EPA United States Environmental Protection Agency
Region 10

Lower Duwamish Waterway Proposed Plan Summary

DEPARTMENT OF ECOLOGY State of Washington

Tell us what you think about EPA and Ecology's plans for cleaning up the Duwamish

Seattle, Washington April 2013

The Environmental Protection Agency has released a *Proposed Plan* to clean up contamination in the Lower Duwamish Waterway Superfund Site, the northern portion of Seattle's only river, located at the south end of Elliott Bay. The Washington Department of Ecology has released a companion *Source Control Strategy* to reduce ongoing sources of pollution to the waterway. The EPA also has released an *Environmental Justice Analysis* that examines the impact of contamination on minority and low-income communities who live around or use the waterway. Your comments on the three documents are important to us and may result in EPA and Ecology changing their plans.

Submit comments by June 13

- **Online** at **www.resolv.org/site-ldpc**
- **Email**: **ldpc@resolv.org**
- **Fax**: 206-420-5999
- **Mail letters to**: Allison Hiltner
  Environmental Protection Agency
  1200 6th Avenue, Suite 900 ECL-111
  Seattle, WA 98101

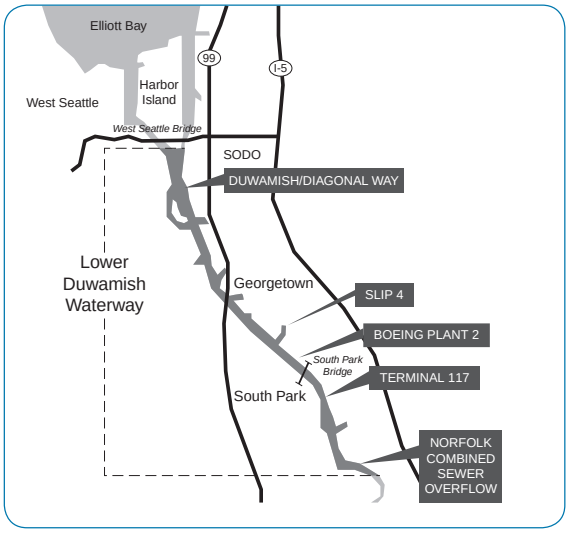
Visit **www.epa.gov/region10/duwamish.html** to download the documents and for information about public comment meetings.

A three -part strategy for cleaning up the Duwamish

There are three parts to the cleanup proposed by the EPA and the Washington Department of Ecology for cleaning up the Lower Duwamish Waterway:

Part 1 – Clean up the most contaminated areas first. Cleanups have been completed at three Early Action Areas (Duwamish Diagonal, Norfolk Combined Sewer Overflow, and Slip 4), and are under way at two more (Boeing Plant 2/Jorgensen Forge and Terminal 117). EPA expects to complete these Early Actions in 2015. They will address 29 acres of polluted sediments, and are projected to reduce PCB* concentrations in the waterway sediments by 50 percent.

Part 2 – Investigate and control ongoing sources of contamination to the waterway. Ecology is the lead agency for controlling sources of contamination to the Duwamish. Ecology and other agencies have made substantial progress towards finding, investigating, and controlling historical and ongoing sources of contamination to the Duwamish but more work remains. Ecology's Source Control Strategy is Appendix A in the Proposed Plan.



Part 3 – Clean up the remaining contamination and monitor to measure the success of the remedy in reducing risks. The Proposed Plan describes EPA's recommendation for cleaning up the contaminated sediment (mud) in the Lower Duwamish Waterway.

**For more information on contaminants, see the box on page 9.*

EPA's Proposed Plan Summary

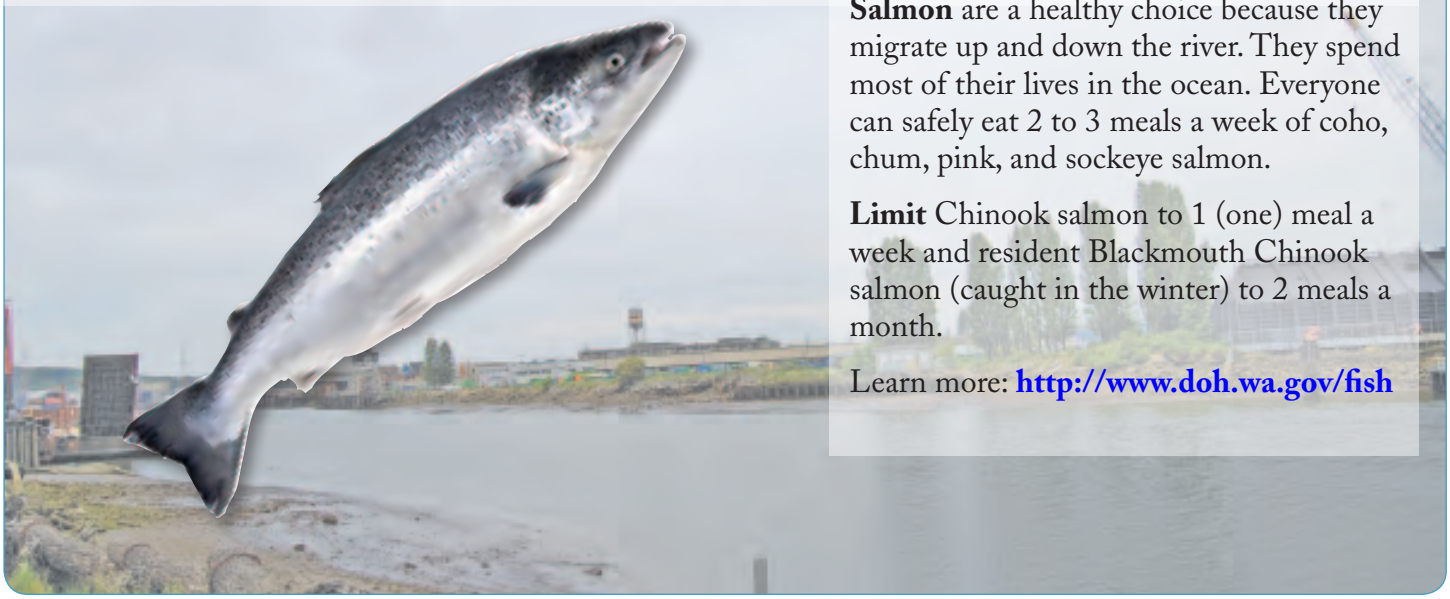
EPA's proposed cleanup plan addresses approximately 412 acres and includes the following elements:

- A total of 156 acres of active cleanup, consisting of:
  - ➢ 84 acres of dredging or partial dredging and capping (an anticipated total volume of 790,000 cubic yards would be dredged and disposed in an upland permitted landfill);
  - ➢ 24 acres of capping;
  - ➢ 48 acres of enhanced natural recovery;
  - ➢ Both capping and enhanced natural recovery may include amendment with activated carbon or other substances to make the remaining contamination less harmful.
- Further reduction of contaminant concentrations over time in the remaining 256 acres through monitored natural recovery. Long-term monitoring data will determine whether additional cleanup actions will be necessary in these areas.
- Institutional controls and waterway-wide monitoring will be used to enhance and measure protectiveness. EPA's objective is to minimize, to the greatest extent possible, reliance on seafood consumption advisories to protect people's health.
- The proposed "active" cleanup will take about 7 years to implement, and is projected to take an additional 10 years to further reduce contaminant concentrations through monitored natural recovery.
- The estimated cost of the proposed cleanup is $305 million.
- The footprint of the Proposed Plan may change slightly based on the results of sampling once the Early Action Area (hot spot) cleanups are completed.

A detailed map of the Proposed Plan footprint is on EPA's Duwamish web page.

Do you eat fish from the Lower Duwamish?

The main way people are exposed to the chemicals in the Duwamish River is by eating the seafood that live in the river year round. **Don't eat resident fish, shellfish or crab from the river.**



Salmon are a healthy choice because they migrate up and down the river. They spend most of their lives in the ocean. Everyone can safely eat 2 to 3 meals a week of coho, chum, pink, and sockeye salmon.

Limit Chinook salmon to 1 (one) meal a week and resident Blackmouth Chinook salmon (caught in the winter) to 2 meals a month.

Learn more: **http://www.doh.wa.gov/fish**

Why does the Duwamish need to be cleaned up?

Over 100 years of industrial and urban use has polluted the sediments (mud on the river bottom), water, and marine life in the Lower Duwamish Waterway. Many people and businesses are affected by both the pollution and the cleanup. The communities of South Park and Georgetown are on either side of the Duwamish, and public parks give people direct access to the waterway. Tribes have fished from the Duwamish for centuries and have Treaty-guaranteed fishing rights.

Wildlife, including salmon, ospreys, and otters live in, along, or migrate through the Duwamish. An active port and various industrial facilities operate along the Duwamish.

What do we know about contamination in the Lower Duwamish?

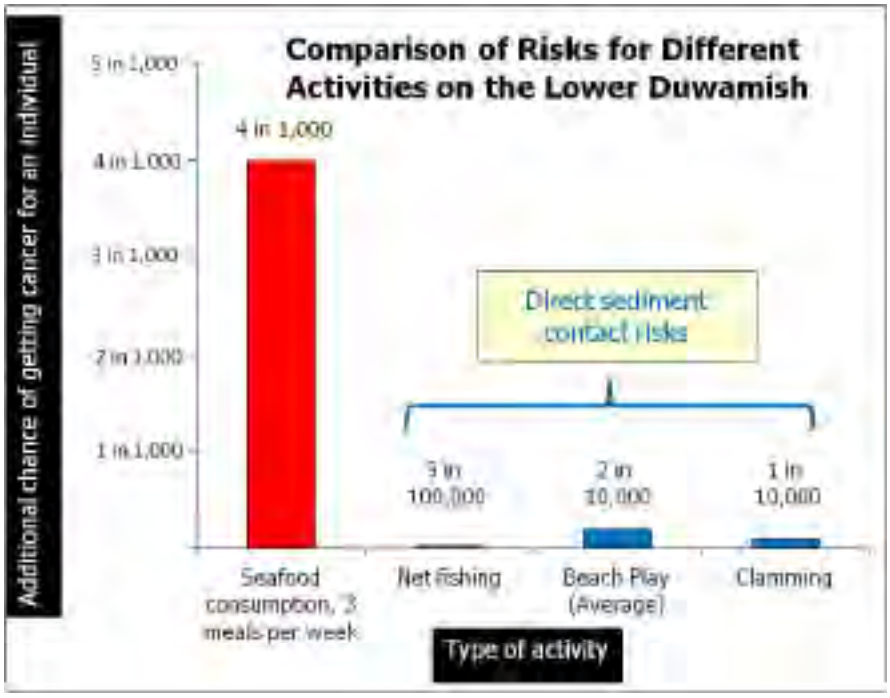
Since 2000, The Port of Seattle, City of Seattle, King County, and The Boeing Company, under oversight by EPA and Ecology, have done extensive studies to understand the amount of chemical contamination in the Lower Duwamish Waterway and risks from exposure to the contamination.

These studies show that contaminants in the waterway can threaten the health of people and wildlife. Shellfish, worms and other benthic invertebrates live in the Duwamish sediments (mud) and pick up contaminants.

As fish and other animals eat the benthic invertebrates and shellfish, those contaminants build up in their bodies. Because of this contamination, all the fish and shellfish, except salmon, are not safe to eat.

Studies show that:

- The most harmful Duwamish contaminants are PCBs, arsenic, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and dioxins/furans.*
- Concentrations of 41 contaminants in sediments exceed the State of Washington's Sediment Quality Standards for protection of organisms that live in the sediments.
- The greatest risks to people come from eating contaminated fish and shellfish that spend most of their lives in the Lower Duwamish Waterway.
- Risks from touching or accidently ingesting contaminated sediments while playing on the beach, clamming or netfishing are relatively low, but some areas exceed "threshold" values for cleanup and are included in the cleanup plan. Risks are lowest in easily accessible beaches like Duwamish Waterway Park and highest in less accessible industrial areas.
- Mammals such as river otters are at risk from eating contaminated seafood. Risks to fish, birds, and wildlife are lower. Cleaning up contamination to reduce risks to people, bottom-dwelling organisms, and river otters will protect other wildlife as well.



Objectives for the cleanup

Contaminants must be either removed or covered so that the benthic invertebrates, fish and shellfish and the people and wildlife that eat them are protected.

Using the results of these studies, EPA developed four Remedial Action Objectives for the Duwamish cleanup. The objectives of the cleanup are to reduce risks to health-protective levels for:

1. people who eat resident fish and shellfish
2. people who come into contact (skin contact and incidental ingestion) with contaminated sediments during net-fishing, clamming, and beach play;
3. bottom-dwelling organisms; and
4. crabs, fish, birds, and mammals.

The proposed cleanup plan includes Preliminary Remediation Goals, or contaminant concentrations that must be met in sediments, fish and shellfish, and water in order to meet the Remedial Action Objectives. Preliminary Remediation Goals will become cleanup levels in EPA's Record of Decision.

Cleanup technologies

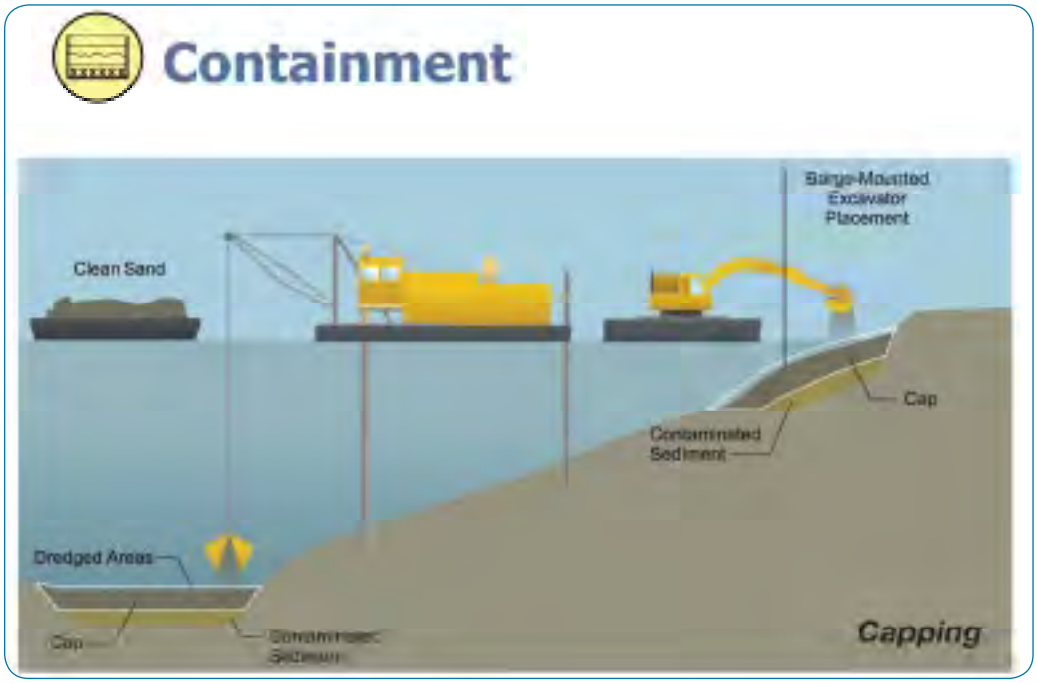
Several cleanup technologies can be used to clean up contaminated sediments in the waterway. Some technologies rely mostly on construction, such as dredging and capping. They are considered "active" technologies. Other methods rely on the natural flow of cleaner sediments from upriver.

The decision to use active technologies is based on several factors including:

- the type, amount, and depth of contamination;
- the likelihood that people, wildlife, or marine creatures will come into contact with the contamination;
- the likelihood that it might be disturbed by ships or construction activities; and
- the need to maintain water depths and habitat so that people and marine creatures can continue to use the waterway.

Removal – dredge to remove contaminated sediments from the waterway. Options to deal with the dredged material after removal include:

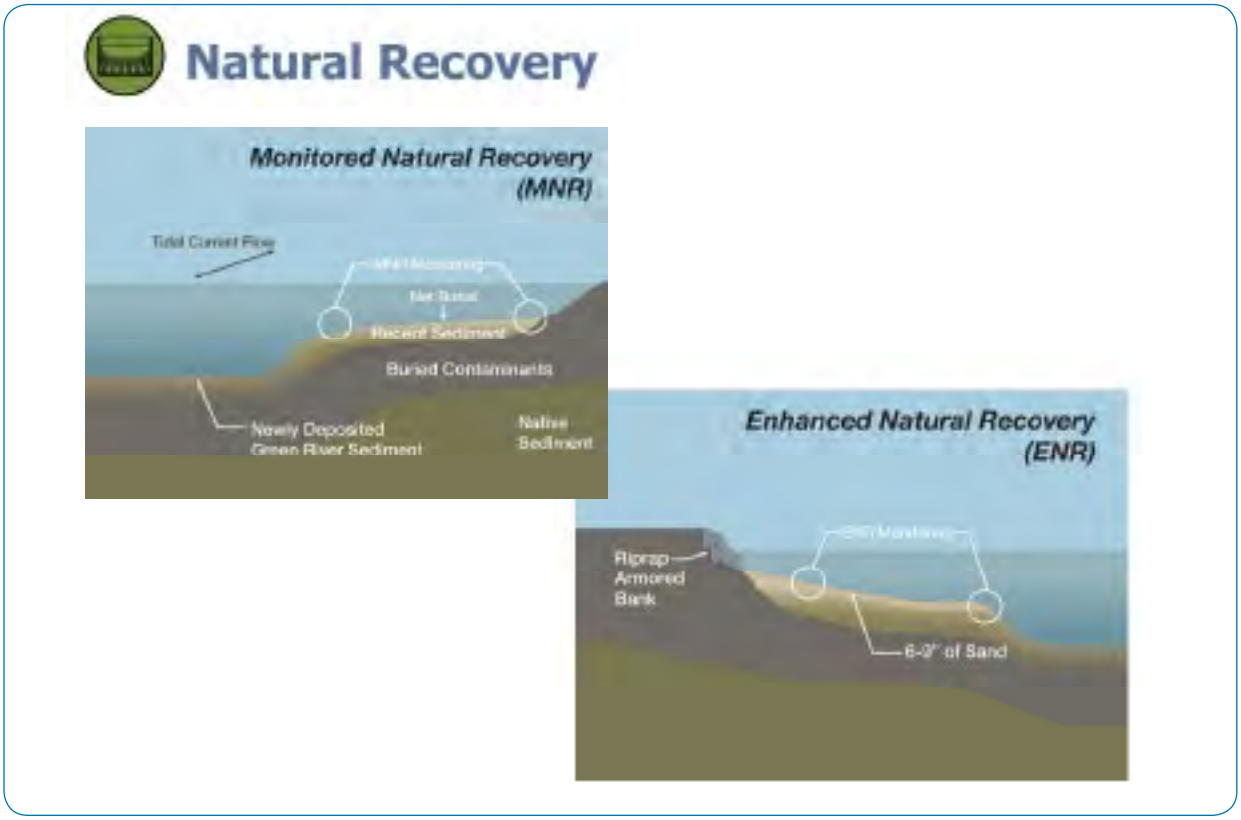
- Disposal: on-site (for example, in a contained in-water disposal facility) or off-site (for example, in a permitted landfill).
- Treatment of sediments and/or water draining from dredged materials to reduce toxicity.



Containment – cover the contaminated sediments with layers of, sands, silts, gravel and rock designed to contain and isolate the contamination. This also is called "capping."

Enhanced natural recovery – use a thin layer of sand to cover the pollution and speed up the natural recovery process. Activated carbon or other materials may be added to caps or enhanced natural recovery areas to make remaining contamination less harmful to bottom-dwelling creatures. Pilot testing is needed to test the effectiveness of this relatively new technology.

Monitored natural recovery – rely on the natural flow of cleaner sediments from upriver to cover contaminated sediments in the waterway. Monitor to measure the reduction in contamination over time.



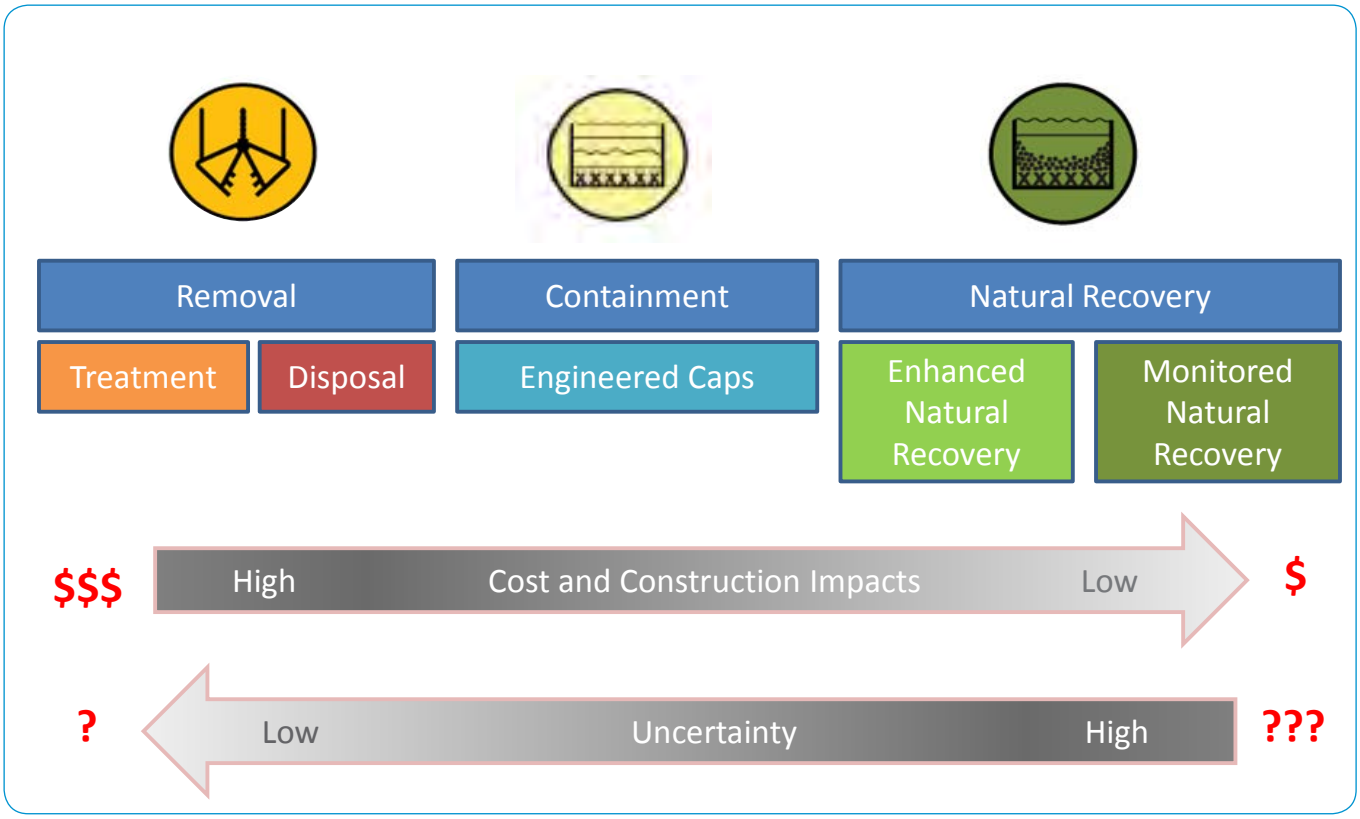
Cleanup technologies

⇨*Continued*

Monitoring and Institutional Controls – Monitor to track pollution levels in the sediments, water, and fish and shellfish before, during and after cleanup. More cleanup may be required if monitoring shows pollution levels are not decreasing as expected.

Use fish advisories to warn against eating resident fish and shellfish and restrictions on activities such as digging or anchoring in specified areas if needed.

Cleanup technologies have different features and effects



What alternatives did EPA consider?

EPA considered many cleanup alternatives and is recommending a cleanup plan that the agency believes provides the best balance of effectiveness, certainty, time, and cost while considering community and business needs. All alternatives assume:

- Completion of cleanup at the most contaminated 29 acres of the Duwamish. These are referred to as Early Action Areas; and,
- Continuation of efforts to control ongoing sources of pollution.

The table on Page 7 summarizes the alternatives evaluated.

Each alternative uses a mix of technologies to achieve cleanup goals. The higher numbered alternatives require more active cleanup, like dredging or capping, over more of the waterway. The lower numbered alternatives place more emphasis on monitored natural recovery.

The "removal emphasis" or "R" alternatives use mostly dredging, while the "combined technology" or "C" alternatives use less dredging, and rely more on capping and enhanced natural recovery. EPA's Preferred Alternative is "5 Combined Technology Plus" in the last line of the table on the next page.

Cleanup Alternatives Considered

	Cleanup Alternatives	Cleanup Technology Used					Total Dredge Volume (cubic yards)	Years to Construct	Years to Reduce Risk Following Start of Construction	Cost ($ millions)
		Dredge or Partial Dredge & Cap (acres)	Cap (acres)	Enhanced Natural Recovery (acres)	Monitored Natural Recovery (acres)	Total Active Remedy (acres)				
	1 No Further Action	0	0	0	412	0	n/a	n/a	25	$9
Removal Alternatives	2 R (with Onsite Disposal Option)	32	0	0	380	32	580,000	4	24	$200
Removal Alternatives	3 R	58	0	0	354	58	760,000	6	21	$270
Removal Alternatives	4 R	107	0	0	305	107	1,200,000	11	21	$360
Removal Alternatives	5 R (with Treatment Option)	157	0	0	255	157	1,600,000	17	22	$510
Removal Alternatives	6 R	302	0	0	110	302	3,900,000	42	42	$810
Combined Alternatives	3 C	37	11	10	354	58	490,000	3	18	$200
Combined Alternatives	4 C	68	23	16	305	107	690,000	6	21	$260
Combined Alternatives	5 C	80	24	53	255	157	750,000	7	17	$290
Combined Alternatives	6 C	150	51	101	110	302	1,600,000	16	16	$530
	Preferred Alternative (5C Plus)	**84**	**24**	**48**	**265**	**156**	**790,000**	**7**	**17**	**$305**

Each alternative has trade-offs. Here are some things to consider when comparing alternatives:

- Alternatives 2 through 6 differ in the amounts of dredging, capping, enhanced natural recovery, and monitored natural recovery used. All alternatives rely on institutional controls such as seafood consumption advisories to provide additional protection to people's health.
- Alternatives with more **dredging** give more certainty in the long-term by removing the contamination from the waterway, but have more short-term impacts (disturbance, emissions, traffic, etc).

  Care will be taken to minimize disturbances during dredging. Dredging takes longer and costs more than other technologies.
- Alternatives with more **capping and enhanced natural recovery** have less short-term impacts and cost, but increase the need for long-term management and monitoring.
- Alternatives with more **monitored natural recovery** have the lowest short-term impacts and cost, but have the greatest uncertainty and the greatest need for long-term management and monitoring.
- Mathematical models predict that none of the alternatives evaluated will meet the cleanup levels set to protect human health and to comply with all State and Federal laws. EPA and Ecology's plan is to implement the selected cleanup plan and pollution source control, and then monitor to see what levels are actually achieved. More work may be required if monitoring shows contaminant levels are not being reduced to meet the cleanup levels.

What criteria did EPA use to evaluate the alternatives?

The alternatives were evaluated in the Feasibility Study. All alternatives must meet Threshold Criteria in order to be considered for the Proposed Plan. They are:

1. Protect human health and the environment; and
2. Comply with federal and State environmental laws and regulations.

Then the evaluation compares alternatives using the following criteria:

3. Long-term effectiveness and permanence;
4. Reducing toxicity, mobility, and volume through treatment;
5. Short-term effectiveness;
6. Ability to be implemented; and
7. Cost.

After the public comment period, EPA will also consider the following criteria in making its final selection:

8. State and Tribal acceptance; and
9. Public acceptance.

What Happens Next?

- Cleanup of the Early Action Areas is expected to be completed in 2015. The Washington Department of Ecology will continue to oversee efforts to control ongoing sources of contamination to the Duwamish.
- EPA will make a final cleanup decision after considering public comments and consulting with the State and affected Tribes.
- EPA will publish the Record of Decision and response to comments received during the public comment period approximately a year after the Proposed Plan.
- The agency will negotiate a cleanup agreement with parties responsible for the pollution, then design and implement the cleanup.

Controlling Ongoing Sources of Contamination to the Duwamish

The Source Control Strategy is currently available for public review and comment as Appendix A of the Proposed Plan. This document replaces Ecology's Lower Duwamish Source Control Strategy (Jan. 2004). Ecology will use this document to guide future efforts to reduce pollution in the Duwamish River.

The **Source Control Strategy**:

- Describes goals and a framework for achieving these goals.
- Describes how agencies will work together and what regulations Ecology will use to accomplish this work.
- Helps protect the sediment cleanup by continuing to locate and reduce sources of pollution. This will reduce the chances of recontamination.

As part of this long-term strategy, Ecology and other agencies are also developing documents called Implementation Plans.

These plans will describe:

- Specific pollution control tasks each agency is working on.
- How an agency will accomplish those tasks.
- What resources will be necessary to conduct pollution source control.

Ecology asked other agencies working on source control, including City of Seattle, EPA and King County to develop implementation plans for their agencies. These plans will also contain agency-specific information about pollution control work. Some information about the contents of these plans are in the appendix section of the Strategy.

For more information, see Ecology's Frequently Asked Questions about the Lower Duwamish Waterway Source Control Strategy at: **www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/lower_duwamish_hp.html**

Environmental Justice Analysis

The Environmental Justice Analysis is Appendix B of the Proposed Plan. A separate fact sheet describes the Analysis. See the fact sheet at: **www.epa.gov/region10/duwamish.html**

* What are the most harmful contaminants found in the Duwamish?

There are many chemical contaminants in Duwamish sediment, fish, and shellfish. Most of the human health risk comes from the four chemicals discussed below. While each of these chemicals can be found throughout the Waterway, the largest amounts were found near industrial areas.

Polychlorinated biphenyls (PCBs) are man made chemicals that were banned in 1979. They stay in the environment for a long time and can build up in fish and shellfish. PCBs are known to impact the immune system and may cause cancer in people who have been exposed over a long time.

Arsenic is naturally present at low levels in Puget Sound area rock and soil. Industrial activities have spread additional arsenic over much of the Puget Sound region. Long-term exposure to toxic forms of arsenic may cause skin, bladder, and other cancers.

Carginogenic Polycyclic aromatic hydrocarbons (cPAHs) are formed during the burning of substances such as coal, oil, gas, wood, garbage and tobacco and during the charbroiling of meat. Long periods of breathing, eating, or having skin contact with high levels of some of the PAHs may increase a person's risk of cancer.

Dioxins and furans are by-products of burning (either in natural or industrial settings), chemical manufacturing and metal processing. Dioxins last a long time in the environment and, like PCBs, can build up in fish and fatty foods. Specific toxic effects related to dioxins include reproductive problems, problems in fetal development or in early childhood, immune system damage, and cancer.

NOTES:

The EPA provides reasonable accommodation to people with disabilities on a case-by-case basis. If you need a reasonable accommodation for a public meeting (such as information in Braille format or large print or interpretation services), please notify Renee Dagseth at ☎206-553-1889 or by e-mail at dagseth.renee@epa.gov

TDD or TTY users, please call 1-800-877-8339 and give the operator Renee's phone number.

United States
Environmental Protection
Agency

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1200 Sixth Avenue, Suite 900, ETPA-086
Seattle, Washington 98101-3140

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