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State of Washington

Guidelines for the Preparation of Industrial Stormwater General Permit Engineering Reports

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Guidelines for the Preparation of Industrial Stormwater General Permit Engineering Reports

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Table of Contents

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Executive Summary

The Industrial Stormwater General Permit (ISGP) requires certain facilities to install stormwater treatment best management practices (BMPs). Treatment BMPs include facilities that remove pollutants by simple gravity settling of particulate pollutants, centrifugal separation, filtration, biological uptake, and media or soil adsorption. Treatment BMPs can accomplish significant levels of pollutant load reductions if properly designed and maintained. This document provides guidance to permittees and consultants on how to prepare engineering reports for industrial stormwater treatment BMPs in accordance with Chapter 173-240 WAC.

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Introduction

This guidance document applies to engineering reports submitted to the Washington State Department of Ecology (Ecology) pursuant to Chapter 173-240 WAC for industrial stormwater treatment systems at facilities covered under Ecology's Industrial Stormwater General Permit (ISGP).

The 2012 Industrial Stormwater General Permit (ISGP), Condition S8.D.3, states:

> *Before installing treatment best management practices (BMPs) that require the site-specific design or sizing of structures, equipment, or processes to collect, convey, treat, reclaim, or dispose of industrial stormwater, the Permittee must submit an engineering report, plans and specifications, and an operations and maintenance (O&M) manual to Ecology for review in accordance with Chapter 173-240 WAC.*

This document provides guidance to permittees and consultants on how to prepare complete industrial stormwater engineering reports in compliance with Chapter 173-240 WAC (WAC), thereby reducing review time and unnecessary delays. Ecology originally published the WAC in the 1990s to address a wide range of industrial wastewaters, including process wastewater from mills, refineries and wood treaters; as well as leachate from landfills, and contaminated stormwater from industrial facilities. As such, the WAC includes requirements that may be more extensive than what is required for a typical facility covered under the ISGP. Because of the site-specific nature of stormwater management, Ecology highly recommends consultants contact the Ecology regional office assigned to the facility to discuss any issues not fully addressed by the guidance document. Proactive communication with Ecology can save money, reduce review time, and prevent unnecessary delays in gaining approval.

Administrative Procedures and Timelines

For engineering reports related to a Level 3 Corrective Action (Treatment BMPs), the ISGP includes a deadline for submitting engineering reports (Condition S8.D.3.a):

> *a. The engineering report shall be submitted no later than the May 15th prior to the Level 3 deadline, unless an alternate due date is specified in an order.*

WAC 173-240-110(2) also includes a timeline for submission and review of engineering reports:

> *(2) All engineering reports and plans and specifications should be submitted by the owner consistent with a compliance schedule issued by the department or at least thirty days before the time approval is desired. The department will generally review and either approve (or conditionally approve), comment on, or disapprove those*

plans and reports within the thirty-day period unless circumstances prevent, in which case the owner will be notified and informed of the reason for the delay.

Ecology staff will prioritize the review and approval of engineering reports so that permittees can commence construction and installation as soon as possible and meet ISGP deadlines. Ecology will review engineering reports in the order received, so early submittals are highly recommended. Ecology strongly recommends that permittees submit the report 60 to 90 days before the deadline.

The Level 3 Treatment BMP installation deadline is September 30 of the year after the permittee triggered the Level 3 corrective action. In other words, after a permittee exceeds a benchmark during three quarters during a calendar year, the permittee must install Level 3 Treatment BMPs no later than September 30th of the following year. If it is not feasible to install treatment BMPs by the September 30th deadline, permittees can request and obtain a Level 3 deadline extension. The time extension request must include a detailed explanation of why more time is needed (technical basis), and a complete Modification of Coverage form, and it must be submitted to Ecology no later than May 15th prior to the Level 3 deadline. Ecology will approve or deny the request within 60 days. When Ecology grants time extensions through the issuance of an Administrative Order, Ecology may specify an alternate due date from the May 15th engineering report deadline set forth in the ISGP.

The ISGP also requires permittees to submit plans, specifications, and an O&M manual prior to construction:

b. The plans and specifications and O&M Manual shall be submitted at least 30 days before construction/installation, unless an alternate date is specified in an order. Upon request of the Permittee, Ecology may allow final conceptual drawings to be substituted for plans and specifications.

Permittees may request that Ecology waive the 3-step submission of documents (1.engineering report > 2.plans and specifications > 3.O&M manual) when they submit their engineering report. In such a case, Ecology will instead require conceptual plans that also include the appropriate information from the engineering report and an O&M manual [(WAC 173-240-110(5)].

Engineering Report Review Standards

WAC 173-240-120 provides the review standards for engineering reports. Ecology expects engineering reports will conform to standard engineering practice. In the following text, the actual WAC language is in italics. This guidance discusses only those sections that require clarification.

Section 173-240-130

(1) The engineering report for an industrial wastewater facility shall be sufficiently complete so that plans and specifications can be developed from it without substantial changes. Two copies of the report shall be submitted to the department for approval.

A professional engineer shall sign and stamp the hard copies. In addition to the two hard copies of the engineering report, you should provide a digital version (.pdf) for Ecology to upload to Ecology's Permit and Reporting Information System (PARIS) database, which will allow concurrent access by multiple staff.

An engineering report's conclusions, recommended facility, and unit process sizing for the facility must be in adequate detail to enable a different engineer to prepare the final construction plans and specifications. You must include the design criteria for the plant (and for each intermediate phase for phased projects) and sizing of the unit processes and major support units. There must be adequate detail so that you can make an accurate estimate of the final construction costs.

- "Sufficiently complete" means the report shall contain enough design information that an engineer who was not involved in performing design calculations or writing the report can produce construction drawings that will result in the construction of the facility envisioned by the report writer without any need for process change or more than minor unit sizing modifications.

- "Substantial change" means a change in the selected treatment process, the design criteria and unit process sizing, the project location, the environmental impact of the project, or an increase in the total project cost (design, construction, operation, or maintenance costs). A substantial change will require an amendment to the approved engineering report.

- "Adequate detail" means that there is suitable attention given in the report to the individual elements and components that make up the entire proposed project.

(2) The engineering report shall include the following information together with any other relevant data as requested by the department:

(a) Type of industry or business.

Include the SIC Code or SIC codes that best fit the facility.

(b) The kind and quantity of the finished product.

State clearly the quantity/amount of product/service that is being produced/rendered. Ecology uses this information to help track whether or not a facility has expanded operations.

(c) The quantity and quality of water used by the industry and a description of how it is consumed or disposed of, including:
(i) The quantity and quality of all process wastewater and method of disposal;
(ii) The quantity of domestic wastewater and how it is disposed of;
(iii) The quantity and quality of noncontact cooling water (including air conditioning) and how it is disposed of; and
(iv) The quantity of water consumed or lost to evaporation.

These sections request information on the quality and quantity of the process wastewater used by the facility. Process wastewater is outside the scope of the ISGP and you may not propose to discharge it to waters of the state unless authorized by a separate NPDES or state waste discharge permit (ISGP Condition S5.E). Process wastewater streams must not co-mingle with stormwater. If any of the waste streams identified in (2) (c) are co-mingled with stormwater, the resulting waste stream is considered process water and may not be discharged to waters of the state (ISGP Condition S5.E). Please provide a short description of how you handle any "non-stormwater", process wastewater and/or domestic wastewater on the site; e.g., "Domestic wastewater is connected to sewer service provided by City of …"

(d) The amount and kind of chemicals used in the treatment process, if any

If you will use chemicals in the stormwater treatment process, Ecology needs to be convinced that the concentration of the chemicals in the effluent is at a non-toxic level. If you plan to use a chemical treatment system that has not received a use designation (approval) through the "Chemical Treatment Assessment Protocol – Ecology" (CTAPE) process, provide Ecology with adequate toxicity and discharge concentration information on the chemical(s) added to the stormwater treatment process.

If you plan to use an Ecology-approved chemical treatment system that has received a use designation (approval) through the CTAPE process, it is not necessary to include toxicity and discharge concentration information on the chemical(s) added to the stormwater treatment process. For more information on the CTAPE process, see:
www.ecy.wa.gov/programs/wq/stormwater/newtech/construction.html

The ISGP requires permittees to obtain Ecology approval before beginning construction or installation of all treatment BMPs that include the addition of chemicals to provide treatment. If you are planning to use a chemical treatment system, please include a "Request for Chemical Treatment Form" with your engineering report:
https://fortress.wa.gov/ecy/publications/summarypages/ecy070258.html

(e) The basic design data and sizing calculations of the treatment units

The detailed sizing calculations and design criteria used for sizing the selected alternative treatment systems shall be included in this section. Use the Western Washington Hydrology Model (WWHM) or other approved hydrological models to determine runoff amounts.

NOTE: Permittees shall design the treatment system to meet the design storm volume or flow rate as described in the appropriate Stormwater Management Manual for Western Washington (SWMMWW) or the Stormwater Management Manual for Eastern Washington (SWMMEW). Permittees within certain local jurisdictions may be subject to more stringent requirements than listed in the Ecology manual. In that case, you must use the more stringent design requirements.

At a minimum, you must design Level 3 Corrective Action treatment systems to meet the design criteria listed above. In addition, Ecology recommends that you use a method to determine if runoff exceeds the treatment capacity of the facility and discharges untreated water.

Appendix 1 contains text from the SWMMWW and SWMMEW regarding design storm flows and volumes.

It is the responsibility of the design engineer to determine the design flow rate for the treatment system. Quarterly monitoring of discharge from the site includes a blend of treated and bypassed flows. The design engineer should evaluate the pollutant concentrations in the untreated runoff to determine the design flow rate and the likelihood of bypass during any storm event. Any deviation from the design criteria must be justified. This is where you will develop and use the basic hydraulic and pollutant loading data in the sizing calculations for the treatment system.

(f) A discussion of the suitability of the proposed site for the facility.

This is part of the alternative evaluation process in (d) and (e). When you evaluate the site, you must include the topography, tidal influence, flood potential, impacts to existing wetlands, soil suitability for construction, zoning, and proximity to residential areas.

During the planning stage, there should be enough soils analyses done at the selected site to determine the ability of the soils to structurally support the proposed structure(s). You must also provide hydrogeologic information on the site soils if you propose infiltration for disposal or treatment. Reference the Stormwater Management Manuals for Eastern (Section 5.4.3) and Western (Volume III, Section 3.3.7) Washington for specific site soil evaluation criteria.

(g) A description of the treatment process and operation, including a flow diagram.

The flow diagram for the proposed treatment system must be a schematic flow diagram showing all wastewater liquid and solids flow paths. In addition, provide a scaled site layout drawing (showing the site topography) that shows that the proposed treatment unit(s) will actually fit on the land available.

You must develop hydraulic profile(s) for the treatment system. Complete the hydraulic profile for the largest flow rate proposed for the treatment system with a receiving water elevation at the highest reasonable level. Hydraulic profiles for other critical flow conditions as determined by the engineer should also be included.

(j) Physical provision for oil and hazardous material spill control and/or accidental discharge prevention

This section should address physical features such as grading and structural features such as secondary containment and oil/water separators necessary for the added treatment facility. The permittee should place best management practices for pollution prevention such as the placement of drip pans and tank filling procedures in the operation and maintenance manual. The report may refer to the current Spill Prevention and Emergency Cleanup Plan (SPECP)/SWPPP for the site.

(k) Results to be expected from the treatment process including the predicted wastewater characteristics, as shown in the waste discharge permit, where applicable.

Address all pollutants monitored at the facility pursuant to the ISGP, and any others required by Ecology order. The expected concentration and variability of pollutants in the treated stormwater may form the basis of whether the proposed treatment BMPs have a reasonable chance of meeting the ISGP benchmark values.

(l) A description of the receiving water, location of the point of discharge, applicable water quality standards, and how water quality standards will be met outside of any applicable dilution zone. (see WAC 173-201A-100)

The ISGP does not authorize mixing zones, so engineering reports need not address the receiving water flow, 7Q10 (7 day - 10-year recurrence low flow), critical condition, etc.

The ISGP requires the engineer to design the treatment system "with the goal of achieving the applicable benchmark value(s) in future discharges." Benchmarks are at pollutant concentrations that are unlikely to cause a violation of water quality standards in the receiving water, so it is not necessary to describe how you will meet water quality standards. Rather, the engineer should describe, in (q) below, the likelihood of meeting the benchmarks given the expected characteristics and variability of treated stormwater.

The engineering report shall include the name, location (river mile, latitude/longitude, waterway segment number, township/range, etc.), and water quality classification of the proposed receiving water. Provide any data related to pollutants at levels in the receiving water that exceed water quality standards or are subject to an adopted TMDL. See https://fortress.wa.gov/ecy/publications/summarypages/0610091.html

(m) Detailed outfall analysis.

The site plans should identify the location of the outfall, elevations needed to verify proper drainage, tidal influence, location below water surfaces, and pipe material and size.

The treatment facility outfall/discharge point (whether an existing or new site) is a stormwater sampling location for the ISGP. You must monitor this site quarterly and provide the monitoring results to Ecology.

(p) Where discharge is through land application, including seepage lagoons, irrigation, and subsurface disposal, a geohydrologic evaluation of such factors as:

(i) Depth to ground water and ground water movement during different times of the year;
(ii) Water balance analysis of the proposed discharge area;
(iii) Overall effects of the proposed facility upon the ground water in conjunction with any other land application facilities that may be present.

This section is not applicable unless the facility is proposing a land application discharge or underground injection system to meet permit requirements.

(q) A statement (expressing sound engineering justification through the use of pilot plant data, results for other similar installations and/or scientific evidence from the literature) that the effluent from the proposed facility will meet applicable permit effluent limitations and/or pretreatment standards.

For facilities under the ISGP, the responsible design engineer should design the treatment system to meet the benchmark values. This statement in the engineering report should express the likelihood of meeting the benchmarks, given the expected characteristics and variability of treated stormwater. The design engineer is responsible for determining the design flow rate and the likelihood of bypass during larger storm events. Ecology assumes that the combined treated and bypassed discharge from the site will meet the benchmarks.

(r) A discussion of the method of final sludge disposal selected and any alternatives considered with reasons for rejection.

If your treatment process generates sludge or residual solids from the treatment system, the engineering report must include an evaluation of sludge quantities generated and disposal options. Include identification of proper disposal methods for the waste material predicted based on WAC 173-350 Solid Waste Handling Standards and applicable local health department requirements.

(s) A statement as to who will own, operate, and maintain the system after construction.

This section requires the name of the permittee/owner, who the operator of the system will be (if system operation is contracted out), and who will maintain the system. Please provide contact information and names for contact persons.

(v) A discussion of the various alternatives evaluated, if any, and reasons they are unacceptable.

If the proponent evaluates multiple treatment options that are available to treat stormwater, this section must summarize the design flows, treatment capabilities, costs, and other considerations that led to the selection of the preferred treatment option. This discussion should include the options of zero discharge and source control of pollutants to reduce treatment size and cost. The engineer must develop the annual O&M costs of each final treatment alternate considered in order to properly compare the costs of the alternates. The alternatives considered must be ranked (with their reasons) according to their ability to meet the benchmarks, receiving water quality standards, costs, and other objectives of the engineering report.

You must select, develop, and evaluate the final alternatives that meet the report's objectives from this group of ranked alternatives. Further evaluation includes environmental impact, applicability to available site(s), cost effectiveness (capital cost and present worth cost), ease of operation, and other criteria. The final alternative recommended for implementation should rank first in this evaluation. The selection of the recommended alternate includes a discussion of why you did not select the other alternatives.

> *(x) A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA), if applicable.*

If the proposal requires a local permit or a new discharge to surface water, SEPA is probably required. The engineering report should identify any local permits required and if SEPA is required for the treatment system. In either case, the engineering report should include a copy of the SEPA checklist and the Determination made by the lead agency.

Section 173-240-160

WAC 173-240-160 requires a professional engineer for engineering reports:

> *(1) All required engineering reports, and plans and specifications for the construction or modification of wastewater facilities must be prepared under the supervision of a professional engineer licensed in accordance with chapter* 18.43 *RCW. All copies of these documents submitted to the department for review shall bear the seal of the professional engineer under whose supervision they have been prepared.*
>
> *(2) Upon request of the owner, the department may waive the above requirement for construction or modification at industrial wastewater facilities.*

Ecology may waive the requirement for a professional engineer to design an industrial stormwater treatment system. Ecology usually grants this waiver only for non-mechanical, small volume, and low concentration on-site systems. Design of manufactured systems sized by the manufacturer may receive a waiver if the manufactured product is the only unit process in the treatment system.

Appendices

Appendix A. General advice on selecting an engineering consultant

1. Remember that you are responsible for the product. You will benefit from a good planning effort.

2. Choose the most qualified professional you can find.

3. Competence is more important than price. A relatively small amount of money apparently saved in planning can be quickly lost in unnecessary implementation cost or in poor performance of the finished project.

4. Check references. The most important thing to look for in the selection process is successful experience in the kind of work proposed by the particular person who will be doing the work. The owner should obtain and contact references. Include all clients for similar work in the recent past, not just selected ones.

5. Put out a request for qualifications first, prior to a request for proposals. This will narrow the field with the least expense to the prospective consultant and with the least trouble to your company.

6. Look at all feasible alternatives. Watch out for those who may have a "canned" or predetermined solution and would develop a report from there backwards. We are particularly watchful for this kind of circumvention of the intent of a bona fide open-minded planning process.

7. Consider the advantages of obtaining an unbiased, second opinion. For example, hire one engineer to represent your company’s interest on an on-going basis and select another qualified consultant for each major project.

8. Use EPA's "Contracting for Professional Services" (EPA-430/9-82-005) to assist in the selection process and in preparation of the contract.

9. Familiarize yourself with the requirements of Chapter 173-240 of the Washington Administrative Code, Submission of Plans and Reports for Construction of Wastewater Facilities.

10. Contact Ecology for assistance in defining the scope of the project and explaining the submittal process.

Appendix B. Additional resources

Regulations for engineering reports

Submission of plans and reports for construction of wastewater facilities
http://apps.leg.wa.gov/wac/default.aspx?cite=173-240

Industrial Stormwater General Permit website
www.ecy.wa.gov/programs/wq/stormwater/industrial/index.html

Ecology stormwater management manuals and other technical resources
www.ecy.wa.gov/programs/wq/stormwater/tech.html

Appendix C. Site-specific questions

If your facility is located in:	Contact the following office:
San Juan, Skagit, or Whatcom	Bellingham Field Office 360-715-5200
Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, or Benton	Central Region 509-575-2490
Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County	Eastern Region 509-329-3400
Kitsap, Snohomish, Island, or King	Northwest Region 425-649-7000
Grays Harbor, Lewis, Mason, Thurston, Pierce, Clark, Cowlitz, Skamania, Wahkiakum, Clallam, Jefferson, or Pacific	Southwest Region 360-407-6300

Appendix D. Design storm criteria

Western Washington treatment system design criteria

The 2005 Stormwater Management Manual for Western Washington (SWMMWW) contains the following volume and flow rate for design of water quality treatment BMPs:

Volume:
The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). Alternatively, use the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model. (Volume V, Section 4.1.1)

Flow rate:
The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated. (Volume V, Section 4.1.2)

Eastern Washington treatment system design criteria

The 2004 Stormwater Management Manual for Eastern Washington (SWMMEW) contains the following volume and flow rates for design of water quality treatment BMPs:

Volume:
There are five methods to determine the design volume suggested in the SWMMEW. Jurisdictions are encouraged to select one method from the five. Designers should confirm the method accepted by the jurisdiction before beginning design. See below for the five approved methods (Section 2.2.5):

- *Method 1*: The volume of runoff predicted for the proposed development condition from the regional storm with a 6-month return frequency. An alternative to this method is the modified Type IA storm described in Chapter 4.2; this alternative method is intended for use on small projects where the designer's software does not accept storms longer than 24 hours.

- *Method 2*: The volume of runoff predicted for the proposed development condition from the SCS Type IA 24-hour storm with a 6-month return frequency.

- *Method 3*: In Regions 2 and 3, volume-based facilities may be sized for 0.5 inch predicted runoff produced for the proposed development condition from all impervious surface areas that contribute flow to the treatment facility

- *Method 4*: The volume of runoff predicted for the proposed development condition from the SCS Type II storm with a 6-month return frequency.

- *Method 5*: Another sizing approach and criteria based on peer-reviewed methods and supported by local data that meet the objective of treating at least 90% of the annual volume of runoff from the site.

Flow rate:
There are three methods to determine the design flow rate suggested in the SWMMEW. Jurisdictions are encouraged to select one method from the three. Designers should confirm the method accepted by the jurisdiction before beginning design. See below for the three approved methods (Section 2.2.5):

- *Method 1*: The runoff flow rate predicted for the proposed development condition from the short-duration storm with a 6- month return frequency (The BMP design information designates the time intervals.)

- *Method 2*: The runoff flow rate predicted for the proposed development condition from the SCS Type II 24-hour storm with a 6-month return frequency. (The BMP design information designates the time intervals.)

- *Method 3*: The runoff flow rate for the proposed development condition calculated by the Rational Method using the 2-year Mean Recurrence Interval (see Chapter 4.7). You may only use this method to design facilities based on instantaneous peak flow rates.