

## Sediment Management Standards Overview

This document is meant to provide a simplified explanation of the current Sediment Management Standards (SMS), and it is not intended to revise or contradict the contents in any way. For clarification on any concept presented here, please refer to the SMS (WAC 173-204). Specific references are provided throughout the document.

### **Outline**

1. Overall structure of the Sediment Management Standards
2. Criteria in the Sediment Management Standards
  - a. Sediment Quality Standards
  - b. Cleanup Screening Levels, Sediment Impact Zone Maximum Criteria, Minimum Cleanup Levels
3. Sediment Source Control
4. Listing Sediment Cleanup Sites
5. Setting Sediment Cleanup Standards and Process for Cleaning Up Sites

### **List of Acronyms Commonly Used:**

CSL = Cleanup Screening Level  
MCUL = Minimum Cleanup Level  
MTCA – Model Toxics Control Act  
NPDES = National Pollutant Discharge Elimination System  
SIZ = Sediment Impact Zone  
SIZmax = Sediment Impact Zone maximum criteria  
SMS = Sediment Management Standards  
SQS = Sediment Quality Standards  
SRZ = Sediment Recovery Zone  
WPCA = Water Pollution Control Act

#### **1. Overall Structure of the Sediment Management Standards**

The purpose of the SMS is to reduce and ultimately eliminate adverse effects on biological resources and significant threats to human health from surface sediment contamination.<sup>1</sup>

The SMS are promulgated primarily under the authority of to Chapter 90.48 RCW, the Water Pollution Control Act; and Chapter 70.105D RCW, the Model Toxics Control Act,<sup>2</sup> because they have a dual use:

- 1) To provide water quality standards protective of sediment quality for NPDES permitted dischargers under the Water Pollution Control Act (WPCA).
- 2) To guide sediment cleanup under Model Toxics Control Act (MTCA).

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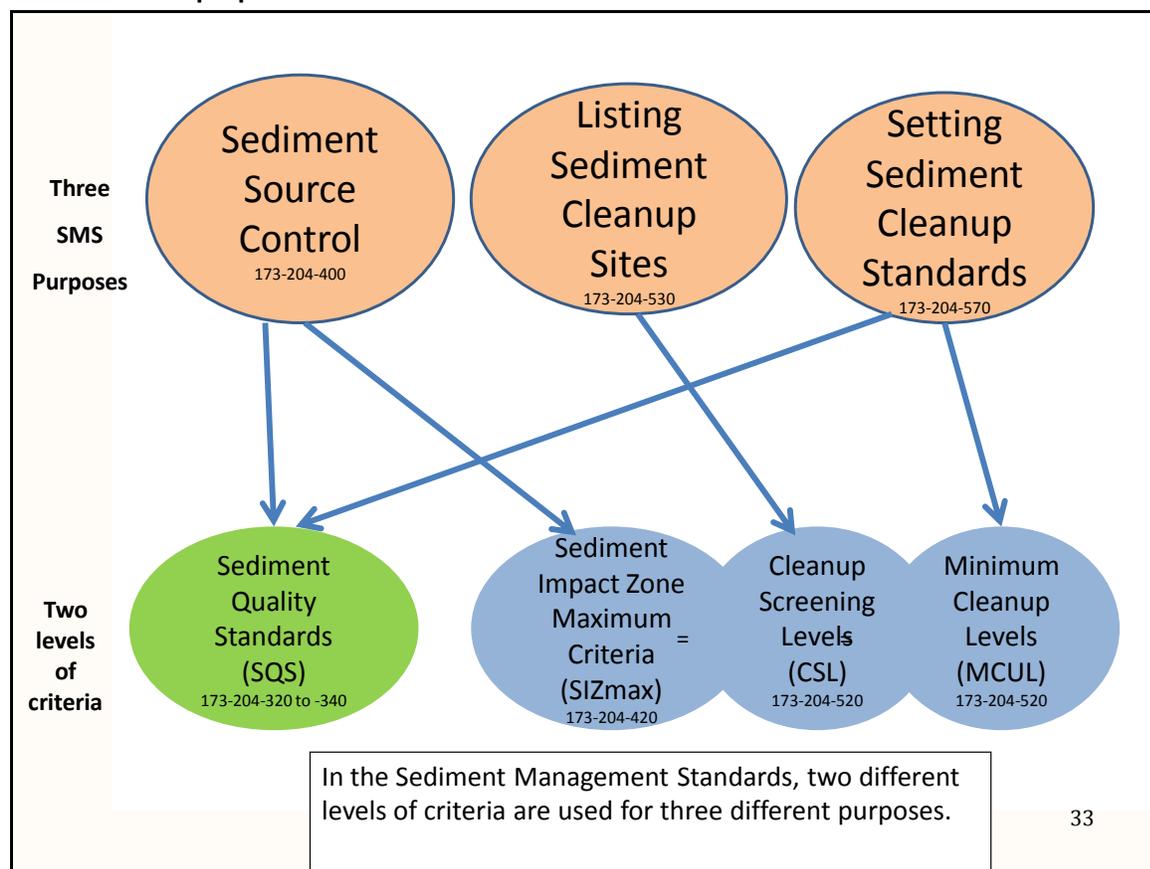
<sup>1</sup> WAC 173-204-100 (2)

<sup>2</sup> WAC 173-204-100

There are two levels of criteria in the SMS that used for three different purposes, as shown in Figure 1. The three purposes in the SMS are to:

1. Apply the standards for managing sources of sediment contamination. (**Sediment Source Control**).
2. Provide a decision process for identifying and prioritizing contaminated sediment cleanup sites (**Listing Sediment Cleanup Sites**).
3. Provide a decision process for cleaning up contaminated sediment sites (**Setting Cleanup Standards**).

**Figure 1: Structure of the Sediment Management Standards. Two levels of criteria are applied to three different purposes.**



There are two different criteria levels in the SMS:

1. The lower level is the **Sediment Quality Standards (SQS)**. Sediment Quality Standards provide a regulatory and management goal for sediment quality.<sup>3</sup>
2. Although the **higher level criteria** have three different names (SIZmax, CSL, MCUL), the level of protection is the same for all three. The higher level is used as follows for the different purposes:

<sup>3</sup> WAC 173-204-320 (1)

- **Sediment Impact Zone Maximum (SIZmax)** is the maximum sediment concentration or effects level allowed in a Sediment Impact Zone (SIZ) for discharges.
- **Cleanup Screening Level (CSL)** is used for identifying stations of potential concern and defining which areas will become cleanup sites.
- **Minimum Cleanup Level (MCUL)** is the maximum sediment concentration or effects level allowed to remain at a sediment cleanup site (the upper limit of a sediment cleanup standard).

## **2. Criteria in the Sediment Management Standards**

The SMS have two levels of criteria, as described in section 1. The lower level (SQS) corresponds to a “no adverse effects” level, while the higher level (SIZmax, CSL, MCUL) correspond to an upper bound of minor adverse effects level for benthic organisms. Both levels have the same human health narrative “no significant threat to human health”. Both the lower level and higher level have a similar format in the rule. Table 1 shows what type of criteria are in the SMS for different environments and receptors. There are numeric chemical and biological criteria for the protection of benthic organisms in Puget Sound. For other environments, and other receptors – criteria are determined on a case-by-case basis.

The **Puget Sound chemical criteria** describe maximum sediment concentrations for 47 chemicals or chemical groups. For 15 of the chemicals, the criteria are in mg/kg or ug/kg sediment dry weight. For the other 32 chemicals, the criteria are organic carbon normalized (sediment dry weight divided by organic carbon percentage), and are in mg/kg organic carbon. These numeric criteria are based on short-term acute and chronic effects to benthic organisms. The numeric criteria for some chemicals are not necessarily protective of human health or higher trophic level aquatic organisms.

There are **five types of biological tests in the Puget Sound marine standards section used to determine SQS and CSL exceedances**. These biological tests include both acute and chronic laboratory bioassays and benthic abundance in the environment. If a sample fails the chemical criteria, bioassays may be done to determine whether the chemical is bioavailable and causing toxicity. Biological test results override chemistry for designating sediment quality. That is, if a sample fails the chemical criteria but passes the biological criteria, it is designated as meeting the criteria. If a sample passes the chemical criteria but fails the biological criteria, it is designated as an exceedance.<sup>4</sup>

**Non-anthropogenic background concentrations may be used** for Puget Sound marine sediments in place of the applicable criteria, whenever the non-anthropogenic sediment has a higher concentration than the chemical criteria. Non-anthropogenic background is not specifically defined in the SMS.<sup>5</sup>

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<sup>4</sup> WAC 173-204-310 and WAC 173-204-520

<sup>5</sup> WAC 173-204-320 (6), WAC 173-204-420 (1)(a), and WAC 173-204-520 (6)

**Table 1: List of sediment criteria in the Sediment Management Standards, -how the criteria are determined and where they apply, the corresponding level of effects, and references.**

<b>Environment/ Receptor</b>	<b>How determined</b>	<b>SQS Level of effects SMS reference</b>	<b>SIZmax Level of effects SMS reference</b>	<b>CSL and MCUL Level of effects SMS reference</b>
Marine environments, non-Puget Sound	Decided case-by-case	Corresponds to “no adverse effects” WAC 173-204-320	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520
Marine Puget Sound benthic organisms chemical criteria	Maximum concentrations for 47 chemicals	Corresponds to “no adverse effects” WAC 173-204-320	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520
Marine Puget Sound benthic organisms biological criteria	5 biological tests (lab bioassays and benthic community study)	Corresponds to “no adverse effects” WAC 173-204-320	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520
Marine human health	Decided case-by-case	No significant threat to human health. WAC 173-204-320	No significant threat to human health. WAC 173-204-420	No significant threat to human health. WAC 173-204-520
Marine Other toxic, radioactive, biological or deleterious substances	Decided case-by-case	Corresponds to “no adverse effects” WAC 173-204-320	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520
Low salinity environments	Decided case-by-case	Corresponds to “no adverse effects” WAC 173-204-330	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520
Freshwater environments	Decided case-by-case	Corresponds to “no adverse effects” WAC 173-204-340	Corresponds to upper bound of “minor adverse effects” WAC 173-204-420	Corresponds to upper bound of “minor adverse effects” WAC 173-204-520

### **3. Sediment Source Control**

The Source Control standards are used as a basis for controlling NPDES-permitted discharges to protect sediment quality, and may also be used for other means of controlling discharges.<sup>6</sup> Section WAC 173-204-420 describes a process for managing sources of sediment contamination. This process includes:

- Evaluating discharges for potential sediment impacts.
- Application and conditions for a sediment impact zone for discharges.
- Establishing effluent limits, as determined necessary.

If a discharge causes or is expected to cause an impact above the SQS criteria, a sediment impact zone (SIZ) may be authorized in a permit. Sediment impact zones have a number of requirements including application, design, maintenance, closure and public notification procedures. For a sediment impact zone to be authorized, the discharger must demonstrate that they have implemented all known, available and reasonable methods of prevention, control, and treatment and meet best management practices stipulated by Ecology. Sediment Impact Zones are to be minimized in effects and areal extent, and eliminated whenever practicable. The maximum concentration allowed within a Sediment Impact Zone is the SIZmax criteria<sup>7</sup>, which is the upper bound of minor adverse effects on aquatic organisms.

### **4. Listing Sediment Cleanup Sites**

Section WAC 173-204-510 describes a process for evaluating sediment data to determine whether cleanup actions are needed. The process is based on evaluating sediment data as a “station cluster” of spatially and chemically similar samples. Three samples with the highest concentrations in a station cluster have the concentrations averaged. If the average concentration of the three stations is higher than the Cleanup Screening Level (CSL) criteria, then the station cluster is identified as a “station cluster of potential concern”.

Section WAC 173-204-530 describes a process for assessing sites with “station clusters of potential concern” and determining whether it should be identified as a cleanup site.

Section WAC 173-204-540 describes a process for preparing a list of contaminated sediment sites, and ranking sites on that list.

### **5. Setting Sediment Cleanup Standards and Process for Cleaning Up Sites.**

Section WAC 173-204-560 describes the intent and content of a Cleanup Study. Activities done for the cleanup study include collection and evaluation of sufficient information to consider cleanup alternatives, selection of a site-specific cleanup standard, and evaluation of alternative cleanup actions. Two documents are produced for a Cleanup Study:

1. The Cleanup Study Plan, which **defines the scope** of the cleanup study including a site investigation and planned public information activities.

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<sup>6</sup> “Sediment source control standards of this chapter shall be used as a basis for controlling the effects of point and nonpoint source discharges to sediments through the National Pollutant Discharge Elimination System (NPDES) federal permit program, state water quality management permit programs, issuance of administrative orders or other means determined appropriate by the department.” WAC 173-204-100 (5)

<sup>7</sup> WAC 173-204-420

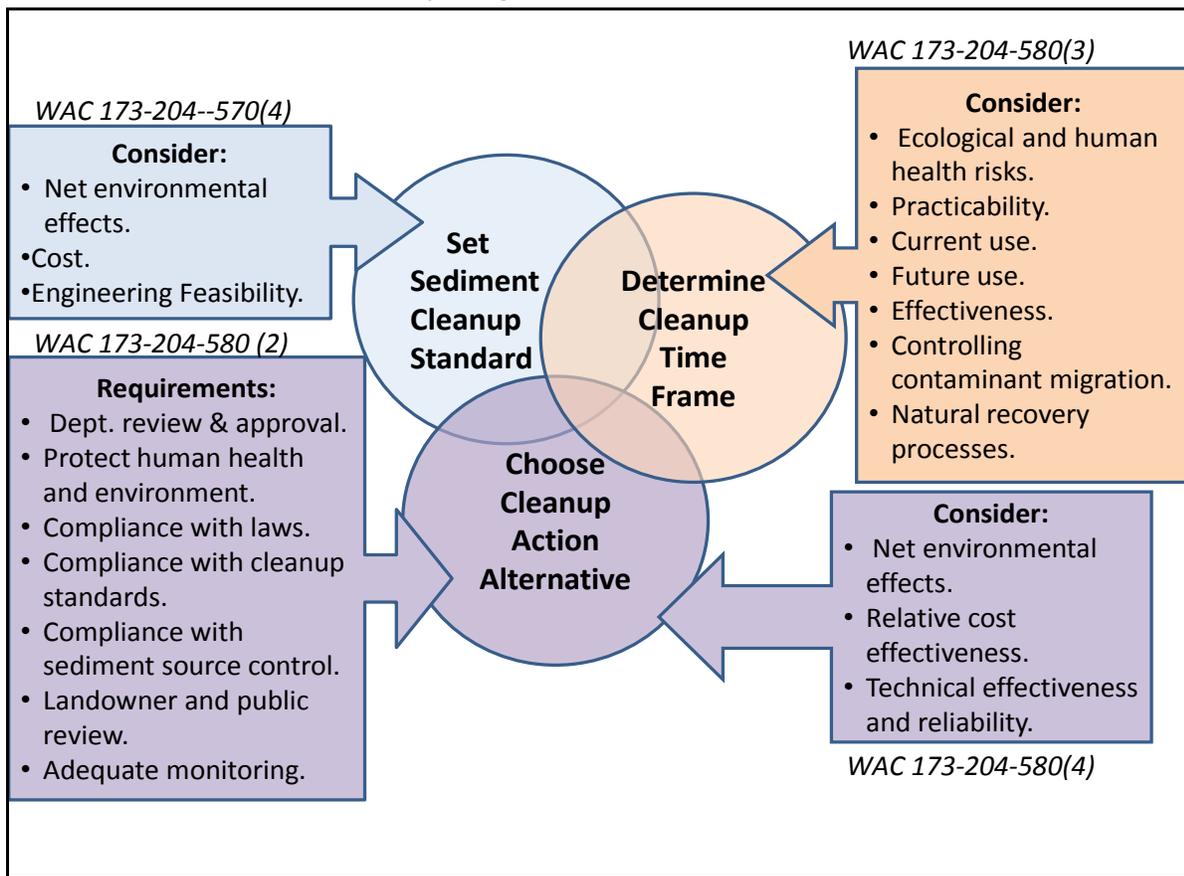
2. The Cleanup Study Report which **contains the information** obtained from the site investigation, evaluation of alternatives, and recommends preferred and alternate cleanup action proposals.

As shown in figure 2, three basic decisions must be made for a sediment cleanup site:

1. **Set a Sediment Cleanup Standard;** the concentration that must be achieved to make the cleanup action final.
2. **Set a Cleanup Time Frame;** establishing how long it will take to achieve the cleanup standard.
3. **Choose a Cleanup Action Alternative;** describing what actions must be taken to achieve the sediment cleanup standard in the time frame.

Each of these decisions is complex, and they are interrelated in the SMS, as depicted by the overlapping circles in Figure 2. Both the Sediment Cleanup Standard and the Cleanup Time Frame are set within a range, depending on a number of factors. Figure 2 shows the factors listed in the SMS that should be considered for each of these decisions. When choosing a Cleanup Action Alternative, there are some factors that are requirements (shown in the purple box on the left of Figure 2), and others that are considerations when choosing an action (shown in the purple box on the right of Figure 2).

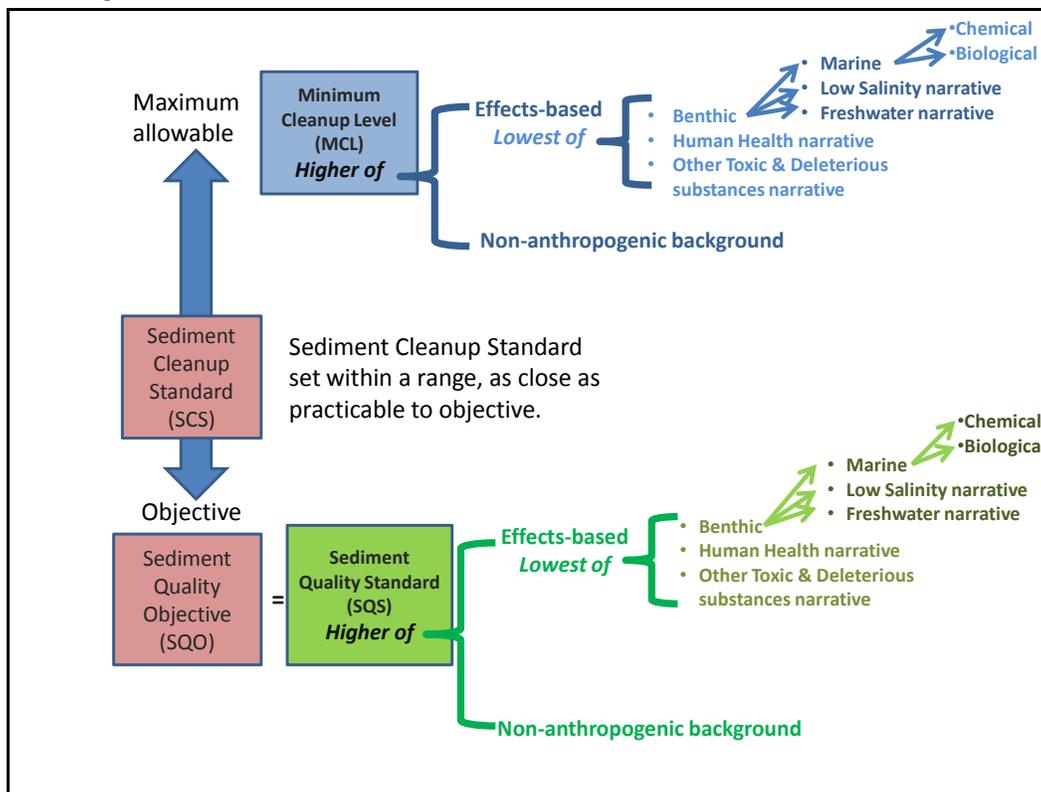
**Figure 2: For sediment cleanup sites, three basic inter-related decisions are made with the considerations for each listed in adjoining boxes.**



**When setting a sediment cleanup standard, site-specific exposure scenarios must be considered.** For each chemical of concern, a sediment quality objective is determined by evaluating the safe sediment concentration for different exposure scenarios, and selecting the number that is the most protective. Figure 3 shows a diagram of how the criteria in the SMS relate to the selection of sediment cleanup standards. The Sediment Quality Objective is always the goal, and the Sediment Cleanup Standard is set as close as practicable to the objective.<sup>8</sup> The maximum allowable concentration that can remain at a sediment cleanup site is the Minimum Cleanup Level (MCUL).<sup>9</sup>

**The SMS allows some flexibility for the time to achieve the cleanup standard.** The regulation requires that the cleanup be completed within a “reasonable time frame” taking into consideration a number of factors shown in Figure 2.<sup>10</sup> Figure 4 shows a diagram of how both the cleanup standard and time frame can be set within a range. The rule states the maximum allowed at a cleanup site is achieving the MCUL at 10 years.<sup>11</sup> Additional time may be allowed to achieve the Sediment Cleanup Standard, if it is set below the MCUL.

**Figure 3: This diagram shows how the Sediment Cleanup Standard relates to the criteria in the Sediment Management Standards.**



<sup>8</sup> WAC 173-204-570(4)

<sup>9</sup> WAC 173-204-520

<sup>10</sup> WAC 173-204-580(3)

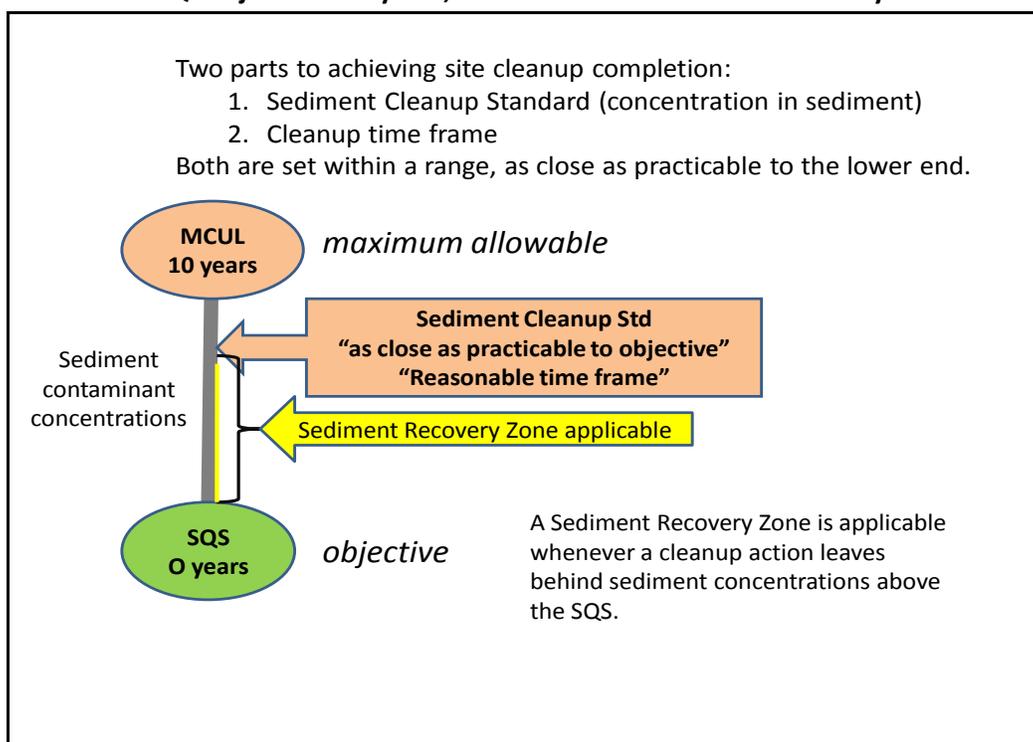
<sup>11</sup> WAC 173-204-570(3)

**Section WAC 173-204-590 describes the use of Sediment Recovery Zones.** A sediment recovery zone is an area where SQS criteria are exceeded as a result of historical discharges, and are authorized by Ecology as part of a cleanup decision.<sup>12</sup> Sediment Recovery Zones are “applicable” whenever a cleanup action leaves behind sediments that are above the SQS.<sup>13</sup> Ecology has to provide specific authorization for a Sediment Recovery Zone in the Cleanup Study Report or other document, and includes specific landowner notification procedures. The rule states “The department shall only authorize sediment recovery zones so as to minimize the number, size, and adverse effects of all zones, with the intent to eliminate the existence of all such zones whenever practicable”.<sup>14</sup>

Sediment Recovery Zones:

- Must have a time period specified during which a Sediment Recovery Zone is authorized.
- May have operation terms and conditions, including ongoing monitoring, as determined necessary by Ecology.
- If terms and conditions are violated, or new information becomes available that show a Sediment Recovery Zone is no longer appropriate, Ecology may revise the authorization, require additional monitoring, or require additional actions including cleanup.

**Figure 4: Sediment Cleanup Standards and Cleanup Time Frame are both set within a range, as close as practicable to the SQS objective at 0 years, but not to exceed the MCUL at 10 years.**



<sup>12</sup> WAC 173-204-200 (24)

<sup>13</sup> WAC 173-205-590 (1)

<sup>14</sup> WAC 173-204-500 (4).