

Framework for Sediment Cleanup Decisions

Department of Ecology, Toxics Cleanup Program

Joint MTCA/SMS Advisory Group & Sediment Workgroup

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Introduction

At the last advisory group meetings held in June and July 2010, Ecology presented a synthesis of input received since the first meeting in November 2009. At that time, we identified a number of areas and guiding principles where we believe there is common ground. These include:

The Sediment Management Standards (SMS) rule should use the MTCA terminology for common terms (such as RI/FS).

Section 580 of the SMS rule (Cleanup Action Decisions) should be revised to incorporate all applicable remedy selection criteria from Section 360 of the MTCA rule.

The long-term environmental goal for sediment cleanup based on human health risks should generally be based on risk targets included in the MTCA rule. For example, incremental cancer risks of one-in-one million and a hazard index of one.¹

Source control of NPDES permitted dischargers should be an integral part of preventing recontamination.

The short-term clean up goal should be based on background that is more attainable than natural background.

The current MTCA liability framework (strict, joint and several) poses some unique challenges when applied to sediment sites.

Cleanup decisions must be implementable.

However, four key issues remained to be decided by Ecology.

- 1) Whether to maintain a two tier decision framework similar to the approach in the current SMS rule.
- 2) When to consider cost in setting sediment cleanup standards or remediation levels.
- 3) If and how to settle liability for “site units” within a larger sediment site.
- 4) How to clarify liability given the probability of recontamination.

Over the past four months, Ecology worked through these issues in order to select a decision-making framework to serve as the initial basis for draft rule revisions. We reviewed all comments we received from the advisory groups and held intensive internal discussions.

This paper describes Ecology proposals for resolving these issues. Ecology will be using the framework presented here as a blueprint for developing rule language.

¹ MTCA cleanup standards are established using the highest of natural background, practical quantitation limit, or incremental cancer risks of one-in-one million and a hazard index of one.

Ecology Strategy for Contaminated Sediment Sites

1. Reduce Risks From Legacy Contamination Through Active Cleanup Measures: Reduce risk to human health and the environment by cleaning up high risk/highly contaminated sites, reducing contaminant loading to the environment and reducing redistribution of nearshore contamination to the environment.
2. Provide Workable Approaches and Incentives for Active Cleanup of Legacy Contamination (and better predictability) for PLPs to clean up the most contaminated areas (identified as Site Units) within larger baywide sites.
3. Resolve Liability: The ability to resolve liability for legacy contamination serves as a powerful incentive for cleanup actions. RCW 70.105D.040(4) authorizes the attorney general to agree to a settlement if Ecology finds that the proposed settlement would lead to a more expeditious cleanup of hazardous substances in compliance with cleanup standards and consent decrees.² Under the current MTCA rule, compliance with cleanup standards can be demonstrated by using a combination of remedial technologies. Ecology identified three pieces to resolving liability:
 - Identify Site Units for active cleanup (see below).
 - For the Site Unit, prevent recontamination by PLP sources through PLP source control; AND reduce contaminant loading to the baywide site.
 - Contribution to long term cleanup efforts for the larger baywide site (for example, funding long term monitoring, further remedial actions, or source control efforts).
4. Active Cleanup Measures: We cannot always dredge our way to complete success. However, active cleanup measures (e.g., dredging, capping) provide a mechanism for rapidly reducing risks by reducing exposure to contaminated sediments. The process for selecting sediment cleanup standards (Section 570 of the SMS rule) is currently designed to identify concentrations that must be achieved within 10 years of completing active cleanup measures. The SMS rule envisions that lower concentrations might still pose a threat to human health and the environment, but would be addressed through source control, natural recovery, institutional controls and/or future active cleanup of residual concentrations.
5. Source Prevention/Control Measures: Long-term solutions to achieve and maintain risk-based standards will require actions to prevent and control ongoing releases of hazardous substances. Such measures will be implemented over several decades. Given those timeframes, ongoing discharges sometimes place practical limits on what can be achieved in the near term with active cleanup measures (e.g., dredging, capping). The current SMS rule includes administrative mechanisms (sediment impact zones and sediment recovery zones) for coordinating active cleanup measures and source control actions.

Additional Operating Premises & Underlying Assumptions Guiding This Strategy

- Cleanup Goals: Risk-based cleanup levels for some hazardous substances can be lower than sediment concentrations resulting from natural processes, global pollution and diffuse regional sources (for example, air emissions and storm water discharges). Consequently, it is important to consider both short-term and long-term environmental goals.

² Any covenant not to sue must be commensurate with the scope of the proposed settlement.

- Use of Multiple Technologies: A combination of remedial technologies (active cleanup measures, source control, natural recovery and institutional controls) will continue to be needed to achieve long term environmental goals. Different technologies may be selected for different areas and/or different contamination levels. For example, higher contamination levels at a site might be addressed by dredging while lower contamination levels are addressed through source control and natural recovery.
- Institutional Controls: Institutional controls have limited effectiveness for aquatic sites. However, they will be needed to help bridge the timeframes between active cleanup measures and achieving long-term goals that rely on source control and natural recovery.
- ARAR Under Federal Superfund Program: The SMS rule is generally considered an ARAR at EPA Superfund sites. The SMS rule states that Ecology will identify the entire contents of the SMS rule as the appropriate state requirement.³

³ WAC 173-204-130(11).

The Two Tier Decision Framework

Issue

For a number of bioaccumulative chemicals, cleanup levels based on protecting human health fall below natural background. In addition, these bioaccumulative chemicals are ubiquitously present throughout Puget Sound at levels above risk based concentrations and natural background. A workable and practical mechanism for sediment cleanup must take into account the reality of widespread, ubiquitous, anthropogenic contamination.

Problem being addressed

How do we integrate human health risks, background concentrations, and the current SMS rule two tier framework and provide flexibility to establish sediment cleanup levels that are attainable?

History

MTCA and SMS define background differently. The MTCA rule requires cleanup standards be the highest of a risk-based value, natural background, or the practical quantitation limit. Feedback from both the MTCA/SMS Advisory Group and the Sediment Workgroup identified that this approach, developed for upland sites, is a difficult fit for sediment sites due to significant differences between upland and aquatic environments, and especially with respect to natural background. Typical MTCA sites are upland and associated with identifiable sources that can be traced back to current or historic site operations. Sediment sites, conversely, typically involve co-mingled contaminant plumes influenced by multiple in-water, upland, upstream, and numerous stormwater and atmospheric depositional sources.

Proposal

We are proposing to use a modified version of the two-tiered framework in the current SMS rule. Under this framework, the Sediment Cleanup Objective⁴ defines the lower bound and the Maximum Allowable Level defines the upper bound. Site-specific cleanup standards are established as close as practicable to the Sediment Cleanup Objective taking into account net environmental effects, costs and engineering feasibility. We believe this framework can be used for sites or site units.

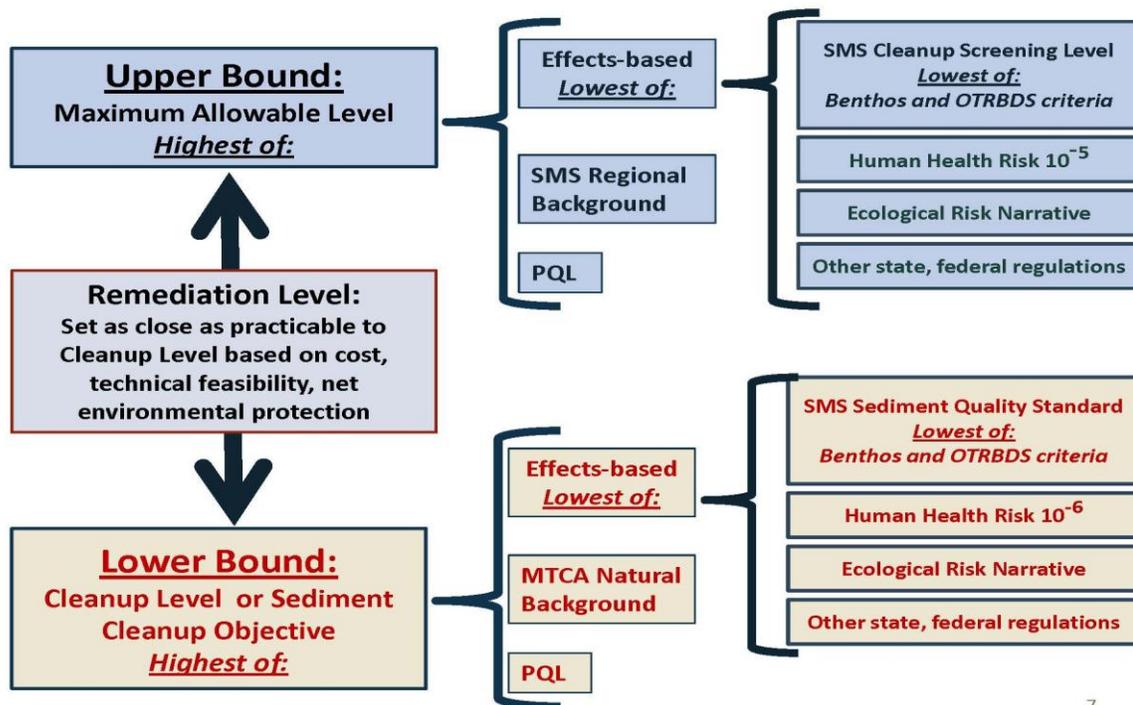
The proposed modifications are shown in Figure 1 below. Key features include:

- Maximum Allowable Level (Upper Bound): The SMS rule would be modified to state that the maximum allowable level could not exceed “regional background” levels. Regional background would be defined as follows:

Concentrations of hazardous substances within an Ecology-defined geographic area, typically encompassing an embayment, watershed, or reach of a river, that result from combined point and nonpoint sources not attributable to *significant identifiable sources*. Regional background concentrations are generally expected to be *greater than or equal* to natural background and *less than* area background as defined in WAC 173-340-200
- Sediment Cleanup Objective (Lower Bound): The SMS rule would be modified to state that the sediment cleanup objective would be established using the general MTCA risk policies. MTCA cleanup standards are established using the highest of an incremental cancer risk of one-in-one million and a hazard index of one, natural background, or the practical quantitation limit.

⁴ The Sediment Quality Standards (SQS) are currently used to define the Sediment Cleanup Objective.

Figure 1. Structure of the proposed two tier framework .This framework retains the current SMS framework of a Sediment Quality Standard and Cleanup Screening Level as the lower and upper bound. However, it also addresses risk to human health and incorporates natural and regional background concentrations. This framework could be used for both sites and site units.



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Rationale for the two-tiered approach

- This approach recognizes the practical limitation of sustaining active sediment cleanup measures when there are ongoing discharges (e.g. storm water) and air deposition that are outside the authority of the PLP. Active sediment cleanup measures are one part of a comprehensive strategy for achieving clean sediments that includes reducing ongoing discharges, controlling air deposition sources, and reducing toxics use in products.
- This approach is flexible. In some cases, it will not be necessary to adjust risk-based cleanup standards based on background concentrations. For example, not all sediment sites are located in depositional areas. In other cases, there will be no ongoing discharges that significantly contribute to a regional background level that is separate from the PLPs releases (e.g., Upper Columbia River).
- Flexibility to establish sediment cleanup levels at concentrations equal to regional background is consistent with MTCA Method C if we interpret “technical impossibility” to include the inability for an individual PLP to control the discharges from other people. It is also consistent with the concept of MTCA remediation levels which provide the flexibility to use a combination of remediation technologies.
- This approach is consistent with EPA Superfund policies and complies with the MTCA statutory directive that cleanup standards be at least as stringent as federal cleanup standards.

Issues associated with two-tier framework

- Terminology: The SMS rule uses the term “cleanup standard” to define the chemical concentrations and level of biological effects that must be achieved by year ten after completion of the active cleanup action.⁵ Conceptually, this is similar to MTCA “remediation levels”. The sediment cleanup objective is conceptually similar to MTCA “cleanup standards”. Based on internal discussions, we are continuing to evaluate the appropriate terminology as we develop draft rule language. We recognize that the choice of terminology could impact the decisions on resolving liability and use of the SMS rule as an ARAR at federal Superfund sites.
- Settling liability for active cleanup measures: RCW 70.105D.040(4) authorizes the attorney general to agree to a settlement if Ecology finds that the proposed settlement would lead to a more expeditious cleanup of hazardous substances in compliance with cleanup standards and consent decrees.⁶ Under the current MTCA rule, compliance with cleanup standards can be demonstrated by using a combination of remedial technologies (e.g., removal, containment, natural recovery, institutional controls). We believe a similar approach can be used for sediments. Based on internal discussions, we are continuing to evaluate how this would work for sediment cleanup actions.
- Limitations on application of regional background approach: We are continuing to evaluate how regional background concentrations would be developed and limitations on applying this concept. For example, we do not believe the regional background approach would be applicable to defining final cleanup requirements for a scenario where a single or a few identifiable sources contributed to widespread contamination (as in the Upper Columbia River).

Considering Cost when Setting Sediment Remediation Levels

Issue

The current Sediment Management Standards consider cost when setting cleanup standards during remedy selection. Conversely, under MTCA cleanup levels are risk-based and costs are considered only during remedy selection. For example, under MTCA the decision to use containment systems and institutional controls may be based in part on costs.

Problem being addressed

Should this SMS framework apply when setting cleanup standards or remediation levels for protection of human health?

History

The SMS framework for protection of the benthic community allows a cleanup standard to be set within a range between the Sediment Quality Standard and Cleanup Screening Level based on considerations of cost, technical feasibility, and net environmental benefit.

⁵ WAC 173-204-570(3) specifies that “...the minimum cleanup level is the maximum allowed chemical concentration and level of biological effects permissible at the cleanup site to be achieved by year ten after completion of the active cleanup action.”

⁶ Any covenant not to sue must be commensurate with the scope of the proposed settlement.

The SMS has successfully been used to set sediment cleanup standards because it provides needed flexibility. It allows decisions to take into account site-specific factors inherent to aquatic environments, including hydrology, numerous unknown contaminant sources, multiple co-mingled plumes, habitat, and land use issues due to state ownership.

Proposal

Use the SMS strategy of a two tier framework to set remediation levels for protecting human health and the environment between the MTCA levels (highest of 10^{-6} human health risk, natural background, PQL) as the lower sediment cleanup goal, and regional background as the upper bound.

Consider technical feasibility, cost, and net environmental benefits when determining remediation levels or cleanup standards. See Figure 1.

Rationale

- This is a practical and workable solution that offers site specific flexibility.
- Maintaining the current SMS framework provides consistency with the SMS rule and the two tier framework.
- Setting achievable cleanup values will encourage liable parties to complete active cleanup of the higher risk contaminated areas (site units) yet still allow for a long-term cleanup goal similar to the very protective MTCA cleanup levels for the larger site.
- The aquatic environment has unique characteristics. The MTCA approach of using institutional controls and remediation levels when meeting risk-based cleanup levels is not feasible or effective for most sediment cleanups. For example, fences and land use restrictions are largely ineffective for controlling exposure.

Discrete “Site Units” Within a Larger Baywide/Watershed Wide Site

Issue

Working with input from advisory group members, we have clarified a mechanism that addresses baywide or watershed wide contamination from numerous liable parties. The goal is to provide an incentive for cleanup of the most contaminated portions of larger areas. The strategy is to focus on higher risk discrete “site units” within the larger sediment site while requiring contribution to cleanup for the larger (baywide or watershed wide) contamination.

Problem being addressed

How do we cleanup contaminated sediments and provide the flexibility for PLPs to settle their liability for discrete site units within a larger sediment cleanup site while resolving liability related to contamination to the larger site? (Ecology would determine whether it is appropriate to enter into such a settlement.)

History

Bioaccumulative contaminants (such as dioxin) are found throughout Puget Sound and in freshwater environments above the MTCA acceptable human health risk level of one-in-one million and above natural background. In embayments with urban or industrial shorelines, concentrations are frequently much higher.

Sediments are a sink for typically hundreds of contamination sources, including a mix of permitted and unpermitted stormwater, atmospheric deposition, and historical releases from site-related activities. Consequently, in theory, an entire embayment could be considered a cleanup site with numerous sources and numerous liable parties.

Proposal

We propose a mechanism that enables targeting highly contaminated portions (called “site units”) where there are identifiable and viable PLPs.

Steps are:

One: Settle liability for discrete site units. Requirements for active cleanup would be established using the two tier SMS framework (see Figure 1). Settlement of liability may include a consent decree with a covenant not to sue and contribution protection if cleanup and source control requirements are met.

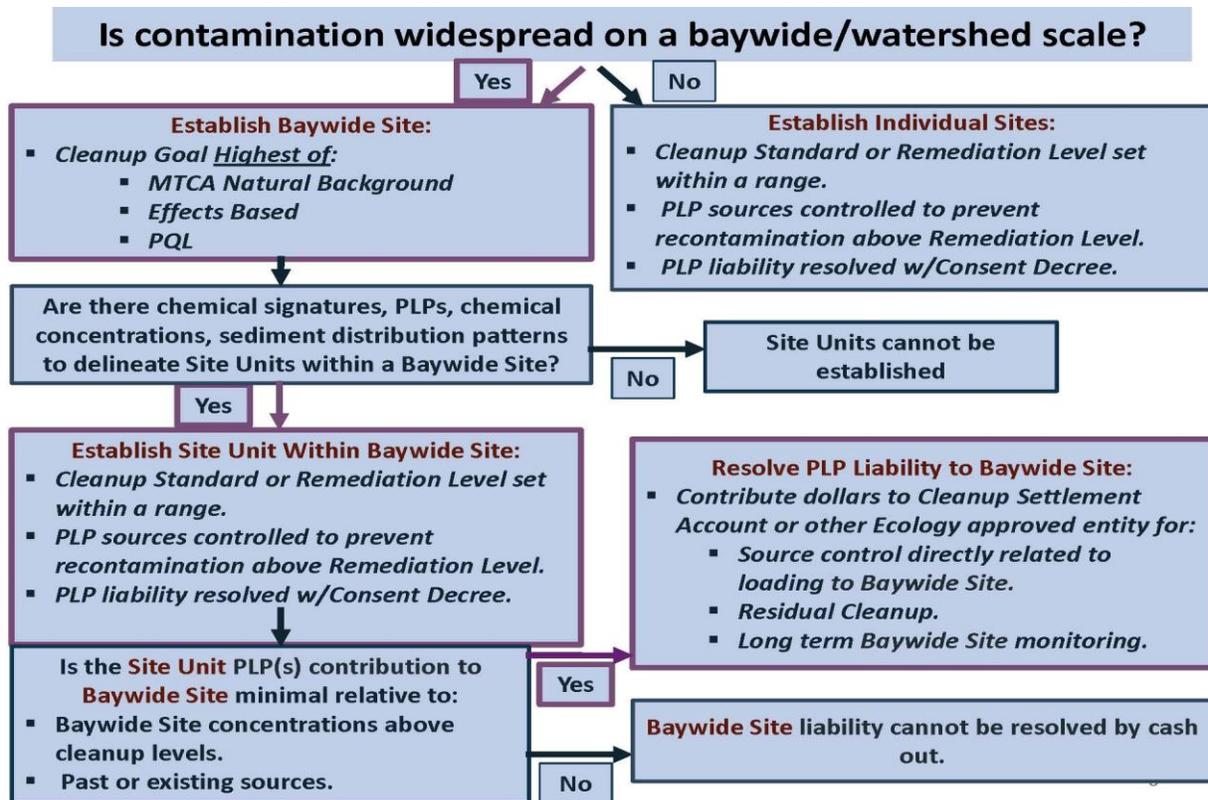
Two: Contribute to larger long term baywide cleanup efforts. Settle liability related to baywide or watershed wide contamination (if the contribution from the PLP is small) by contributing dollars to a Cleanup Settlement Account.

To completely settle all site-related liability requires cleanup of all identified discrete site units to the determined cleanup standard (or remediation level) and contribute dollars toward PLP liability for baywide or watershed wide contamination above natural background. See Figure 2.

Rationale for addressing site units

- Cleanup of discrete site units will produce environmental benefits because the smaller highly contaminated areas can be remediated more rapidly than larger areas with more diffuse sediment contamination.
- This approach provides flexibility. In some cases, it will not be necessary to break sites into discrete site units. In other cases, the PLP proposal will not provide sufficient environmental benefits to justify the level of effort required to oversee and reach a settlement agreement.
- This approach is consistent with current practice. Ecology and/or EPA have reached settlement agreements on portions of larger sediment cleanup projects (Commencement Bay, Bellingham Bay, etc.). It is also consistent with the comprehensive strategy developed for San Francisco Bay.
- Funds contributed to baywide or watershed wide cleanup would be used by Ecology for:
 - Source control to reduce contaminant loading to the site unit or larger site.
 - Additional cleanup of areas with no viable PLP or residual cleanup where needed.
 - Long term monitoring to verify that baywide/watershed wide contaminant concentrations above natural background are declining. Most settlements would be structured so that monitoring verifies the effectiveness of PLPs cleanup actions.
- RCW 70.105D.040(4) authorizes the attorney general to agree to a settlement if Ecology finds that the proposed settlement would lead to a more expeditious cleanup of hazardous substances in compliance with cleanup standards and consent decrees. Any covenant not to sue must be commensurate with the scope of the proposed settlement.

Figure 2. The decision process. This diagram shows the decision process for determining if site units should be established, what the process would be for establishing cleanup standards or remediation levels, and how liability could be settled for the site unit or the larger site.



Address Recontamination of Sediment Cleanup Sites

Issue

Recontamination is a serious problem for sediment cleanups. This is in part because NPDES permitted and unpermitted stormwater and wastewater facilities discharge at concentrations above human-health risk based sediment cleanup goals and natural background concentrations.

In order to move forward with sediment cleanup, we need a mechanism that provides incentive for the liable parties when recontamination (coming from elsewhere) is highly likely. That is, liable parties are reluctant to cleanup because the site(s) will likely be contaminated from other (possibly unidentifiable) sources. This is a particularly pressing problem in urban areas due to both point and nonpoint source stormwater/runoff and atmospheric deposition.

Problem being addressed

How can we clarify liability for recontamination of a cleaned up site or site unit when the contamination is not from the PLP?

History

Settling liability typically includes a consent decree with a covenant not to sue and contribution protection. Neither MTCA nor SMS currently offers a way to settle liability when recontamination of the site is outside the responsibility of the liable parties.

For sediments, recontamination of a cleaned up unit is highly likely due to the ubiquitous nature of contaminants in stormwater, atmospheric deposition, redistribution of nearby contaminated sites that are not yet cleaned up, and other unknown sources.⁷

Proposal

Clarify how MTCA's "innocent landowner" provision would apply to these situations. This might allow Ecology to require cleanup and source control but not hold the responsible party liable for recontamination not under their authority. (An example of recontamination that could not be controlled might be municipal stormwater discharge that recontaminates the cleaned up unit, but is not under the authority of the PLP conducting the cleanup).

In addition, the PLP must implement facility specific source control (for example, facility permitted point source discharges and cleanup of contaminated upland soil or groundwater) to ensure the facility property and operations do not contribute to nearshore or baywide contamination above regional background (or a lower site-specific level established after consideration of net environmental effects, costs and engineering feasibility).

If the liable party implements and maintains source control that prevents recontamination above regional background or a site-specific level, a full settlement with a consent decree would be given for the site unit. If the PLP's efforts at source control to prevent recontamination above regional background are ineffective (for example, from storm water) the cleanup will be considered an interim action without full liability settlement of the unit.

Rationale for acknowledging recontamination

- Stormwater NPDES permits are very limited by the chemicals monitored and it is likely that the current effluent limits will cause sediment recontamination. There are also many stormwater contaminant sources that are not currently under an NPDES permit.
- Ecology's Water Quality Programs' schedule for addressing the types of contaminants from the numerous stormwater sources that cause sediment contamination is not consistent with preventing near term recontamination of sediment sites.
- Even if a higher set of criteria are used to regulate NPDES sources, it is highly likely that continuing sources will cause ongoing sediment concentrations above the cleanup standard.
- Without reducing permitted sources, it may not be possible to meet cleanup standards, nor maintain them for the long term.
- Those engaged in cleanup do not want to be held responsible for recontamination by other continuing sources, or by redistribution of existing contaminated sediments, and will not fully participate in cleanups that make them accountable for sources over which they have no responsibility.

⁷ This discussion assumes that the liable parties have conducted and are maintaining source control for their facilities.