

Portland Harbor Superfund Site, Portland OR

Acronyms, Glossary, and Contaminant Summary



*Prepared
for the
community
by EPA to
explain
commonly
used
acronyms,
technical
and legal
terms, and
chemicals of
concern
found at the
Site.*



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Why Can't We Just Speak Plain Language?

EPA hears it all the time. *"Drop the jargon."* *"Say it plainly."* *"Don't use acronyms."* *"Don't use technical terms."* Believe us, we'd love to be able to do just that! Unfortunately, the hard fact is that the type of in-depth science and engineering needed to investigate and cleanup severely-contaminated Superfund sites requires a certain level of technical and legal language in order to avoid misunderstandings among the people who are doing the work and the decision makers. This same problem is faced by professions like medicine and law.

That being said, it is important to EPA that the public understands the work that is being done and has an opportunity to provide meaningful input on cleanup decisions. EPA believes the best remedies are developed and implemented with the support of a well-informed community. Therefore, the Superfund law requires that the public has an opportunity to read and comment on EPA's proposed plan for cleanup at a site.

EPA has been working closely with the public since the Portland Harbor Superfund Site was added to the National Priorities List in December 2000. During this time period, EPA has worked with the impacted communities, tribes, and local government to provide information that is as easy to read and as clear as possible. With the issuance of our proposed plan for cleanup, EPA is adding this list of acronyms, glossary of terms, and contaminant summary to make it even easier for the public to navigate.

What's Included?

Inside you will find the following:

- **Need More Details (table)?** **Page 2**
- **Definitions of Commonly Used Acronyms** **Pages 3-6**
- **Explanations of Commonly Used Superfund Terms** **Pages 7-10**
- **Contaminants of Concern** **Pages 11-13**

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Need More Details?

Although the Portland Harbor Site can be very complicated, there is a LOT of information available for those who are interested. EPA's *Proposed Cleanup Plan Community Fact Sheet* is a good place to start. If you want more details on a particular topic, the table below shows the documents where those details can be found. All of the site documents listed in the table can be found on EPA's website at: <http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/ptldharbor>.

For More Details on This Topic	Please Look Here	
	A More-Detailed <i>Summary</i>	<i>All the Details</i>
	<i>Proposed Plan for Cleanup</i> June 2016	<i>Final Remedial Investigation Report</i> February 2016
Background and Regulatory Actions	Pages 4 through 12	Executive Summary and Sections 1, 2, and 3
Identification of Sources and Extent of Contamination	Pages 12 through 14	Executive Summary and Sections 4 and 5
Risk to People	Pages 16 through 19	Section 8 and Appendix F, <i>Baseline Human Health Risk Assessment</i>
Risk to the Environment	Pages 19 through 21	Section 9 and Appendix G, <i>Baseline Ecological Risk Assessment</i>
Cleanup Needs (Goals and Objectives)	Pages 21 through 24	<i>Final Feasibility Study Report</i> April 2016
		Executive Summary and Sections 1 and 2
EPA's Cleanup Alternatives	Pages 25 through 48	Executive Summary and Sections 3 and 4
Evaluation of Alternatives	Pages 49 through 62	
Preferred Alternative and Rational	Pages 62 through 68	
Public Comment	Page 1 (How to comment)	<i>Record of Decision, (not issued yet), Responsiveness Summary</i>
Acronyms and Terms	<i>Acronyms, Glossary, and Contaminant Summary, June 2016</i>	

Commonly Used Acronyms

µg	micrograms	GPS	global positioning system
95 UCL	95 percent upper confidence limit	HI	hazard index
AOC	administrative order on consent	HQ	hazard quotient
AR	administrative record	HST	hydrodynamic and sediment transport
ARAR	applicable or relevant and appropriate requirement	IC	institutional control
AWQC	ambient water quality criteria	IRIS	Integrated Risk Information System
BERA	baseline ecological risk assessment	ISA	Initial Study Area
BHHRA	baseline human health risk assessment	kg	kilogram
bml	below mudline	L	liter
BMP	best management practice	LDR	land disposal restriction
CDF	confined disposal facility	LNAPL	light non-aqueous phase liquid
CY	cubic yard	LOAEL	lowest observed adverse effect level
CIP	community involvement plan	LRM	Logistic Regression Model
CRD	Columbia River datum	LWG	Lower Willamette Group
CRITFC	Columbia River Inter-Tribal Fish Commission	m ³	cubic meter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	MCL	maximum contaminant level
CFR	Code of Federal Regulations	MCLG	maximum contaminant level goal
COC	contaminant of concern	MGP	manufactured gas production
COPC	contaminant of potential concern	mllw	mean low low-water
cPAH	carcinogenic PAH	MNR	monitored natural recovery
CSM	conceptual site model	MOU	memorandum of understanding
CSO	combined sewer overflow	NAPL	non-aqueous phase liquid
CTE	central tendency exposure	NAVD88	North American Vertical Datum of 1988
CWA	Clean Water Act	NCP	National Contingency Plan
1,1-DCE	1,1-dichloroethene	NMFS	National Marine Fisheries Service
<i>cis</i> -1,2-DCE	<i>cis</i> -1,2-dichloroethene	NOAA	National Oceanic and Atmospheric Administration
DEQ	Oregon Department of Environmental Quality	NOAEL	no observed adverse effect level
DMM	disposed material management	NPDES	National Pollution Discharge Elimination System
DNAPL	dense non-aqueous phase liquid	NPL	National Priorities List
DSL	Oregon Division of State Lands	NRWQC	National Recommended Water Quality Criteria
E.O.	Executive Order	NTCRA	non-time-critical removal action
ECSI	Environmental Cleanup Site Information Database	O&M	operation and maintenance
ENR	enhanced natural recovery	OAR	Oregon Administrative Rules
EPC	exposure point concentration	ODOT	Oregon Department of Transportation
EPA	U.S. Environmental Protection Agency	OHA	Oregon Health Authority
eq	toxic equivalency	OHSRA	Oregon Hazardous Substance Remedial Action
ERA	ecological risk assessment	ORS	Oregon Revised Statutes
ESA	Endangered Species Act	ppb	parts per billion
FS	feasibility study	ppm	parts per million
FWM	food web model	PRD	Portland River Datum
g	gram	PRG	preliminary remediation goal
GIS	geographic information system	PRP	potentially responsible party
		PTW	principal threat waste

RAL	remedial action level	SLERA	screening-level ecological risk assessment
RAO	remedial action objective	SMA	sediment management area
RAO 1	direct contact with sediment – human	SVOC	semi-volatile organic compound
RAO 2	fish consumption – human	SWAC	surface weighted average concentration
RAO 3	direct contact with surface water- human	TBC	to be considered
RAO 4	groundwater migration – human	TBT	tributyltin
RAO 5	direct contact with sediment – eco	TCE	trichloroethene
RAO 6	fish consumption – eco	TEF	toxicity equivalency factor
RAO 7	direct contact with surface water – eco	TOC	total organic compounds
RAO 8	groundwater migration – eco	TMDL	total maximum daily load
RAO 9	riverbanks	TRV	toxicity reference value
RCRA	Resource Conservation and Recovery Act	TSCA	Toxic Substance Control Act
RD/RA	remedial design/remedial action	TSS	total suspended solids
RfD	reference dose	TZW	transition zone water
RI	remedial investigation	U.S.C.	United States Code
RI/FS	remedial investigation and feasibility study	UCL	upper confidence limit
RM	river mile	USACE	U.S. Army Corps of Engineers
RME	reasonable maximum exposure	USCG	U.S. Coast Guard
ROD	record of decision	USFWS	U.S. Fish and Wildlife Service
RSL	regional screening level	USGS	U.S. Geological Survey
SDU	sediment decision unit	VOC	volatile organic compound
SDWA	Safe Drinking Water Act	WQS	Water Quality Standard

Explanation of Commonly Used Superfund Terms

Administrative Order On Consent: Legal vehicle to assure cleanup moves forward at a contaminated site. It typically contains stipulated penalties for non-performance by the liable entity and cannot be terminated unilaterally.

Advection: The transfer of heat or matter by the flow of a fluid, especially horizontally in the atmosphere or the sea.

Anadromous fish: Born in fresh water, spends most of its life in the sea and returns to fresh water to spawn. Salmon, smelt, shad, striped bass, and sturgeon are common examples.

Anaerobic: Relating to, involving, or requiring an absence of free oxygen.

Applicable or Relevant and Appropriate

Requirements (ARARs): Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Aquablok™: AquaBlok® is a patented, composite-aggregate technology resembling small stones and

typically comprised of a dense aggregate (sand/gravel) core, clay or clay-sized materials, and polymers and commonly used in capping sediments.

Armoring: The practice of using material such as gravel or rocks to protect riverbanks or caps from erosion.

Atmospheric deposition: Gases and particulates released to the atmosphere from combustion sources such as motor vehicle emissions, slash burning (cutting and burning of plants), and industrial sources, contain nitrogen, sulphur, and metal compounds, which eventually settle to the ground as dust or fall to the earth in rain and snow.

Background concentration: The concentration of a substance in an environmental media (air, water or soil) that occurs naturally or is not the result of human activities.

Bathymetry/bathymetric: Study of underwater depth of lake or ocean floors. In other words, bathymetry is the underwater equivalent to topography.

Beach mix: A mix of sand, gravel and inorganic material used for anchoring caps to prevent erosion. This material mimics previous habitat material.

Bedload transport: The particles in a flowing fluid (usually water) that are transported along the river bed.

Benthic organisms/invertebrates: Organisms that live in and on the bottom of the river floor. These organisms are known as benthos. Benthos include worms, clams, crabs, lobsters, sponges, and other tiny organisms that live in the bottom sediments.

Best Management Practices (BMPs): Methods determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

Bioaccumulation: The process through which the concentration of a chemical in an organism is greater than the concentration of the chemical in an ambient medium (usually water).

Biological uptake: The transfer of substances from the environment to plants, animals, and humans.

Bioavailability: A subcategory of absorption (one substance taken up by another) and is the fraction of an administered dose that reaches the blood circulation system, one of the principal pharmacokinetic properties of drugs. By definition, when a medication is administered intravenously, its bioavailability is 100%.

Biodegradation: The process by which organic substances are decomposed by micro-organisms (mainly aerobic bacteria) into simpler substances such as carbon dioxide, water and ammonia.

Biota: The animal and plant life of a particular region, habitat, or geological period.

Bioturbation: The disturbance of sedimentary deposits by living organisms.

Cap amendments: Material such as organoclay or activated carbon, added to caps to enhance performance in isolating and containing contaminants.

Capital costs: Expenditures required to construct each alternative, include all labor, equipment, and material costs associated with activities such as mobilization/demobilization; monitoring; site work; installation of dredging, containment, or treatment systems; and disposal.

Carcinogens: Any substance that can cause.

Cleanup: Actions taken to address a release or threatened release of hazardous substances that may affect public health or the environment. Agencies often use the term broadly to describe various response actions or phases of remedial activities, such as an RI/FS. "Cleanup" is sometimes used interchangeably with the terms "remedial action," "remediation," "removal action," "response action" or "corrective action."

Cleanup Level: Residual concentration of a hazardous substance determined to be protective of public health, safety and welfare, and the environment under specified exposure conditions.

Community Advisory Group (CAG): A committee, task force or board of stakeholders affected by a Superfund or other hazardous waste site. A CAG provides a way for representatives of diverse community interests to present and discuss needs and concerns related to the site and the site cleanup process. CAGs are a community initiative and responsibility. They function independently of EPA.

Community Involvement Plan (CIP): A formal plan of communication and public participation activities developed by the EPA to ensure opportunities for community members to learn more about Superfund site activities and provide input to inform site decision-making. The plan is the result of information collected through community meetings and interviews and a review of site-related documents.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): This law, enacted by Congress on December 11, 1980, created the Superfund program. Specifically, CERCLA: (1) established prohibitions and requirements concerning closed and abandoned hazardous waste sites; (2) provided for liability of persons responsible for releases of hazardous waste at these sites; and (3) established a trust fund to provide for cleanup when no responsible party could be identified. CERCLA was amended by the Superfund Amendments and Reauthorization Act of 1986.

Conceptual Site Model: A written description and illustration of predicted relationships between receptors (both human and ecological) and the hazardous substances they may be exposed to.

Contaminant of concern (COC): Contaminants that pose an unacceptable risks to human health and the environment, as identified in the risk assessments.

Desorption: A phenomenon whereby a substance is released from or through a surface.

Diffusion: The process by which molecules intermingle as a result of their kinetic energy of random motion.

Dioxin/furan: By-products of chemical manufacturing, combustion (either in natural or industrial settings),

metal processing and paper manufacturing that are highly persistent in the environment and toxic.

Dredge residual: Material that is left behind from dredging activities. This can occur from resuspension or from remaining contamination.

Dynamic Equilibrium: When contaminant concentrations in the sediment reach a steady state after remediation is conducted.

Ecological Risk Assessment: The process for evaluating how likely it is that the environment may be impacted because of exposure to one or more environmental stressors such as contaminants and hazardous wastes.

Ebullition: The action of bubbling or boiling.

Endangered Species Act (ESA): Federal statute enacted in 1973 to conserve species and ecosystems. Species facing possible extinction are listed as “threatened” or “endangered” or as “candidate” species for such listings. Following such a listing, recovery and conservation plans are put in place to protect the species and its habitat.

Enhanced Natural Recovery (ENR): Accelerating the natural recovery process by adding a thin-layer cover of clean sand over contaminated sediment.

Environment: The sum of all external conditions affecting the life, development and survival of an organism.

Environmental Protection Agency (EPA): Federal agency whose mission is to protect human health and safeguard the environment.

Environmental media: Sediment, groundwater, surface water and river banks.

Erosion: The action of surface processes (such as water flow or wind) that remove soil, rock, or dissolved material from one location on the Earth's crust, then transport it away to another location.

Exposure pathway/route: Means by which hazardous substances move through the environment from a source to a point of contact with people or animals.

Ex-situ treatment: The chemical, physical, biological, thermal or electrical processes that remove, degrade, chemically modify or stabilize contaminants after being removed from environmental media.

Fate and Transport: Natural transport of chemicals in ground water, surface water, soil and atmosphere.

Feasibility Study (FS): An assessment of cleanup alternatives. A feasibility study, or FS, is conducted if the risk assessment performed during a remedial investigation establishes the presence of unacceptable risks. During an FS, EPA screens and evaluates alternatives to clean up a site based on nine evaluative criteria, including effectiveness, cost and community acceptance.

Five-year review: Pursuant to CERCLA a five-year review is required if the remedial action results in hazardous substances, pollutants or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure. This review evaluates whether such a remedy is protective of human health and the environment and is required no less often than every five years after the start of the cleanup.

Focused COC: A subset of the Site COCs with concentrations of the most widespread contaminants and those that pose the greatest risks. The focused COCs are used only for the development of SMAs.

Future Maintenance Dredge (FMD): Areas near and around docks based on information regarding vessel activity, dock configuration, and future site uses where maintenance dredging is likely to occur. FMD locations were developed from estimates of likely future navigation depth requirements and potential future maintenance dredging depths near and around docks.

Hazard Index (HI): An estimate of the potential total non-cancer effects, derived by summing the HQ values.

Hazard Quotient (HQ): The ratio of the potential exposure to a substance and the level at which no adverse effects are expected. If the Hazard Quotient is

calculated to be less than 1, then no adverse health effects are expected as a result of exposure.

Hazardous Waste: Solid wastes that possess at least one of four characteristics (ignitability, corrosivity, reactivity or toxicity), appear on special EPA lists, or are defined as hazardous by Oregon rules and statutes.

Human Health Risk Assessment: The process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future.

In-situ treatment: The chemical, physical, biological, thermal or electrical processes that remove, degrade, chemically modify or stabilize contaminants in place without any removal from environmental media.

Institutional Control (IC): Non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site.

In-river: The proposed action will address contaminated sediment, riverbanks, pore water, and surface water in a portion of the Portland Harbor Superfund Site. The upland portion will be addressed by ODEQ.

Mean low low-water level (mllw): Tidal datum that is the arithmetic mean of the lower low water heights of each tidal day.

Migratory fish: Fish that move from one part of a water body to another on a regular basis. Examples include spring Chinook salmon, lamprey, shad, steelhead trout.

Monitored Natural Recovery (MNR): A risk reduction approach for contaminated sediment that uses

ongoing, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment.

Multnomah Channel: The Multnomah Channel is a 21.5-mile (34.6 km) distributary of the Willamette River. It diverges from the main stem a few miles upstream of the main stem's confluence (RM 2.8) with the Columbia River in Multnomah County.

Navigational Channel (NAV): The area within the Site that is federally authorized. The US Army Corps of Engineers maintains the channel.

National Contingency Plan (NCP): The National Oil and Hazardous Substances Pollution Contingency Plan, commonly known as the National Contingency Plan, is the federal government's blueprint for responding to both oil spills and hazardous substance releases.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term cleanup under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. The EPA is required to update the NPL at least once a year.

Nearshore: Relating to or denoting the region of the river or riverbed relatively close to the shoreline

Non aqueous phase liquid (NAPL): Material that is not soluble in water.

Non-carcinogen: Hazardous substances with adverse health effects other than cancer on humans.

Oregon Department of Environmental Quality (ODEQ): State agency whose job is to protect the quality of Oregon's Environment. ODEQ is responsible for protecting and enhancing Oregon's water and air quality, for cleaning up spills and releases of hazardous materials, and for managing the proper disposal of hazardous and solid wastes.

Organic contaminants: Carbon-based chemicals, such as solvents and pesticides, which can get into water through runoff from facility discharge.

Oxidation: The loss of electrons or an increase in oxidation state by a molecule, atom, or ion.

PCDD/F: Polychlorinated dibenzodioxins and furans.

Porewater: The water occupying the spaces between sediment particles.

Potentially Responsible Party (PRP): An individual, company, government agency or other entity (such as owners, operators, transporters or generators of hazardous waste) potentially responsible for, or contributing to, contamination at a Superfund site. Whenever possible, the EPA requires a PRP, through administrative and legal actions, to clean up hazardous waste sites it has contaminated.

Preliminary Assessment (PA): An assessment of information about a site and its surrounding area. A preliminary assessment determines whether a site poses little or no threat to human health and the environment or if it does pose a threat, whether the threat requires further investigation.

Preliminary Remediation Goal (PRG): Used to develop the long-term contaminant concentration levels needed to be achieved to meet remedial action objectives by the remedial alternatives.

Proposed Plan: A plan for a site's cleanup that is available to the public for review and comment.

Periodic costs: Periodic Costs: These costs include activities that occur only once every few years (such as 5-year reviews and equipment replacement) and site maintenance and monitoring.

Present value costs: The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given discount rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. The present value was calculated based on a 7 percent real discount rate as recommended in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (USEPA 2000). Also, per guidance, inflation and depreciation are not considered in preparing the present value costs.

Propwash: The disturbed mass of air or water pushed aft by the propeller of an aircraft or propeller-driven watercraft.

Public Comment Period: A formal opportunity for community members and the public to review and contribute written comments on various EPA documents or actions.

Public Meeting: Formal public sessions characterized by a presentation followed by a question-and-answer session. Formal public meetings may involve the use of a court reporter and the issuance of transcripts. Formal public meetings are required only for the Proposed Plan and ROD amendments at a site.

Remedial Action Level (RAL): RALs are a range of contaminant concentrations that are less than the current site-wide surface weighted average concentrations (SWACs) and greater than the PRGs. At this Site, RALs are contaminant-specific sediment concentrations used to identify areas where capping and/or dredging will be assigned, and thus are the basis of the SMA boundaries or footprints.

Remedial Action Objective (RAO): Media-specific goals that remedial alternatives/remedy need to achieve for protecting human health and the environment.

Resource Conservation and Recovery Act (RCRA): Enacted in 1976, is the principal federal law in the United States governing the disposal of solid waste and hazardous waste.

Subtitle C facility: Landfills which are authorized under RCRA to accept hazardous waste for disposal.

Subtitle D facility: Municipal solid waste landfills and other solid waste disposal facilities.

Record of Decision (ROD): The document issued by the EPA that explains the cleanup alternatives selected to clean up a Superfund site.

Release: Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment, including the abandonment or discarding of barrels, containers and other closed receptacles containing any hazardous substance, or any threat thereof, but excluding exposures within a workplace, emissions

from the engine exhaust, nuclear material and the normal application of fertilizer.

Remedial Alternative: An action considered in the FS intended to reduce or eliminate unacceptable risks to human health and the environment at a site. The FS considers a range of remedial alternatives.

Remedial Action : The long term cleanup that can involve removal, containment or treatment of hazardous substances, pollutants or contaminants from land, water and air to protect human health and the environment. These actions are selected in RODs. Also see cleanup.

Remedial Investigation (RI): The first of the two-part site study known as a remedial investigation/feasibility study (RI/FS). RI involves collecting and analyzing information about a site to determine the nature and extent of contamination.

Removal Action: Short-term immediate or emergency action that addresses releases of hazardous substances that require expedited responses. It may take place at any point in the site response process, and may include source control measures, removal of highly contaminated material, and/or posting warning signs or constructing fences around a contaminated site. These actions are identified in Removal Action Memos.

Resident fish: Fish species that complete their entire life cycle in the Site. Examples include small mouth bass, sculpin, and catfish.

Residual layer: Layer of material, generally sand, used to cover sediments disturbed by dredging or contaminated sediments left behind.

Responsiveness Summary: A component of the ROD that summarizes information about the comments and views of the public and support agency regarding both the remedial alternatives and general concerns about the site submitted during the public comment period. It also documents in the record how public comments were integrated into the decision-making process.

Resuspension: The renewed suspension of sediment, such as stirring up settled mud at the bottom of a body of water.

Risk: Probability that a hazardous substance, when released into the environment, will cause adverse effects in exposed humans or ecological receptors.

Risk Assessment: The process of evaluating whether a hazardous substance poses a potential threat to human health and the environment, either now or in the future.

Scour: The removal of bottom sediment by surface water movement/forces.

Sediment: Soils, sand, organic matter or minerals that accumulate on the bottom of a water body or an at some point in time are submerged.

Surface sediment: The top 30 cm of sediment.

Subsurface sediment: Sediment below surface sediment.

Suspended Sediment: Solid particles transported in a fluid media.

Sediment Management Areas (SMAs): Areas delineated by RALs where containment or removal technologies will be considered to immediately reduce risks upon implementation.

Sediment Decision Units (SDUs): A tool to evaluate the expected effectiveness of the alternatives throughout the site. Generally identified as areas with the highest focused COC concentrations over one river mile segment.

Site Assessment: Process to evaluate potential or confirmed releases of hazardous substances that may pose a threat to human health or the environment. Criteria established under the Hazard Ranking System guide the process, which EPA, state, tribal or other federal agency environmental programs carry out.

Solidification/stabilization: To make into a solid, or to immobilize in a stable hard mass.

Sorption: A physical and chemical process by which one substance becomes attached to another.

Source control: Actions that prevent or reduce migration of contamination to environmental media, through removal, containment or treatment.

Source material: Material that includes or contains hazardous substances, pollutants, or contaminants that acts as a reservoir for migration of contamination to groundwater, surface water, sediment, or air or that acts as a source for direct exposure.

Subsistence Fishers: People who obtain a significant portion of their dietary protein from eating self-caught fish of various species.

Superfund: The program operated under the legislative authority of CERCLA that funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions. Superfund is the common name for CERCLA. People often use the term as an adjective for hazardous waste sites and the investigation and cleanup process directed by the EPA.

Surface Weighted Average Concentrations (SWACs): The concentration of a contaminant in sediment calculated as an average over a specified surface area.

Thermal desorption: An environmental remediation technology that utilizes heat to increase the volatility of contaminants such that they can be removed (separated) from the solid matrix (typically soil, sludge or filter cake). Thermal desorption is not incineration.

Transload Facility: The facility where contaminated sediment is transferred from a barge to a land based transportation method, such as trucks or rail.

Transition Zone Water (TZW): The zone where surface water and groundwater mix.

Uplands: The portion of the Portland Harbor Superfund Site that includes the sources of contamination to the river, such as upland facilities. The upland portion is being addressed by ODEQ.

Volatilization: Process where a liquid or solid is converted to a vapor.

Willamette River: The 187-mile long waterway in northwest Oregon that flows northward between the coast and the Cascade Mountains.

Contaminants of Concern (COCs)

Shown below are brief descriptions of the COCs at the Site and some of their effects on humans and ecological receptors.

Polychlorinated biphenyls (PCBs)	
What are they?	PCBs are compounds manufactured by electrophilic chlorination of biphenyl with chlorine gas. Over 1.5 million tons were produced globally. Their production was banned in US in 1979 and by Stockholm Convention in 2001.
How are they used?	PCBs are used as dielectric and coolant fluids in electrical apparatus (such as transformers), cutting fluids for machining, carbonless copy paper, and heat transfer fluids. They are found in paints, sealants, and coal tar coatings on water tanks, bridges, and other structures.
How did they get there?	PCBs are found in stormwater runoff, direct discharge from sewers, leaching from paints and coatings on structures in the water, and overwater spills. They are persistent in environment, especially rivers and lakes.
What's the risk?	PCBs cause cancer in animals and are probable human carcinogens. PCBs are endocrine (hormone) disruptors and neurotoxins. Other effects of PCBs include changes in the immune system, behavioral changes, and impaired reproduction. Some PCBs cause a variety of birth defects in animals.
Dioxins and Dibenzofurans (PCDD/Fs)	
What are they?	PCDD/Fs are by-products of organochloride manufacture, incineration of chlorine-containing substances (like PVC), bleaching of paper, and natural sources (like volcanoes and forest fires).
How are they used?	There are no common uses.
How did they get there?	PCDD/Fs are found in stormwater runoff, direct discharge from sewers, and airborne deposition from fires.
What's the risk?	PCDD/Fs bioaccumulate in the bodies of humans and wildlife. They may cause developmental problems and cancer.
Polycyclic Aromatic Hydrocarbons (PAHs)	
What are they?	PAHs are one of the most widespread organic pollutants (in soil, sediment, oily substances, and particulates in air). Found in processed fossil fuels, tar, and edible oils. Also formed by incomplete combustion of fuels and high temperature cooking, and in smoked fish. PAHs are linked to oil spills, steel manufacturing, wood preservation, and residential wood burning. PAHs are also manufactured as derivatives from coal tar for a variety of industrial uses.
How are they used?	Industrial uses of manufactured PAHs include: dyestuffs, explosives, research, and drug manufacturing. The, naphthalene, which is a PAH, is used for moth balls.
How did they get there?	PAHs are found in stormwater runoff, direct discharge, airborne deposition, and overwater spills of hydrocarbons.
What's the risk?	In humans, PAHs are known to cause cancer. They can also cause infertility, developmental neurological effects, and affect the immune system.

Pesticides (aldrin, DDT and DDT compounds (DDx), chlordane, dieldrin, 2,4-D, MCP, 2,4,5-TP, and Lindane)	
What are they?	These compounds are man-made, chlorinated chemicals manufactured for industrial, agricultural, commercial, and residential use, primarily as pesticides. The term “pesticides” includes chemicals designed to kill certain types of plants, which are also known as herbicides.
How are they used?	Pesticides are applied in small areas (home use) to large-scale applications (crop dusting, truck-mounted application, etc.). Contamination from mishandling and improper disposal are concerns. The use of these pesticides has been banned in the US. DDT was ban in 1972 and can only be used in the US for public health emergencies involving vector (insect) transmitted diseases.
How did they get there?	These pesticides are found in stormwater runoff, discharge from sewers, spills, and airborne deposition from aerial spraying. These pesticides are highly persistent in the environment.
What's the risk?	The highest concentrations generally occur in carnivorous species (predatory and fish-eating birds). They accumulate in the body causing neurological and endocrine (hormone) disruptions. In wildlife, impacts include death, reproductive impairment, and behavioral alteration. These pesticides are probable human carcinogens.
Semi-Volatile Organic Compounds (SVOCs) (Bis(2-ethylhexyl) phthalate [BEHP], hexachlorobenzene, pentachlorophenol, PBDEs)	
What is it?	BEHP is the most common member of the class of phthalates which are used as plasticizers. Manufactured chemicals made by reacting phthalic anhydride with alcohol. Over 2 million tons are produced annually.
How is it used?	BEHP is added to plastics to increase their flexibility, transparency, durability, and longevity.
How did it get there?	Stormwater runoff and direct discharge from sewers.
What's the risk?	Phthalates have been found in fish, water, and sediment. They are suspected to be endocrine disruptors, can cause increased obesity, and impair cardiac function. EPA considers BEHP to be possibly carcinogenic to humans.
Volatile Organic Compounds (VOCs) (benzene, ethylbenzene, 1,1-DCE, cis-1,2-DCE, TCE, toluene, vinyl chloride, xylenes)	
What are they?	VOCs are colorless, highly-flammable, industrial chemical that easily evaporates. It occurs naturally in coal tar and petroleum.
How are they used?	VOCs are commonly used in paint thinners, lacquer thinners, moth repellents, air fresheners, hobby supplies, wood preservatives, aerosol sprays, degreasers, automotive products, and dry cleaning fluids. They are also used in a variety of industrial processes.
How did they get there?	Groundwater plumes and nearshore or overwater spills. Ethylbenzene is found mostly as a vapor. It does not readily bind to soil, so it can easily move into groundwater.
What's the risk?	Health effects of VOCs can vary greatly according to the compound, and can range from being highly toxic to having no known health effects. Some (benzene, TCE, and vinyl chloride) are known to cause cancer. VOCs can cause damage to the liver, kidneys, and central nervous system. Short-term exposure can cause eye and respiratory tract irritation, headaches, dizziness, visual disorders, fatigue, loss of coordination, allergic skin reactions, nausea, and memory impairment.
Cyanide	
What is it?	Cyanides are produced by certain bacteria, fungi, and algae and are found in plants. They are also products of combustion. Cyanide is also manufactured for industrial processes.
How is it used?	Cyanide is used in mining, medicine, jewelry making, photography, and electroplating. It is used as an insecticide for fumigating ships and was formerly used as a pesticide.

How did it get there?	Cyanide is found in stormwater runoff, direct discharge from sewers, groundwater plumes, aerial deposition, and overwater spills.
What's the risk?	Cyanides can be highly toxic because they interfere with the body's ability to absorb oxygen.
Perchlorate	
What is it?	Perchlorates are the salts derived from perchloric acid and most are produced commercially.
How is it used?	The dominant use of perchlorates are for propellants in rockets. They are also used extensively in the pyrotechnics industry and in certain munitions and for the manufacture of matches.
How did it get there?	Perchlorates are found in stormwater runoff, direct discharge from sewers, and groundwater plumes. They are highly soluble in water, and relatively stable and mobile in surface and subsurface aqueous systems.
What's the risk?	Perchlorate may affect the human thyroid gland and interrupt regulation of metabolism.
Metals (arsenic, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc)	
What are they?	They are naturally occurring elements and are generally mined and concentrated or refined for use in industry.
How are they used?	They are used in electrical conductors and semi-conductors, jewelry, pesticides, herbicides, insecticides, wood treatment, manufacturing, drugs, antimicrobials, alloys, pigments, propellants, dietary supplements, thermometers, telescopes, electrodes, fluorescent lamps, batteries, nuclear fission, and much more.
How did they get there?	They are found in stormwater runoff, direct discharge from sewers, groundwater plumes, aerial deposition, and overwater spills.
What's the risk?	In very small amounts, many of these metals are necessary to support life. However, in larger amounts, they become toxic. They may build up in biological systems and become a significant health hazard. Some metals (copper and zinc) are more toxic to marine life than others.
Tributyltin	
What is it?	Tributyltin is manufactured by combining tin with carbon. It was banned in the EU in 2003 due to environmental toxicity.
How is it used?	Tributyltin is used in algacides, wood preservatives, and fungicides. It is also used as a biocide in anti-fouling paint (bottom paint) applied to hulls of ocean going vessels.
How did it get there?	Tributyltin is found in stormwater runoff, direct discharge from sewers, and leaching from marine paints and coatings. It adheres to bed sediments due to high specific gravity and low solubility.
What's the risk?	Tributyltin leaches into the marine environment and is highly toxic to wide range of organisms. This has led to the collapse of whole populations of organisms. It has been shown to affect many layers of the ecosystem, including invertebrates (e.g., marine snails), vertebrates (e.g., fish), and mammals (e.g., dolphins and even humans).
Total Petroleum Hydrocarbons (TPH)	
What are they?	Hydrocarbons that are pumped from underground deposits and refined into a variety of products. Diesel-, gasoline-, and residual-range TPH are hydrocarbons.
How are they used?	They are used as fuel for transportation, power generation, and heating, manufacture of plastics and other materials. It is also used for lubrication.
How did they get there?	TPH is found in stormwater runoff, direct discharge, groundwater plumes, and overwater spills. Some TPH fractions evaporate, some float, and others sink.
What's the risk?	TPH can adversely affect the lungs, central nervous system, liver, and kidneys. Some TPH compounds affect reproduction and the developing fetus in animals.