

12 ANTIDegradation EVALUATIONS

As part of each sediment characterization that includes core sampling, the DMMP agencies [require the collection and archiving of a sample \(Z-sample\)](#) from each core, consisting of the first two feet of material extending beyond the proposed project overdepth (Section 5.9). These samples represent the post-dredge sediment that would be exposed following dredging. The exposed sediment must meet the SMS antidegradation policy (WAC 173-204-120), which seeks to manage “sediment quality so as to protect existing beneficial uses and move towards attainment of designated beneficial uses” ([Ecology, 2013](#)).

Antidegradation evaluations are site-specific and often require best professional judgment on the part of the DMMP agencies. There have been a number of guidance documents written by the DMMP agencies to address testing of Z-samples and evaluation of the data for compliance with the antidegradation policy (PSDDA, 1988; [DMMP 2001a](#), [2008a](#), [2010d](#)). This chapter provides a summary of those documents.

12.1 WHEN TO TEST Z-SAMPLES

Chemical analysis of Z-samples is required if the testing results for the overlying dredged material are

1. found to be unsuitable for unconfined aquatic disposal, or
2. if any other project in the vicinity has shown evidence of subsurface sediments with greater contamination than surface sediments, or
3. if there is any other site-specific reason to believe that the sediment to be exposed by dredging may fail to meet the antidegradation policy.

In a small number of cases, where there is reason-to-believe that concentrations of chemicals of concern increase with depth, the DMMP agencies may require Z-samples to be analyzed concurrently with analysis of the dredged material; or the dredging proponent may opt for concurrent testing to save time. However, for the majority of projects, a decision about Z-sample analysis will be made after review of the chemistry/bioassay data associated with the dredged material.

12.2 DETERMINING ANALYSIS REQUIREMENTS

Z-sample analyses will initially consist of sediment conventional and chemical analyses. At a minimum, the conventionals to be analyzed include grain size, total organic carbon, total solids and total volatile solids. If there is a possibility that bioassays may need to be run, then ammonia and sulfides data will also be important. As for chemicals-of-concern, typically only those chemicals that were elevated in the overlying dredged material will need to be tested in the Z-samples. However, the overall data set will need to be taken into consideration in making this call. For example, if two adjacent DMMUs are found unsuitable for open-water disposal, one due to elevated PCBs and the other due to elevated TBT, then the DMMP agencies could require the z-samples underlying both DMMUs to be tested for both PCBs and TBT.

Bioassays may become necessary if chemistry testing alone does not provide enough information for the antidegradation evaluation. For example, there have been cases in which DMMUs with no SL exceedances have failed biological testing. In such cases it might be necessary to run bioassays on the Z-samples to test for toxicity not predicted by the chemistry

results. Due to holding time constraints (56 days for bioassays), the Z-samples may need to be recollected before bioassays can be run.

Bioaccumulation testing of Z-samples may also be necessary in some situations. However, it is anticipated that bulk sediment concentrations (or optional porewater results in the case of TBT) could be used in most cases to determine the bioaccumulation potential of the Z-samples relative to the overlying dredged material. If the calculated bioaccumulation potential exceeds acceptable limits, the dredging proponent always has the option to conduct bioaccumulation testing to determine the actual bioaccumulation potential.

12.3 EVALUATING COMPLIANCE WITH THE ANTIDegradATION POLICY

As indicated previously, antidegradation evaluations can be complicated and often require best professional judgment on the part of the DMMP agencies. DMMP (2008a) should be referenced for more detail, but the following guidelines are expected to cover the majority of antidegradation evaluations for marine projects:

- If the post-dredge sediment meets the SMS Sediment Quality Standards (SQS), it is generally also compliant with the antidegradation policy. Exceptions include chemicals without numeric SQS values, such as dioxin and tributyltin.
- Post-dredge sediment may not exceed the SMS Cleanup Screening Levels (CSL) or DMMP MLs unless they pass bioassays.
- If chemical concentrations are higher in the Z-samples than in the overlying dredged material and exceed SQS (or SL for COCs with no numeric SQS), then bioassays might be required to evaluate the material for toxicity. Toxicity would need to be below SQS in order to meet the antidegradation guidelines.
- If chemical concentrations are lower in the Z-samples than in the overlying dredged material, but still exceed SQS (or SL for COCs with no numeric SQS) and/or BT, the DMMP agencies will review the bioassay and/or bioaccumulation results from the overlying dredged material before requiring the Z-samples to be tested biologically.
- Dioxin concentrations will be evaluated using the following guidelines:
 - TEQs less than 4 pptr meet the antidegradation standard
 - TEQs greater than 10 pptr generally do not meet the antidegradation standard, but will be evaluated on a case-by-case basis

TEQs between 4 and 10 pptr will be compared to concentrations in the overlying dredged material.

Antidegradation guidelines for freshwater projects are similar to those for marine projects, with the SCO (SL1) replacing SQS. Dioxin will be addressed on a case-by-case basis.

12.4 WHAT HAPPENS IF THE SEDIMENT IS NOT COMPLIANT?

If the sediment to be exposed by dredging does not meet the antidegradation standard, there are two options available:

- Dredge deeper until acceptable material is reached

- Overdredge and place a clean sand cover over the area

12.5 OTHER CONSIDERATIONS

The complexity of dredging projects varies considerably. Following are additional considerations for Z-sample collection and analysis:

- Multiple Z-layers might need to be collected depending on anticipated conditions at the project site. For example, if there is a high probability of encountering elevated chemical concentrations in the newly exposed sediment, the dredging proponent might want to collect Z-samples from 0-2, 2-4 and 4-6 feet beyond the planned overdepth in order to reach uncontaminated native material.
- Projects with planned upland disposal might not ordinarily be required to test the dredged material for DMMP disposal. However, an antidegradation evaluation will still be required by the Department of Ecology. This evaluation could involve sampling and testing of the sediment that will be exposed by dredging.
- In those cases where the sediment to be exposed by dredging is resampled to collect sediment for biological testing, the resampled sediment must undergo DMMP chemical testing to provide a synoptic dataset.
- Due to time or monetary constraints the dredging proponent may desire to forego biological testing of the Z-layer and proceed directly to overdredging and/or placement of a clean sand layer over the new sediment surface.

12.6 POST-DREDGE EVALUATIONS

In certain situations, the post-dredge sediment surface (top 10 cm) may be subject to sediment quality evaluation at the discretion of the DMMP agencies. This may be necessary if pre-project Z-samples could not be collected due to the presence of rip rap; where underpier sloughing occurs and the underpier sediment could not be evaluated prior to dredging; in cases of dredging violations where material that has not been approved for open-water disposal is dredged; or where dredging residuals are of concern. Post-dredge evaluations will be conducted on a case-by-case basis.