



Salmon Creek Wastewater Treatment Plant and Staffing Study

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Section 1: Background

On September 27, 2012, Clark County, Clark Regional Wastewater District, the City of Ridgefield, and the City of Battle Ground (collectively, the “Alliance Members”) entered into the “Discovery Clean Water Alliance Interlocal Formation Agreement” (the “Alliance Agreement”). The Alliance Agreement provides for the formation of the Discovery Clean Water Alliance (the “Alliance”). On January 4, 2013, the Alliance Agreement was filed with the Washington Secretary of State and the Alliance was formed.

The purpose of the Alliance is to jointly provide regional wastewater transmission and treatment services to Alliance Members and other contracting municipal wastewater utilities.

The Salmon Creek Wastewater Treatment Plant (WWTP) serves an estimated 100,000 Clark County residents living inside the Clark Regional Wastewater District and the cities of Battle Ground and Ridgefield. In 2015 Clark County (County) transferred ownership of the WWTP to the Alliance. However, Clark County Public Works operates and maintains the WWTP, 2 off-site regional pump stations, and 26 miles of gravity interceptors and pressurized force mains.

The WWTP is a secondary treatment plant originally constructed in the mid-1970s, with four major expansion phases. The WWTP is designed to treat approximately 15 million gallons per day, and has 14 full-time staff, including a manager, maintenance technicians, certified operators, grounds maintenance personnel, and a laboratory analyst.

The 36th Avenue Pump Station pumps raw sewage from the Salmon Creek Interceptor to the WWTP through a 24-inch diameter force main. The force main runs approximately 1.4 miles to the WWTP and was constructed in the mid-1970s. The pump station was constructed in the mid-1970s and upgraded in 1994 and 2005.

The 117th Street Pump Station (also known as the Klineline Pump Station) pumps raw sewage from the Salmon Creek and Klineline Interceptors to the WWTP through a 30-inch diameter force main. The force main runs approximately 4.9 miles along public rights-of-way to the WWTP and was constructed in segments from 2004 to 2008. The pump station was constructed in 2008.

The Salmon Creek WWTP operates under Waste Discharge Permit No. WA0023639 of the National Pollutant Discharge Elimination System (NPDES). A copy of the Permit is included in Appendix A of this report. Created in 1972 by the Clean Water Act, the NPDES Permit Program is authorized to state governments by the Environmental Protection Agency (EPA) to perform permitting, administrative, and enforcement aspects of the program. EPA delegates responsibility for implementing all federal and state water pollution control laws and regulations within Washington State to the Department of Ecology’s (Ecology) Water Quality Program.

According to the Salmon Creek WWTP NPDES Permit, “the Clark County Department of Public Works is the Permittee responsible for operation, maintenance, monitoring, reporting, and all other permit requirements related to the ultimate treatment and discharge of treated sewage from the Salmon Creek Wastewater Treatment Plant. This Permittee’s responsibilities also include any permit requirements related to conveyance systems of trunk lines under Clark County’s ownership.”

With regard to staffing, the NPDES Permit states under Special Condition S5, "Operation and Maintenance", that "the Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also include adequate laboratory controls and appropriate quality assurance procedures." Special Condition S5.A, "Certified Operator", states that "an operator certified for at least a Class IV plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant shall be in charge during all regularly scheduled shifts."

With regard to compliance, under "General Conditions", General Condition G15, "Penalties for Violating Permit Conditions", states "any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to \$10,000 and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation." Additionally, General Condition G18, "Duty to Comply", states that "the Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application."

As stated in the NPDES Permit, the Clark County Department of Public Works is responsible for determining the level of staffing required to achieve compliance with the terms and conditions of the permit.

The WWTP Staffing Study will help determine if the WWTP is adequately staffed to operate and maintain the facility and implement systems, programs and services needed to enable the WWTP to perform optimally while protecting public health, the environment, and the investment that the Clark County residents have made in the facility. The study will identify any risks related to staffing of the WWTP and related facilities.

The County retained Ronald Moeller Operations Services, LLC (RMOS) to perform the Staffing Study.

Section 2: General Approach

The general approach for completing the wastewater staffing study involved four primary elements:

1. Information Collection and Review
2. Staff Interviews
3. Observing Staff
4. Staffing Comparisons.

In addition to these four primary elements, the County also asked RMOS to conduct an exploratory evaluation of whether staffing levels are adequate to implement the systems, programs and services needed to enable the WWTP to perform optimally.

Information was collected from the County and reviewed to familiarize RMOS with the County facilities, staffing, communications, and organizational structure. Information collected for review included job descriptions, WWTP and collection system information (e.g., WWTP historical data, collection system manhole and pipeline data, lift station data), operation and maintenance (O&M) manuals, standard operating procedures, maintenance logs, organizational structure, and other information related to operation of the wastewater facilities. A project kickoff meeting was conducted with County staff to introduce RMOS, make arrangements to collect information, and explain RMOS' approach to this evaluation.

RMOS interviewed all County staff involved with the wastewater utility to learn about staff communication, organizational structure, responsibilities and expertise, and solicit feedback regarding current staffing. County staff interviews included:

- Wastewater Operations Manager – Travis Capson
- Wastewater Operator Leadworkers – Nathaniel (Nate) Swyers, William (Bill) Michaud
- Wastewater Operators II – Mike Allen, Dawn McDowell, Brandon Salice
- Wastewater Maintenance Leadworker – Monte Bloemke
- Wastewater Maintenance Technicians – Jeffrey (Jeff) Welch, Shane Ripp
- Laboratory Analyst – Dmitriy Bashkatov
- Supervisory Control and Data Acquisition (SCADA) System Specialist – Garrett Solinger
- Custodial Aide – Kevin Rathje

Three positions were vacant at the time of the evaluation: Wastewater Operator III, Wastewater Maintenance Technician, and Grounds Maintenance Worker.

WWTP personnel were observed to ascertain actual duties performed. The observed job duties and responsibilities were compared with the written job descriptions, WWTP performance and compliance, maintenance schedules, and the experience of RMOS to help determine whether current staffing is appropriate.

Staffing was benchmarked by comparison with industry standards and similar facilities. RMOS evaluated the staffing needs for the County facilities using guidelines from the U.S. Environmental Protection Agency (EPA) publications, “Estimating Staffing for Municipal Wastewater Treatment Facilities” and “Manpower Requirements for Wastewater Collection Systems in Cities and Towns Up to 150,000 in Population.” RMOS identified and examined staffing at three wastewater facilities to compare with staffing of the existing County WWTP. The examination of facility staffing included both WWTP and collection system staffing. The staffing levels and experience, performance, O&M, and compliance of these similar facilities were used to help determine appropriate staffing for the County facilities.

RMOS recognizes that no two wastewater treatment plants or collection systems are identical. However, benchmarking based on the above sources is an industry standard often used to provide reasonable staffing estimates.

All this work, including all staff interviews and observations, was completed by Mr. Ron Moeller, Owner of RMOS. Mr. Moeller has been a certified wastewater treatment plant operator for over 35 years and currently holds an Ecology -issued Certificate of Competency as a Group 4 WWTP Operator. Mr. Moeller worked at wastewater facilities prior to becoming a consultant. He also served as the Operations Leader for Kennedy/Jenks Consultants. Mr. Moeller thoroughly understands the work that must be done, the effort involved, the expertise required, and the challenges associated with communicating information.

Section 3: Wastewater Operations Organizational Structure

The Clark County Public Works Department consists of seven Divisions, one of which is the Clean Water Division. Wastewater Operations is a Section of the Clean Water Division. For the purpose of this evaluation, only Wastewater Operations will be considered. Figure 3-1 shows the Public Works Organization chart.

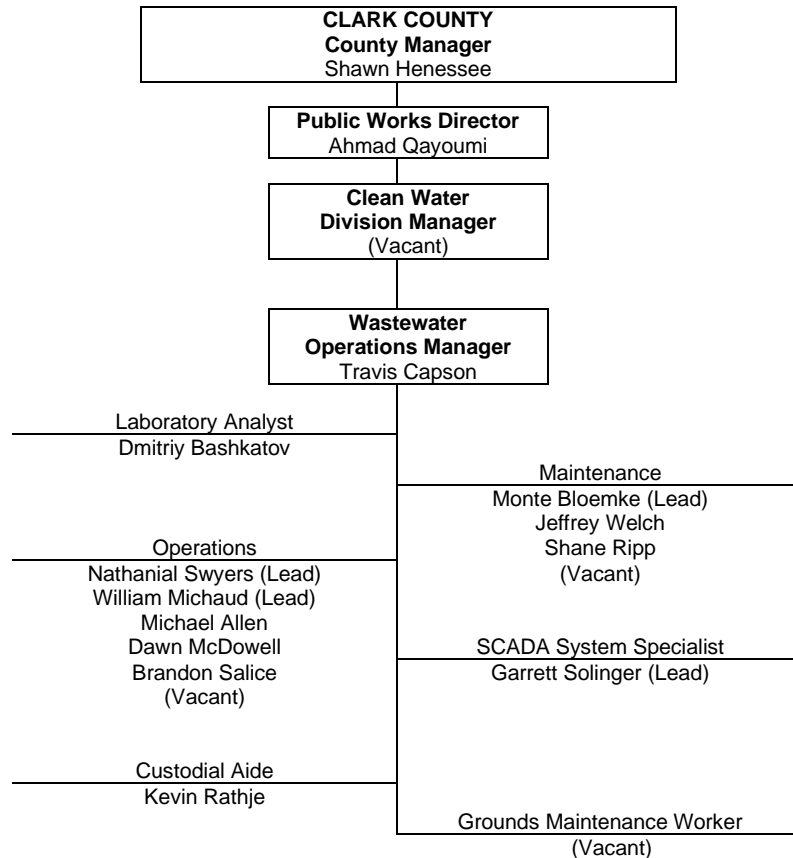


Figure 3-1: Clark County Public Works Organization Chart

The following descriptions identify the key personnel and their duties within the County Wastewater Operations Section:

- Ahmad Qayoumi, Public Works Director. Mr. Qayoumi has been the Public Works Director/County Engineer for approximately 1 year. Mr. Qayoumi oversees the Office of Public Works Director/County Engineer, including the following Divisions: Administration & Finance, Transportation, Engineering & Construction, Road Maintenance & Safety, Parks & Lands, Clean Water, and Fleet Services. He works under the direction of the County Manager, and his office is located at the Clark County Public Service Center.
- Travis Capson, Wastewater Operations Manager. This position is in “responsible charge of the day-to-day operation of the wastewater treatment plant” as required in the Salmon Creek WWTP’s NPDES Permit. Mr. Capson has been the Wastewater Operations

Manager for approximately 3 and a half years and currently holds an Ecology-issued Certificate of Competency as a Group 4 WWTP Operator. He assumes management responsibility for all services and activities of the Salmon Creek WWTP, regional pump stations, regional interceptors and force mains, and related facilities. He works under the direction of the Clean Water Division Manager. His office is located at the Salmon Creek WWTP.

- Nate Swyers, Lead Operator. Mr. Swyers has been an operator at the Salmon Creek WWTP for approximately 8 and a half years and currently holds an Ecology-issued Certificate of Competency as a Group 3 WWTP Operator. He works under the supervision of the Wastewater Operations Manager and is one of the leads for the Operators. This position is in “charge during all regularly scheduled shifts” as required in the Salmon Creek WWTP’s NPDES Permit. Mr. Swyer’s office is located at the WWTP.
- Bill Michaud, Lead Operator. Mr. Michaud has been an operator at the Salmon Creek WWTP for approximately 2 years and currently holds an Ecology-issued Certificate of Competency as a Group 3 WWTP Operator. He works under the supervision of the Wastewater Operations Manager and is one of the leads for the Operators. This position is in “charge during all regularly scheduled shifts” as required in the Salmon Creek WWTP’s NPDES Permit. Mr. Michaud’s office is located at the WWTP.
- Dawn McDowell, Wastewater Operator II. Ms. McDowell has been an operator at the Salmon Creek WWTP for approximately 3 and a half years and currently holds an Ecology-issued Certificate of Competency as a Group 2 WWTP Operator. She works under the supervision of the Wastewater Operations Manager.
- Mike Allen, Wastewater Operator II. Mr. Allen has been an operator at the Salmon Creek WWTP for approximately 3 and a half years and currently holds an Ecology-issued Certificate of Competency as a Group 2 WWTP Operator. He works under the supervision of the Wastewater Operations Manager.
- Brandon Salice, Wastewater Operator II. Mr. Salice has been an operator at the Salmon Creek WWTP for approximately 2 years and currently holds an Ecology-issued Certificate of Competency as a Group 2 WWTP Operator. He works under the supervision of the Wastewater Operations Manager.
- Dmitriy Bashkatov, Laboratory Analyst. Mr. Bashkatov has been a WWTP operator for approximately 18 and a half years and currently holds an Ecology-issued Certificate of Competency as a Group 4 WWTP Operator. He performs most of the lab work, and his primary responsibility is laboratory analyst. He works under the supervision of the Wastewater Operations Manager. He reports to work at the WWTP.
- Monte Bloemke, Wastewater Maintenance Leadworker. Mr. Bloemke has been the Wastewater Maintenance Leadworker for approximately 29 years and currently holds an Ecology-issued Certificate of Competency as a Group 1 WWTP Operator. He works under the supervision of the Wastewater Operations Manager and is a lead for the Wastewater Maintenance Technicians. Mr. Bloemke’s office is located at the WWTP.
- Jeff Welch, Wastewater Maintenance Technician II. Mr. Welch has been a Wastewater Maintenance Technician for approximately 20 and a half years. He works under the supervision of the Wastewater Operations Manager.
- Shane Ripp, Wastewater Maintenance Technician II. Mr. Ripp has been a Wastewater Maintenance Technician for approximately 11 years. He works under the supervision of the Wastewater Operations Manager.

- Garrett Solinger, SCADA System Specialist. Mr. Solinger has been the Supervisory Control And Data Acquisition (SCADA) System Specialist for approximately 1 year. He works under the supervision of the Wastewater Operations Manager and is a lead for the Wastewater Maintenance Technicians. Mr. Solinger's office is located at the WWTP.
- Kevin Rathje, Custodial Aide. Mr. Rathje has been the Custodial Aide for approximately 16 and a half years. He works under the supervision of the Wastewater Operations Manager.
- Wastewater Operator III. This position is currently vacant. Once filled, the Operations group will be fully staffed. This position works under the supervision of the Wastewater Operations Manager.
- Wastewater Maintenance Technician I. This position is currently vacant. Once filled, the Maintenance group will be fully staffed. This position works under the supervision of the Wastewater Operations Manager.
- Grounds Maintenance Worker. This is a new position created to maintain the landscaping and vegetation at the WWTP. Once the position job description is complete, the County will advertise to fill this position. **(NOTE – During the course of this study, Clark County entered into an agreement with the Washington Department of Natural Resources (DNR) to maintain the grounds at the WWTP using DNR crews. As a result, the County will not fill this position.)**
- Schedules. The WWTP's daily operating hours are 6:00 AM to 4:30 PM, Monday through Sunday. The following schedules are utilized:
 - Wastewater Operations Manager – Mr. Capson works a 9/80 schedule. His hours are from 6:00 AM to 3:30 PM, Monday through Friday. His schedule allows him to take every other Friday off.
 - Laboratory Analyst – Mr. Bashkatov works 40 hours a week, 8 hours a day. His hours are from 6:00 AM to 2:30 PM, Monday through Friday.
 - Wastewater Operators – The Operators work 40 hours a week, 10 hours a day. Bill Michaud, Mike Allen, and Brandon Salice's hours are from 6:00 AM to 4:30 PM, Wednesday through Saturday. Nate Swyers and Dawn McDowell's hours are from 6:00 AM to 4:30 PM, Sunday through Wednesday.
 - Maintenance Leadworker – Mr. Bloemke works 40 hours a week, 8 hours a day. His hours are from 7:00 AM to 3:30 PM, Monday through Friday.
 - Maintenance Technicians – The Maintenance Technicians work a 9/80 schedule. Their schedules are arranged so that the Technicians have every other Friday off.
 - SCADA System Specialist – Mr. Solinger works 40 hours a week. His hours are from 7:00 AM to 3:30 PM, Monday through Friday.
 - Custodial Aide – Mr. Rathje works 40 hours a week. His hours are from 7:00 AM to 3:30 PM, Monday through Friday.
 - An example of the WWTP work schedule is provided in this report as Appendix B.
- Standby Personnel. Currently staffed by the Operation and Maintenance personnel, who are on-call from 4:30 PM to 6:00 AM the following morning. Personnel are on-call

for one week, from Monday to Monday, and then the responsibility is rotated to another member of the Standby Personnel. Standby Personnel respond to all emergency calls/alarms related to the WWTP, pump stations, and collection system. If needed, they can call in other personnel to assist with the emergency call/alarm. Standby Personnel carry a County cell phone for on-call purposes, but they also make their personal home and/or cell phone numbers available so they can be reached via multiple sources. For additional information see Section 5.

3.1 Staff Responsibilities

Each staff member has a role and is responsible for operation of the WWTP and Pump Stations in a manner that ensures that all raw wastewater always receives adequate treatment.

3.1.1 Management

Management is ultimately responsible to see that federal and state regulations are met, and that the facility operates within budgetary constraints. Managerial responsibilities include the following:

- Maintain plant efficiency.
- Maintain adequate records.
- Establish staff requirements.
- Provide good working conditions.
- Conduct in-plant training sessions when necessary and encourage enrollment in technical training. Provide special training on safety and emergency procedures as needed.
- Maintain good public relations.
- Prepare budgets and reports as required.
- Develop Standard Operating Procedures (SOPs).
- Be prepared to help operate the plant during emergency conditions.
- Establish a preventive maintenance program.

3.1.2 Operations

Operations personnel are responsible for the day-to-day operation of the plant and monitoring of its performance. Responsibilities of the operations staff include the following:

- Coordinate with the maintenance and laboratory personnel to assure that the plant performs properly.
- Know and use proper operational procedures.
- Maintain accurate operating records. Records show trends and causes and provide information that must be reported to authorities. Detailed daily logs provide essential information for evaluating process and system issues related to plant efficiency and reliability and the corrective action methods employed and whether those measures were successful or unsuccessful.

- Keep management informed in a timely manner.
- Utilize operating funds properly and efficiently.
- Keep informed about current operation practices for similar treatment plants.
- Stay up to date on treatment technology.

3.1.3 Maintenance

Regular maintenance is an essential requirement for the continued smooth operation of the WWTP and Pump Stations. Maintenance personnel are directly responsible for keeping equipment in working order and performing preventative and reactive maintenance. Duties of maintenance personnel include the following:

- Practice preventive maintenance.
- Be ready to respond to the immediate repair needs of the facility as they occur.
- Keep an adequate supply of appropriate spare parts and supplies on hand and maintain an accurate inventory.
- Perform cleaning and housekeeping chores and maintain a pleasant and safe environment at the plant.
- Keep accurate and detailed maintenance records.
- Keep informed about current maintenance practices for similar treatment plants.

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Section 4: General Observations

4.1 Wastewater Treatment Plant

The Wastewater Operations Manager is Travis Capson. He has been the Wastewater Operations Manager for approximately 3 and a half years. Mr. Capson is responsible for the operation and maintenance (O&M) of the WWTP, the pump stations, and portions of the collection system. There are 14 full-time equivalents (FTEs) at the WWTP. **(NOTE – The position of Grounds Maintenance Worker will not be filled.)** A Liquid/Solids diagram of the existing WWTP is shown in Figure 4-1 below.

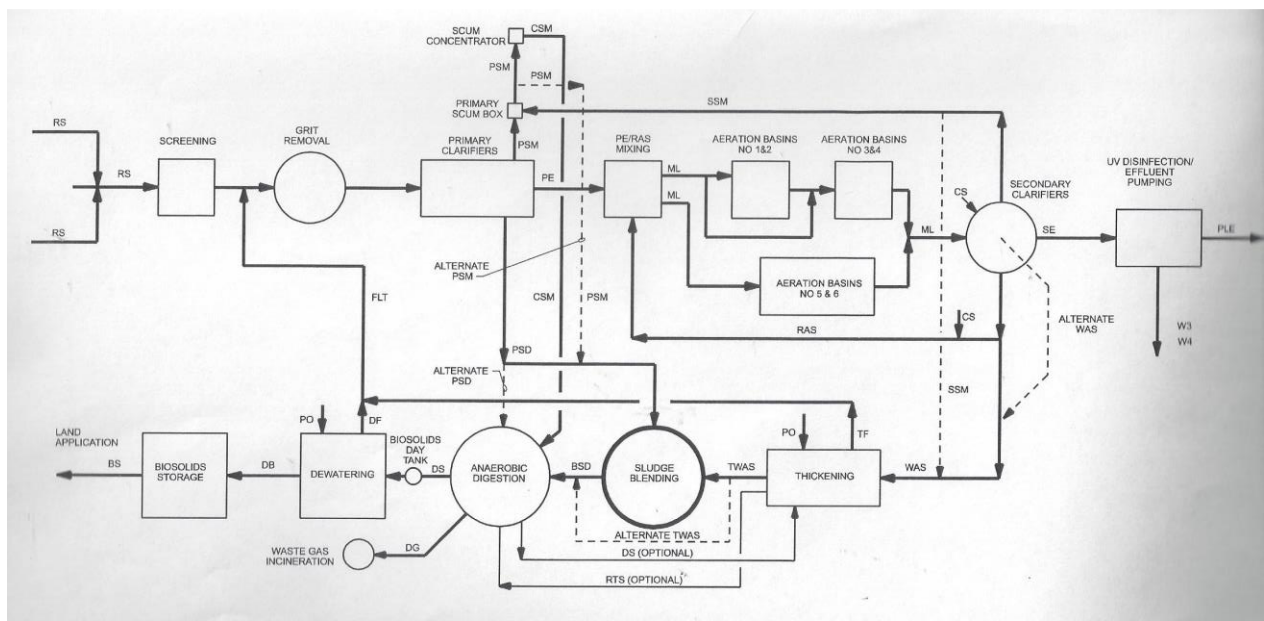


Figure 4-1: WWTP Liquids/Solids Diagram

The WWTP consists of a **Vector truck decant pad**; **influent flow meter**; **screening** (1 manually cleaned bar screen, 2 mechanically cleaned bar screens, 2 screenings compactor); **grit removal** (2 grit separators, 3 grit pumps, 2 grit cyclones, 2 grit washers); **primary treatment** (4 primary clarifiers, 8 primary sludge pumps, 2 high pressure air compressors); **secondary treatment** (2 PE/RAS mixing box mixers, 4 aeration basins, aeration diffusers, 7 process blowers, 4 mixed liquor recycle pumps, 10 anoxic zone mixers, 2 mixed liquor mixing box mixers, 4 secondary clarifiers, 6 return activated sludge pumps, 2 waste activated sludge pumps, 2 secondary scum pumps, 2 secondary clarifier scum pump); **ultraviolet disinfection**; **effluent pumping** (4 plant effluent pumps); **effluent flow meter**; **solids thickening** (2 gravity belt thickeners, 2 gravity belt wash water pumps, 2 thickened waste activated sludge pumps); **anaerobic digestion** (1 sludge blend tank, 1 sludge blend tank mixing pump, 2 digester feed pumps, 2 anaerobic digesters, 1 digester transfer pump, 3 sludge recirculation pumps, 2 primary heating water pumps, 2 secondary heating water pumps, 2 boiler supply pumps, 2 boilers, 2 heat exchangers, 1 digester waste gas incinerator); **dewatering** (2 belt filter presses, 2 belt press feed pumps, 2 belt press wash water pumps, 2 cake collection screw conveyors, 1 cake transfer screw conveyor, 1 biosolids storage hopper, 1 sludge mixing pump); **biosolids storage** (4 biosolids storage bays, 1 monorail trolley, 1 monorail hoist, rolling stock); **W1/W2 water**

systems (2 well pumps, 1 air compressor); **W3 water system** (2 non-potable water pumps); **numerous HVAC units**; **numerous monorails, hoists, and trolleys**; **sump pump system** (8 sump pumps); **plant drain system** (1 plant drain pump, 1 basin dewatering pump); **filtrate recycle** (3 filtrate recycle pumps); and, **liquid polymer chemical systems**.

While touring the WWTP, the following observations were made:

1. The WWTP is well operated and maintained. (Pictures 4-1 through 4-3)



Picture 4-1: Primary Clarifiers



Picture 4-2: Aeration Basins

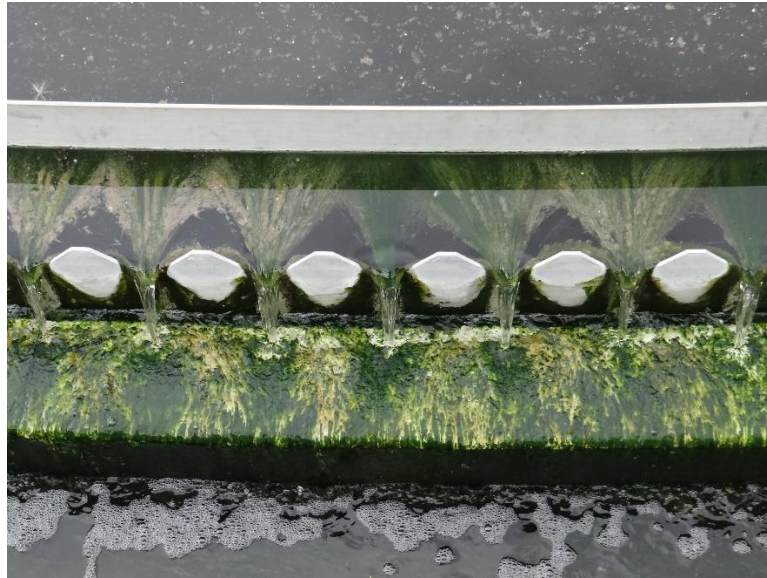


Picture 4-3: Sludge Drying Beds

2. The plant received the 2018 Wastewater Treatment Plant Outstanding Performance award. This award, presented by Ecology, acknowledges those plants that achieved full compliance with its NPDES Permit in 2018. This is the 12th consecutive year that the Salmon Creek WWTP has received this award. See Section 7 for additional information.
3. The operators currently work 40 hours a week, 10 hours a day. Three operators work Wednesday through Saturday, and the other 3 operators work Sunday through Wednesday. That means that Wednesday is the only day of the week when all operators work together. However, because Wednesday is the only day when all operators are present, meetings for all plant staff and/or all operators must be scheduled on Wednesday. Additionally, since the operators know that there are additional operators on Wednesday, some operators will schedule time off for personal matters on Wednesdays.
4. Waste Activated Sludge (WAS) controls the inventory of solids in the activated sludge process. WAS control includes the following methods:
 - a. Constant Mixed Liquor Suspended Solids (MLSS)
 - b. Mean Cell Residence Time (MCRT)/Solids Retention Time (SRT)
 - c. Food to Microorganism (F/M) Ratio
 - d. Sludge Quality Indicators

The Salmon Creek WWTP operators currently use either F/M Ratio or MCRT for inventory control. Staff utilize the HACH Water Information Management Systems (WIMS) for process control calculations.

5. Secondary clarifiers #3 and #4 are washed every week and pressure washed every other week to keep algae blooms from getting out of control. Algae blooms can potentially affect plant performance (high effluent total suspended solids). (Pictures 4-4 and 4-5)



Picture 4-4: Algae in Secondary Clarifier Weirs



Picture 4-5: Algae in Secondary Clarifiers

6. There were indications that the grounds weren't maintained as well as they could have been. (Pictures 4-6 and 4-7) Although this does not affect plant performance, it might communicate to visitors that the plant is not well maintained.



Picture 4-6: Grounds Maintenance #1



Picture 4-7: Grounds Maintenance #2

7. WWTP staff can monitor operation of equipment at the WWTP and the 36th Avenue and 117th Street Pump Stations through the Supervisory Control and Data Acquisition (SCADA) system. However, there are no enunciators or alarms to notify staff of alarms at the WWTP or pump stations.

8. The laboratory is neat, clean, and well maintained (Picture 4-8).



Picture 4-8: WWTP Laboratory

The Salmon Creek WWTP NPDES permit states, under Special Condition S2, “Monitoring Requirements”, the minimum sampling frequency for each parameter listed. However, it was observed that the Laboratory Analyst performs sampling in excess of that required by the NPDES permit. Since the operators do all sampling and testing on the weekend, this excess testing results in the operators spending more time than is necessary in the lab. Depending on the operator, it can take up to 8 hours per day to do the sampling/testing on the weekend.

WWTP staff currently perform most of the lab work. Operators receive refresher training for 2 days every 6 months. Staff also conduct testing on wastewater samples from the City of Ridgefield.

The Salmon Creek WWTP laboratory has been accredited by Ecology (ID #W499). The Quality Assurance/Quality Control (QA/QC) Manual should be reviewed and updated annually.

9. Weekend operations include laboratory sampling and testing; pump station checks, process control testing and calculations; solids thickening and dewatering; and, plant checks (rounds).
10. Operators do the rounds first thing in the morning. This allows the staff to check equipment and processes and to identify potential issues before they become major problems. Staff also read elapsed time meters (ETMs). Staff do not do the rounds before leaving the WWTP in the afternoon.
11. Logbooks were located throughout the plant. Logbooks are viewed as legal documents that are utilized by Permittees to establish the defense of an upset or some other NPDES permit violation. Logbooks are typically paginated so that any tampering can be identified. However, most logbooks at the WWTP have very little information in them and contain just the name of the operator(s) working on that day.
12. The Maintenance Leadworker works 40 hours a week, Monday through Friday. The Maintenance Technicians work a 9/80 schedule, alternating days off every other Friday.

13. The maintenance crew does virtually all preventative maintenance at the WWTP. Operators will assist as needed. The staff utilize the “MPulse” Computerized Maintenance Management System (CMMS) to generate work requests, or work orders. Operators generate a work order, and then once the work is completed, maintenance staff close out the work order. Operators are typically not notified when a work order has been closed out.
14. Maintenance staff do not utilize the CMMS fully. Features of “MPulse” that can be utilized more fully are work order management, preventative maintenance scheduling and tracking, parts and supplies inventory and management, and graphical reporting.
15. WWTP operators communicate with each other, and the maintenance crew communicates with each other. However, it was observed that the WWTP operators and the maintenance crew do not communicate well with each other. This is due in part to differences in personalities and styles of communication. It is also due in part to the amount of operator turnover in recent years. Both management and wastewater personnel have expressed a desire to improve communications and are working to correct this deficiency.

4.2 Collections

The Maintenance Technicians maintain 2 off-site regional pump stations, and 26 miles of gravity interceptors and pressurized force mains. They maintain the approximately 25 Salmon Creek Interceptor Trail manholes (Picture 4-9) and mow approximately ½ mile of vegetation along the trail (Picture 4-10). They also maintain the vegetation along the 36th Avenue PS force main to the WWTP, as well as the vegetation and air relief valves along the outfall line to the Columbia River.

(NOTE – During the course of this study, RMOS was provided with a Draft of the “Discovery Clean Water Alliance Operator Agreement” dated July 8, 2019. According to this document, Clark County will only be responsible for the Salmon Creek WWTP, the 36th Avenue Pump Station and Force Main, and the 117th Street Pump Station and Force Main. This agreement goes into effect on January 1st, 2020 and will remain in effect for 5 years until December 31st, 2024. See Section 13 for more information.

As a result of this agreement, Clark County will not be responsible for operating the Salmon Creek Interceptor, the Kline Interceptor, and the Battle Ground Force Main. This will greatly reduce the scope of responsibility of the Maintenance Technicians regarding the collection system.)



Picture 4-9: Salmon Creek Interceptor Trail Manhole



Picture 4-10: Vegetation Along the Salmon Creek Interceptor Trail

While touring the wastewater collection system, the following observations were made:

1. The pump stations are well cared for and maintained. (Picture 4-11 and 4-12)



Picture 4-11: 36th Avenue Pump Station Dry Well



Picture 4-12: 117th Street Pump Station Pump Room

2. The pump stations are checked by 2 technicians every day, even though the 117th Pump Station only runs during wet weather months. In addition, staff check the Battle Ground Interceptor. Typically, staff try to check the interceptor when they get a request for sewer locates. Minimal checks require approximately 2 hours.
3. During power outages, the 36th Avenue Pump Station pumps do not start automatically. Personnel must start the pumps on-site. This can potentially have an adverse environmental impact if the pumps are not started in a timely manner during wet weather events.

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Section 5: Standby Procedures

The County currently has a standby roster of 9 employees (11 when vacant positions are filled), made up entirely of staff at the WWTP. Participation in standby is mandatory. The procedure for handling a wastewater-related alarm is as follows:

- Standby personnel are notified of an alarm condition at the WWTP or Pump Station through the WWTP SCADA system and an automatic dialer. In addition, multiple agencies notify standby personnel in the event of a sewage spill or other emergency condition in the collection system.
- “WIN-911” is the alarm notification software (automatic dialer) that Clark County uses at the WWTP.
- Specific alarms are identified on the County phone, so personnel have an idea of the type of alarm condition that they are responding to.
- If Maintenance Technicians or the SCADA System Specialist responds to a WWTP alarm, they will contact an Operator for assistance or direction if necessary. If an Operator or the SCADA System Specialist responds to a Pump Station or collection system alarm, they will contact a Maintenance Technician for assistance or direction if necessary. If the alarm is associated with instrumentation, the SCADA System Specialist is contacted for assistance or direction if necessary.
- If the scheduled standby personnel can’t be contacted, the next person in rotation is called. If no one is contacted, the Wastewater Operations Manager is contacted.
- Once contacted, standby personnel will respond to the alarm and attempt to correct the alarm condition.

Although the current standby procedures are thorough, consideration should be given to the following scenario:

- If Ecology, the Department of Health, or any other regulatory agency must be notified, which personnel are responsible for making the appropriate notifications? Procedures for reporting to regulatory agencies should be documented.

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Section 6: Job Descriptions

Job descriptions for each position in the WWTP were provided for comparison to actual duties. Copies of the job descriptions are provided in Appendix C of this report. Representative duties and actual duties are compared below. Representative duties are duties typical for a particular classification and usually defined in a position's job description. Actual duties reflect the actual work performed by the employee.

Wastewater Operations Manager (Job Description Date of Revision: 05/2015)

The Wastewater Operations Manager directs, manages, supervises, and coordinates the activities of the WWTP and related facilities, including laboratory analyses, process control, solids handling, instrumentation, and maintenance. The Wastewater Operations Manager is the Operator in "responsible charge of the day-to-day operation of the wastewater treatment plant" as required in the WWTP's National Pollutant Discharge Elimination System (NPDES) permit.

At the same time, the Wastewater Operations Manager must interact with multiple agencies that have a measure of influence on the Salmon Creek WWTP O&M. These agencies each have their own unique goals and objectives, and the Wastewater Operations Manager acts as a liaison to each agency. As an example, the Wastewater Operations Manager chairs the "Operations Coordination Committee". This committee meets monthly and is made up of representatives from Ridgefield, Battle Ground, Clark Regional Wastewater District, and the Alliance.

The Wastewater Operations Manager was observed fulfilling the representative duties of the job description, with the following exceptions:

- Representative duty: Receives direction from the Public Works Operations Manager.
 - Actual duties: The Wastewater Operations Manager receives direction from the Clean Water Division Manager. The position of the Clean Water Division Manager is vacant and has an Interim Manager until a permanent manager can be hired. However, the Wastewater Operations Manager also works in consultation with the Alliance, since the Alliance owns the WWTP and associated assets, and approves the annual budget.
- Representative duty: Implements discipline and termination procedures.
 - Actual duties: The Wastewater Operations Manager may initiate discipline and termination procedures, but the County Human Resources Department implements the procedures.

Wastewater Operations Leadworker (Job Description Date of Revision: 02/2010)

Under direction from the Wastewater Operations Manager, the Wastewater Operations Leadworker prioritizes, assigns, coordinates, and monitors the more complex and difficult work of staff responsible for the operation of the WWTP. This position monitors all WWTP processes and ensures compliance with all state and federal wastewater quality standards. This position is in "charge during all regularly scheduled shifts" as required in the Salmon Creek WWTP's NPDES Permit.

The Wastewater Operations Leadworker was observed fulfilling the representative duties of the job description, with the following exceptions:

- Representative duty: Supervises and evaluates personnel.
 - Actual duties: The Leadworkers will prioritize, assign, coordinate and monitor the work of personnel, but the Wastewater Operations Manager supervises and evaluates personnel with input from the Leadworkers.
- Representative duty: Assists in... monitoring department base line budget.
 - Actual duties: The Wastewater Operations Manager establishes and monitors the budget, and the Leadworkers do not assist in monitoring the budget.
- Representative duty: Operates, maintains, and repairs equipment.
 - Actual duties: The operators do minimal maintenance of equipment, and do not repair any equipment.
- Representative duty: Performs routine maintenance of equipment.
 - Actual duties: The Maintenance Technicians perform routine maintenance of equipment. Leadworkers will assist as requested.
- Representative duty: Performs general housekeeping duties and grounds maintenance.
 - Actual duties: The housekeeping duties are performed by a janitor under contract who does housekeeping at the WWTP on a weekly basis, and the grounds maintenance is performed by the Custodial Aide and the DNR.

Wastewater Operator II (Job Description Date of Revision: 12/2017)

Under general supervision, the Wastewater Operator II performs a variety of technical work in the operation of the Salmon Creek WWTP. This position works under the direction of the Wastewater Operations Leadworker.

The Wastewater Operator II was observed fulfilling the representative duties of the job description, with the following exceptions:

- Representative duty: Typical duties include...preventative maintenance of equipment.
 - Actual duties: The Maintenance Technicians perform routine preventative maintenance of equipment. Operators will assist as requested.
- Representative duty: Perform general housekeeping duties and grounds maintenance.
 - Actual duties: The Custodial Aide, the DNR, or contractors perform these duties.

Laboratory Analyst (Job Description Date of Revision: 02/2008)

Under general supervision, the Laboratory Analyst performs required laboratory testing at the WWTP to ensure quality control to meet all State and Federal wastewater quality standards. This position provides input on process changes at the WWTP and maintains a variety of data records and logs.

Laboratories that analyze environmental samples must be capable of providing accurate and defensible analytical data. In Washington, such labs must receive accreditation through Ecology to ensure they are conducting analyses according to prescribed methods. The Salmon Creek WWTP NPDES permit states under Special Condition S2, "Monitoring Requirements", that "all monitoring data required by Ecology shall be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, Chapter 173-50 Washington Administrative Code (WAC)." The Salmon Creek WWTP laboratory has been accredited by Ecology (ID #W499).

The Laboratory Analyst was observed fulfilling the representative duties of the job description, with the following exceptions:

- Representative duty: Collects and analyzes.... samples.
 - Actual duties: The Wastewater Operators collect the samples for the Laboratory Analyst.
- Representative duty: Work is performed primarily in an office setting, with up to 50% of the work performed in a laboratory and in the field.
 - Actual duties: Work is performed primarily in the laboratory, with up to 90% of the work performed in the laboratory and very little in the field.

Wastewater Maintenance Leadworker (Job Description Date of Revision: 01/2018)

Under direction from the Wastewater Operations Manager, the Wastewater Maintenance Leadworker prioritizes, assigns, coordinates, and monitors the more complex and difficult work of staff responsible for maintaining and repairing the WWTP, pump stations, and portions of the collection system. This position oversees the preventative maintenance program and requires specialized knowledge of equipment maintenance and repair techniques as applied to a WWTP.

The Wastewater Maintenance Leadworker was observed fulfilling the representative duties of the job description, with the following exceptions:

- Representative duty: Maintains plant asset management database.
 - Actual duties: The Leadworker does not maintain the asset management database.
- Representative duty: Employees may be required to use a respirator and/or a self-contained Breathing Apparatus.
 - Actual duties: Respirators and self-contained breathing apparatuses, or SCBAs, are no longer used.

Wastewater Maintenance Technician II (Job Description Date of Revision: 09/1998)

Under general supervision, the Wastewater Maintenance Technicians perform a variety of highly skilled work in the maintenance and repair of the WWTP, pump stations, and portions of the collection system. This position works under the direction of the Wastewater Maintenance Leadworker.

- Representative duty: The Maintenance Technician II employees...report directly to the Operation's Superintendent.

- Actual duties: The Maintenance Technician II employees report directly to the Wastewater Operations Manager.
- Representative duty: Participates in the development, planning and implementation of ongoing preventative maintenance programs.
 - Actual duties: Although the Maintenance Technician II employees are capable of the duty, they do not participate in it as described.
- Representative duty: Uses computer system to track work orders, spare parts inventories, and maintain maintenance records.
 - Actual duties: The Maintenance Technician II employees are not fully utilizing the “MPulse” CMMS to track work orders, spare parts inventories, and maintain maintenance records.
- Representative duty: Employees may be required to use a respirator and/or a self-contained Breathing Apparatus.
 - Actual duties: Respirators and self-contained breathing apparatuses, or SCBAs, are no longer used.

Custodial Aide (Job Description Date of Revision: 06/2000)

Under general supervision, the Custodial Aide performs custodial work and unskilled maintenance work. This position performs basic custodial work of a routine nature.

- Representative duty: Replaces fluorescent lamps.
 - Actual duties: The Custodial Aide does not replace fluorescent lamps.
- Representative duty: Performs related duties as assigned.
 - Actual duties: It should be noted that the following duties are performed by the Custodial Aide on a regular basis and should be listed as “Key or Typical Tasks and Responsibilities” – Mowing; cleaning vehicles; and, pressure washing.

SCADA System Specialist (Job Description Date of Revision: 07/2017)

Under direction from the Wastewater Operations Manager, the SCADA System Specialist designs, develops code, installs, tests, modifies, and maintains complex PLC and SCADA computer controls hardware, programs, software interfaces, and applications. This position is responsible for the design, installation, maintenance, and on-going support of electrically/electronically controlled pieces of equipment.

- Representative duty: Oversees the day-to-day maintenance activities conducted by the Wastewater Technicians I and II.
 - Actual duties: The Wastewater Maintenance Leadworker oversees the day-to-day maintenance activities conducted by the Wastewater Technicians I and II.

Section 7: Regulatory Compliance

EPA delegates responsibility for implementing all federal and state water pollution control laws and regulations within Washington State to Ecology's Water Quality Program. Wastewater discharges are regulated primarily by wastewater discharge permits, which stipulate specific limits and conditions of allowable discharge.

A wastewater discharge permit is required for disposal of waste material into "waters of the state," which include rivers, lakes, streams, and all underground waters and aquifers. An individual permit is written for a specific discharge at a specific location. The individual permit is written specifically to regulate the pollutants in the discharge. An individual permit is typically an NPDES permit for discharges to surface waters. Individual NPDES permits may be issued to an industry or to a municipality.

Clark County operates the Salmon Creek WWTP under the terms and conditions of NPDES Permit No. WA-0023639, administered by Ecology. The permit contains two sets of conditions: Special and General. Special Conditions refer to those limits and conditions that are unique to Clark County and its receiving water, the Columbia River. These Special Conditions include the following:

- The types and concentrations of pollutants allowed to be discharged from the WWTP to the Columbia River.
- Monitoring requirements, such as the frequency of pollutant testing, sampling and analytical procedures, and laboratory accreditation.
- Reporting and recording requirements, which include conditions for the Discharge Monitoring Report (DMR), non-compliance reporting, and records retention.
- Facility loading criteria, which includes plans for maintaining adequate capacity and notification of new or altered sources.
- O&M, which includes necessary operator certification levels, O&M programs, WWTP bypasses, and O&M manuals.
- Pretreatment requirements, including the identification of all industrial dischargers.
- Schedules, sampling, and reporting requirements for acute toxicity, chronic toxicity, and additional chemical analyses.

General Conditions refer to those limits and conditions that apply to all WWTPs operating under a NPDES Permit. These General Conditions include the following:

- Signatory requirements
- Compliance with other laws and statutes
- Penalties for violating permit conditions
- Response to upset conditions
- Reporting anticipated noncompliance
- Compliance schedules.

RMOS had anticipated reviewing DMRs for the Salmon Creek WWTP to determine how well the plant was being operated at current staffing levels. However, in a letter from Ecology to the Discovery Clean Water Alliance Board of Directors dated June 28, 2019, Ecology acknowledged that the Salmon Creek WWTP achieved full compliance with its NPDES Permit for 2018, resulting in the WWTP receiving the “Wastewater Treatment Plant Outstanding Performance” award, marking the twelfth consecutive year that that the Salmon Creek WWTP has achieved full compliance. A copy of the letter is included in Appendix D.

Section 8: Mutual Aid Agreement

Mutual aid, an agreement often employed by emergency services, is a formal agreement among agencies to lend assistance across jurisdictional boundaries when required, either due to a disaster or an emergency that exceeds local resources. Clark County has several interlocal agreements for mutual aid with nearby agencies, including the City of La Center, Clark Regional Wastewater District, the City of Battle Ground, and the City of Ridgefield.

It is important to recognize the two types of mutual aid agreements: Informal Cooperation and Contractual Assistance.

Informal cooperation is a voluntary agreement between agencies to provide a service without contractual obligations. These agreements can either be long term or on an as-needed basis. The provided service can be paid for or exchanged for another service. These agreements are easy to create, implement, and terminate, but they are not legally enforceable.

Contractual assistance is used when one agency develops a service contract with another agency to provide professional support. Contractual assistance is often used when an agency needs more assistance than can be provided through informal cooperation. Although a contract is required, it can be under County control. This type of agreement is easy to create and terminate. Community autonomy and independence are not affected when implementing this option. Examples of wastewater services often provided through contractual assistance include routine system O&M, periodic monitoring, and on-call emergency assistance.

As Clark County continues to maintain and/or investigate future mutual aid agreements, it is important that the County give due consideration to the following questions:

- Are the terms (and, if applicable, the price) of the agreement reasonable?
- Will the rate payers be impacted and if so, how?
- Are any additional investments required?
- Are there any other alternatives, and what are the impacts of not pursuing mutual aid?
- Can the staff of the contracted agency provide the necessary service and/or expertise?
- How does the public feel about mutual aid opportunities?
- Does the mutual aid agreement increase or decrease the County's regulatory, environmental, and public health risks?

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Section 9: Systems, Programs and Services Evaluation

There are several systems, programs and services related to the operation and maintenance of the wastewater system that have become industry norms. These systems, programs and services include the following: Training, Operation and Maintenance Manual(s), Preventative Maintenance, Computerized Maintenance Management Systems (CMMS), Safety, Housekeeping and Grounds Maintenance, Process Control Monitoring, Standard Operating Procedures (SOPs), Instrumentation and Automation, and Asset Management. RMOS will evaluate and determine if the current staffing levels at the WWTP supports the implementation and continued use of the identified systems, programs, and services.

9.1 Training

Employees who are not properly trained can expose the County to risk and could expose themselves and others to hazardous situations.

Employees should be trained to do the work outlined in their job descriptions. As such, the job description is a good place to start in determining training needs. Any difference between the work required in the job description and the employee's knowledge or skill represents a need for training. Although this knowledge/skills gap might be identified during the employment interview, it is best to assume that all new employees need some training.

To provide on-the-job training to employees, the Wastewater Operations Manager should assign an experienced employee to work side by side with less experienced employees until the less experienced employee has mastered the work and can work on his own. Successful on-the-job training is based on the following:

- The knowledge and expertise of the experienced employee
- Careful management of the training process, and
- Recognition of the less experienced employee's progress

Workshops, short courses, and conferences are educational programs designed to help operators pass their certification exams and can be very helpful in improving technical skills. Although experienced employees may believe they know how to do their work well, many times they need training to improve their skills or learn procedures for working with new materials and equipment. By attending training programs, experienced employees can keep up with new developments and changes in their industry and sharpen skills that may have become dull from lack of use.

It was observed that certain staff receive regular training. Examples of this are the laboratory training that operators receive every 6 months, as well as the weekly Process Meetings where less experienced operators can learn about process control from more experienced operators. Since Ecology requires Continuing Education Units (CEUs) for their professional growth, operators must attend Ecology-approved training courses to maintain their certification. ***This work would typically be done by outside vendors/trainers, with support from the WWTP staff. Current staffing levels are adequate for this effort.***

9.2 Operations and Maintenance Manual

Special Condition S5 of NPDES Permit No. WA0023639 states that “prior to placing new equipment into operation, the Permittee shall submit a new or revised O&M Manual that integrates the equipment and satisfies chapter 173-240 WAC.”

The most recent WWTP O&M Manual in a paper format was prepared by CH2M Hill in 2000. Not only are O&M Manuals required by regulatory/funding agencies, but they also serve as a repository of information. They are used to train and educate staff, resulting in less risk and improved performance. However, the O&M Manual for the Salmon Creek WWTP is a paper manual, and paper manuals often go unused for several reasons. Because people have a limited capacity to absorb information, it can be difficult to read through page after page of narrative text to find the needed information buried in that text. Paper manuals are almost always outdated, as it takes a tremendous amount of effort to edit the manual to reflect even minor changes made in the WWTP.

Clark County made the transition to an Electronic O&M Manual (E-Manual) in 2015. However, the format of the E-Manual makes it difficult to update and edit. It is recommended that the County update to an E-Manual that allows staff to update and edit as needed. The new E-Manual should be user friendly, where updating/editing of the E-Manual can be done immediately when changes are made to process units, equipment, policies, etc. ***This work would typically be done by a Consultant with support from the WWTP staff. Current staffing levels are adequate for this effort.***

9.3 Preventative Maintenance

Maintenance is work devoted to keeping a plant operating. It can be classified as either corrective or preventive. Corrective maintenance concerns the repair of equipment after breakdown, while preventive maintenance is work scheduled to minimize or eliminate breakdowns. Preventive maintenance assures maximum safety and reliability of system operation, as well as protecting the County's investment in equipment.

Preventive maintenance involves continuous equipment surveillance and servicing on a planned and scheduled basis. This maintenance should be performed on machinery, tankage, piping, valves, electrical equipment, and the buildings themselves. Detailed maintenance guidelines, maintenance checklists, troubleshooting guides and corrective maintenance procedures associated with a system or piece of equipment can be found in the manufacturer's technical manual.

The Wastewater Maintenance Technicians have a preventative maintenance program and perform preventative maintenance on all equipment at the WWTP and Pump Stations. It is recommended that the Maintenance Technicians incorporate ETM readings into their schedules, according to the appropriate equipment manufacturers recommendations. ***This work would typically be done by WWTP staff. Current staffing levels are adequate for this effort.***

9.4 Computerized Maintenance Management Systems (CMMS)

A WWTP utilizing CMMS can optimize maintenance productivity by using the equipment data that has been collected, stored, and processed by the system. Admittedly, a CMMS requires a

significant amount of time and effort to initially set up. However, this initial effort is worthwhile because of the benefits that maintenance personnel gain from automatic scheduling of preventative maintenance work, work order tracking, equipment history, and budget information.

As stated in Section 4.1, the Salmon Creek WWTP utilizes the “MPulse” CMMS to generate work requests, or work orders. However, features of “MPulse” that can be utilized more fully are work order management, preventative maintenance scheduling and tracking, parts and supplies inventory and management, and graphical reporting. “MPulse” can also be used to track where and how the maintenance budget is being spent, identify high-cost units and processes, and justify requests for capital improvements. Once the database is populated and put into place, reports on labor, materials, and contract services can be generated fairly quickly.

It is recommended that Clark County utilize their CMMS more fully by allocating resources to populate the system with missing data, and to gain the training needed to implement the complete suite of features that “MPulse” offers. ***This work would typically be done by WWTP staff with support from a Consultant. Current staffing levels are not adequate for this effort.***

9.5 Safety

Personnel working at the Salmon Creek WWTP may be exposed to several hazards, including the following:

- Physical injuries
- Biological hazards
- Toxic or suffocating gases or vapors
- Toxic and harmful chemicals
- Fire and explosion
- Electrical shock
- Equipment hazards
- Excessive noise
- Drowning

Clark County has developed a formal Accident Prevention Program that is outlined in writing. The program is tailored to the needs of the workplace or operation and to the types of hazards found at the WWTP and Pump Stations.

Clark County should make sure that their Accident Prevention Program contains at least the following elements:

- A safety orientation
- A description of their total safety and health program
- On-the-job orientation showing employees what they need to know to perform their initial job assignments safely
- How and when to report on-the-job injuries including instruction about the location of first-aid facilities at the WWTP and Pump Stations
- How to report unsafe conditions and practices
- The use and care of required personal protective equipment (PPE)
- What to do in an emergency, including how to exit the workplace. Identification of hazardous gases, chemicals, or materials used on-the-job and instruction about the safe use and emergency action to take after accidental exposure

The WWTP staff have monthly safety meetings with the County Safety Coordinator. However, the staff should consider conducting and documenting safety tailgate meetings when

appropriate. A tailgate meeting is an informal safety meeting, which is generally conducted at the job site prior to the commencement of a job or work shift. Leadworkers can draw attention to hazards, processes, equipment, tools, environment and materials to inform all workers of the risks in their surroundings.

WWTP staff should also consider implementing safety moments. A safety moment is a brief safety talk about a specific subject at the beginning of a meeting or shift. Also known as safety minutes or safety chats, these talks can be done in a variety of ways but are typically a brief (2-5 minute) discussion on a safety related topic.

It is recommended that the County continue to provide a safe work environment for its employees. Employees at the WWTP are responsible for observing all rules and procedures established for their safety and health. Employees are expected to comply with rules, procedures, and general safety practices established by the County, the State of Washington, and the Federal Government. ***This work would typically be done by WWTP staff. Current staffing levels are adequate for this effort.***

9.6 Housekeeping and Grounds Maintenance

Regarding housekeeping, the Custodial Aide performs basic custodial work, such as sweeping, washing windows, vacuuming, pressure washing, and dusting. In addition, the Process and Solids Operators perform monthly duties designed to keep all the buildings, handrails, and floors clean.

Regarding grounds maintenance, Clark County entered into an agreement during this study with the Washington Department of Natural Resources (DNR) to maintain the grounds at the WWTP using DNR crews. ***Without the DNR agreement, this work would typically be done by WWTP staff. Current staffing levels are not adequate for this effort.***

9.7 Process Control Monitoring

The WWTP Operators use the HACH Water Information Management Solution, or WIMS. Process data is automatically stored in the WIMS database, where the data can be accessed for easy monitoring, analysis, reporting, and predictive modeling. WIMS also has over 100 built-in formulas and equations to quickly and accurately perform complex calculations with the click of a button.

The Laboratory Analyst enters process testing results into the WIMS database, and the operators use the program to calculate solids wasting rates. Operators can also use the data to monitor activated sludge process parameters, such as growth pressures. Growth pressures are environmental conditions that determine sludge quality, and includes dissolved oxygen, pH, hydraulic loading, food, temperature, and toxins.

It is recommended that the County provide operators with Process Control training aimed at providing operators with a detailed understanding of the activated sludge process at the Salmon Creek WWTP. ***This work would typically be done by WWTP staff with support from a Consultant. Current staffing levels are not adequate for this effort.***

9.8 Standard Operating Procedures (SOPs)

The following is taken from the Environmental Protection Agency’s (EPA) document, “*Guidance for Preparing Standard Operating Procedures (SOPs)*”, (EPA QA/G-6): “A Standard Operating Procedure (SOP) is a set of written instructions that document a routine or repetitive activity followed by an organization. The development and use of SOPs are an integral part of a successful quality system as it provides individuals with the information to perform a job properly and facilitates consistency in the quality and integrity of a product or end-result... If not written correctly, SOPs are of limited value. In addition, the best written SOPs will fail if they are not followed. Therefore, the use of SOPs needs to be reviewed and re-enforced by management, preferably the direct supervisor. Current copies of the SOPs also need to be readily accessible for reference in the work areas of those individuals actually performing the activity, either in hard copy or electronic format, otherwise SOPs serve little purpose.”

The plant is operated by a group of individuals that have a lot of experience, both in the industry and at the Salmon Creek WWTP. However, like many facilities in the United States, the County has seen, and will continue to see, many of their experienced personnel retire, losing a lot of the institutional knowledge of long-time staff. A good way to capture that knowledge before it ‘walks out the door’ is with SOPs.

In 2014, WWTP staff began the process of reviewing original O&M documents and began developing SOPs. They developed 1/week for about 6 months. Some of these SOPs are still in use, but they have not been reviewed since their development. This is an area that staff needs to give attention to. The information for developing SOPs related to equipment startup/shutdown can be found in the plant’s O&M Manual. However, that data will have to be verified as being current and relevant, and it will have to be written in a concise, step-by-step, easy-to-read format.

There are other SOPs that staff should consider, some of which are listed below:

- *Natural Disasters*
- *Civil Unrest*
- *Chemical Delivery*
- *Terrorist Attack*
- *Earthquake*
- *Chemical Spill*
- *Facility Security*
- *Windstorm*
- *Tankage Failure*
- *Low Effluent pH*
- *Power Outage*
- *Fire*
- *High SVI*
- *Landslide*
- *Loss of Plant Process Water*
- *Bulking Sludge*

It is recommended that the County make the development of SOPs a priority. ***This work would typically be done by WWTP staff with support from a Consultant. Current staffing levels are not adequate for this effort.***

9.9 Instrumentation and Automation

Instrumentation in wastewater treatment is important for monitoring processes in the plant, transferring data quickly back to the operator, and logging essential data for plant operations. In addition, with the aid of SCADA, instrumentation not only monitors but also regulates treatment plant processes. Finally, instrumentation is essential for effective risk management.

Salmon Creek’s NPDES permit requires continuous on-line monitoring for influent flow, effluent pH, and effluent temperature. (Note – The NPDES permit states that “continuous means

uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. Sampling shall be taken three times per day when continuous monitoring is not possible.”) Thus, instrumentation enables the County to meet regulatory requirements.

Automation allows an operator to remotely control equipment or a process using instrumentation and control elements. With appropriate automation, one operator is capable of completely running an entire process from a central control room.

The instrumentation and automation at the Salmon Creek WWTP allows the County to operate and maintain the facility with a minimum number of staff. It is therefore critical that instrumentation be properly maintained. The SCADA System Specialist, with support from the Wastewater Technicians, is responsible for the design, installation, maintenance, and on-going support of electrically/electronically controlled pieces of equipment, including instrumentation.

Because this critically important program demands most of the SCADA System Specialist's time, it is recommended that a Wastewater Technician be permanently assigned to assist in this work. This will allow the Maintenance Technician to receive on-the-job training and be available to handle instrumentation needs when the SCADA System Specialist is not available. ***This work would typically be done by WWTP staff. Current staffing levels are adequate for this effort.***

9.10 Asset Management

Asset Management (AM) is the practice of managing infrastructure capital assets to minimize the total cost of owning and operating these assets while delivering the desired service levels. Many utilities use asset management to pursue and achieve sustainable infrastructure. A high-performing asset management program includes detailed asset inventories, operation and maintenance tasks, and long-range financial planning.

The Alliance, with help from Jacobs Engineering and County staff, conducted a condition assessment of all equipment, tanks, buildings, instruments, etc. at the WWTP, the 36th Avenue Pump Station, and the 117th Street Pump Station. The general approach for conducting a condition assessment involves equipment data collection, visual equipment inspections, and staff interviews. Information regarding staffing, communications, and organizational structure can also be considered. Information collected for review includes O&M manuals, equipment manuals, standard operating procedures, maintenance logs, regulatory permit requirements, and other information related to the operation of the facility. The condition assessment rating for a given piece of equipment is typically based on the criteria shown below.

- Condition of equipment
- Maintenance history
- Estimated useful life/probability of failure
- Redundancy

Condition assessment ratings are assigned a numerical value and applied to equipment based on a condition assessment review. For example, equipment that is worn and shows signs of extensive deterioration receives a condition assessment of 10, whereas equipment with little or no deterioration receives a condition assessment of 1.

County staff also made an evaluation of how critical the equipment is in meeting its performance goal. For example, high-risk equipment that is old and lacks redundancy receives a risk factor rating of 10, whereas low-risk equipment, which is newer and has redundancy, receives a risk factor rating of 1.

The highest cumulative ranking (risk factor plus equipment condition) denotes equipment that requires the most attention for obtaining its operational condition and future reliability.

This is a good first step in developing an Asset Management program. However, there is much more to an AM program than condition assessments. It is recommended that the County advance its condition assessment program to determine minimum life-cycle costs and long-term funding strategies.

(It is recommended that County staff include performance goals in its condition assessment evaluation. For example, equipment that provides for the safety of individuals is typically identified as highly critical equipment and is given a performance goal ranking of 10, whereas less critical pieces of equipment, perhaps used simply to provide for efficiency, are given a performance goal ranking of 1. Thus, a ranking that includes risk factor plus equipment condition plus performance goals will yield a list of equipment identified in the high-risk category that can also be used for the basis of a capital improvement plan (CIP) for repair and/or replacement.

It is also recommended that the County develop a subset list of condition assessment criteria to facilitate CIP development. This will make the condition assessment descriptors more relevant to the County's efforts. The additional condition assessment criteria can be defined as follows:

Criteria	Rating Value
No Improvements Required/Normal Preventative Maintenance	1
No Improvements Required/Accelerated Preventative Maintenance	3
Repair	5
Refurbish/Rehabilitate	8
Replace	10

The addition of these codes allows for capturing recommendations for equipment replacement and/or enhancement in a way that can be rendered in a database table.)

This work would typically be done by WWTP staff with support from a Consultant. Current staffing levels are not adequate for this effort.

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Section 10: Basic Wage Comparison

Clark County entered into an Agreement with the Washington State Council of County and City Employees, Council 2, AFSCME AFL-CIO, Local 307CO (Union) for purposes of setting forth the mutual understanding of the parties regarding wages, hours, and conditions of employment. The Union is the exclusive bargaining representative for all regular full-time and regular part-time employees employed within the County's Public Works Department, which includes the employees at the Salmon Creek WWTP. The exception is the Wastewater Operations Manager, whom is excluded from this agreement because he is a supervisory and confidential employee. The Agreement covers the period from July 1, 2018 to June 30, 2021.

The salary schedule contained in the Agreement consists of a salary range of a series of steps, and all employees are paid at one of the steps in the range. (Employees are eligible for step increases after 12 months at each step in the range. There are 9 steps in each range.) The Agreement also allows for salary increases: 2.2% effective January 1, 2019; 2.2% effective January 1, 2020; and, 2.2% effective January 1, 2021. Therefore, employee salaries are locked in by the Agreement and can't change before June 30, 2021.

A basic wage comparison is typically conducted among utilities that are similar in size. However, when it comes to WWTPs, it is important to take into consideration the following factors:

- Plant Classification – WAC 173-230-140, "Classification of Wastewater Treatment Plants", classifies plants based on a combination of design flow and treatment type, or technology. For example, because the Salmon Creek WWTP has activated sludge as its treatment type, and it has design flows greater than 10 MGD, the plant is classified as a Class IV Plant. Conversely, an extended aeration plant with design flows greater than 10 MGD is classified as a Class III Plant. This difference in plant classification is significant, since the operator in "responsible charge of the day-to-day operation of the wastewater treatment plant" must be certified at least at a level equal to or higher than the classification of the plant. Additionally, operators in charge of each shift must be certified at a level not lower than one level below the classification of the plant.
- Operator Certification – WAC 173-230-250, "Operator Certification Requirements and Substitutions", contain qualification requirements for each operator certification level, which is a combination of education and experience. For example, a Group III operator must have a High school diploma or GED and 2 years of college (90 credits or CEUs), along with 4 years of operating experience, with at least 2 years at a Class II or higher plant. Conversely, a Group IV operator must have a High school diploma or GED and 4 years of college (180 credits or CEUs), along with 4 years of operating experience, with at least 2 years at a Class III or higher plant. Thus, a Group 4 operator must have more education and experience than a Group 3 operator. This also applies in the case of operators in charge of a shift. (NOTE – Ecology allows excess education to be substituted for operating experience, to a limit, and allows excess relevant experience to be substituted for education, to a limit.)
- Operator Pool – Because the certification requirements increase as each level of certification increases, the pool of operators available to hire decrease with each increasing level of certification. Thus, it is harder for larger plants to fill lead positions because the pool of Group III and IV operators is smaller. According to Ecology's Office

of Operator Certification, there are 939 Group II operators, 404 Group III operators, and 328 Group IV operators.

- Aging Workforce – As stated in the “Task Force on Workforce Sustainability Final Report”, published by the Water Environment Federation (WEF), “It’s projected that in the next 10 years, 37 percent of the water utility workers and 31 percent of wastewater utility workers will retire.” This ‘silver tsunami’, as it’s been called, will result in an extremely competitive environment where WWTP employers will attempt to attract the best and brightest operators to fill the shoes of retired operators. And one of the top reasons why individuals choose one employer over another is wages. Operators (and other employees) will often leave one Utility and work for another that pays more. This has happened to Clark County at the Salmon Creek WWTP, and the trend will continue if wages aren’t increased.
- Adding to this complex issue is Appendix D of the Agreement, which is a Memorandum of Understanding (MOU) between Clark County, Washington and the Coalition of Unions OPEIU Local 11; PTE Local 17; LIUNA Local 335; and AFSCME Local 307. The MOU states the following:
 - “It is mutually agreed by all parties effective upon ratification of this Agreement and for the duration of this Agreement the County agrees to a non-precedent setting “me too” clause; in that in the event that any other bargaining unit or non-bargaining unit employee receives a salary-adjustments approved by the County Council (be it a percentage increase, general cost of living increase, or flat dollar amount) given to any bargaining unit or non-bargaining unit employees; that is above the agreed upon increases defined in Article 11 to this Agreement, the same shall be provided to all bargaining unit employees as well.”
 - “Be it further agreed that this provision does not apply to binding interest arbitration agreements and does not apply to market adjustments for specific classifications or reclassifications for positions.”

RMOS did a basic wage comparison with the Utilities identified in Section 14. RMOS limited the comparison to Operator III, and not all job titles, because the standard established by Ecology for certification at a certain level is the same, regardless of employer. RMOS also included the Lead Operator and the Operator in Responsible Charge because both positions are required by Permit.

The results are listed in Table 11-1 below.

Table 10-1: Basic Wage Comparison Summary

Utility	Operator III Salary Range	Lead Operator Salary Range	Operations Manager Salary Range
Salmon Creek	\$26.88 - \$32.77	\$29.18 - \$35.57	\$37.19 - \$52.54
TRRWA	\$27.27 - \$34.78	\$28.77 - \$36.66	\$32.11 - \$41.20
Camas	\$31.07 - \$37.10*	\$33.04 - \$40.54	\$37.84 – \$45.32
CRWD	\$28.62 - \$37.42**	\$30.98 - \$40.50**	\$45.58 - \$59.59

*Camas does not have an Operator III position. Therefore, the Operator III salary range reflects the range for an Operator I position with the City of Camas.

**CRWWD does not have a Lead Operator position. Therefore, Operator II and Operator III salary ranges are listed for the Operator III and Lead Operator salary ranges, respectively.

The wage disparity between the Salmon Creek WWTP and regional facilities, many of which are smaller and less complex, presents a unique challenge for the County. Traditionally, operators start their careers and gain experience at smaller plants. As operators gain additional experience and education, they qualify for higher certification levels. Once obtained, the higher certification enables them to apply at larger facilities, typically as lead workers and plant managers. In turn, Group III and IV operators enjoy a higher salary, and most utilities maintain a competitive salary range to attract this pool of operators.

However, it has been noted that the opposite is occurring at the Salmon Creek WWTP. Because of the salary disparity, operators (and other staff) from the County are leaving for jobs in smaller, less complex plants because of a higher salary. This could potentially expose the County to risk in the future in the form of less experienced staff being hired to replace the more experienced staff who are leaving.

To illustrate this challenge, the County recently advertised for a Group III operator and received only 3 applications, none of whom were qualified. As a result, the County is re-advertising for a Group I, II, or III operator, in the hopes of attracting more applicants who are not only skilled for their certification level, but who can be trained to qualify for their Group III certification in the future.

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Section 11: Conclusions

Clark County has a hard-working staff at the Salmon Creek WWTP who are dedicated to their work. They shoulder a tremendous responsibility in the community as they work to protect public health and the environment. They have an obligation to the citizens of Clark County, the State of Washington, and the Federal government, and they fulfill that obligation admirably. Still, a number of deficiencies must be corrected within the Division to improve operation, safety, and compliance of the wastewater facilities. Some deficiencies were discussed during this evaluation, and both staff and management made verbal commitments to make the needed corrections. The deficiencies include:

1. Many of the job descriptions are outdated. Recommend that the County's Human Resources Department work with the WWTP Staff to review and revise.
2. The County has Safety Data Sheets (SDS) that are accessible by computer. However, in the event of a network failure, there are no paper copies of the SDS at the WWTP. Recommend that copies of the SDS be printed and placed in those areas of the WWTP and Pump Stations where chemicals are used.
3. Recommend that a laptop computer (or similar technology) be provided to Standby Personnel so that they can check on the alarm condition at the WWTP or Pump Stations and determine a course of action before responding.
4. The Laboratory's QA/QC Manual needs to be reviewed and updated. The last update appears to be over 5 years ago. Recommend that the Laboratory Analyst review the manual on an annual basis (or more frequently if needed) and include the date of review in the manual.
5. The Laboratory Analyst enters the data from the benchsheets into the DMR. It was also reported that it takes the analyst two days to enter the data. Recommend that another employee enter the data into the DMR, for QC purposes.
6. The Operators and Laboratory Analyst commented on how valuable the weekly Process Meetings are. However, because of schedules and other reasons, these meetings have been sporadic. Recommend that staff make the Process Meetings a priority and continue to have them weekly.
7. Operators do the rounds first thing in the morning, allowing the staff to check equipment and processes and to identify potential issues before they become major problems. However, staff do not do the rounds before leaving the WWTP in the afternoon. Recommend the Operators do the rounds before leaving at the end of each day. The focus of the rounds at the end of the day may be different from the morning rounds. Recommend that staff get together and determine equipment and/or processes that should be checked before leaving the plant.
8. The SCADA alarm and annunciator issues at the WWTP must be corrected. WWTP staff are evaluating several possible solutions to this issue and expect to have something in place by the end of 2019.

9. Procedures at the WWTP and in Collections should be evaluated and modified to save time and create efficiencies.

Section 12: Recommendations for Increasing Staff Efficiency

The following recommendations are made to increase the efficiency and overall effectiveness of the WWTP Personnel and reduce the County's regulatory risk. They are not presented in any particular order or priority.

1. It is recommended that the County consider different shifts for the operators. For example, if the Leadworkers stayed with a 4/10 shift, and the Operator II's change to a 5/8 shift, with 2 working Tuesday through Saturday, and 2 working Sunday through Thursday, then the operators would have 3 days (Tuesday, Wednesday, and Thursday) when all the operators are present. This could accomplish the following:
 - a. Increased mentoring of the Operators by the Leadworkers.
 - b. Having a full complement of operators for 3 days allows the Operations group to tackle larger projects at the WWTP.
 - c. Foster teamwork within the operations group.
2. The Salmon Creek WWTP NPDES permit, under Special Condition S2, "Monitoring Requirements", lists the minimum sampling frequency for each parameter listed. However, it was observed that the Laboratory Analyst performs sampling in excess of that required by the NPDES permit. Therefore, it is recommended that the Laboratory Analyst (and the operators on the weekend) adhere to the minimum sampling frequency outlined in the NPDES permit, unless extraordinary circumstances dictate otherwise. This is also true regarding process control testing, the frequency of which is determined by the Permittee. This could accomplish the following:
 - a. Reduce the amount of time that operators spend in the laboratory on the weekend. The time saved can be spent on ancillary programs that need attention, like the development of SOPs, and updating CMMS and AM databases.
 - b. Allow the operators to collectively determine which tests are most needed for process control purposes, and their frequency. This not only saves time that can be spent on other duties, but also fosters teamwork, mentoring, and training.
3. The operators collect elapsed time meter (ETM) readings on a regular basis. However, this data is not used to schedule preventative maintenance. Recommend that maintenance staff collect the ETM readings and incorporate them into the WWTP PM program. This could accomplish the following:
 - a. Prevent maintenance technicians from performing maintenance on equipment when it might not be necessary.
 - b. Protect equipment warranties. Many equipment manufacturers will not apply the warranty to a piece of equipment that has been installed, operated, used and/or maintained in a manner which is in an application that is contrary to the manufacturer's printed instructions as it pertains to installation, operation and maintenance of the equipment.
4. It is recommended that the Maintenance Technicians check the Pump Stations 3 times a week, instead of every day, unless conditions dictate otherwise. It is also recommended that only one technician do the pump station checks. This could accomplish the following:

- a. Free up a technician to focus more on plant maintenance.
 - b. Free up a technician to learn and more fully utilize the CMMS program.
 - c. Free up a technician to learn the SCADA system and assist the SCADA System Specialist.
5. It is recommended that management promote and provide additional training for the WWTP staff. Training topics that would be beneficial to the County include safety, activated sludge process control, laboratory procedures, collections, certification review, and design drawing basics. This could result in the following:
- a. Job skills that will create greater efficiencies within the Division.
 - b. Improved employee safety and awareness of the latest regulatory requirements and industry standards.
 - c. Standardization of operating procedures. This is extremely important at a time when the wastewater workforce is aging, and employee turnover continues.
 - d. Reduced risk of permit violations. The networking opportunities and knowledge transfer gives operators' additional tools to use when dealing with process issues.
 - e. The development of a functional preventive maintenance program.
 - f. Improved workplace morale. Employees will see that management wants them to be successful and is giving them opportunities to improve their skill set.
6. It is recommended that management budget for and utilize temporary workers during the summer months. This could accomplish the following:
- a. Allow for additional help to assist with general housekeeping. Tasks could include grounds and building maintenance; organization of supplies, tools, and equipment; cleaning of equipment, including vehicles; and other tasks designed to create time for staff to attend to more important matters.
8. Recommend that those operators that have a Wastewater Operator Group II certification strive to obtain their Group III certification. This could accomplish the following:
- a. Provide additional resources to draw from should a Lead Operator require extensive periods of time away from the WWTP. Those assigned to fill in can be an Acting Lead Operator on a temporary basis.

Section 13: Estimates

13.1 Estimate of WWTP Staffing Based on EPA Guidelines

The U.S. Environmental Protection Agency (EPA) publication “Estimating Staffing for Municipal Wastewater Treatment Facilities” (March 1973) provides a method to estimate WWTP staffing needs for plants with capacities ranging from 0.5 to 25 MGD and level of treatment ranging from primary to advanced. Although this document was published some time ago, the information developed from staffing studies of 35 WWTPs is largely still relevant today. However, the estimates derived from this document are only a general guideline to compare with staffing recommendations made from direct observations of and conversations with the WWTP staff and are not intended to represent a rigid estimate.

Two primary components are involved in the EPA WWTP staffing estimate: (1) development of a baseline staffing estimate and (2) development of adjustment factors for local conditions. The baseline staffing is derived from the WWTP average design flow and major unit processes present at the WWTP. The existing Salmon Creek WWTP has an average design flow of 15.0 million gallons per day (MGD), although the influent flow currently averages only about 10 MGD. Major unit processes at the Salmon Creek WWTP and currently include influent pumping (at the Pump Stations), screening, grit removal, primary clarification, aeration, secondary clarification, anaerobic digestion, thickening, sludge dewatering, and sludge drying beds. The EPA has developed curves that plot estimated annual hours required for O&M for major unit processes versus average design flow. Curves have also been developed that plot estimated annual hours required for supervisory and administrative work, clerical work, laboratory work, and yard work. The baseline staffing estimate is calculated by totaling the hours estimated from the applicable unit process curves and the supervisory and administrative, clerical, laboratory, and yard work curves.

The baseline staffing estimate is adjusted by considering the following site-specific conditions:

- WWTP Layout
- Unit Process Equipment Standardization
- Level of Treatment
- Waste Removal Requirement
- Industrial Waste
- Productivity of Labor
- Climate
- Training
- Automatic Monitoring
- Automatic Sampling
- Laboratory Work Sent Offsite
- Maintenance from Offsite
- Age and Condition of Equipment

With each site-specific condition listed above, up to three different categories or classifications can be selected. Selection of each category results in a percentage increase, decrease, or no change in the baseline staffing estimate. The percentage changes for each condition are compiled into a single percentage adjustment for each staffing component. The staffing components are operations, maintenance, supervisory and administrative, clerical, laboratory, and yard work.

Appendix E of this report includes the EPA method estimates for WWTP staffing, and includes the following:

- A table showing the possible choices for each site-specific condition and the resulting impact on baseline staffing components
- A summary sheet showing the selection of major unit processes used in establishing the baseline staffing estimate
- Two tables summarizing the mathematical results of the staffing estimate using the EPA method.

Based on the 15.0 MGD design flow, the existing unit processes, and site-specific conditions as noted in Appendix F, the EPA method estimates 16.3 FTEs. It should be noted that this staffing estimate includes assumptions that the WWTP staff will receive more continuing education training than in the past (which decreases the staffing estimate) and will not perform yard work.

For comparison, an estimate was calculated for a WWTP with a design flow of 10.0 MGD, representative of current influent flows. The estimated staffing for a 10.0 MGD WWTP with the same setup as the existing WWTP is 12.2 FTEs. However, this estimate is less accurate, because even though the average flow is currently well below the design flow of 15.0 MGD, all equipment and unit process are in place for the full design flow and must be operated and maintained.

13.2 Estimate of Collection System Staffing Based on EPA Guidelines

(NOTE – During the course of this study, RMOS was provided with a Draft of the “Discovery Clean Water Alliance Operator Agreement” dated July 8, 2019. According to this document, which is included as Appendix F, Clark County will only be responsible for the Salmon Creek WWTP, the 36th Avenue Pump Station and Force Main, and the 117th Street Pump Station and Force Main. This agreement goes into effect on January 1st, 2020 and will remain in effect for 5 years until December 31st, 2024.

As a result of this agreement, Clark County will not be responsible for operating the Salmon Creek Interceptor, the Kline Interceptor, and the Battle Ground Force Main. This greatly reduces the scope of responsibility of the Maintenance Technicians regarding the collection system.

Therefore, it was agreed upon by Clark County and RMOS that an “Estimate of Collection System Staffing Based on EPA Guidelines” is not necessary at this time.)

13.3 Estimate of Staffing Based on Comparative Analyses

In addition to comparison with EPA guidelines, RMOS also benchmarked City wastewater staffing by researching similar facilities, which are identified and discussed below. The staffing levels and experience, performance, O&M, and compliance of these similar facilities were used to help evaluate appropriate staffing for the City Wastewater Division. (NOTE – RMOS did not benchmark facilities in Oregon, because of different certification and plant classification criteria that the Oregon Department of Environmental Quality utilizes. RMOS also did not benchmark

facilities with contract operations, except for the City of Ridgefield, which is operated by the Clark Regional Wastewater District.)

Facility #1: Three Rivers Regional Wastewater Authority, Longview, Washington

The Three Rivers Regional Wastewater Authority (TRRWA) treats wastewater from the City of Kelso, part of the City of Longview, the Beacon Hill Sewer District, and areas in unincorporated Cowlitz County, including the Port of Longview. The TRRWA WWTP is in Cowlitz County, and is situated off Interstate-5, approximately 130 miles south of Seattle and 40 miles northwest of the Salmon Creek WWTP. Nestled near the Columbia River, Longview receives an average of 56 inches of precipitation a year.

The collection system is separated into four main basins each with multiple sub-basins. These main basins (the Jurisdictions) include the City of Kelso, the Beacon Hill Sewer District, the City of Longview, and a small portion of unincorporated Cowlitz County. Each of the main basins in the collection system is maintained by each of the Jurisdictions, except for the Longview Pump Station, the Kelso Pump Station, the West Industrial Way Pump Station, 4 Interceptors, and a gravity sewer with pipe diameters ranging from 45 to 54 inches, which are maintained by TRRWA WWTP staff.

The TRRWA WWTP is a Group IV plant. It is two plants in one compound. The North Plant was built in 1976 and the South Plant was completed in 2002. Both are conventional activated sludge plants. The North Plant is designed to treat 10 MGD, while the South Plant has a design limit of 16 MGD, with a designed total plant capacity of 26 MGD. The older plant is used mainly to assist the newer plant during higher flows and add additional redundancy. The flow enters the compound and enters a common headworks for both the North and South Plants. At the new headworks, flow is measured, screened, de-gritted, and then is split and sent to each plant as needed. After the flows from the both plants are recombined, the effluent is disinfected, dechlorinated, then pumped to the Columbia River.

Solids other than screenings are generated from primary clarifiers and from the secondary clarifiers. The waste from the North primary clarifiers goes through a pair of gravity thickener basins before the being sent to a sludge strainer. The waste from the South primary clarifiers is sent directly to the sludge strainer. Waste activated sludge from the secondary clarifiers from both plants is thickened in a gravity belt thickener with polymers and then sent on to sludge blending. The waste sludge from all these sources is then blended and sent to dewatering centrifuges after more polymer is added. A thermo-blending process with lime and heat will end up with Pasteurized solids which can be trucked away as Class A biosolids.

The 3 pump stations pump all wastewater flows to the WWTP. The West Industrial Pump Station, which only operates seasonally, has 24-inch and 36-inch force mains to the WWTP. When the pump station is not operational, wastewater flows by gravity to the Longview Pump Station through a gravity sewer line that varies in diameter from 45 to 54 inches. The Kelso Pump Station pumps wastewater through two 20-inch force mains to the Longview Pump Station. The Longview Pump Stations pumps the combined wastewater flows to the WWTP through a 30-inch force main. Four Interceptors, ranging in sizes from 36 to 48 inches, is also maintained by the WWTP staff.

The WWTP is operated by 25 full-time employees who are responsible for the WWTP, the 3 pump stations, the Interceptors, and the force mains. There is a General Manager, 1 Maintenance Supervisor, 1 working Maintenance Foreman, 6 Maintenance Technicians, 6

Operators, 4 Lead Operators, 1 Process Analyst (who oversees the laboratory and pretreatment), 1 Laboratory Analyst, 1 Pretreatment Technician, 1 Administrative Finance Manager, and 2 Accounting/Clerical staff.

The Maintenance Technicians perform all maintenance on the WWTP, the Pump Stations, and the collection system. (Operators perform very minor preventative maintenance.) The maintenance staff work Monday through Friday, from 6:30 AM to 2:30 PM. Maintenance staff check the pump stations on Monday, Wednesday, and Friday.

The 10 Operators work 10-hour shifts, 4 days a week. The day shifts are Monday through Thursday and Thursday through Sunday, and the swing shifts are Monday through Thursday and Thursday through Sunday. The plant is manned from 6:30 AM to 12:00 AM.

Because the plant is unmanned from 12:00 AM to 6:30 AM every day, there are 2 on-call dialers and 2 on-call groups: one for operations, and one for maintenance. Standby is rotated monthly. SCADA monitors the WWTP and pump stations.

Several permit excursions have occurred in the past 5 years.

Facility #2: City of Camas, Washington

The City of Camas is a city in Clark County, Washington, with a population of 19,355 at the 2010 census. The east side of town borders the city of Washougal, Washington, and the west side of town borders Vancouver, Washington. Camas lies along the Washington side of the Columbia River, along Highway 14. The Camas WWTP is approximately 177 miles south of Seattle and 24 miles southeast of the Salmon Creek WWTP. Camas receives approximately 61 inches of precipitation each year.

There are 22 pump stations serving the City of Camas, including conventional gravity/lift systems and Septic Tank Effluent (STE) systems. STE systems discharge only the effluent to the WWTP, leaving the settleable solids in the septic tank. Most of these STE systems discharge by gravity to pump stations tributary to the WWTP and do not have individual pumps. The City collects a significant proportion of industrial flow. Wastewater from Wafer Tech, a semiconductor manufacturer, is the largest industrial contribution, and is dilute in BOD and TSS, but contains higher than domestic levels of ammonia. Because of the diluted wastewater from the collection system, DOE lowered the percent removal rates for BOD and TSS from 85% to 74% and 76%, respectively, while requiring more stringent BOD and TSS concentrations of 20 mg/L (monthly average) and 30 mg/L (weekly average).

The Camas WWTP is a Group IV plant. The existing WWTP was originally constructed in 1972 and has had several modifications since that time. The most recent upgrade, completed in 2014, improved blower controls, added a third secondary clarifier, and added new effluent filters and digester gas treatment facilities. The WWTP currently receives an average dry weather flow of 2.0 MGD.

The WWTP contains a headworks where the influent flow is measured and screened. The wastewater flows to two primary clarifiers. Grit and sludge from the primary clarifiers are pumped to a grit cyclone and classifier, and then to the solid's digestion tank. After the primary clarifiers, the wastewater enters the three aeration basins. Within each aeration basin there are three selector zones. Mixing is provided in the selector zones by coarse bubble aeration. At the end of each aeration basin, mixed liquor is routed to one of three secondary clarifiers. Return

activated sludge from the clarifiers is routed to either the aeration basin splitter box or the sludge digestion tank. Clarified effluent then passes through a magnetic flow meter before going to a fabric filtration system. The final treatment step is UV disinfection. Effluent pumps are triggered by a high-water level switch. Otherwise, the effluent flows by gravity through the outfall pipe to the Columbia River.

Solids from the primary clarifiers are de-gritted and routed to a gravity thickener and/or rotary drum thickener. The thickened solids, along with solids from the secondary clarifiers, are pumped to the anaerobic digester. Digested sludge is mixed with a polymer to aid in thickening and dewatered with a centrifuge. The thickened sludge is stored in drying beds. The final product is a Class A biosolids.

The WWTP is staffed by seven operators (5 operators, 1 Lead Operator, and 1 Plant Supervisor) every day of the week, from 8:00 AM to 4:30 PM. The operators work an offset schedule. One operator works Tuesday through Saturday, and one operator works Sunday through Thursday. The remaining operators work Monday through Friday.

The operations staff does all required laboratory testing and is responsible for all 22 pump stations. The pump stations are checked daily by one operator who does nothing but check pump stations. The operators also perform all preventative maintenance.

A SCADA system allows the operators to monitor and control the WWTP and the pump stations. For off-hour coverage of the WWTP, the operators are on-call for one week at a time. Camas utilizes a call service for alarm notification and the operators carry a City-provided phone.

Facility #3: Clark Regional Wastewater District (CRWWD), City of Ridgefield, Washington

Ridgefield is a city in the rolling hills of northern Clark County, Washington. The population was 4,763 at the 2010 census. The Ridgefield WWTP is located 150 miles south of Seattle and 11 miles north of the Salmon Creek WWTP. Ridgefield receives approximately 47 inches of precipitation each year.

In 2013, the Clark Regional Wastewater District (CRWWD) entered into a contract with the City of Ridgefield for the acquisition, ownership, use, and operation of the wastewater collection system in Ridgefield. As a result, CRWWD has assumed ownership of the collection system within the city of Ridgefield and is therefore the Permittee responsible for operation of all sewage collection, pumping, and conveyance facilities.

The Ridgefield WWTP is a Class II Plant, with a design flow of 1.0 MGD. CRWWD took over the plant O&M on July 1, 2018. Wastewater from the City flows through the collection system to a 10-inch interceptor sewer, which discharges to the influent pump station, which lifts wastewater flows to the elevated headworks structure, where the influent flow is measured, screened, and de-gritted.

From the headworks, wastewater flows by gravity to the aeration basins. Effluent from the aeration basins flows to the secondary clarifiers, and the clarified effluent overflows to the ultraviolet disinfection facility where the final effluent flow is disinfected and measured prior to discharge to the Lake River outfall.

Solids from the clarifiers are pumped to the aeration basin distribution structure. The waste sludge pumps are operated periodically to pump sludge from the clarifier hopper to either the

rotary drum thickener or to Aerobic Digester No. 1. Thickened, digested sludge from Aerobic Digester No. 1 is transferred to the Sludge Storage Basin, which is an aerated storage tank. The solids are hauled to the Salmon Creek WWTP for processing and disposal.

The WWTP is staffed by 2 operators. The operators work 40 hours a week, 10 hours a day. One operator works Monday through Thursday, and the other operator works Tuesday through Friday. On weekend days, the On-Call personnel goes in and does the plant rounds and runs the required lab tests, which takes about 2 hours. The On-Call list is made up of 6 certified operators, 4 of whom work in Collections.

The WWTP operators send their DMR samples to the Salmon Creek WWTP, while doing their own process control testing. The operators do their own maintenance.

Results of the Comparative Analysis

This evaluation took the WWTP O&M data supplied by the TRRWA, Camas, and CRWWD and compared them to the WWTP data from the Salmon Creek WWTP. The data was tabulated and a point system was devised to define the level of O&M effort *per operator* at each WWTP. The point system awarded points for the following:

- Average dry weather flow at each WWTP. One point was awarded for flows less than 2 MGD; two points for flows greater than 2 MGD.
- The number of pump stations. One point was awarded for every 10 pump stations.
- If pump stations were checked by Wastewater Division personnel. One point was awarded to those cities whose wastewater personnel check pump stations. Even if the WWTP operators and other wastewater personnel may not be the ones assigned to day-to-day O&M, a point was still awarded when they have the responsibility to fill in if assigned personnel are unavailable.
- Headworks. One point was awarded if the WWTP has a headworks structure that needs regular cleaning.
- Influent pumping. One point was awarded for influent pump O&M, regardless of the number of pumps.
- Influent screening. One point was awarded for influent screening O&M, regardless of the number of screens.
- Influent grit removal. One point was awarded for grit removal O&M, regardless of the number of units.
- Primary clarifiers. One point was awarded for primary clarification, regardless of the number of clarifiers.
- Aeration basins. One point was awarded for aeration basins, regardless of the number of basins.
- Secondary clarifiers. One point was awarded for secondary clarification, regardless of the number of clarifiers.
- Chlorination. One point was awarded for chlorination, regardless of the chemical used.
- Effluent filtration. One point was awarded for effluent filtration, regardless of the number of filters.

- Anaerobic digestion. One point was awarded for anaerobic digestion, regardless of the number of digesters.
- Solids thickening. One point is awarded for solids thickening, regardless of the process used.
- Sludge dewatering. One point is awarded for sludge dewatering, regardless of the technology used.
- Sludge drying beds. One point is awarded for sludge drying beds, regardless of the number of beds.
- Laboratory testing. One point was awarded if wastewater personnel perform most of the WWTP tests.
- WWTP maintenance. One point was awarded if wastewater personnel perform most of the WWTP O&M.
- Wastewater collection system O&M. One point was awarded to those facilities whose wastewater personnel maintain the wastewater collection system. Even if the WWTP operators and other wastewater personnel may not be the ones assigned to day-to-day O&M, a point was still awarded when they have the responsibility to fill in if assigned personnel are unavailable.
- Pretreatment programs. One point was awarded to those facilities whose wastewater personnel are involved in the utility’s pretreatment program.

Many other parameters could have been included in the evaluation, such as the age of the WWTP and equipment, training programs, and additional duties outside the WWTP. However, the goal of this analysis was simply to benchmark the findings of the most significant data collected and evaluate for comparison with staffing recommendations made in this report. The total score is divided by the number of operators at that particular WWTP and the total number of wastewater personnel. The result was a relative comparison of the level of O&M effort per operator at each WWTP and per wastewater employee. A summary of the relative O&M effort for each of the four utilities' wastewater personnel is provided in Table 14-1 below.

Table 13-1: Comparative Staffing Analysis Summary

Utility	Relative O&M Effort per WWTP Operator	Relative O&M Effort per Wastewater Employee*
Salmon Creek	2.8	1.3
TRRWA	1.7	0.9
Camas	2.7	2.3
CRWWD	1.7**	1.7**

*Wastewater Employee does not include management, administrative, and clerical staff.
 **Although there are only two operators at the Ridgefield WWTP, a total of 6 certified operators are available to fill in. These additional operators do the weekend rounds at the WWTP when they are on-call. Therefore, the additional operators are included in the Staffing Analysis.

13.4 Recommendations for Additional Wastewater Staff

Comparisons of current County wastewater staffing with EPA guidelines and similar facilities in the region indicate that the County wastewater facility is understaffed. Conversations with

County wastewater personnel and observations of the personnel and facilities support this initial assessment. While there appears to be enough staff to operate the wastewater facilities, the current level of staffing has not been sufficient to perform all necessary support program activities. Therefore, it is recommended that the County hire one additional FTE for the Salmon Creek WWTP.

The role of the Wastewater Operations Manager is critical to the overall success of the Salmon Creek WWTP. He is involved in all aspects of the WWTP: he is a decision maker, a supervisor, and an administrator. His work involves planning, organizing, directing, and controlling the O&M work at the WWTP, Pump Stations and Collection System. The Wastewater Operations Manager was also observed applying business principles to make the O&M work more efficient. These include:

- *Delegating* – The Wastewater Operations Manager relies heavily on his personnel to make sure the day-to-day O&M work is carried out efficiently
- *Establishing Clear Lines of Communication* – Subordinates know what the Manager expects, and open communication exists between the Manager and employees
- *Reliance on Leadworkers* – The Manager relies on Leadworkers to prioritize, assign, coordinate and monitor the work of personnel
- *Flexibility* – The Manager makes necessary changes to accommodate changing workloads, conditions, and goals

RMOS observed that the Wastewater Operations Manager was so involved in the day-to-day O&M issues of the WWTP that he had difficulty giving attention to the programs and services that only he can provide. It was obvious to RMOS that there needed to be a position that alleviated him of the demand placed on him by the day-to-day issues at the WWTP.

It should be noted that the Salmon Creek WWTP once had a Wastewater Operations Superintendent, which was a supervisory position between the Wastewater Operations Manager and the Leadworkers. RMOS did not discover a valid reason why this position was eliminated. However, there is tremendous benefit to restoring and filling that position.

A Wastewater Operations Superintendent can relieve the Wastewater Operations Manager of duties related to the day-to-day O&M of the WWTP, Pump Stations, and Collection System, allowing the Manager to focus more on the Administrative and Managerial aspects of his responsibilities. These responsibilities include the implementation of Systems, Programs, and Services that are essential to successful wastewater compliance and to minimize risk. (See Section 10) It is therefore the recommendation of RMOS that the one additional FTE that the County hire be a Wastewater Operations Superintendent.

It is the opinion of RMOS that implementation of the recommendations for increasing staff efficiency and hiring a Wastewater Operations Superintendent will address current O&M deficiencies at the Salmon Creek WWTP and meet staffing needs into the near future. It should also be noted that as the County continues to increase in population, expand its wastewater service area, expand facilities, and treat greater influent flows and loads, the County must periodically reevaluate its staffing needs and adjust as necessary. Already there is concern that the WWTP may be approaching the need for additional coverage after hours, either in the form of a “Night Watchman” or an additional shift. This will need to be evaluated sooner, rather than later. In either case, the County will want to continue its long history of providing the appropriate staff to effectively, and efficiently, operate and maintain the Salmon Creek WWTP.