Cloudy with a Chance of Limits:

An Update on Oregon's 1200-Z Permit Renewal

Benchmarks and Limits

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BENCHMARKS AND LIMITS

Today's Topics:

- What's a Benchmark?
- What's a Limit?
- Current Permit Benchmarks
- Current Permit Reference Concentrations
- Future Considerations

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NUMERIC EFFLUENT BENCHMARKS

- **Benchmarks**: end-of-pipe guideline concentrations to evaluate efficacy of SWPCP and BMPs
  - Benchmark exceedance is NOT a violation of the permit
  - Not implementing corrective actions in response to a benchmark exceedance is a violation of the permit

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NUMERIC EFFLUENT LIMITS

- **Numeric Limits**: enforceable end-of-pipe concentrations
  - Limit exceedance is a violation of the permit
- **Technology-based effluent limitations (TBELs)** are concentrations based on effluent data and the capabilities of available treatment technologies for specific pollutant
- **Water-quality-based effluent limits (WQBELs**) are concentrations based on effluent data, water quality standards and background concentrations

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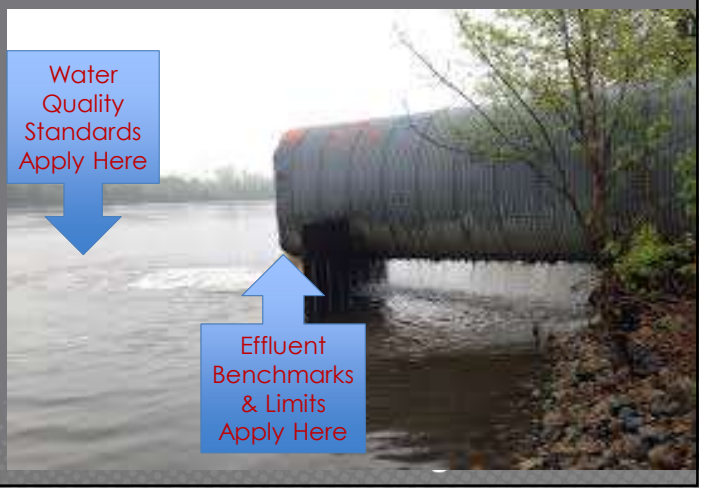
WATER QUALITY STANDARDS

Numeric/narrative water quality standards/criteria apply in the receiving water (not end-of-pipe)

- EPA/DEQ published values
- Acute and chronic WQS
- Aquatic and human health
- Calculated based on receiving water chemistry



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NARRATIVE EFFLUENT LIMITS

Water quality goals that require selection/implementation of site-specific BMPs

- Some are "mandatory" BMPs
  - e.g., secondary containment for chemical storage
- Some BMPs are selected and implemented *"to the extent technologically available and economically practicable and achievable in light of best industry practice"*
  - *e.g., minimize exposure*

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1200-Z PERMIT NARRATIVE EFFLUENT LIMITS

- Minimize Exposure
  - Secondary containment for hazardous substances/waste
  - Closed loop systems for wash water
- Oil and Grease
- Waste Chemicals and Material Disposal
  - Covered scrap dumpsters
- Erosion, Sediment and Debris Control
- Dust Generation/Vehicle Tracking
- Housekeeping
- Spill Prevention and Response
- Preventative Maintenance
  - Inspections
- Employee Education
- Non-Stormwater Discharges

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1200-Z PERMIT EFFLUENT BENCHMARKS

- **Technology-based benchmarks** are concentrations based on effluent data and available treatment technologies
- **Water-quality-based benchmarks** are concentrations based on effluent data, water quality standards and background concentrations

Parameter	Units	Columbia River	Columbia Slough	Portland Harbor	Regional
Total Copper	mg/L	0.020	0.020	0.020	0.020
Total Lead	mg/L	0.040	0.060	0.040	0.015
Total Zinc	mg/L	0.12	0.24	0.12	0.12
pH	SU	5.5 – 9.0	5.5 – 8.5	5.5 – 9.0	5.5 – 9.0
TSS	mg/L	100	30	30	100
Total Oil & Grease	mg/L	10	10	10	10
E. coli	counts/100 ml	406*	406	406*	406*
BOD5	mg/L	N/A	33	N/A	N/A
Total Phosphorus	mg/L	N/A	0.16	N/A	N/A

*The benchmark for E. coli applies only to active landfills and sewage treatment plants.
N/A: Not Applicable (no benchmark or required sampling for this parameter)

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1200-Z PERMIT BENCHMARKS

Technology Based Copper Benchmark

- DEQ modeled concentrations based on:
  - DMR effluent concentrations
  - Passive media filtration treatment capabilities published in the International Stormwater BMP Database

Metal	Discharge Range (mg/L)	Treatability Range (mg/L)	Technologically Achievable Benchmark (mg/L)
Copper	0.019-0.038	0.016-0.030	0.020
Lead	0.010-0.017	0.0045-0.0064	0.005
Zinc	0.188-0.353	0.074-0.112	0.090

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1200-Z PERMIT BENCHMARKS

Water Quality Based Copper Benchmark

- DEQ-modeled stormwater concentrations that correspond to a 10% probability of effluent exceeding water quality criteria for copper (using the Biotic Ligand Model)

Geo-region	Copper (mg/L)
Cascades	0.004
Coastal	0.011
Columbia River	0.050
Columbia Slough	0.017
Eastern	0.038
Portland Harbor	0.020
Willamette Valley	0.011

Current Permit Copper Benchmark = **0.020 mg/L**

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1200-Z PERMIT BENCHMARKS

Technology Based Zinc Benchmark

- DEQ modeled concentrations based on:

Metal	Discharge Range (mg/L)	Treatability Range (mg/L)	Technologically Achievable Benchmark (mg/L)
Copper	0.019-0.038	0.016-0.030	0.020
Lead	0.010-0.017	0.0045-0.0064	0.005
Zinc	0.188-0.353	0.074-0.112	0.090

Current Permit Zinc Benchmark = 0.12 to 0.24 mg/L

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1200-Z PERMIT BENCHMARKS

Water Quality Based Zinc Benchmarks

- DEQ-modeled stormwater concentrations that correspond to a 10% probability of effluent exceeding water quality criteria for lead and zinc (using hardness-based equations)

Geo-region	Lead (mg/L)	Zinc (mg/L)
Cascades	0.019	0.048
Coastal	0.040	0.102
Columbia River	0.146	0.274
Columbia Slough	0.218	0.368
Eastern	0.036	0.092
Portland Harbor	0.054	0.151
Willamette Valley	0.013	0.038

Current Permit Zinc Benchmark = **0.12 to 0.24 mg/L**
Current Permit Lead Benchmark = 0.015 to 0.060 mg/L

Equation
$Pb = \exp^{(1.273*[\ln(Hardness)]+(-1.460))}$
$Zn = \exp^{(0.8473*[\ln(Hardness)]+0.884)}$

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1200-Z PERMIT BENCHMARKS

TSS Benchmark

- 100 mg/L for most of Oregon, based on the EPA's permit (1983 National Urban Runoff Program median concentration)
- 30 mg/L for sediment-impaired water bodies (Portland Harbor and Columbia Slough), based on:
  - A sediment-protection analysis by Washington Department of Ecology; and
  - DEQ's analysis of Portland Harbor and Columbia Slough discharges in 2014-2015
    - 84% Portland Harbor reported concentrations were below 30 mg/L
    - 82% Columbia Slough reported concentrations were below 30 mg/L

COD Sector-Specific Benchmark

- 120 mg/L, based on the EPA's permit (North Carolina benchmark based on a 4:1 correlation of BOD to COD, and BOD limit of 30 mg/L)

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1200-Z PERMIT REFERENCE CONCENTRATIONS

- Most impairment pollutant concentrations are equal to **acute** water quality standards for aquatic life
  - **Acute** WQSs are based on 1-hour exposure
- Iron Reference Concentration
  - Based on the **chronic** aquatic life water quality criteria
    - **Chronic** WQSs are based on a 72-hour exposure

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FUTURE 1200-Z PERMIT

DEQ has contracted with a consultant to complete an impairment analysis and calculate Technology Based Effluent Limits (TBELs)

- Based on January 2000 – December 2018 DMR data
- Did not include monitoring waivers
- Impairment Analysis: % of reported concentrations exceeding the impairment pollutant reference concentration by pollutant, sector and receiving water
- TBELs: potential technologically achievable limits
- Following summaries are based on PG Environmental's presentation to DEQ Advisory Committee

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FUTURE 1200-Z PERMIT

Impairment Analysis Findings (by Parameter)

- Metals
  - Significant exceedances (>25%) for copper (total), iron, and zinc (total and dissolved)
  - Moderate exceedances (10-25%) for cadmium (total), copper (dissolved), and lead (total)
- Conventional and nutrient-related parameters
  - Moderate exceedances (10-25%) for pH (minimum)
  - Significant exceedances (>25%) for E. coli
- PAHs, Pesticides, PCBs
  - Low to no exceedances (<10%)

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Impairment Analysis Findings (by Sectors)

- Most or all sectors contribute to moderate (10-25%) or significant (25%) exceedances of:
  - Copper, iron, and zinc
  - pH (minimum)
- Only certain sectors contribute to moderate (10-25%) or significant (25%) exceedances
  - Cadmium and lead
  - Ammonia, aquatic weeds or algae (total nitrogen), BOD_5, pH (maximum), TSS, and E. coli

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FUTURE 1200-Z PERMIT

TBELs

- Significant variability throughout the industrial sectors
  - Variability results in limits that are many times higher than current average performance (not protective)
- Variability may be reduced through:
  - More detailed DMR data would be required, including correlation of reported concentrations to treatment BMPs (complicated reporting)
  - Further division of sectors into subsectors
  - More extensive/detailed (expensive) analysis would be required

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CALCULATED EFFLUENT LIMITS

Sector	Copper mg/L		Lead mg/L		Zinc mg/L		TSS mg/L	
	Calc Limit	Mean	Calc Limit	Mean	Calc Limit	Mean	Calc Limit	Mean
Sector A: Timber Products	0.515	0.016	0.310	0.006	18.1	0.157	2440	66
Sector AA: Fabricated Metal Products	0.993	0.025	0.297	0.010	16.8	0.462	1155	36
Sector AB: Transportation Equipment, Industrial or Commercial Machinery	2.06	0.028	0.321	0.010	57.1	0.428	1206	31
Sector AC: Electronic, Electrical, Photographic and Optical Goods	0.419	0.025	0.161	0.007	2.63	0.155	451	17
Sector B: Paper and Allied Products	0.315	0.012	206	0.613	3.53	0.132	766	35
Sector C: Chemicals and Allied Products Manufacturing and Refining	0.640	0.016	0.283	0.009	27.8	0.244	1063	35
Sector D: Petroleum Refining and Related Industries	1.376	0.037	0.403	0.008	3.91	0.222	2091	49
Sector E: Glass, Clay, Cement, Concrete, and Gypsum Products	3.197	0.025	4.31	0.021	9.44	0.167	2883	68
Sector F: Primary Metals	0.796	0.024	0.408	0.008	2.77	0.217	3887	61
Sector K: Hazardous Waste Treatment, Storage, or Disposal Facilities	399	0.879	0.819	0.018	2966	6.72	3278	53
Sector M: Motor Vehicle Parts, Used	0.322	0.025	1.03	0.026	2.02	0.130	969	44
Sector N: Scrap and Waste Materials	1.681	0.065	2.72	0.081	9.95	0.337	1482	70
Sector O: Steam Electric Generating Facilities	0.101	0.012	0.108	0.009	1.31	0.082	568	40
Sector P: Land Transportation and Warehousing	14.1	0.041	0.206	0.009	2.88	0.134	1608	62
Sector Q: Water Transportation	5.088	0.033	1.217	0.019	866	2.912	2388	47
Sector R: Ship and Boat Building and Repairing Yards	2.319	0.112	0.176	0.009	3.79	0.374	470	25
Sector S: Air Transportation Facilities	1.536	0.042	0.234	0.006	5.20	0.128	1173	19
Sector T: Treatment Works	0.134	0.007	0.057	0.003	0.89	0.044	1425	25
Sector U: Food and Kindred Products	1.39	0.019	0.374	0.009	4.84	0.187	14743	65
Sector Unassigned	37.8	0.092	0.402	0.012	2.77	0.156	1751	81
Sector W: Furniture and Fixtures	0.350	0.012	0.094	0.004	11.3	0.439	3316	40
Sector Y: Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries	0.364	0.010	3.299	0.014	2.90	0.128	933	26

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QUESTIONS

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