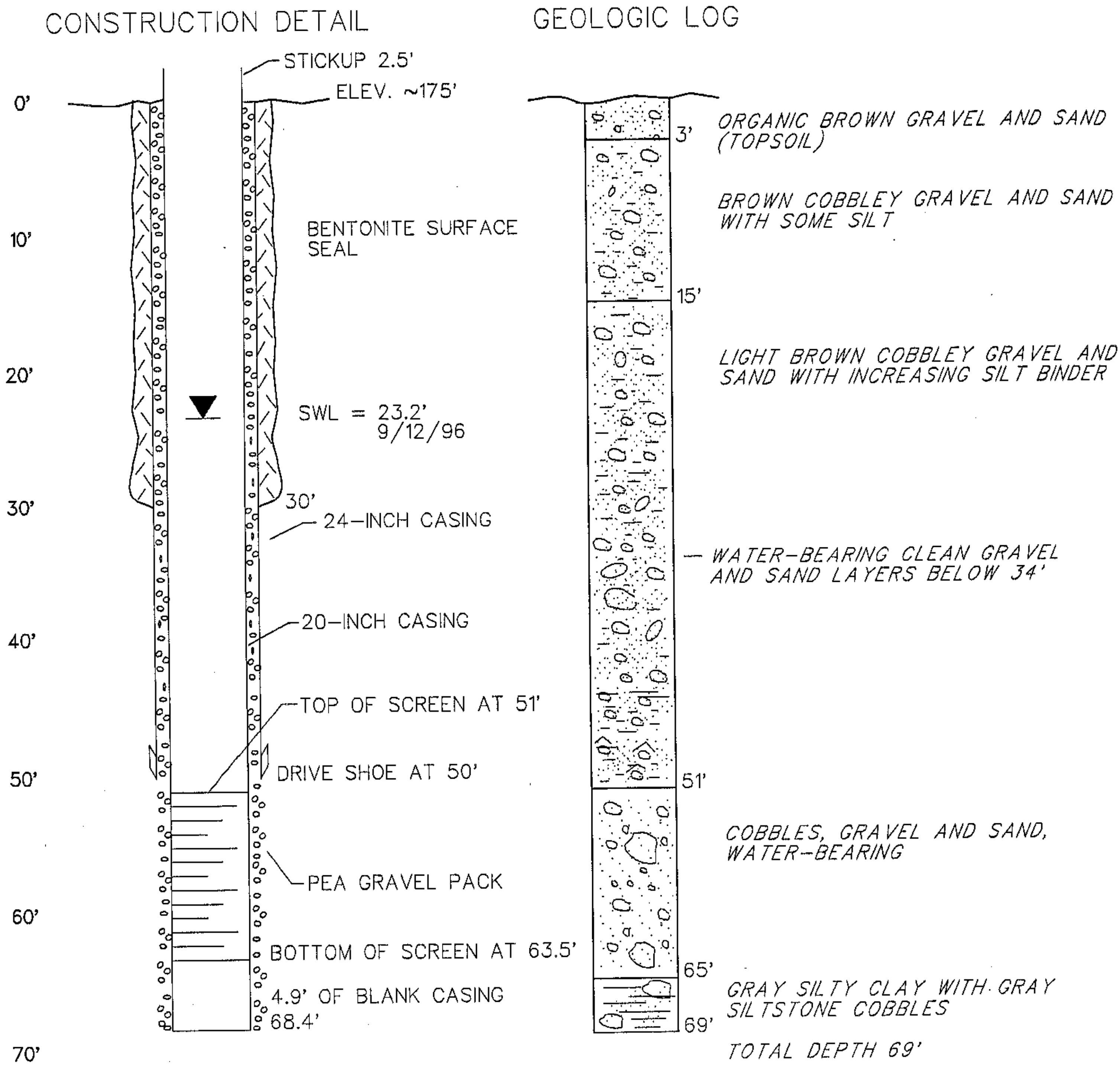
TENNIS COURT TEST WELL (14/02W-6P)



ROBINSON & NOBLE, INC.

FIGURE 2

CITY OF CENTRALIA
TENNIS COURT PRODUCTION WELL 1
(T 14 N/R 2 W – 6P)

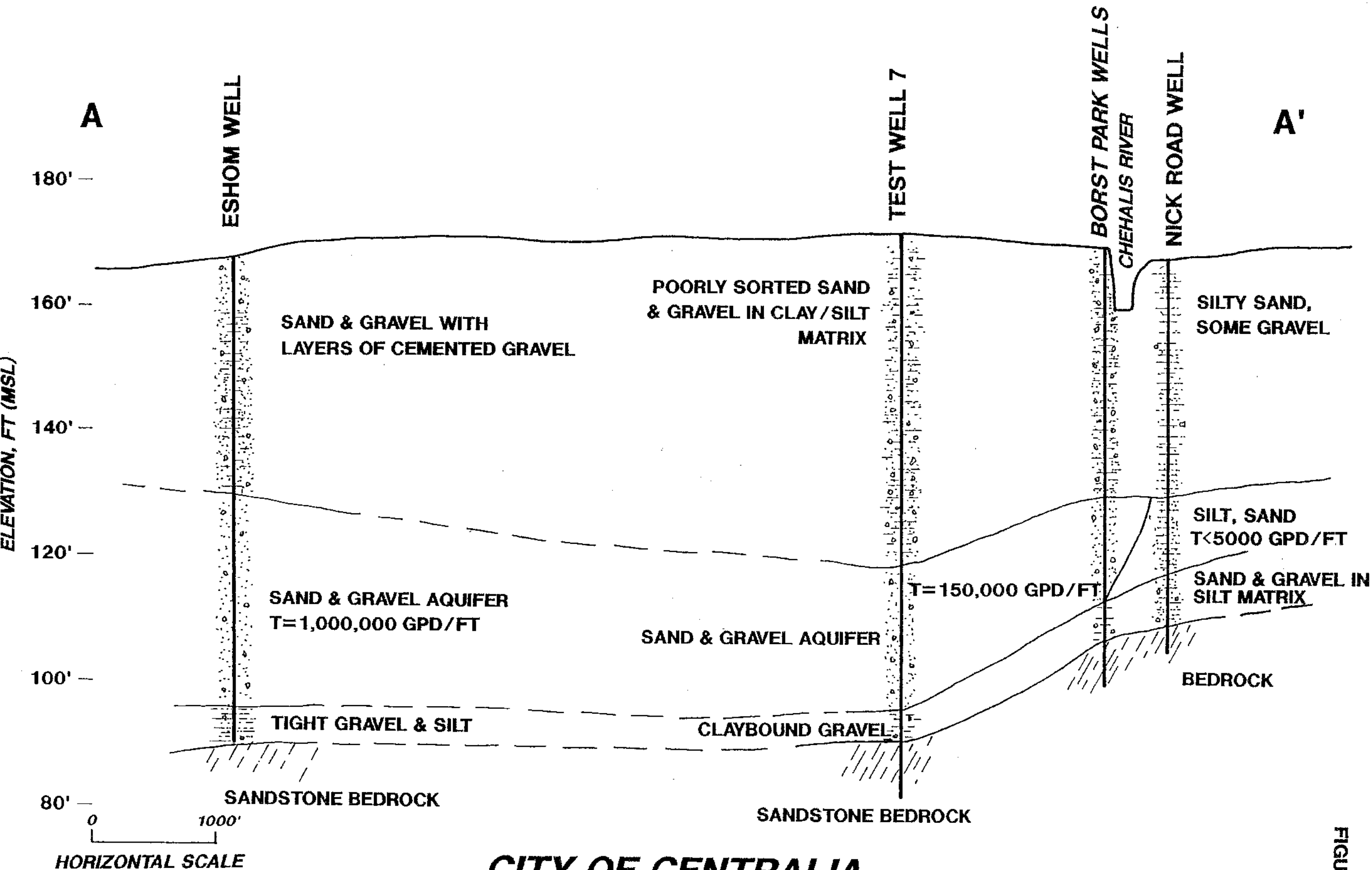


NOTE:

20–INCH PIPE SIZE, 0.100–INCH STAINLESS STEEL WIRE WOUND SCREEN

80'

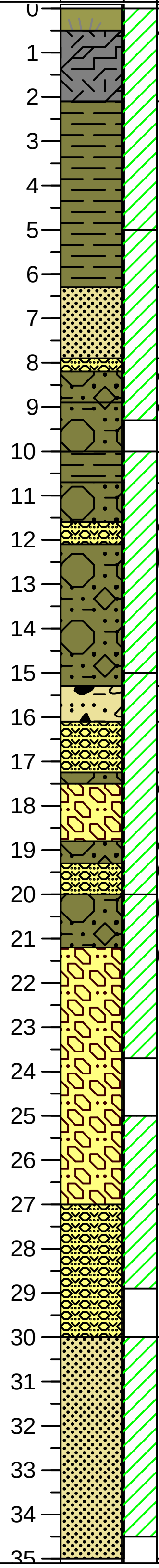
JOB NO. 00–049C
DRAWINGS\GEO–LOGS\TENNIS.GCD



CITY OF CENTRALIA
GENERALIZED CROSS SECTION

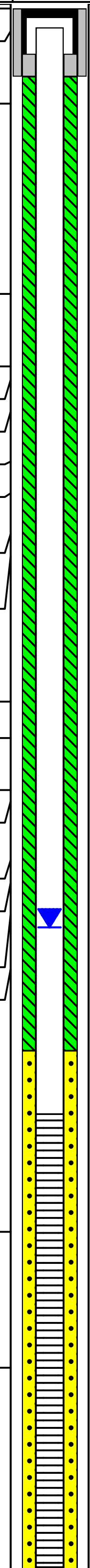
FIGURE 13

Depth (ft)	Graphic Log	Recovery	Soil Description	Sample Results



Soil Description

- Moist, dark brown, slightly gravelly, silty, SAND with organics (Topsoil)
- Moist, brown, slightly silty, very gravelly, SAND (Fill).
  1.4 - 2.1 ft: gray
- Moist, brown to dark brown, silty CLAY.
- Moist, brown, trace to slightly silty, fine SAND. Local pebbles.
- Moist, brown, slightly silty, gravelly, fine-to-coarse SAND.
- Moist, brown, silty, very gravelly, fine-to-coarse SAND.
- Moist, brown, fine-to-coarse sandy, very silty, GRAVEL (silt-bound).
- Very moist, dark brown, trace to slightly gravelly, slightly sandy, CLAY.
- Very moist, brown, very clayey, very fine-to-coarse sandy, GRAVEL (clay-bound).
- Very moist, brown, gravelly, fine-to-coarse SAND. Sand is predominately fine-to-medium.
- Very moist, dark gray, silty, sandy, GRAVEL (silt-bound). Cobbles present.
- Wet, brown, slightly silty, fine-to-coarse sandy, GRAVEL.
- Wet, brown, very gravelly, fine-to-coarse SAND.
- Very moist, silty, sandy, GRAVEL (silt-bound).
- Very moist, brown, very fine-to-coarse sandy, GRAVEL. Trace silty, local cobbles.
- Moist, silty, fine-to-coarse sandy, GRAVEL & COBBLES (silt-bound).
- Very moist, trace to slightly silty, gravelly, fine-to-coarse SAND. Sand predominately fine-to-medium.
- Wet, brown, silty, gravelly, fine-to-coarse SAND. Local cobbles.
- Interbeded layers of brown, fine-to-coarse sandy, GRAVEL and very gravelly, clean fine-to-coarse SAND. Layers approximately 0.5 to 1 ft thick, gravel layers are loose.
- Brown, fine-to-coarse SAND & GRAVEL. Clean.
- Brown, fine-to-medium SAND. Clean, local fine gravel.
  33.2 - 35 ft: slightly gravelly, local cobbles



Sample Results

Flush-mount steel monument. PVC measuring point stickdown 0.42 ft.

0 - 1.5 ft: neat cement surface seal

1.5 - 23 ft: bentonite seal

0.42 - 24.4 ft: 2-inch PVC schedule 40 riser pipe. Joints threaded with o-rings.

0 - 35 ft: 6-inch diameter borehole

Depth to water (bgs): 20.28 ft, 7/16/19

23 - 35 ft: 12-20 silica sand filter pack

24.4 - 34.4 ft: 2-inch PVC schedule 40 screen, 10-slot (0.01-inch)

34.4 - 34.6 ft: 2-inch PVC schedule 40 end cap (flat), 0.18 ft length

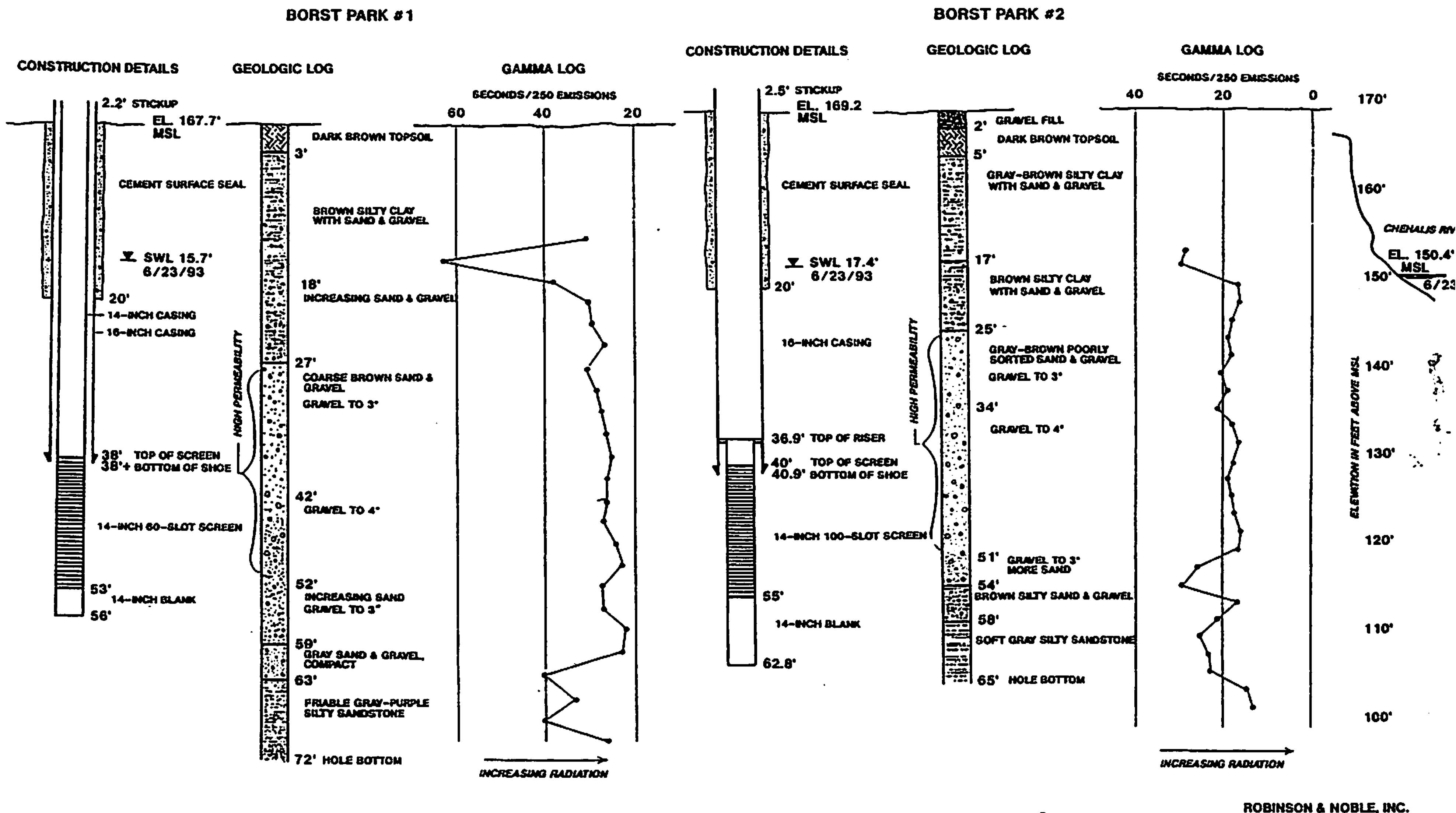
35 ft: Bottom of hole

Latitude: 46.7229731
Longitude: -122.9808001
NAD83/91
Measuring Point Elevation: 170.74 ft NAVD88
Ecology UWID: BLT 951
Drilled: 07/16/2019
Location Description: Borst Park, east of ball diamonds & ~800' south of Pioneer Way

Driller: Zach Bailey, Holocene Drilling
Drilling Method: Sonic
Logged by: Glenn Mutti-Driscoll, PGG
Depth to Water (bmp): 19.86 ft, 7/16/19

MW-3
Boring Log and As-Built

Centralia Monitoring Wells
Task 4
JV1805.04



COMPOSITE LOGS, *CENTRALIA BORST PARK WELLS*

Well Tag: AGJ766 City of Centralia Nick Road Test Well

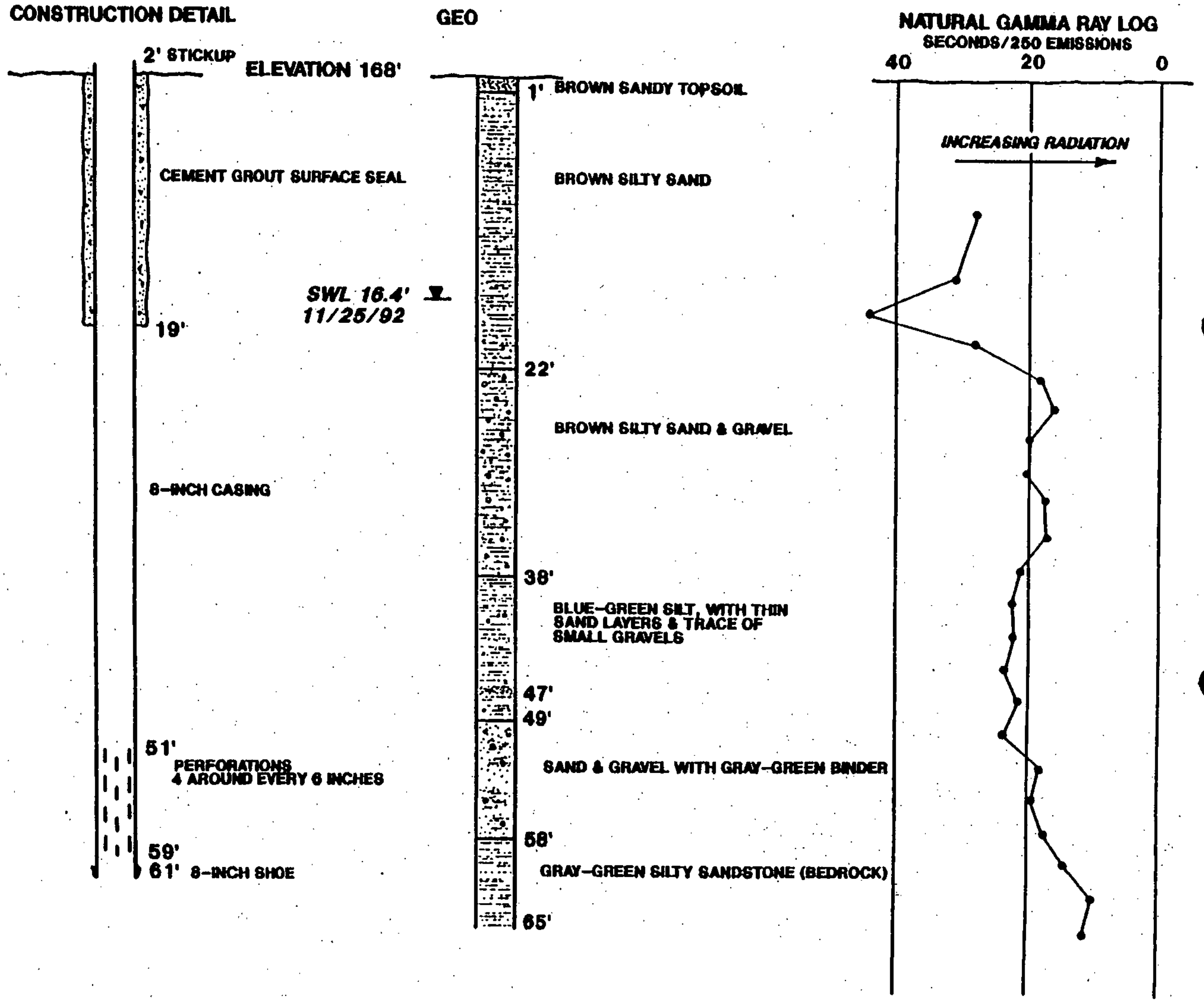


FIGURE 5

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

11
Riverside Pk

Application No. ......
Permit No. ......

(1) OWNER: Name City of Centralia Address Centralia, Wash

(2) LOCATION OF WELL: County Lewis — NW ¼ SW ¼ Sec. 41 T. 14 N., R. 2 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) No 11
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20 inches.
Drilled 80'4" ft. Depth of completed well 78' ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20" Diam. from 0 ft. to 45 ft.
Threaded ☐ ......" Diam. from ...... ft. to ...... ft.
Welded ☑ ......" Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☑
Type of perforator used ......
SIZE of perforations ...... in. by ...... in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☑ No ☐
Manufacturer's Name UOP Johnson
Type Wire Wound w/riser Model No. csg
Diam. 12" Slot size 80 from 48 ft. to 79 ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☑ No ☐ Size of gravel: 90% on 80slot
Gravel placed from 79 ft. to 27' ft.

Surface seal: Yes ☑ No ☐ To what depth? 22' ft.
Material used in seal Concrete
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ...... Depth of strata ......
Method of sealing strata off ......

(7) PUMP: Manufacturer's Name ......
Type: ...... H.P. ......

(8) WATER LEVELS: Land-surface elevation above mean sea level 185 ± ft.
Static level 11.0 ft. below top of well Date 2-11-71
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by ...... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☑ No ☐ If yes, by whom? Robinson Roberts

Yield (gal./min.)	with (ft. drawdown)	after (hrs.)
471	11	1
618	14	2
760	18	3

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
15 min	12.5'	60	11.6		
30	11.9'	75	11.55		
45	11.75	110	11.5		

Date of test May 5, 6 1971
Bailer test ...... gal./min. with ...... ft. drawdown after ...... hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water 51½°F Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Brown Silt	0	8
Sa & Gvl w/clay binder	8	14
Silty Sa & Gvl	14	21
Sand and Gvl	21	37
Silty sand and gravel (water bearing)	37	60
Br-gr M-C sa w/some gvl (water bearing)	60	66
Br-gr sa & gvl (water bearing)	66	71
Br-gr gvl w/ some sa	71	75
Br-gr gvl w/sa	75	77
layered br-gr sa, sa w/gvl sa & gvl	77	79'6"
Brown. Weathered Bedrock	79'6"	80'4"

Work started ...... 19...... Completed ...... 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Robinson Roberts & Assoc. (Person, firm, or corporation) (Type or print)

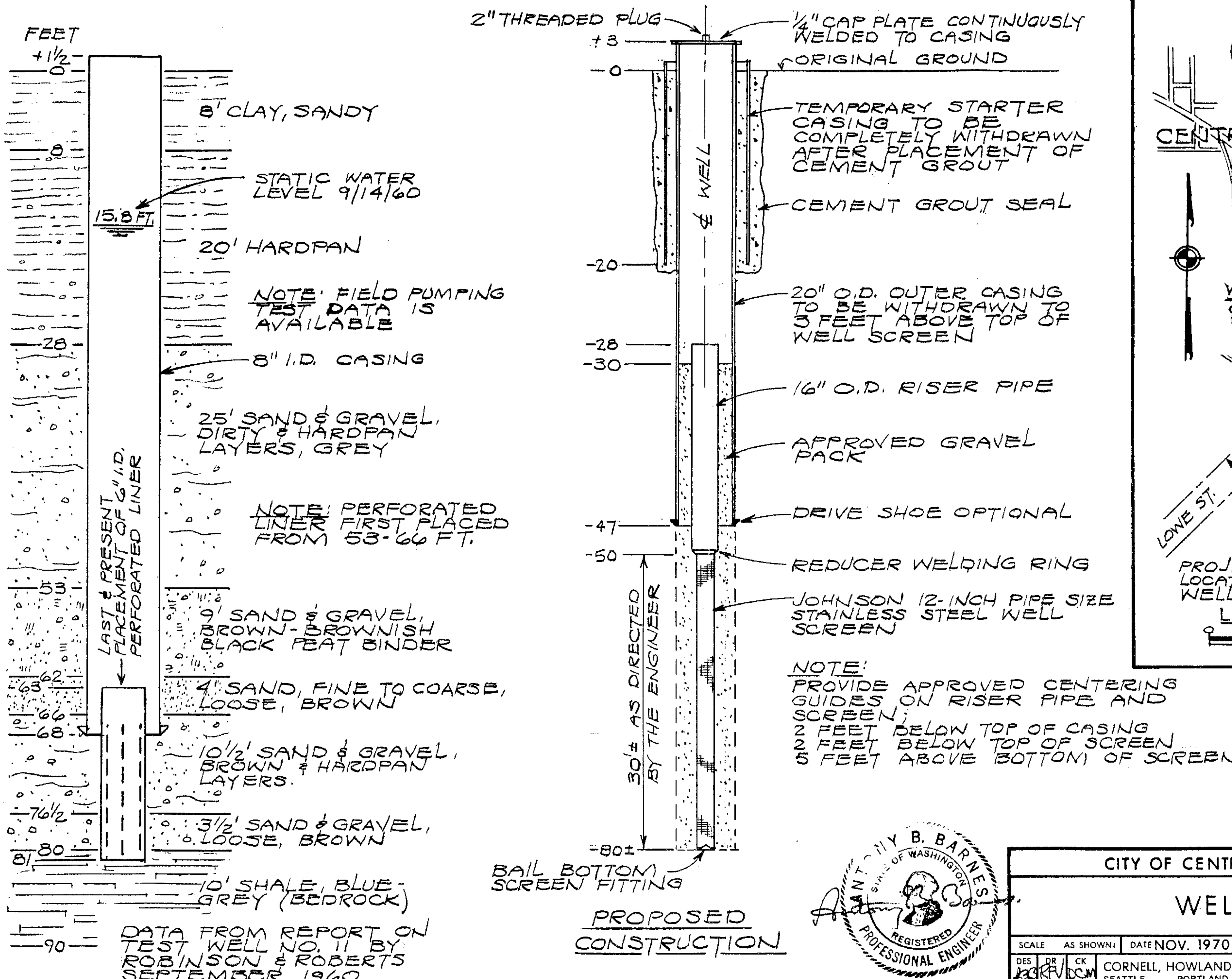
Address 1215 S. 59th Tacoma Wash

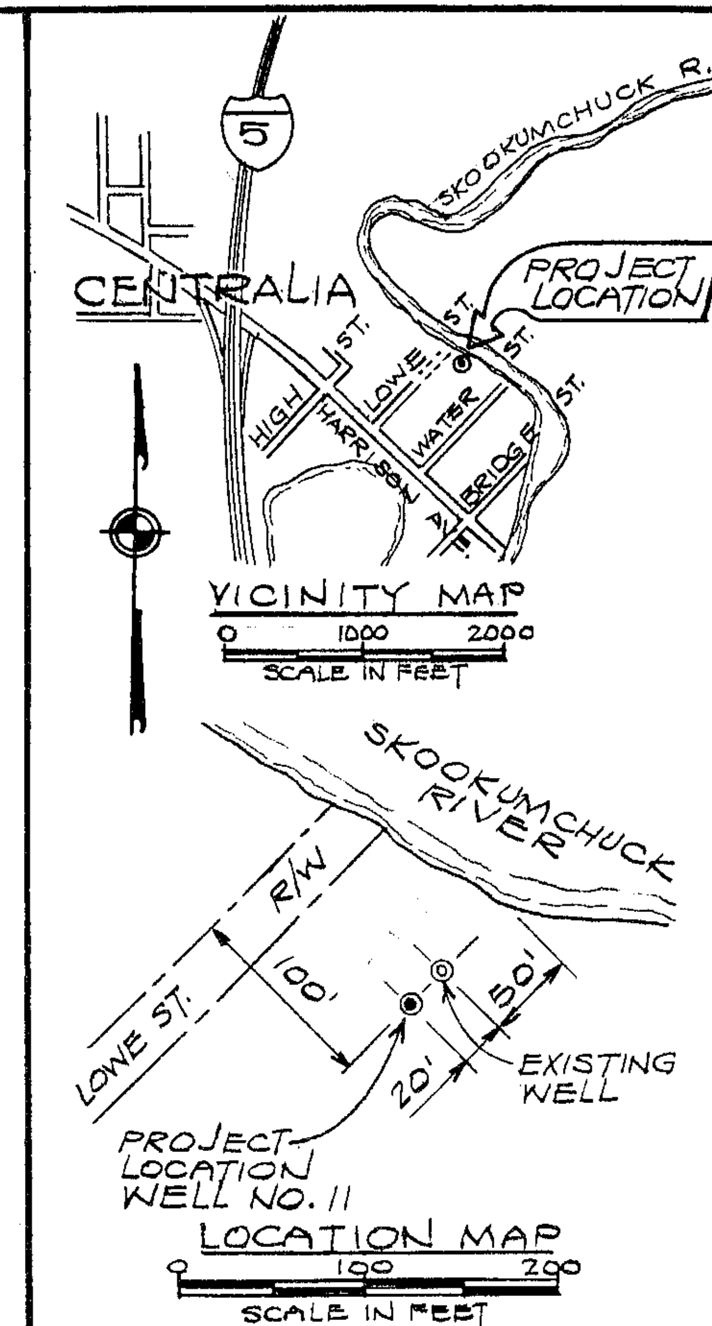
[Signed] David S. [illegible] (Well Driller) Geologist

License No. ...... Date 9-2-1 ......, 1972

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).





ANTHONY B. BARNES — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

CITY OF CENTRALIA, WASHINGTON

WELL NO. 11

SCALE AS SHOWN	DATE NOV. 1970	RN S 6317.1	SHEET 1 OF 1
DES / DR KFV / CK DCW	CORNELL, HOWLAND, HAYES & MERRYFIELD — SEATTLE PORTLAND CORVALLIS BOISE		DWG E 6317-1

WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle)
- ☒ Construction
- ○ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number W129094

135662

CURRENT Notice of Intent No. W129094

Unique Ecology Well ID Tag No. AFT 317

Water Right Permit No. G2-02019CWRIS-01156 G2-00684SWRIS-0535 G2-20927CWRIS

Property Owner Name City of Centralia

Well Street Address 1214 Goodrich DR Centralia

City Centralia County: Lewis

Location SW 1/4- 1/4 NE 1/4 Sec 26 Twn 15 R 3 EWM circle or WWM one

Lat/Long: (s,t,r still REQUIRED) Lat Deg NA Lat Min/Sec ______ Long Deg NA Long Min/Sec ______

Tax Parcel No. 23771-1

PROPOSED USE: ☐ Domestic ☐ Industrial ☒ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other

TYPE OF WORK: Owner's number of well (if more than one) ______
☒ New Well ☐ Reconditioned Method: ☐ Dug ☐ Bored ☐ Driven
☐ Deepened ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 70 ft.
Depth of completed well 60 ft.

CONSTRUCTION DETAILS
Casing Installed: ☒ Welded 8" Diam. from +2 ft. to 60 ft.
☐ Liner installed ____" Diam. from ____ ft. to ____ ft.
☐ Threaded ____" Diam. from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No
Type of perforator used ______
SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location ______
Manufacturer's Name Johnson
Type 304 Stainless Steel Model No. ______
Diam. 8" P.S. Slot Size 100 from 45 ft. to 55 ft.
Diam. ____ Slot Size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☒ Yes ☐ No ☐ Size of gravel/sand Pea Gravel
Materials placed from ____ ft. to ____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 42 ft
Materials used in seal High Solids Bentonite
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

PUMP: Manufacturer's Name NA
Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level 12'5" ft. below top of well Date 7/8/03
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Hokkaido
Yield: 400 gal./min. with 14'3" ft. drawdown after 24 hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0	29'2"	10	15'1 3/4"	60	15'3/4"
2	15'6 1/4	20	15'3/4"	90	15'0
5	15'2"	30	15'1	120	15'0"

Date of test ______
Bailer test ____ gal./min with ____ ft. drawdown after ____ hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? ☒ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Brown silty top soil	0'	1'
Brown silty sand w/ embedded Gravel	2'	14'
Brown silty sand & Gravel	14'	16'
Gray Cemented sand & Gravel	16'	26'
Brown sand and Gravel Very Course	26'	41'
Light Brown tight cemented Sand & Gravel	41'	45'
Brown sand and Gravel water bearing	45'	55'
Gray silt	55'	63'
Gray Cemented Gravel	63'	67'
Gray hard brittle	67'	70'

RECEIVED
JUL 1 5 2003
Washington State Department of Ecology

Start Date 6/18/03 Completed Date 7/10/03

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) ROBERT B. CARPER
Driller/Engineer/Trainee Signature Robert B Carper
Driller or Trainee License No. 1239

If trainee, licensed driller's Signature and License no. ______

Drilling Company HOKKAIDO DRILLING, INC.
Address P.O. BOX 100
City, State, Zip GRAHAM, WA 98338-0100
Contractor's Registration No. HOKKADI017M8 Date 7-11-03

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

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