

Appendix L

Potential Removal Action Monitoring

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This appendix outlines the options for Removal Action monitoring that may be employed to:

- confirm that Removal Action construction activities are performed in accordance with the Archaeological Monitoring Protocol (DEQ and USEPA, 2002);
- confirm that construction of the Removal Action meets the design requirements; and
- confirm that the Removal Action is performing as expected.

The monitoring technologies discussed below are intended to provide a general idea of monitoring methodologies that may be performed during construction or after a given technology is implemented. The final monitoring program will be developed during the detailed design of the selected remedy.

This appendix discusses monitoring for the following technologies:

- Removal Action construction;
- dredging;
- capping;
- monitored natural recovery (MNR); and
- confined disposal facility (CDF).

L.1 Archaeological Monitoring

During design, the on-site procedures for the Archaeological Monitoring Protocol will be developed to ensure compliance with the National Historic Preservation Act (16 USC 470) and applicable Oregon statutes (ORS 97.740 et seq., 358.905 et seq., and 390.235 et seq.). These procedures will address potential inadvertent discoveries of cultural materials and deposits (including sacred objects, funerary objects, and objects of cultural patrimony as defined in ORS 358.905) and Indian burials and human remains (as defined in ORS 358.905) during ground disturbing activities. The Archaeological Monitoring Protocol will include information regarding:

- Pre-action ceremonies.
- Notification of ground disturbing work.
- Professional archaeologist on-site.
- Tribal representative on-site.
- Procedures in case of discovery.

L.2 Post-Dredging Confirmation Sampling

Post-Removal Action confirmation sampling for dredging will likely consist of:

- bathymetric survey; and

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- surface sediment sampling.

These monitoring activities would likely be performed once, shortly after completion of dredging.

L.2.1 Bathymetric Survey

A bathymetric survey after dredging may be performed to confirm that the dredging elevations were met. The bathymetric survey could also be used to confirm that the Removal Action Objectives (RAOs) were met and to evaluate contractor performance.

L.2.2 Surface Sediment Sampling

Surface sediment sampling may be performed in the post-dredge area. The samples would likely be analyzed for the chemicals of potential concern (COPCs). The surface sediment chemistry would likely be used to confirm that the RAOs were met and to evaluate contractor performance.

L.3 Post-Capping Confirmation Sampling and Monitoring

Post-Removal Action confirmation sampling for capping may consist of:

- bathymetric surveys;
- diver surveys and sediment coring (under-pier areas); and
- surface sediment sampling.

These confirmation activities would likely be performed shortly after completion of capping. Under-pier capping is assumed for the pier at Berth 411 in Slip 3. This area is relatively small (approximately 1.7 acres) compared to the overall Removal Action Area (approximately 45 acres). Bathymetric surveys will not be practical under the pier. To the extent practical, pre-capping and post-capping lead-line surveys would likely be performed. Diver surveys and sediment coring through the cap to verify thickness would also likely be performed in these areas. The cap thickness verification would also likely be performed in proximity to the sheet pile wall to verify design assumptions.

Post-Removal Action Monitoring for cap integrity may consist of:

- bathymetric surveys and
- cap inspections

The frequency of monitoring activities would be determined during detailed design of the selected remedy and likely depend on performance. If the cap is performing as expected, the length of time between monitoring events may increase.

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L.3.1 Bathymetric Survey

A bathymetric survey after capping may be performed to confirm that the cap thickness requirements were met and to establish cap surface elevations. The post-capping bathymetric survey could also be used to confirm that the RAOs were met and to evaluate contractor performance. Bathymetric surveys would likely be performed periodically thereafter for monitoring purposes to confirm that the cap is maintaining appropriate thickness (i.e., it meets the long-term effectiveness requirements of the Removal Action).

In under-pier areas, bathymetric surveys may consist of simple lead-line surveys that would be performed prior to and following construction to verify cap thickness.

L.3.2 Diver Survey and Sediment Coring

Diver surveys in conjunction with sediment coring through the cap may be performed after capping to confirm cap thickness in under-pier areas and evaluate contractor performance as part of the post Removal Action confirmation sampling.

L.3.3 Surface Sediment Sampling

Post-Removal Action confirmation surface sediment sampling may be performed in the capped areas to confirm that the RAOs were met. In areas that are capped and then armored, no cap chemistry verification sampling would occur. Surface sediment samples would likely be analyzed for the COPCs. The surface sediment chemistry would likely be used to confirm that the RAOs were met and to evaluate contractor performance.

L.3.4 Cap Monitoring

Post-Removal Action monitoring of the capped areas may consist of a diver visual inspection program of the cap to evaluate cap integrity. Cap inspections would likely be performed on a periodic basis to confirm the integrity of the cap. In addition, it is likely that cap inspections would be performed following a natural event (earthquake or 100-year flood event) to confirm the integrity of the cap. The frequency of cap monitoring would be determined during detailed design of the selected remedy and may be modified based on performance.

L.4 MNR Monitoring

Post-Removal Action monitoring for MNR may consist of:

- surface sediment sampling.

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These monitoring activities would likely be performed shortly after completion of the Removal Action and periodically thereafter. The frequency would be determined during detailed design of the selected remedy and may be modified based on performance. If the MNR area is performing as expected, the length of time between monitoring events may increase. If surface sediment concentrations in MNR areas do not recover to agreed upon cleanup criteria within five years, then the MNR areas that do not meet the cleanup criteria will be evaluated for additional removal action (provided upstream source control actions have been accomplished).

L.4.2 Surface Sediment Sampling

Surface sediment sampling may be performed in the MNR area to monitor surface MNR concentrations. Samples would likely be analyzed for the COPCs. The surface sediment chemistry would likely be used to confirm that the RAOs were met. Surface sediment samples would likely be collected annually for a 5-year period. If after 5 years of post-removal action monitoring, concentrations are not consistent with RAOs, additional removal action will be evaluated.

L.5 Post-CDF Confirmation Sampling and Monitoring

Post-Removal Action monitoring for the CDF may consist of:

- cap inspections;
- armor inspections; and
- groundwater sampling.

These monitoring activities would likely be performed shortly after completion of the CDF and periodically thereafter. The frequency of the periodic monitoring would be determined during detailed design of the selected remedy and may be modified on performance.

L.5.1 Cap Monitoring Inspection

A visual inspection program of the paved cap of the CDF will likely be implemented following construction to evaluate its integrity. Cap inspections would likely be performed periodically to confirm the integrity of the cap.

L.5.2 Armor Monitoring Inspection

A monitoring inspection program of the CDF armor will likely be implemented following construction to evaluate its integrity. The armor inspection could also be used to confirm that the RAOs were met and to evaluate contractor performance. Armor inspections would likely be performed periodically thereafter to confirm the integrity of the armor.

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L.5.3 Groundwater Sampling

Monitoring wells may be installed in or in close proximity of the berm of the CDF. Groundwater sampling may be performed following construction to confirm the CDF is functioning as designed. Groundwater samples would likely be analyzed for the COPCs. The groundwater chemistry would likely be used to confirm that the RAOs were met. Groundwater samples would likely be collected periodically thereafter to confirm the integrity of the CDF.

L.6 References

U.S. Army Corps of Engineers (USACE), 2003. Pacific Sound Resources Superfund Site Technical Specifications, Harbor Island, Seattle, Washington. RFP No. DACW67-03-R-0003. March.

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