

# The Language of Wastewater

IACC 2017

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# Goals of Presentation

- Present a high-level view of the roles & responsibilities for wastewater utilities
- Brief introduction to permitting for wastewater systems in WA
- Review different types of wastewater treatment and technologies
- Help build confidence of owners/operators for what questions to ask



# Difference Between “Water” Systems



WASTEWATER



STORM WATER



RECLAIMED  
WATER



Drinking Water... ask DOH

# The Evolution of Water Quality



# Washington leads the way in WQ



DEPARTMENT OF  
**ECOLOGY**  
State of Washington



Photo: Cleveland State University Library

# Clean Water Act

33 U.S.C. §1251 et seq. (1972)

## Water Quality Standards

- Designated Uses
- Water Quality Criteria
- Antidegradation Policy

## Pollution Control Programs

- National Pollutant Discharge Elimination System (NPDES)



# Regulatory Authority

Wastewater  
&  
Stormwater

- Federal Water Pollution Control Act (Clean Water Act)
- State of Washington Water Pollution Control Law  
*Revised Code of Washington (RCW) Chapter 90.48*

Reclaimed  
Water

- RCW 90.46



# Wastewater Permitting

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Permit No. WA0023175

Issue Date: May 6, 2015  
Effective Date: June 1, 2015  
Expiration Date: May 31, 2020

**National Pollutant Discharge Elimination System  
Waste Discharge Permit No. WA0023175**

State of Washington  
DEPARTMENT OF ECOLOGY  
Eastern Regional Office  
4601 North Monroe Street  
Spokane, Washington 99205-1295

In compliance with the provisions of  
The State of Washington Water Pollution Control Law,  
Chapter 90.48 Revised Code of Washington  
and  
The Federal Water Pollution Control Act  
(The Clean Water Act)  
Title 33 United States Code, Section 1342 et seq.

City of Colfax  
PO Box 157  
Colfax, Washington 99115

is authorized to discharge in accordance with the Special and General Conditions that follow:

Plant Location: 1/4 mile northwest of Town Center along SR195	Receiving Water: Union Flat Creek
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Treatment Type: Municipal Wastewater  
Lagoons, Chlorine Disinfection

*James M. Bellamy*  
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Water Quality Section Manager  
Eastern Regional Office  
Washington State Department of Ecology

**NPDES**

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Permit No. ST0045508

Issue Date: July 26, 2016  
Effective Date: September 1, 2016  
Expiration Date: August 31, 2021

**State Waste Discharge Permit Number ST0045508**

State of Washington  
DEPARTMENT OF ECOLOGY  
Eastern Regional Office  
4601 North Monroe Street  
Spokane, Washington 99205-1295

In compliance with the provisions of the  
State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington, as amended,

City of Harrington  
P.O. Box 492  
Harrington, Washington 99134

is authorized to discharge wastewater in accordance with the special and general conditions which follow:

Plant Location: 600 W. Sherlock Street Harrington, WA 99134	Discharge Location: Latitude 47.479045° N Longitude 118.265080° W
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Treatment Type:  
Swirling concentrators, primary sedimentation, aeration basins, recirculating granular media filters, & infiltrating wetlands

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Water Quality Section Manager  
Eastern Regional Office  
Washington State Department of Ecology

**SWDP**

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Permit No. WA0021148

Issue Date: July 27, 2014  
Effective Date: August 1, 2014  
Expiration Date: July 31, 2019

**National Pollutant Discharge Elimination System  
Waste Discharge Permit No. WA0021148**

State of Washington  
DEPARTMENT OF ECOLOGY  
Olympia, Washington 98504-7600

Eastern Regional Office  
4601 North Monroe Street  
Spokane, Washington 99205-1295

In compliance with the provisions of  
The State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington  
and  
The Federal Water Pollution Control Act  
(The Clean Water Act)  
Title 33 United States Code, Section 1342 et seq.

City of Medical Lake  
P.O. Box 369  
Medical Lake, Washington 99022

Contributing Jurisdiction: Lakeland Village and Eastern State Hospital  
Department of Social and Health Services  
Consolidated Support Services, P.O. Box 500, B32-26  
Medical Lake, Washington 99022

is authorized to discharge in accordance with the Special and General Conditions that follow:

Plant Location: East 207 Ellen Ave. Medical Lake, WA 99022	Receiving Water: Outfall #1 - Intermittent Tributary to Deep Creek
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Treatment Type: Activated Sludge  
Coagulation, Filtration

Use Area #1 - West Medical Lake  
Use Area #2 - City Reclaimed Water System

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Water Quality Section Manager  
Eastern Regional Office  
Washington State Department of Ecology

**Reclaimed  
Water**

**\*General (not shown)**



# Permit Basics

- Dischargers required to submit an application
- Ecology prepares the permit document with an accompanying fact sheet
- **FACTUAL REVIEW!!!**
- Public review and comment
- Issued for term of 5 years



# Elements of a Permit

- Effluent limits
- Monitoring requirements
- Reporting requirements
- Facility specific information
- Compliance schedule(s)
- General conditions



# Responsible Parties

- Authorized Official(s)
- Responsible Operator in Charge  
(or contract operator)
- Staff



# Permittees Responsibilities

- Permit Requirements
  - KNOW WHAT'S IN YOUR PERMIT!
- Day-to-day operations
- Keeping updated O&M manual
- Asset management & financial planning



# Types of Treatment



Lagoons



Mechanical  
Treatment



Land  
Treatment



# Lagoons



# Mechanical Treatment



# Mechanical Treatment



# Mechanical Treatment



# Mechanical Treatment



# Reclaimed Water

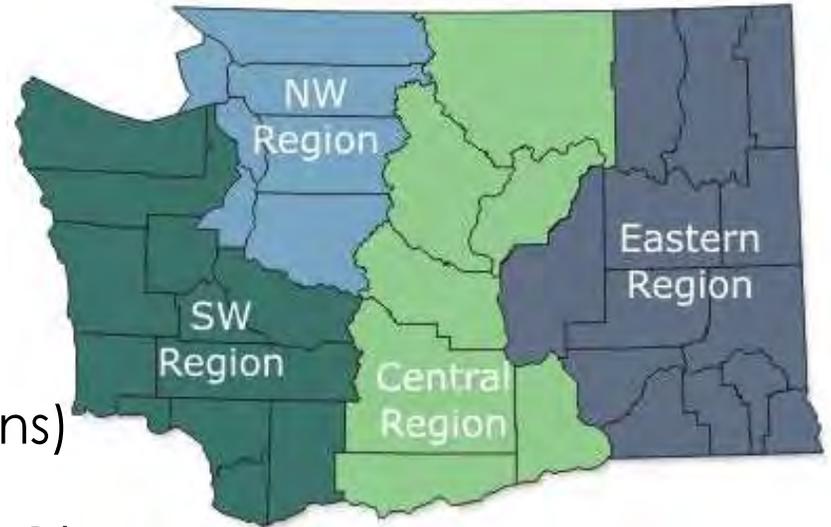


# Land Treatment



# Contacting Ecology

- Technical assistance
  - Andy O’Neill (ERO & CRO)
  - Carl Jones (NWRO & SWRO)
- Permit managers (regions)
- Financial managers (HQ)
- Unit Supervisors/ Section Managers/  
Regional Directors (regions)
- Program Manager (HQ)





# Questions and discussion

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(509)329-3450 Desk

**DEPARTMENT OF ECOLOGY TREATMENT PLANT CLASSIFICATION CRITERIA**

<b>Treatment Types</b>	<b>Design flow MGD</b>	<b>Typical Operator Classification Required</b>
Primary Nonaerated Lagoon Aerated lagoon Wetlands	≤1 All ≤1 ≤1	Class I
Primary Aerated lagoon Bioinfiltration Extended aeration Activated sludge Wetlands MBR	>1 - ≤10 > 1 ≤1 ≤5 ≤1 >1 - ≤5 ≤1	Class II
Primary Bioinfiltration Extended aeration Activated sludge Wetlands Tertiary MBR (class A reuse) MBR (with chemical addition for nutrient removal) MBR	>10 - ≤20 >1 - ≤10 >5 >1 - ≤10 >5 ≤5 ≤1 ≤1 >1 - ≤10	Class III
Primary Bioinfiltration Activated sludge Tertiary MBR	>20 >10 >10 >5 >10	Class IV

## WASTEWATER PERMIT TERMS GLOSSARY

**AKART:** The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200 030(2)(c)(ii), and WAC 173-216-110(1)(a).

**Ammonia (NH<sub>3</sub>):** Compound produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**BMP (Best Management Practice):** Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub> (Biochemical Oxygen Demand):** Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD<sub>5</sub> is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**COD (Chemical Oxygen Demand):** A measure of the decomposable substances in water or wastewater which uses a chemical oxidant instead of bacteria as in the BOD test.

**Chlorine:** A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Clean Water Act (CWA):** The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Combined Sewer Overflow (CSO):** The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Composite Sample:** A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

**Critical Condition:** The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**DMR (Discharge Monitoring Report):** A report submitted by a permittee, (usually monthly or quarterly) which gives the results of the effluent monitoring tests performed.

## WASTEWATER PERMIT TERMS GLOSSARY

**Effluent Limitation:** Any restriction established by a permitting authority on quantities, rates, and concentrations of chemical, physical, biological pollutants discharged to waters of the state.

**Fact Sheet:** A document prepared and issued with every permit which summarizes the activities and decisions on the permit and tells how the public may comment (40 CFR 124.8, 124.56).

**Fecal coliform bacteria:** Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**FMS:** Financial Management Section (Ecology)

**Grab Sample:** A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

**Groundwater:** Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

**MBR (Membrane Bioreactor):** Type of advanced wastewater treatment that utilizes membranes for microfiltration or ultrafiltration.

**Mixing Zone:** An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

**NPDES (National Pollutant Discharge Elimination System):** The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

**O&M:** Operation and maintenance.

**PCHB (Pollution Control Hearings Board):** A 3-member board appointed by the governor to hear and decide appeals of Ecology's permits and orders.

**Permit:** A document prepared by a permitting authority (Federal Government, State Government, Local Government) which limits the pollutants to be discharged by the holder of the permit (Permittee).

**pH:** The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

**Point Source:** Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture. (See 40 CFR 122.3 for exclusions)

**POTW (Publicly Owned Treatment Works):** A sewage treatment plant and the collection system

## WASTEWATER PERMIT TERMS GLOSSARY

(40 CFR 122.2).

**Reasonable Potential:** A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

**Reclaimed Water:** Reclaimed water is high-quality water produced by treating municipal or domestic wastewater to very high standards so that it is safe and suitable for the intended use.

**RCW:** Revised Code of Washington.

**Solid Waste:** All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

**State Waste Discharge Permit:** A wastewater discharge permit issued under State authority (Chapter 90.48 RCW) to control the discharge of pollutants to waters of the State. Generally issued for discharges to ground water and for industrial discharges to a municipal sewage system when that municipal system does not have a delegated pretreatment program.

**Stormwater:** That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

**Technology-Based Effluent Limit:** A permit limit based on the ability of a treatment method to reduce the pollutant.

**Total Maximum Daily Load (TMDL):** The sum of the Load Allocations and Wasteload Allocations, plus reserves for future growth and a margin of safety, which are equal to the Loading Capacity of the water body. This is a requirement of Section 303(d) of the federal Clean Water Act and is defined in 40 CFR 130.2(i). The term "TMDL" is often applied to the process to determine a TMDL ("Ecology is doing a TMDL") and to the final documentation of the TMDL ("Ecology has submitted a TMDL").

**TSS (Total Suspended Solids):** Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

**WAC:** Washington Administrative Code.

**Water Quality-Based Effluent Limit:** A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

**Water Quality Standards:** Numerical and narrative criteria to protect the beneficial uses of the States' waters. Includes conventional and toxic pollutants. (Chapter 173-201A WAC)

**WET (Whole Effluent Toxicity):** The total toxic effect of an effluent measured directly with a toxicity test so that the interaction of all toxicants present in the effluent are assessed.