



DEQ

State of Oregon
Department of
Environmental
Quality

Guidance for Evaluating the Stormwater Pathway at Upland Sites

Oregon Department of Environmental Quality
Environmental Cleanup Program
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This document provides information and technical assistance to the public and employees of the Department of Environmental Quality regarding the Department's cleanup program. The information should be interpreted and used in a manner that is fully consistent with the state's environmental cleanup laws and implementing rules. This document does not constitute rulemaking by the Environmental Quality Commission, and may not be relied upon to create a right or benefit, substantive or procedural, enforceable in law or equity, by any person, including the Department. The Department may take action at variance with this guidance.

Acknowledgements

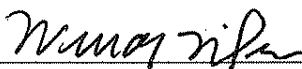
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Approval

This updated guidance document has been approved for use by the Department of Environmental Quality Land Quality Division.



Wendy Wiles, Division Administrator

12.9.10

Date

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List of Acronyms

AWQC	Ambient Water Quality Criteria
BES	Bureau of Environmental Services
BMP	Best Management Practice
CB	Catch Basin
CNFA	Conditional No Further Action
COC	Contaminant of Concern
COI	Contaminant of Interest
COPC	Contaminant of Potential Concern
DST	Daylight Savings Time
DEQ	Department of Environmental Quality
DQO	Data Quality Objectives
EES	Easement and Equitable Servitude
ECSI	Environmental Cleanup Site Information
FS	Feasibility Study
LOD	Limit of Detection
LOQ	Limit of Quantitation
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MRL	Method Reporting Limit
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NWR	Northwest Region
OAR	Oregon Administrative Rule
ORS	Oregon Regulatory Statutes
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PM	Project Manager
PRG	Preliminary Remediation Goal
PST	Pacific Standard Time
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RP	Responsible Party
SCD	Source Control Decision
SCM	Source Control Measure
SLV	Screening Level Value
SVOC	Semivolatile Organic Compounds
SW	Stormwater
SWPCP	Stormwater Pollution Control Plan
SWSCD	Stormwater Source Control Decision
TSS	Total Suspended Solids
UIC	Underground Injection Control

This document describes a process used by the Department of Environmental Quality's Cleanup Program to evaluate and address the stormwater pathway to meet cleanup goals at upland sites in Portland Harbor and the Columbia Slough, pursuant to ORS 465.210. The approach is consistent with Appendix D of the Portland Harbor Joint Source Control Strategy which establishes DEQ's framework for evaluating stormwater discharges from upland sites in Portland Harbor.

DEQ may also elect to apply the guidance at upland sites outside of those areas where site-specific conditions indicate a stormwater pathway evaluation is needed. Its use, however, is not required.

Section 1 Introduction

Contaminants from an upland site that enter a surface waterbody via the stormwater pathway can accumulate in sediments, surface water or aquatic organisms at concentrations that may adversely affect public health, safety or welfare, or the environment. Under certain circumstances, DEQ will find it necessary to evaluate the stormwater pathway at upland sites to determine whether stormwater discharges are causing or contributing to adverse impacts, or likely to do so, and may require stormwater source control measures (SCMs) if necessary to prevent or mitigate such impacts.

This document describes a process for conducting a stormwater pathway evaluation. Specifically, the purpose of this guidance is to:

- help determine when a stormwater pathway evaluation may be needed
- describe the basic site information needed to conduct a stormwater pathway evaluation
- describe acceptable sampling procedures for screening stormwater discharges
- provide contaminant screening values for assessing potential threats
- help determine whether stormwater source control measures are necessary
- provide a suite of source control measures and Best Management Practices (BMPs) that can be used to address legacy and ongoing sources
- determine when conditions for issuing a Stormwater Source Control Decision have been achieved

DEQ will issue a Stormwater Source Control Decision (SCD) when it determines that contaminant sources have been controlled as necessary to minimize potential for contaminant migration to the river via stormwater discharge, and that the resulting discharge is not likely to contaminate in-river sediments. The SCD may be a stand-alone decision document or a component of a broader Remedial Investigation to achieve a No Further Action (NFA) for a site.

Stormwater is a unique contaminant pathway for the Cleanup Program to address because releases of certain types of contaminants are *expected* to continue, at some level, due to the nature of industrial operations and other human activities. Whereas the Cleanup Program typically focuses on contaminated media (e.g., soil, sediment, groundwater) resulting from historic releases of hazardous substances (aka *legacy* contamination), the ongoing, incidental releases of contaminants resulting from day-to-day activities are commonly managed through Water Quality programs and permits.

For this reason, a Stormwater SCD from DEQ's Cleanup Program does not confer the same degree of finality as a SCD for other contaminant pathways (e.g., groundwater, bank erosion) or a No Further Action (NFA) determination. There is an expectation that appropriate stormwater management measures will continue to be implemented and that water quality regulations and programs will be applied as necessary to ensure adequate measures are being taken to achieve environmental objectives. Thus, a Stormwater SCD from the Cleanup Program should be considered a milestone in the stormwater source control process rather than an endpoint. In addition, a SCD is not a release from responsibility to address releases to other media such as soil or groundwater, impacts of past or future stormwater discharges to the adjacent surface waterbody or sediment, or future stormwater discharges that exceed site-specific source control criteria.

The process described in this guidance focuses on stormwater collection systems, which typically consist of catch basins, stormwater pipes or ditches, and outfalls. Stormwater discharges from a site may discharge directly into a waterbody or through a shared conveyance such as a municipal stormwater outfall. Stormwater may also reach waterbodies via overland runoff (i.e., sheetflow) but that pathway is not addressed in detail in this guidance. At sites where overland runoff is a concern, the stormwater evaluation would need to be expanded to incorporate this investigation. The Cleanup Program's general strategy for evaluating overland runoff that flows directly to a waterbody is to compare erodible soil data against toxicity and bioaccumulation screening level values protective of that waterbody.

A Note about Stormwater Permits

Some industrial sites that discharge to surface waters operate under National Pollutant Discharge Elimination System (NPDES) stormwater permits (individual or general permits) that require stormwater control measures and monitoring. However, these permits are designed to address current operations and may not include monitoring or control of all potential contaminants of concern resulting from historic practices or releases, and the permit may only apply to the portion of the site where industrial activities take place. As a result, NPDES monitoring requirements may not always generate sufficient information to evaluate the effectiveness of stormwater control measures relative to cleanup goals. For example, a sampling and analysis plan developed to meet permit requirements may include too few samples, too few analytes and/or not achieve the low detection limits necessary to evaluate onsite contamination relative to cleanup goals.

For these reasons, additional stormwater evaluation and source control measures may be needed to meet cleanup goals at certain sites operating under an NPDES stormwater permit to address existing or potential sources of contaminants. While these sites would commonly be covered by DEQ's Environmental Cleanup Rules that provide a conditional exemption to permitted releases of hazardous substances into the environment, OAR 340-122-0030(2) allows this exemption to be waived under the circumstances described below:

(2) Conditional Exemption of Permitted Releases. These rules do not apply to permitted or authorized releases of hazardous substances, unless the Director determines that application of these rules might be necessary in order to protect public health, safety or welfare or the environment. These rules may be applied to the deposition, accumulation, or migration resulting from otherwise permitted or authorized releases.

Section 2 When to Conduct a Stormwater Pathway Evaluation

ORS 465.260 provides the regulatory authority for DEQ to require either removal or remedial actions at a facility where there is a release or threat of release of hazardous substances. A facility includes any area where a hazardous substance has been deposited or come to be located, including the stormwater conveyance system and river sediments [ORS 465.200(13)]. The sources of contaminants may include hazardous substance releases, as defined in ORS 465.200(22), resulting from historic or past practices (including contaminants released from the site that have accumulated in stormwater catch basins or pipes) and hazardous substance releases arising from current, ongoing practices.

The decision to apply this guidance at a specific upland site is usually based upon a link between the site's Contaminants of Interest¹ (COIs) and contaminants known to exceed risk-based criteria in sediments, surface water or aquatic biota in the vicinity of the site [i.e., Contaminants of Concern (COCs)]. The guidance may also be used as part of a spill response effort where the release impacted or has the potential to impact the stormwater pathway. Any of the following lines of evidence may lend support to such a finding:

- elevated concentrations of site-related hazardous substances are present in sediments near the stormwater outfall or other discharge point, or in bank soil adjacent to the waterbody;
- site-related hazardous substances are present in aquatic organisms that have ranges that include the area in the vicinity of the site;
- site-related hazardous substances are known to impair the beneficial use of the waterbody (i.e., a 303(d) listing);
- elevated concentrations of hazardous substances released at the facility are present in surface soil and have the potential to be transported via surface runoff to the stormwater collection system;
- facility operations have a high potential threat of release of hazardous substances that could be conveyed to the stormwater collection system (e.g., exposed wash pads, steam cleaning stations, sandblasting operations);
- facility has a history of spills or releases of hazardous substances that may have entered stormwater conveyances and continue to be a source of contamination; or
- presence of facility-related hazardous substances in a groundwater contaminant plume that could intersect a stormwater conveyance that could serve as a preferential pathway for migration of contaminants to the waterbody.

A stormwater evaluation can be a component of a broader remedial investigation at a site or it can be the singular focus of a site investigation

Section 3 Overview of the Process

Figure 1 depicts the typical progression of steps for a stormwater pathway evaluation and the major deliverables the Responsible Party (RP) will submit for review and approval at different stages throughout the process. This approach is guidance, however, and Project Managers may deviate from

¹ Guidance for identifying site-related Contaminants of Interest can be found in DEQ's Guidance for Ecological Risk Assessment which is available at <http://www.deq.state.or.us/lq/pubs/docs/cu/GuidanceEcologicalRisk.pdf>

it when appropriate based upon site-specific circumstances. For example, at sites where the sources and pathways of stormwater contaminants are apparent and the control measures are straightforward, it may be appropriate to skip the initial screening steps and advance directly to selection and implementation of SCMs followed by performance monitoring (i.e., Step #4a).

Figure 1: Overview of a Stormwater Pathway Evaluation

DEQ may ask a Responsible Party (RP) to conduct a stormwater evaluation when there is evidence that the release or threat of release of hazardous substances from the site to a waterbody via the stormwater system may contribute to an accumulation of contaminants in sediment, water column or aquatic biota that exceed acceptable risk levels.

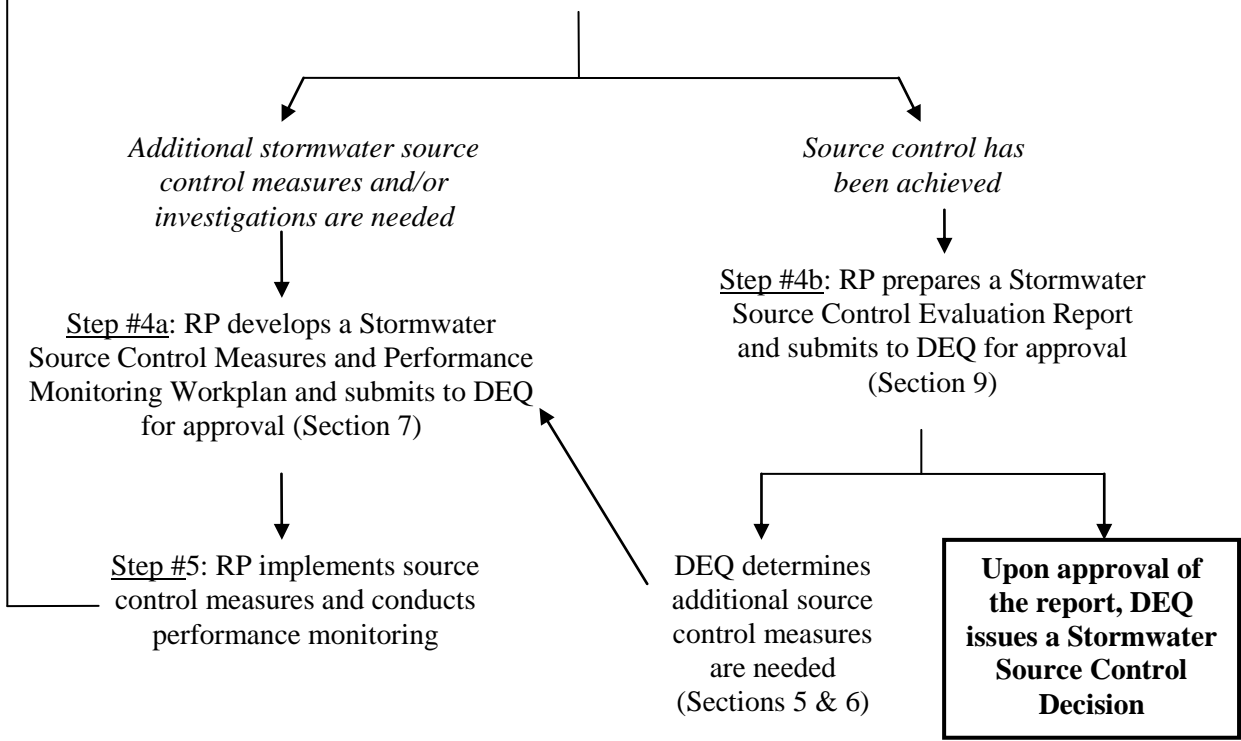
Step #1: RP develops Stormwater Assessment Workplan (Section 4) and submits to DEQ for approval



Step #2: RP implements approved sampling plan and submits data reports to DEQ



Step #3: Evaluate sampling data and other information to determine the need for source control measures (Sections 5 & 6)



Additional stormwater source control measures and/or investigations are needed

Source control has been achieved

Step #4a: RP develops a Stormwater Source Control Measures and Performance Monitoring Workplan and submits to DEQ for approval (Section 7)

Step #4b: RP prepares a Stormwater Source Control Evaluation Report and submits to DEQ for approval (Section 9)

Step #5: RP implements source control measures and conducts performance monitoring

DEQ determines additional source control measures are needed (Sections 5 & 6)

Upon approval of the report, DEQ issues a Stormwater Source Control Decision

Each step in the flowchart is described in detail in the following sections. In addition, detailed instructions for each major deliverable are provided in the appendices. The appendices were developed to provide RPs with clear direction on each major element of a stormwater pathway evaluation in order to minimize the effort Project Managers and RPs need to expend to ensure each deliverable meets DEQ's expectations.

Section 4 Stormwater Assessment Workplan

The Stormwater Assessment Workplan documents basic site information, identifies site-related hazardous substances, and includes a sampling and analysis plan for screening catch basin sediments and stormwater. A template for a Stormwater Assessment Workplan can be found in Appendix A.

4.1 Documenting Basic Site Information

The initial step in a stormwater pathway evaluation involves collecting and documenting existing site information including a site map showing the stormwater system and other key site features, a summary of current and historic activities on the site, a list of hazardous substances used on the site, a history of spills or releases, summaries of previous environmental investigations, and stormwater permit monitoring data if available. Sampling results should be summarized in tables that include sample location and date, analytical results, detection limits and the appropriate screening level values (the Data Reporting and Screening Table in Appendix D can be used for this purpose). All of this information is necessary to identify site-related hazardous substances and, if additional data are needed, to develop a sampling plan to support the stormwater evaluation.

NOTE: If there are Underground Injection Control (UIC) facilities on a site, contact DEQ's UIC Program at 503-229-5160 for assistance in determining whether the UICs are authorized and provide adequate environmental protection. For additional information go to:
<http://www.deq.state.or.us/wq/uic/database.htm>

4.2 Identifying Site-Related Contaminants of Interest (COIs)

Site-specific COIs should be determined based on a review of information on historic and current site use and operations as well as any pertinent environmental data. Stormwater pathway evaluations should also consider any available data indicating elevated concentrations of contaminants in sediments, surface water or aquatic organisms in the vicinity of the site's stormwater outfall. Even though those contaminants may not be suspected site COIs, it may be important to include them on the analyte list to ensure they are not being discharged from the site. Experience has shown that surprises *do* happen, even when there is no explanation for why that contaminant would be found at the site.

At a minimum, the following information, when available, should be considered when developing site-specific COIs for catch basin sediment sampling:

- Contaminants associated with current and historical operations (historical operations include any known operations at the site, not just those undertaken by the current owner)
- Materials stored on site and their potential for release

- Hazardous and solid wastes generated on-site and their potential for release
- Knowledge of historical contaminant releases (spills, leaks, dumping, etc.)
- Nature and extent of contamination
- Facility drainage system and proximity of catch basins to potential contaminants
- Results from waste disposal characterization of stormwater system solids resulting from catch basin or conveyance line cleanouts
- Compliance history with regulatory permits (wastewater or air permits, pretreatment requirements, etc.)
- Stormwater permit monitoring results and requirements
- Contaminants found in elevated concentrations in sediments, surface water or biota in the vicinity of the site's stormwater outfall.

4.3 Developing a Sampling and Analysis Plan for a Screening Evaluation

The purpose of a screening evaluation is to determine whether contaminants are being discharged into the waterbody in concentrations that have the potential to pose unacceptable risks to human or ecological receptors, or adversely affect the beneficial use of water. Media to sample could include stormwater, catch basin sediments and/or “in-line” sediments from stormwater pipes, surface soil that could erode into the stormwater system, and sediment accumulating at the point of discharge into the waterbody. Sampling data provides information on the presence and concentrations of COIs.²

There are unique considerations and approaches for each type of sample when designing a stormwater sampling plan.

Catch basin sediment samples are primarily used to identify stormwater COIs and contaminant sources because they provide information on the types of contaminants entering the stormwater system from the site. Catch basin samples can also be helpful for locating contaminant sources, especially if sampling locations are near to and representative of the different kinds of activities and/or potential sources on the site. When there is more than one catch basin that are equally representative of a potential source area, two approaches to selecting sampling locations can be considered. In one approach, a sample would be collected from a single catch basin with the reasoning that it is representative of the others. Alternatively, a “composite” sediment sample may be collected by combining comparable amounts of sediments from two or more catch basins in the area. There are pros and cons to each approach. While sampling from a single catch basin may inadvertently miss a localized source in what was considered to be a generally uniform activity area, a composite sample may have the effect of “diluting” the contaminant concentration from a catch basin by mixing its sediments with “cleaner” sediments from another catch basin. At sites where relatively small amounts of sediments have collected in the catch basins, it may be necessary to composite samples to generate sufficient sample volume to meet analytical needs.

Sediments removed from stormwater pipes during a cleanout activity may be sampled and analyzed as an alternative to catch basin sampling to provide general information on

² See Section 5.1 and the text box in Section 5.1.2 for discussions about the inherent variability of stormwater data and why multiple lines of evidence should be considered rather than relying solely on stormwater data for decision-making.

contaminants getting into the stormwater system. However, it may not be possible to determine whether those sediments reflect current or historic activities, and the data may be of limited use for identifying contaminant sources if the sample is a composite of the entire system.

Stormwater samples provide information on the types and concentrations of contaminants being discharged from the site. The ideal stormwater sampling locations are often where the stormwater leaves the site – either from the end of the outfall(s) if the site discharges directly to the waterbody or, for sites that discharge into a shared conveyance system, where the site’s stormwater pipes connect to the shared conveyance.

Surface soil samples may be collected to determine whether elevated concentrations of COIs are present in exposed surface soil that could be eroded and transported through the stormwater conveyance system into a waterbody.

A common approach for a stormwater sampling plan involves an initial round of catch basin sediment samples followed by several rounds of stormwater sampling. The catch basin data helps identify site COIs and may reveal sources or source areas on the site. This information is considered when selecting sampling locations and analytes for the stormwater sampling plan. If catch basin sediment data show elevated contaminant concentrations that suggest active sources are present at the site, it may be appropriate to interrupt the sampling plan (i.e., postpone stormwater sampling) so the RP can promptly implement source control measures to address those sources.

Directions for developing a sampling plan and protocols for stormwater and catch basin sediment sampling can be found in Appendix A, and a Data Reporting and Screening Table is provided in Appendix D. In the course of implementing their sampling plan, RPs should submit interim reports that include a description of each sampling event and the analytical results so DEQ can monitor their efforts and notify the RP if a change in the workplan is needed to meet the investigation objectives.

4.4 Coordination with Water Quality Programs and Municipal Permittees

Project Managers are encouraged to communicate with water quality staff at DEQ and/or its local agent³ during the earliest stages of a stormwater evaluation to assess their desired level of involvement in the evaluation and glean information they have about the site. This is appropriate whether the site has an industrial stormwater permit or not.

If the site has an NPDES stormwater permit, the regional Water Quality Program office or its agent will have a Stormwater Pollution Control Plan for the site on file and DEQ or its agent will often have pertinent information about stormwater management efforts and issues at the site based on their inspections. They may also have information on unpermitted sites and may be able to provide technical assistance to the Project Manager and/or the RP during the course of the stormwater evaluation.

³ As of 2009, the following municipalities operate as DEQ’s “agent” to implement DEQ’s industrial stormwater permit within their jurisdictions: the City of Portland, the City of Eugene and Clean Water Services District (includes all or parts of the City of Beaverton, Cornelius, Forest Grove, Hillsboro, Sherwood, Tigard and Tualatin). Contact the Water Quality Program to determine whether this list has changed.

There is generally a good bit of overlap between water quality and cleanup objectives but also some significant differences. Cross-program coordination will help ensure that the most optimal solutions can be achieved with the minimal amount of effort. It also helps prevent the confusion and frustration that arises when two different regulators approach an RP about stormwater and ask for different things.

At sites where stormwater concerns dictate the need for long term controls and oversight beyond what would be addressed under an NPDES *general* stormwater permit, an *individual* stormwater permit may be the appropriate mechanism for accomplishing this objective. Active engagement in cross-program coordination throughout the project will result in effective, comprehensive solutions and help ensure a smooth “hand off” from the Cleanup Program to the Water Quality Program for long-term oversight.

Some sites may be located within areas covered under an NPDES Municipal Separate Storm Sewer Permit (MS4 permit). These areas generally include the larger cities and urbanized areas throughout the state.⁴ MS4 permits require municipalities to develop, implement and enforce stormwater management programs to reduce impacts from stormwater discharged through their conveyance system. PMs are encouraged to contact the MS4 permittee for information on the stormwater conveyance system and information they may have on the site.

Section 5 Screening Evaluation

After the sampling plan has been implemented, the sampling data and other relevant information are evaluated to determine whether additional stormwater source control measures and/or investigation are necessary. This evaluation involves consideration of several lines of evidence as described below. Figure 2 provides an overview of the decision criteria DEQ will typically use to evaluate the adequacy of stormwater source control at a site. Some flexibility may be appropriate when addressing unique site-specific conditions.

5.1 Objective and Approach

The objective of a screening evaluation is to determine whether contaminants are present at a site and/or are being discharged into the waterbody in concentrations that have the potential to pose unacceptable risks to human or ecological receptors, or adversely affect the beneficial use of water. For other contaminant pathways, this is commonly accomplished by comparing site-specific data to relevant Screening Level Values (SLVs) to determine the magnitude, extent and frequency of SLV exceedances. If site-specific data shows no exceedances of SLVs, it can generally be concluded that additional evaluation or SCMs are not needed at the site.

With stormwater, however, a screening evaluation is less straightforward. Industrial stormwater and catch basin sediments commonly include several contaminants at concentrations that exceed SLVs by one or more orders of magnitude, but that doesn't necessarily mean that stormwater discharges from the site cause or contribute to unacceptable risk to human health or the environment. One reason for this has to do with the basis of SLVs.

⁴ A list of MS4 permittees can be found on DEQ's website at <http://www.deq.state.or.us/wq/stormwater/stormwater.htm>

SLVs are developed based upon a receptor's exposure to a contaminant, but receptors are not directly exposed to stormwater or stormwater sediments – the exposure occurs in the receiving waterbody after stormwater discharges mix with surface water and sediments. As a result, the potential effects of stormwater discharges on in-river sediment and biota will be site specific and highly variable, and therefore difficult to predict. This is compounded by the fact that stormwater discharges are intermittent and variable in both concentration and flow volume (see text box below).

The challenge, therefore, is to determine when source control has been achieved in spite of SLV exceedances. This is accomplished by considering several lines of evidence, including comparing site-specific stormwater and catch basin sediment data to “typical” contaminant concentrations at industrial sites. A tool for conducting this comparison is presented in Appendix E and discussed below.

Variability of Stormwater Samples

When conducting the screening evaluation, it's important to keep in mind the inherent variability of stormwater and catch basin sediment samples. Stormwater grab samples taken from the same location can show widely variable concentrations of COIs depending on the duration and intensity of the storm events that were sampled, the length of the dry period preceding the storms, the activities occurring on-site between storms, and whether the sample was collected early or late in the storm.

Catch basin sediments provide an integrated sample of stormwater solids over time but only reflect the activities that took place in the vicinity of the catch basin since it was last cleaned out. In addition, catch basin and inline sediments represent the solids that did not get transported to the river by stormwater, and may or may not be reflective of the concentration of these COIs in stormwater.

For these reasons, stormwater data may be interpreted more broadly and/or given less “weight” in a weight of evidence evaluation than would typically be given to quantitative data when characterizing other media, such as groundwater or soils.

5.2 Distinguishing “Typical” and “Elevated” Contaminant Concentrations

Many kinds of industrial materials and activities have the potential to result in minor releases of contaminants, such as petroleum products in drips of oils, greases and fuels used for vehicles and machinery, phthalates off-gassing from paints and PVC piping, and zinc from galvanized building materials. Off-site sources, including highway traffic, operations at neighboring sites and atmospheric deposition, can also contribute to the contaminant load in stormwater runoff from a site. As a result, industrial stormwater is likely to contain a somewhat predictable list of contaminants within a predictable concentration range even when good stormwater management practices are being implemented. When concentrations exceed these ranges, it is a potential indicator of an uncontrolled source of contaminants at the site.

Appendix E presents a tool for distinguishing “typical” industrial stormwater from stormwater containing potentially elevated concentrations of contaminants. This distinction can be used to help determine the need for additional evaluation or source control at a site. However, due to the highly variable nature of stormwater, interpretations made using these charts should be corroborated by other

lines of evidence and should not be presumed to provide conclusive evidence of the presence or absence of contamination at a site. Furthermore, the determination that contaminant concentrations are “typical” is not the same as determining the discharges will not cause or contribute to risk in the waterbody. That determination requires different types of analyses which may or may not be necessary in the course of the stormwater pathway evaluation, as is discussed later in this guidance document.

The tool can be used to evaluate 12 different contaminants and Total Suspended Solids (TSS). For other contaminants, SLVs are the only screening values available at this time.

5.3 Other Lines of Evidence

Depending upon the site, the following factors may be appropriate to consider in the screening evaluation and determination of next steps.

Presence of Bioaccumulative Chemicals: COIs in stormwater that are bioaccumulative and are known or suspected to be risk drivers in the receiving waterbody should be evaluated conservatively. Where present, polychlorinated biphenyls (PCBs) and persistent pesticides are often risk drivers, and usually represent legacy contamination since most are discontinued for use. These chemicals in particular should be managed aggressively.

Discharges to 303(d) Listed Waterbodies: If the receiving waterbody has been determined to be “Water Quality Limited” for certain pollutants (i.e., concentration of the pollutant exceeds the applicable Ambient Water Quality Criteria (AWQC)), stormwater discharges containing those pollutants at concentrations that exceed SLVs should be more conservatively evaluated in order to protect the beneficial uses of these waterbodies.

Outfall Sediments: If the sediments beneath the outfall show higher concentrations of a chemical than the surrounding sediments, it can be presumed that this exceedance is likely related to historic and/or ongoing stormwater discharges. If multiple sites contribute to the discharge from this pipe via a shared stormwater conveyance system, sites with exceedances of these contaminants should be assigned a higher priority for source control, particularly with respect to Total Suspended Solids (TSS).

Hydrodynamics and Runoff Volume: The flow rates of the receiving waterbody may be a factor in determining the extent to which stormwater discharges will impact surface water and sediments. For example, stormwater discharges entering a quiescent waterbody may have a greater impact than runoff entering a flowing system because suspended sediments carried by the stormwater would settle more rapidly and be more likely to settle in a localized area rather than be more broadly dispersed downstream. Additionally, consideration should be given to the volume of runoff generated during storm events to evaluate whether the contaminant load from the site is likely to have an impact in the receiving waterbody (Load = Flow volume x Concentration of contaminant in stormwater).

Representativeness of the Samples: If site data show no exceedances of SLVs, it may be possible to infer that stormwater discharges do not pose unacceptable risk to human health or the environment. However, because of the inherent variability in stormwater samples, this conclusion should not be drawn if other lines of evidence cast doubt on this assumption. For example, stormwater samples may

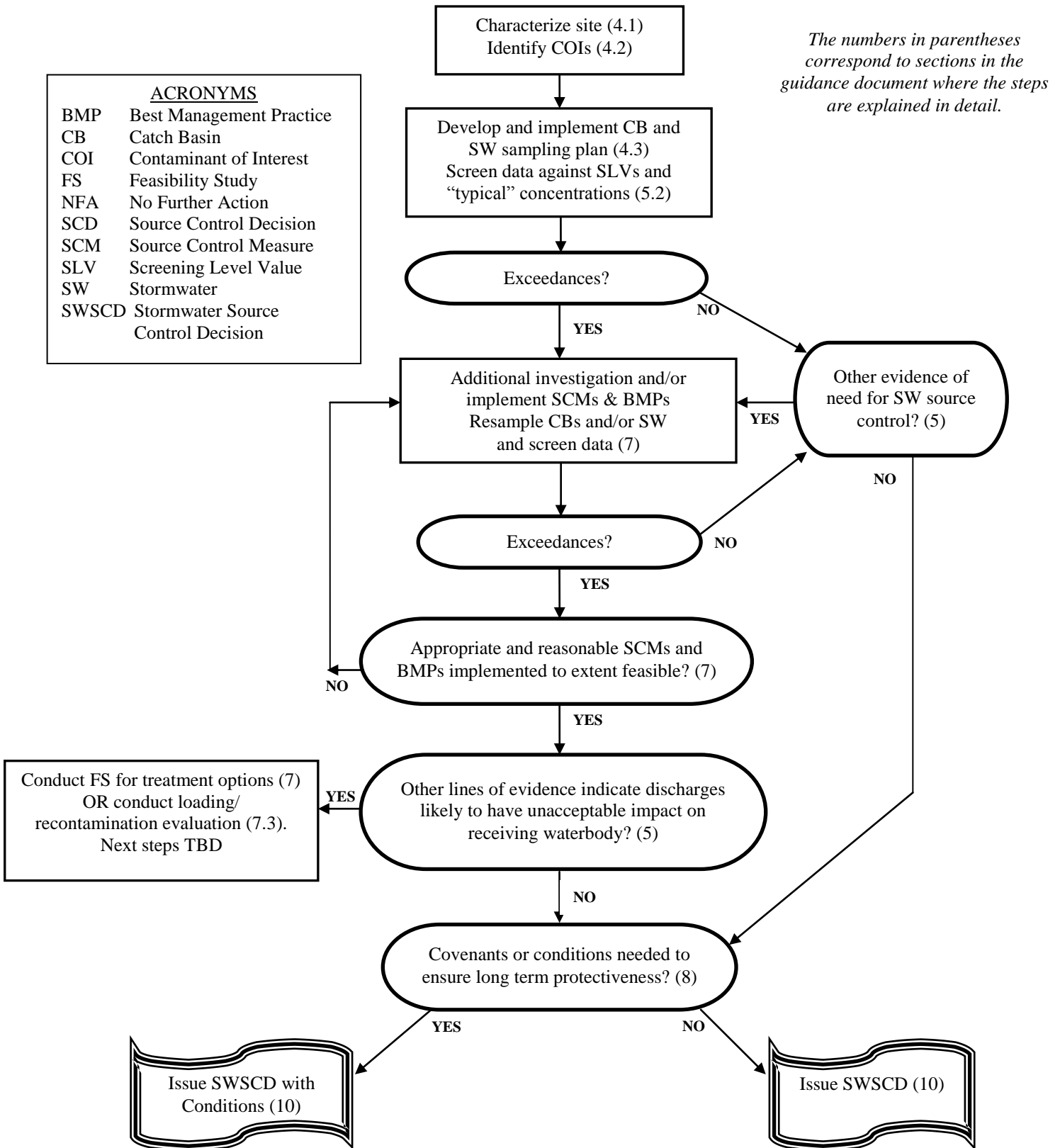
have been collected at a later point in a storm event after substantial runoff has occurred, or following heavy rains that could have swept the site clean of contaminants. If the COI concentrations in stormwater are unexpectedly low, you may want to examine rainfall records for the storm event or period preceding the storm and incorporate this into your interpretation of the data.⁵ You may also want to consider whether more samples, with or without modifications to the sampling plan (e.g., sampling locations, timing of sample collection), would help resolve the matter.

Periodicity of Site Activities: Catch basin sediments only include sediments that accumulated since the last cleanout. The sample may not be representative if activities that took place in the vicinity of the catch basin during this period do not include activities that only occur periodically.

Future Stormwater Management: Before wrapping up work on any stormwater evaluation, consideration should be given to the need for continuing oversight to ensure that stormwater management practices currently being implemented will continue to be implemented. If oversight is needed and not otherwise provided (e.g., through an NPDES stormwater permit), it may be appropriate to issue a SWSCD that includes provisions to address this need. See Section 8 for further discussion on this topic.

⁵ Rainfall data for the Portland area can be found at http://or.water.usgs.gov/non-usgs/bes/raingage_info/clickmap.html. Additional Rain gage data is available at http://waterdata.usgs.gov/or/nwis/current/?type=precip&group_key=county_cd

FIGURE 2: STORMWATER PATHWAY EVALUATION PROCESS



Section 6 Source Control Evaluation and Next Steps

The objective of a Stormwater SCE is to determine whether existing and potential sources of contamination at the site have been identified and if additional characterization or source control measures are needed. This determination generally rests upon demonstrating that site-related information provides sufficient support to make the following findings:

1. Existing and potential facility-related contaminant sources have been identified and characterized.
2. Contaminant sources are being controlled to the extent feasible.
3. If performance monitoring was conducted after Source Control Measures (SCMs) were implemented, post-SCM data supports the conclusion that the SCMs are effective. [See Section 7.3]
4. Adequate measures are in place to ensure source control and good stormwater management measures occur in the future. [See Section 8]

If the weight of evidence supports these findings, the next step would be for the RP to prepare a Stormwater Source Control Evaluation Report and submit it for DEQ review and approval. A template for this report is provided in Appendix C.

If these findings cannot be supported and additional investigation and/or source control is needed, the next step would be for the RP to develop a Stormwater Source Control Measures and Performance Monitoring Workplan (see Appendix B). Information on selecting appropriate source control measures is provided in Section 7.

Section 7 Selecting and Evaluating Stormwater Source Control Measures

If the screening evaluation indicates that stormwater source control measures (SCMs) are needed, the next step is to decide what the sources are and what kinds of source control measures or other follow-up actions are appropriate. SCMs are generally aimed at achieving the following two objectives:

1. Eliminate or control sources of historic contamination to prevent the release of contaminants to stormwater
2. Prevent or minimize the release or threat of release of hazardous substances from ongoing potential sources. At some sites, this goal may be accomplished through the implementation of a NPDES stormwater permit issued by DEQ's Water Quality Program.

There is no "cookbook" for determining which SCMs or BMPs are needed at a site. Site-specific factors such as proximity of a source to stormwater conveyances, magnitude of risk associated with specific COIs, overall management of the site, demonstrated commitment to good stormwater management practices and other relevant information will be evaluated to determine what measures would be most appropriate for the site. At most sites, it will be important to coordinate with the appropriate water quality program staff to avoid duplicative or conflicting efforts.

SCMs are often implemented as an expedited action (e.g., under removal action authorities) and may be evaluated based on effectiveness, implementability and cost consistent with federal guidance (EPA,

1993). If source control is limited to “BMP-based” source control measures, such as removal of catch basin and in-line sediments, roof painting and other facility maintenance/housekeeping measures, a Feasibility Study is not necessary. If source control involves more typical “removal” actions (e.g., soil removal, capping, bank stabilization, stormwater or groundwater treatment), the SCMs should be evaluated consistent with DEQ guidance on conducting a Feasibility Study (DEQ, 2006).

Selection and implementation of SCMs is often an iterative process. After the selected measures have been implemented, additional stormwater samples may need to be collected to evaluate the sufficiency and effectiveness of the SCMs, and to determine whether additional site investigation or SCMs are needed. See Section 7.3 for further discussion on this topic.

7.1 Source Control Measures for Historic Contamination

SCMs should focus on eliminating or minimizing current and future releases of hazardous substances that could be transported to surface waters via the stormwater conveyance system or stormwater runoff. The following are examples of SCMs that could be implemented to accomplish that objective:

- Treat, remove or stabilize contaminated upland or bank soils that have the potential to erode and be transported via stormwater runoff and particulates into the storm sewer system or directly into surface water.
- Clean out catch basins and stormwater conveyance lines. This is generally done after ongoing sources have been controlled unless the time lag and/or potential risk associated with inline sediments is too great.
- Repair storm lines if breaks in the pipe are allowing contaminated groundwater or soil to enter the system. All sites with groundwater plumes that intersect stormwater conveyance lines should address this during the RI/FS phase.
- Remove unneeded catch basins if they are located in or drain an impacted area. Ensure that the RP checks with the local municipality and obtains any approval or required permits.
- Identify and eliminate illicit discharges if these are sources of contamination. An illicit discharge is an unauthorized discharge of non-stormwater into the conveyance system, such as wastewater from equipment wash stations or discharges from floor drains that are illegally (and often unknowingly) connected to the conveyance system. Illicit discharges can be identified by observing the outfalls during dry weather or dye testing to verify whether potential sources are connected.

In addition, many of the BMPs described in the following section can be helpful in reducing the transport of legacy contaminants to a waterbody via the stormwater pathway.

7.2 Controlling Potential Ongoing Sources

Many sources of stormwater contaminants are associated with current, ongoing operations at a site, as opposed to legacy contamination. Contaminants may be released through a process (e.g., sandblasting), improper handling or maintenance (e.g., oil drips from equipment) or simply by being present on the site and coming into contact with stormwater (e.g., storing hazardous materials or wastes outdoors). These potential sources are usually addressed through the implementation of

stormwater BMPs and/or other changes in facility operations designed to prevent releases of contaminants from entering the stormwater system.

Industrial sites covered under an NPDES stormwater permit (e.g., 1200-Z or 1200COLS general permit or a site-specific “individual” stormwater permit) are required to implement a wide array of stormwater BMPs to address these sources. BMPs are designed to eliminate or minimize the exposure of pollutants to stormwater or to remove pollutants from stormwater before it discharges to surface waters. The following list is excerpted from DEQ’s industrial stormwater general permit; permitted facilities are expected to implement these BMPs at their site where appropriate.

Stormwater Best Management Practices (excerpted from NPDES 1200-Z permit issued 7/1/07)

- 1) Containment - All hazardous substances must be stored within berms or other secondary containment devices to prevent leaks and spills from contaminating stormwater. If the use of berms or secondary containment devices is not possible, then hazardous substances must be stored in areas that do not drain to the storm sewer system.
- 2) Oil and Grease - Oil/water separators, booms, skimmers or other methods must be employed to eliminate or minimize oil and grease contamination of stormwater discharges.
- 3) Waste Chemicals and Material Disposal - Wastes must be recycled or properly disposed of in a manner to eliminate or minimize exposure of pollutants to stormwater. All waste contained in bins or dumpsters where there is a potential for drainage of stormwater through the waste must be covered to prevent exposure of stormwater to these pollutants. Acceptable covers include, but are not limited to, storage of bins or dumpsters under roofed areas and use of lids or temporary covers such as tarps.
- 4) Erosion and Sediment Control - Erosion control methods such as vegetating exposed areas, graveling or paving must be employed to minimize erosion of soil at the site. Sediment control methods such as detention facilities, vegetated filter strips, bioswales, or other permanent erosion or sediment controls must be employed to minimize sediment loads in stormwater discharges. For activities that involve land disturbance, the permit registrant must contact the local municipality to determine if there are other applicable requirements.
- 5) Debris Control - Screens, booms, settling ponds, or other methods must be employed to eliminate or minimize debris in stormwater discharges.
- 6) Stormwater Diversion - Stormwater must be diverted away from fueling, manufacturing, treatment, storage, and disposal areas to prevent exposure of uncontaminated stormwater to potential pollutants.
- 7) Covering Activities – Fixed fueling, manufacturing, treatment, storage, and disposal areas must be covered to prevent exposure of stormwater to potential pollutants. Acceptable covers include, but are not limited to, permanent structures such as roofs or buildings and temporary covers such as tarps.
- 8) Housekeeping - Areas that may contribute pollutants to stormwater must be kept clean. Sweeping, litter pick-up, prompt clean up of spills and leaks, and proper maintenance of vehicles must be employed to eliminate or minimize exposure of stormwater to pollutants.

RPs should implement appropriate BMPs prior to conducting cleanouts of catch basins or storm lines to minimize the potential for immediately reintroducing contaminated sediments into the system. If there is legacy contamination on a site that will require ongoing implementation and oversight of BMPs (e.g., sites where erosion and sediment control BMPs are necessary to prevent contaminated

soils from eroding and getting into the stormwater system), it may be necessary to require an Easement and Equitable Servitude to ensure this practice is maintained in the future.

The following practices are required at sites covered by NPDES industrial stormwater permits. They are presented here as examples of additional measures that may be appropriate at unpermitted sites.

Spill Prevention and Response Procedure - Permit registrant must include in the Stormwater Pollution Control Plan (SWPCP) methods to prevent spills along with cleanup and notification procedures. These methods and procedures must be made available to appropriate personnel. The required clean-up material must be onsite or readily available and the location of materials must either be shown on the site drawings or indicated in the text of the SWPCP. Spills prevention plans required by other regulations may be substituted for this provision providing that stormwater management concerns are adequately addressed.

Preventative Maintenance - Permit registrant must include in the SWPCP a preventative maintenance program to ensure the effective operation of all stormwater best management practices. At a minimum the program must include:

- monthly inspections of areas where potential spills of significant materials or industrial activities could impact stormwater runoff,
- monthly inspections of stormwater control measures, structures, catch basins, and treatment facilities, and
- cleaning, maintenance or repair of all materials handling and storage areas and all stormwater control measures, structures, catch basins, and treatment facilities as needed upon discovery. Cleaning, maintenance, and repair of such systems must be performed in such a manner as to prevent the discharge of pollution.

Employee Education - Permit registrant must develop and maintain an employee orientation and education program to inform personnel of the components and goals of the SWPCP. The program must also address spill response procedures and the necessity of good housekeeping practices. A schedule for employee education must be included in the SWPCP. The education and training must occur within 30 calendar days of hiring an employee who works in areas where stormwater is exposed to industrial activities or conducts duties related to the implementation of the SWPCP, and annually thereafter.

7.3 Evaluating Effectiveness through Performance Monitoring

After SCMs have been implemented, monitoring data is often needed to determine how well they performed at achieving source control objectives. Performance monitoring data serve two purposes:

1. Determining whether SCMs have been effective in reducing contaminant concentrations and/or load in stormwater.
2. Providing current discharge data to determine if contaminant concentrations fall within the “typical” range for industrial sites.

Performance monitoring typically consists of three or more additional rounds of stormwater sampling, following the approach described in Appendix A, Section 6 (Stormwater Sampling Plan). Catch basin sediment samples may also be useful for performance monitoring in some instances.

As described previously, COI concentrations in stormwater grab samples can vary depending on the frequency and magnitude of storms and the timing of sample collection relative to the onset of flow, and COI concentrations in catch basin sediments can vary depending on the frequency of cleanouts and the types of activities taking place in their vicinity. For these reasons, it is not uncommon to see anomalous values in the data sets. However, stormwater is typically evaluated based upon average concentrations rather than extremes, so the objective would be to discern a representative concentration or range for each data set. An important exception would be when elevated concentrations of legacy contaminants, such as PCBs and certain pesticides, are detected in any samples.

If the determination is made that SCMs have resulted in reduced COI concentrations but this determination is based upon a few data points spread over a sizable range, it should be supported by other lines of evidence (e.g., characteristics of each storm/sampling event that might skew the results; activities occurring on site during the sampling event that resulted in short-term spikes for certain contaminants, etc). In some cases it may be appropriate to require additional sample collection to strengthen the data set.

If contaminant concentrations continue to be elevated and it has been determined that SCMs were adequately performed, there are two conclusions that could be drawn. One would be that additional site investigation and/or additional SCMs are needed, or SCMs need to be modified, increased or repeated to improve their effectiveness.

Another conclusion could be that additional SCMs are not warranted because the elevated concentrations do not appear to be a result of uncontrolled releases of contamination but are a result of poor or inadequate stormwater management practices. This information should be brought to the attention of the local Water Quality authority.

If there is a lingering concern that ongoing discharges may result in sediment contamination or unacceptable risk in the receiving waterbody, additional analyses may be needed (e.g., contaminant loading evaluation or recontamination evaluation). The objective would be to determine if additional pollution reduction measures are necessary and, if so, whether it would fall under Cleanup or Water Quality authority. Procedures for conducting these analyses were still under development at this time this document was issued.

Section 8 Long-Term Stormwater Source Control

Prior to issuing a SWSCD, the RP needs to demonstrate that source control measures will be maintained and continue to be effective into the future, as necessary. Generally speaking, sites will fall into one of the following three categories:

1. Long-Term Oversight Not Needed

These are sites where it is unlikely that stormwater discharges will be a continuing problem. For example, these could be sites where all potential sources have been controlled and the operations on

the site are not likely to be substantial generators of risk-driving contaminants, and any redevelopment that would likely result in exposure would be managed under the local government's stormwater development codes. These sites are eligible for a SWSCD.

2. Long-Term Oversight Addressed Through another Regulatory or Administrative Mechanism

Sites that have an NPDES industrial stormwater permit will have continuing oversight from state or local water quality authorities as long as the permit is in place. This could potentially be a sufficient mechanism for ensuring the control of future discharges. However, the Project Manager should be familiar with the conditions of the permit before deciding if this is the case. NPDES stormwater general permits require monitoring for a limited list of analytes, which may not include site COIs, and the permit conditions may only apply to a portion of the site.

In addition, the requirement to have an NPDES stormwater permit depends upon the activities and operations currently occurring at the site. If the activities change, the requirement for a permit might go away. At sites where ongoing implementation and oversight is essential for source control regardless of the operations at the site (e.g., sites where erosion and sediment control BMPs are necessary to prevent contaminated soils from eroding and getting into the stormwater system), it may be necessary to require an Easement and Equitable Servitude to ensure this practice is maintained in the future in the event a stormwater permit is no longer required.

Considering these limitations, the NPDES permit may be a sufficient mechanism for ensuring long-term oversight for some sites but not for others.

3. Long-Term Oversight Needed

These sites require an additional enforceable mechanism such as an administrative Order or institutional control to prevent or minimize the potential for stormwater to come into contact with legacy contamination on the site. An example would be a site where contaminated soil that could otherwise become entrained in stormwater is covered by a paved surface. In this instance DEQ would likely issue a "SWSCD with Conditions." If the control measures require a property use restriction, an EES will need to be recorded to memorialize this restriction.

When issuing a SWSCD with Conditions, careful consideration should be given in order to ensure:

- a. there is a clear need for the property to have a set of conditions for long-term stormwater management,
- b. there is an appropriate level of effort to effectively manage the risk involved, and
- c. there are clear conditions for revoking the SWSCD, if necessary.

Section 9 Stormwater Source Control Evaluation Report

The final submittal from the RP presents their rationale for determining that stormwater source control has been achieved. The Stormwater Source Control Evaluation Report should provide an overview of the stormwater source control needs at the site and the actions that were taken to address them, and discuss how performance monitoring or other data supports the determination. The report should also describe the mechanisms in place to ensure future stormwater discharges will be appropriately managed. A template for a Stormwater Source Control Evaluation Report is provided in Appendix C.

It is important for the RP to understand that a SCD does not exempt them from Water Quality programs and regulations. For example, a site that has been issued Stormwater SCD could still be required to take additional measures to treat stormwater to meet water quality permit requirements.

Section 10 Final Decision and Documentation

To support DEQ's determination that stormwater source control has been achieved, the Project Manager prepares a staff report that includes following information.

- Description and maps of the site's stormwater conveyance system.
- Criteria relevant to determining source control effectiveness and completeness for the source/area, including but not limited to:
 - Upland site cleanup information.
 - Surface water or sediment quality information.
 - Other potentially applicable criteria.
- Chronology of the site to include:
 - Occupancy and operations conducted on the site.
 - Environmental actions taken to date.
 - Steps taken for further source characterization and control.
 - Sampling events for data used to support this determination.
- Description of source control measures and BMPs that have been implemented.
- Regulatory or other tools that will ensure stormwater source control measures will be continued in the future, including monitoring.
- Data used to support the effectiveness/completeness determination, either as appendices to the report or summarized in tables.
- Administrative Record Index (Full citations for data and other reports/information supporting determination of effectiveness, guidance documents and other information that informed DEQ's decision).

The staff report should be prepared and reviewed by other members of the DEQ project team, as appropriate, and submitted with a proposed SWSCD for management review and approval.

Stormwater SCMs are usually done under Removal Authority and therefore Public Notice and Comment is not required but is recommended in certain circumstances.

1. If source control is limited to "BMP-based" source control measures, such as removal of catch basin and in-line sediments, roof painting and other facility maintenance/housekeeping measures, Public Notice is generally not warranted unless there is heightened public interest.
2. If source control involves more typical "removal" actions (e.g., soil removal, capping, bank stabilization, stormwater or groundwater treatment) Public Notice is recommended if the measures are expected to be the only cleanup action at the site or if the actions are expected to be a major component of the final remedy.

Additionally, if an institutional control is required or if an NFA is to be issued for the site as a whole, a notice of public comment should be prepared and filed with the appropriate news publication as specified in OAR 340-122-0100.

After a SWSCD has been issued, the Project Manager needs update the site's ECSI file.

REFERENCES

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<http://nsdi.epa.gov/superfund/policy/remedy/pdfs/540f-94009-s.pdf>
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<http://www.ecy.wa.gov/pubs/0210071.pdf>

RESOURCES

DEQ Cleanup Program Webpage

<http://www.deq.state.or.us/lq/cu/index.htm>

DEQ Portland Harbor/Stormwater Resources Webpage

<http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/stormwater.htm>

DEQ Water Quality Program/Stormwater Permits Webpage

<http://www.deq.state.or.us/wq/stormwater/stormwater.htm>

Rain Gage Data Websites for Oregon

Portland area: http://or.water.usgs.gov/non-usgs/bes/raingage_info/clickmap.html

Other areas: http://waterdata.usgs.gov/or/nwis/current/?type=precip&group_key=county_cd

APPENDICES

Appendix A: Instructions for Developing a Stormwater Assessment Workplan

Appendix B: Template for a Source Control Measures and Performance Monitoring Workplan

Appendix C: Template for a Stormwater Source Control Evaluation Report

Appendix D: Data Reporting and Screening Tables

Appendix E: Tool for Evaluating Stormwater Data