

# PUBLIC GUIDE

## Lake Roosevelt and Upper Columbia River Remedial Investigation & Feasibility Study

# 2020 Draft Human Health Risk Assessment



Lake  
Roosevelt  
Forum

# Background

*In 2005, the Environmental Protection Agency (EPA) initiated the Upper Columbia River/Lake Roosevelt Remedial Investigation & Feasibility Study (UCR RI/FS). Since 2006, the RI/FS has been conducted and funded under a settlement agreement between EPA, Teck Metals Ltd. (a Canadian company), and its U.S. affiliate Teck American Inc. (TAI). Inclusive of Lake Roosevelt, the UCR site extends approximately 150 river miles from the Canadian border to the Grand Coulee Dam and includes areas of the Upper Columbia Valley.*

**The purpose of the UCR Lake Roosevelt RI/FS is to establish the nature, extent and possible human health and ecological risks of metals and other contaminants found in the Upper Columbia River.**

EPA identified a primary source of contaminants in sediments as historic discharges from Teck’s Trail Smelter that is located about ten river miles north of the U.S./Canada border. From 1923 until operational changes in 1995, the Trail Smelter discharged millions of tons of granulated fumed slag with trace metals into the Columbia River in British Columbia. EPA also links smelter air emissions to deposition of lead in soils in the Upper Columbia Valley.

**This Human Health Risk Assessment (HHRA) public guide focuses on:**

- key HHRA findings and how possible exposure risks were calculated,
- precautionary measures to protect visitor and resident health where exposure to contaminants may be of concern, and
- cleanup and other actions that are completed, in process or may be considered.

Go to [www.lrf.org/draftHHRA](http://www.lrf.org/draftHHRA) to access the EPA’s draft UCR HHRA and other resources.

## Upper Columbia River Site Human Health Risk Assessment Data Collection and Studies

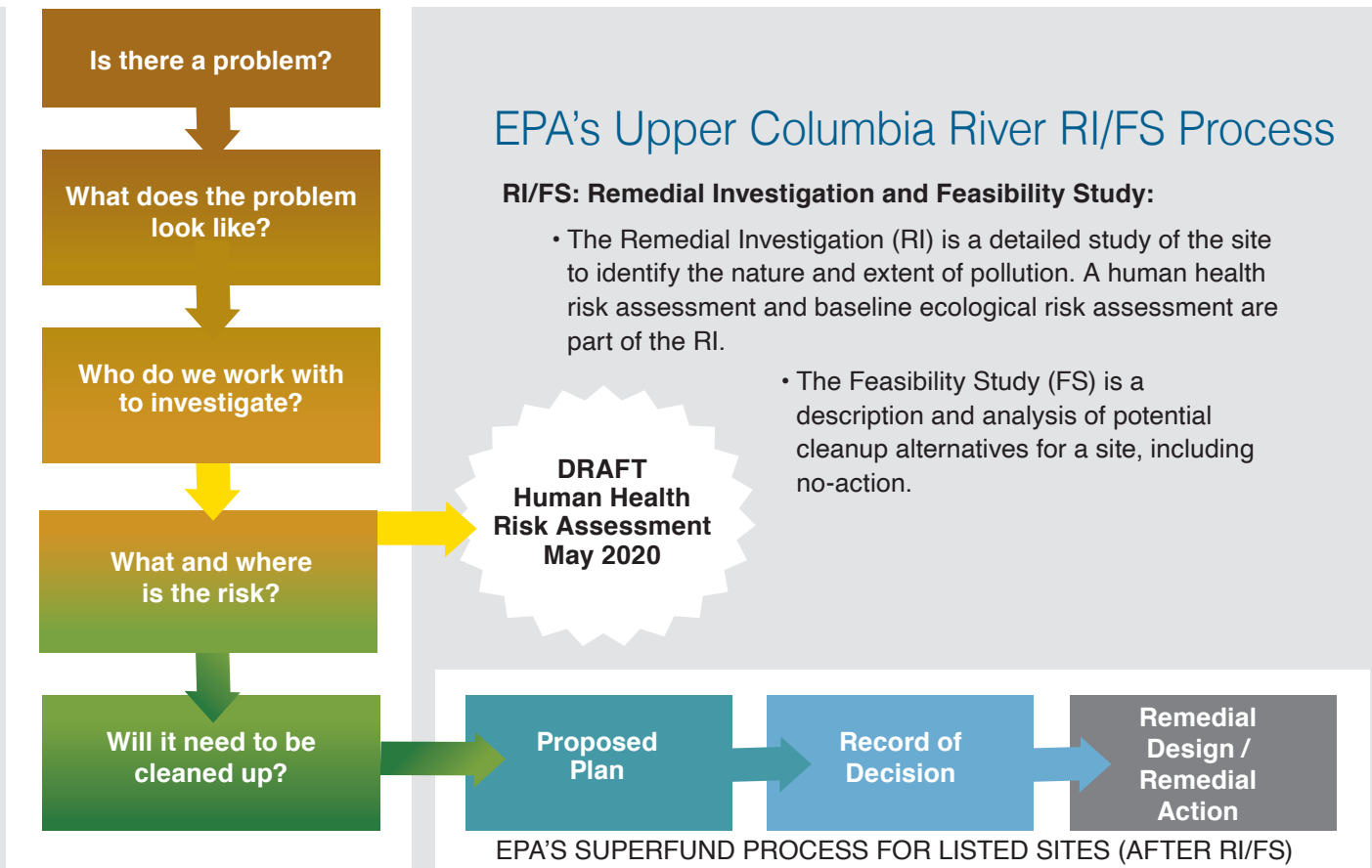
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Public Beach Sediment Sampling	█				█	█	█		█		█			
Fish Sampling	█				█							█		█
Surface Water Sampling					█	█								
Mussels & Crayfish Sampling												█		
Plant Sampling														█
Tribal Consumption & Resource Use Survey					█	█								
Recreational Use Survey						█	█							
Upland Soil Sampling										█				
Residential Soil Sampling										█		█		

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*The Lake Roosevelt Forum (Forum) publishes public guides to increase public awareness, understanding and engagement in this lengthy, complex investigation. Public guides published by the Forum in 2011, 2015 and 2019 provide an extensive history, details on environmental investigations, and updates on human health and ecological risk assessments. These guides can be accessed at [www.lrf.org/publicguides](http://www.lrf.org/publicguides).*

*The Forum also provides updates in print and electronic newsletters. Visit [www.lrf.org/eneews](http://www.lrf.org/eneews) to join the mail list.*

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Source: EPA Region 10

# Human Health Risk Assessment

EPA's draft Human Health Risk Assessment (HHRA) estimates the nature and probability of adverse human health effects from being exposed to chemicals (primarily metal contaminants) of concern now or in the future. This is a key milestone in the ongoing Remedial Investigation/Feasibility Study (RI/FS). Based on the level of risk found, determinations will then be made regarding what, if any, type of additional cleanup or other actions are needed.

The Upper Columbia River (UCR) HHRA uses the results of site-specific investigations and information from the scientific literature regarding exposure and toxicology to assess potential health risks for individuals in the area. The lengthy period of investigation reflects the complexity of a site that is very large, has multiple contaminants being evaluated, and potential ways people can be exposed.

The population groups evaluated in the HHRA include residents, recreational visitors, outdoor workers, and members of the Colville Confederated Tribes and Spokane Tribe of Indians. This public guide focuses on HHRA findings for residents, recreational visitors and workers.

## What the HHRA Does and Doesn't Provide

### DOES

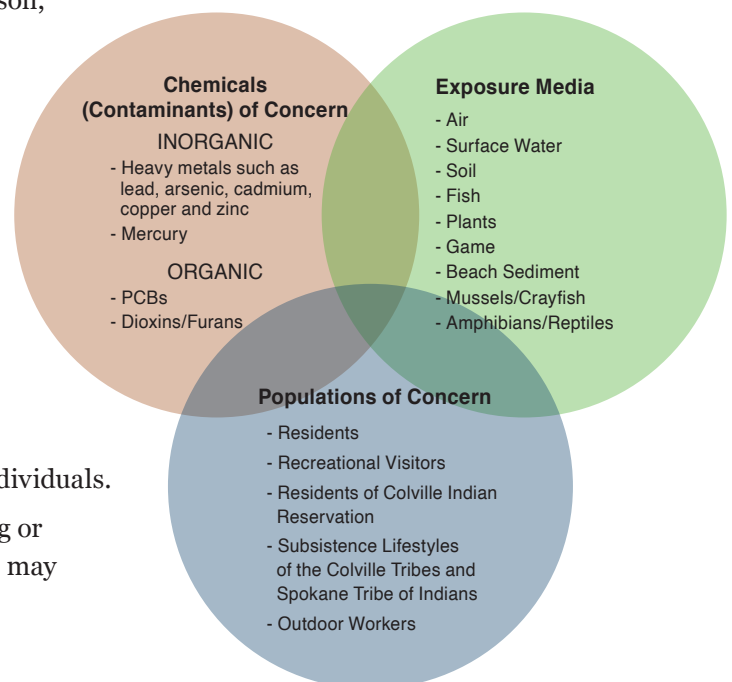
- Estimate human health risks (cancer and non-cancer) from exposure to lead and other chemicals of concern.
- Provide the necessary information to assess whether further cleanup or other actions are needed.
- Use current EPA benchmarks to assess risk and assure a high degree of human health protection and risk prevention. For instance, triggering a cancer benchmark requires an estimated increase in lifetime cancer risk of at least a 1 in 10,000 among populations being exposed to the chemicals of concern under reasonable maximum exposure scenarios. By comparison, the Washington Department of Ecology applies a cancer risk threshold of 1 in 100,000 for its cleanup evaluations.

### DOES NOT

- Recommend whether or where further cleanup or other actions are needed. These decisions occur when EPA risk managers assess the results in the next phases of the RI/FS process.
- Suggest further precautionary measures or advisories to protect human health.
- Collect data based on blood or other medical test of individuals.
- Recommend or address other issues such as the buying or selling of property where concentrations of lead in soil may exceed benchmarks.

## Focal Areas for Human Health Risk Assessment

The desired result of investigating complex relationships between chemicals of concern, exposure pathways, and exposed populations is to establish a safe level of human contact with chemicals of concern.



## Human Health Risk Assessment Findings

This section summarizes findings related to the Upper Columbia Valley, public beaches, fish consumption, swimming and surface water, and air quality. It also summarizes the exposure pathways of populations evaluated and related cleanup activities that are completed or planned.

The section “Calculating Lead, Cancer, and Non-Cancer Human Health Risks” (pages 15-17) summarizes how benchmarks and results of modeling and calculations were used to support these findings.

## Upper Columbia Valley Lead Exposure Risks for Children

**The Upper Columbia River (UCR) Site extends approximately 150 river miles from the U.S.-Canada border to the Grand Coulee Dam.** The Upper Columbia Valley (Valley) area includes approximately 100 square miles (64,000 acres) east and west of the Columbia River that extends from the U.S.-Canada border to China Bend (about 40 river miles).

In the Valley, exposure to lead in soils is a concern. This is primarily due to smelter air emissions linked to air deposition of lead that contaminated surface soil. Exposure to lead is particularly dangerous for children under six because their growing bodies absorb more lead than adults. As their brains develop rapidly, adverse effects can impair cognitive development such as IQ and self-control.

### Exposure to Lead can Seriously Harm a Child’s Health



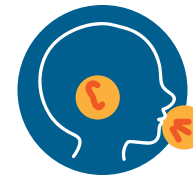
Damage to the brain and nervous system



Slowed growth and development



Learning and behavior problems



Hearing and speech problems

Source: CDC.com

Because children under six are most at risk, blood lead level modeling focuses on determining a protective standard for them. The development of risk-based standards developed for children is also generally protective of adults.

Historically, EPA has used a target blood lead level of 10 micrograms of lead per deciliter of blood ( $\mu\text{g}/\text{dL}$ ) as the benchmark for human health risk. More recently, however, research studies have demonstrated risks to children at concentrations below the target blood lead level of 10  $\mu\text{g}/\text{dL}$ . As a result, for this investigation EPA selected a blood lead level target range of low (3  $\mu\text{g}/\text{dL}$ ), medium (5  $\mu\text{g}/\text{dL}$ ) and high (8  $\mu\text{g}/\text{dL}$ ) to evaluate human health risk in the Upper Columbia Valley.

EPA used the Integrated Exposure Uptake Biokinetic (IEUBK) model, which is commonly used by risk assessors to evaluate lead exposure risk, to estimate blood lead levels in children. See the “Calculating Lead, Cancer, and Non-Cancer Human Health Risks” section to learn more about how the model works.



# Human Health Risk Assessment

**The chart Assessing Upper Columbia Valley Target Blood Lead Levels provides findings and context for this part of the risk assessment. In reading the chart, note that:**

- Blood lead levels are estimated based on soil sample concentrations measured in parts per million (ppm).
- Decision Units (DUs) are soil exposure areas already sampled. A person owning one property can have multiple DUs and DUs can vary greatly in size.
- Residential DUs usually included properties with a home on them. Owners voluntarily agreed to soil testing on their properties.
- DUs with soil sampling results exceeding 700 ppm lead were provided the opportunity to voluntarily participate in yard cleanups that occurred from 2015-2018. TAI conducted yard cleanups from 2015-2018 at 18 properties, including DUs with sampling results exceeding a lower threshold of 600 ppm lead.
- Larger upland site areas were sampled to estimate risk to potential future residents and ecological habitats. These areas are referred to in the HHRA as Aerial Deposition Areas (ADAs). By randomly sampling areas throughout the 100 square mile study area, investigators also established a general understanding of aerial deposition of lead and other metals. In contrast to residential properties, ADAs are at least 25 acres in size, and the soil is less disturbed due to infrequent human contact or development. Like residential DUs, owners agreed to voluntary soil sampling.

## Assessing Upper Columbia Valley Target Blood Lead Levels

EPA Benchmarks Evaluated	Blood Lead Level	Corresponding mean/average Soil Concentration Benchmark	Comparative Soil Concentration Values	Residential Decisions Units (DUs) sampling exceeding benchmark	Residential Decisions Units (DUs) cleaned up since 2014	Upland ADAs samples exceeded benchmark
<b>LOW</b>	<b>3 µg/dL</b>	<b>~50 ppm</b>	<b>35 ppm</b> EPA interim estimate of the upper end of background soil lead concentrations in the Upper Columbia Valley	<b>389 of 588</b>		<b>139 of 142</b>
<b>MEDIUM</b>	<b>5 µg/dL</b>	<b>~200 ppm</b>	<b>250 ppm</b> WA State lead cleanup level for soil when action triggered	<b>87 of 588</b>		<b>68 of 142</b>
<b>HIGH</b>	<b>8 µg/dL</b>	<b>~400 ppm</b>	<b>700 ppm</b> Action level used by EPA for time-critical soil cleanup actions on residential properties sampled in 2014 and 2016	<b>40 of 588</b> Of the 40, 12 DUs currently exceed 400 ppm benchmark after 2015-18 cleanups	<b>28 DUs on 18 properties</b>	<b>15 of 142</b>

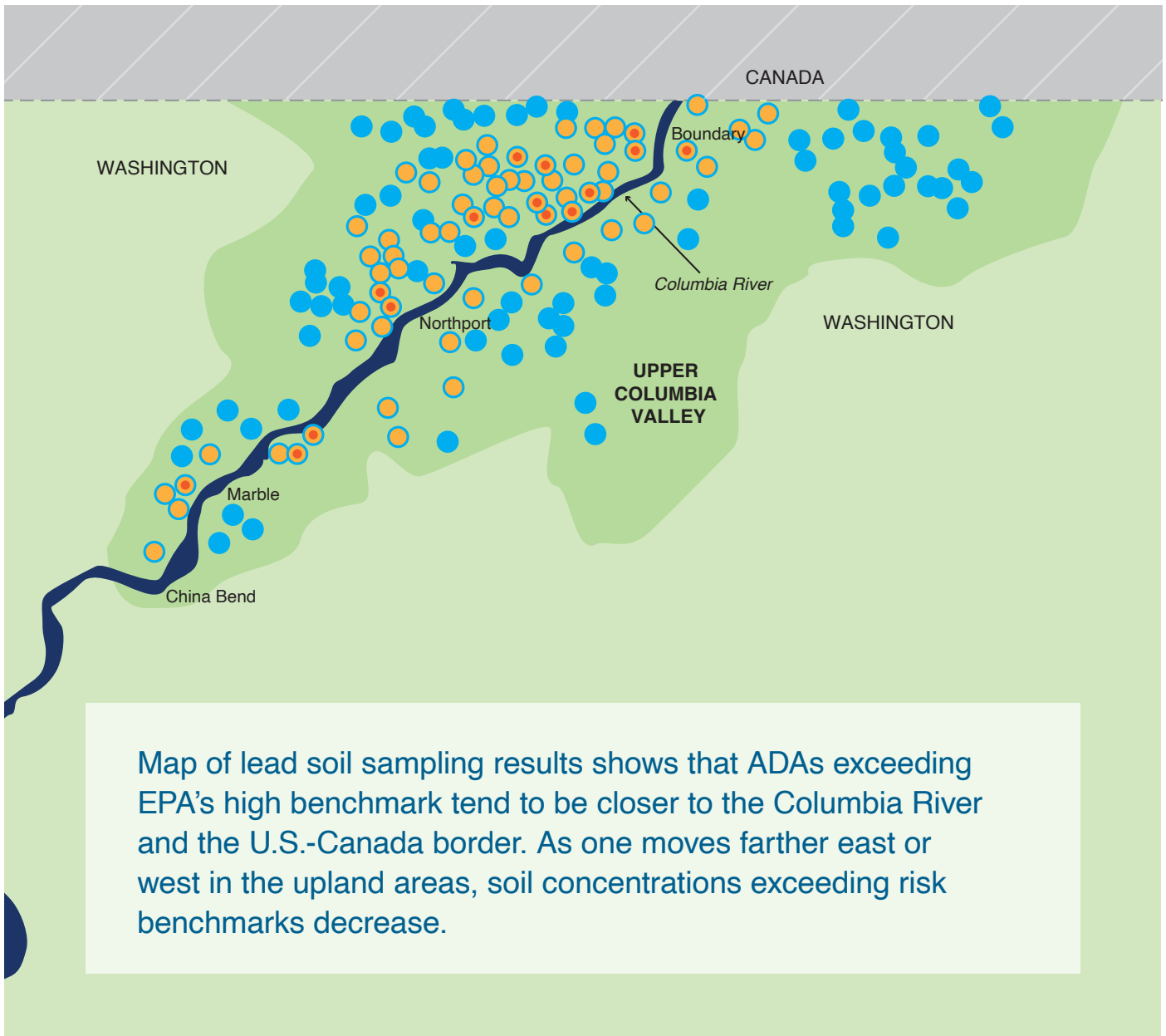
### DEFINITIONS

µg/dL: micrograms of lead per deciliter of blood  
 ppm: parts per million

DUs: Decision Units, also referred to as exposure areas. DU counts exclude tribal allotments.  
 ADAs: Aerial Deposition Areas

**Upper Columbia Valley Aerial Deposition Areas (ADAs) where Lead Risks Exceed Benchmarks**

*ADAs are at least 25 acres in size, and the soil is less disturbed due to infrequent human contact or development.*



**LEAD BENCHMARK**

- Low
- Medium
- High

## Upper Columbia Valley Cancer and Non-Cancer Risk

**A range of metalloids and other chemicals found in the Upper Columbia River Site were evaluated for cancer and non-cancer risks. These represent contaminants other than lead.**

For both residents and recreational visitors, no results exceeded EPA's cancer benchmark. This means there is less than a 1-in-10,000 chance of a person being sufficiently exposed to one or more chemicals that can trigger cancer.

When evaluating possible human exposure to chemicals at the 588 residential decision units (soil sampling areas):

- No individual chemical exceeded the benchmark for non-cancer risk.
- When summing the exposure risk by target organ for all chemicals except those from fish consumption, only one decision unit exceeded the non-cancer benchmark for children.

- When summing the exposure risk, by target organ for all chemicals including fish consumption:
  - Non-cancer benchmarks for children exposed to non-lead chemicals were marginally exceeded for developmental and nervous systems, and skin/hair/nails systems.
  - Developmental and nervous system effects are driven by methylmercury, and skin/hair/nail system effects are driven by thallium. Both occur due to fish consumption.
  - As shown in the graphic, the number of exceedances differed by fish species.
- As shown in the section summarizing fish consumption findings, this is consistent with exceedances of non-cancer benchmarks for children consuming fish. To safely consume fish, follow the Washington Department of Health Fish Advisory (see pages 10-11).

### Non-cancer Benchmark Exceedances for Children When Risks are Summed Across All Chemicals Except Lead

*When the effect of fish consumption is included, non-cancer benchmarks for children are marginally exceeded due to exposure from methylmercury and thallium.*

To safely consume fish, follow the Washington Department of Health Fish Advisory (see pages 10-11). <span style="color: green;">●</span> Healthy Choice <span style="color: yellow;">●</span> Limit <span style="color: red;">●</span> Caution						
BODY ORGAN WITH NON-CANCER HEALTH RISK						
Fish Consumption <i>linked to exceedance of non-cancer benchmark</i>	Developmental System	Nervous System	Skin/Hair/Nails Systems	Reproductive System	Cardiovascular System	Endocrine System
<b>Kokanee</b>	0	219 of 588 DUs	588 of 588 DUs	0	0	0
<b>Northern Pike</b>	0	588 of 588 DUs	588 of 588 DUs	0	0	0
<b>Rainbow Trout</b>	0	577 of 588 DUs	588 of 588 DUs	0	0	0
<b>White Sturgeon</b>	0	588 of 588 DU	18 of 588 DUs	0	0	0
<b>Whitefish</b>	588 of 588 DUs	588 of 588 DUs	588 of 588 DUs	0	0	0
<b>Burbot</b>	588 of 588 DUs	588 of 588 DUs	438 of 588 DUs	0	0	0
<b>Smallmouth Bass</b>	588 of 588 DUs	588 of 588 DUs	588 of 588 DUs	0	0	0
<b>Walleye</b>	0	588 of 588 DUs	588 of 588 DUs	0	2 of 588 DUs	9 of 588 DUs
<b>Sucker</b>	588 of 588 DUs	588 of 588 DUs	578 of 588 DUs	588 of 588 DUs	0	0

*Based on Soil Sampling of 588 Decision Units (DUs). DUs represent residential soil sampling areas in the Upper Columbia Valley.*



### Public Beach Exposure

**33 public beaches were sampled between 2005 and 2015. The draft Human Health Risk Assessment (HHRA) found Bossburg Flats beach was the only one that exceeded human health criteria for recreation due to elevated levels of lead.** Exposure to other metals tested did not exceed EPA cancer or non-cancer human health benchmarks.

Located about 15 miles north of Kettle Falls, the National Park Service (NPS) closed access to Bossburg Flats in 2012 as a precautionary measure. The beach remains closed as EPA and NPS will consider cleanup alternatives as part of the next phase of the RI/FS investigation.



### Public Beach Cleanup Actions

**Black Sand Beach:** In 2010, TAI entered into a voluntary agreement with Ecology to remove about 9,100 tons (6,300 cubic yards) of sediments containing granulated slag from Black Sand Beach. Mostly used by residents in the nearby area, the beach is located near Northport and about three miles south of the U.S.-Canada border.



**Northport City Park Waterfront:** Ecology is completing in 2020 a Focused Feasibility Study (FFS) to evaluate cleanup options for 800 feet of metals contaminated waterfront in Northport Park. This area was principally polluted by the nearby Le Roi Smelter wastes that were deposited and dispersed along the shoreline between 1896 and 1921. Ecology previously completed soil sampling and other testing of this area.



# Fish Advisory

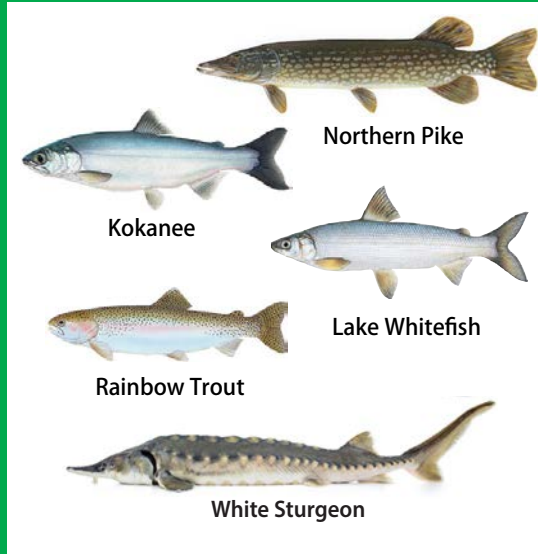
## Upper Columbia River/Lake Roosevelt

Fish are nutritious (mercury and other contaminants)

Babies and young children, pregnant women, and women who are breastfeeding should follow special guidelines.



### HEALTHY CHOICE



### How much can I eat?

**Women 18 - 45**  
especially if pregnant



**Children 1 - 17**



**2- 3 servings per week**

Kokanee  
Lake Whitefish  
Rainbow Trout  
White Sturgeon  
Northern Pike



**1 serving**

4 servings  
of any combination  
of the above

**Women 46 and older**  
and not pregnant



**Men 18 and older**



**7 servings per week**

Kokanee  
Lake Whitefish  
Rainbow Trout  
White Sturgeon  
Northern Pike



**3 servings**

12 servings  
of any combination  
of the above

### What is a serving?



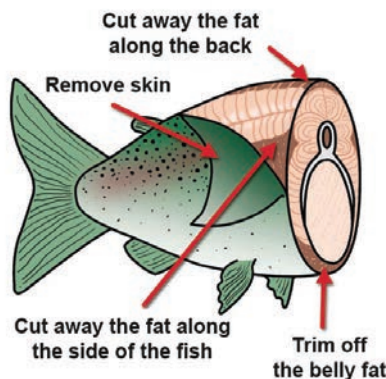
For Adults



For Children

A serving is about the size and thickness of your hand. Give children smaller servings.

### Preparing Fish the Healthy Way



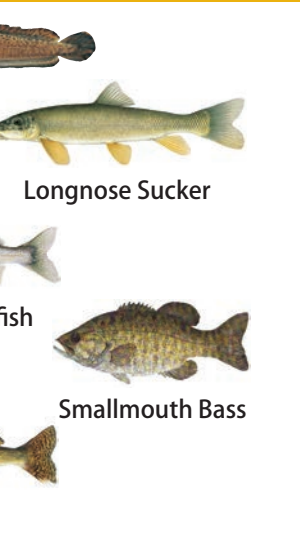
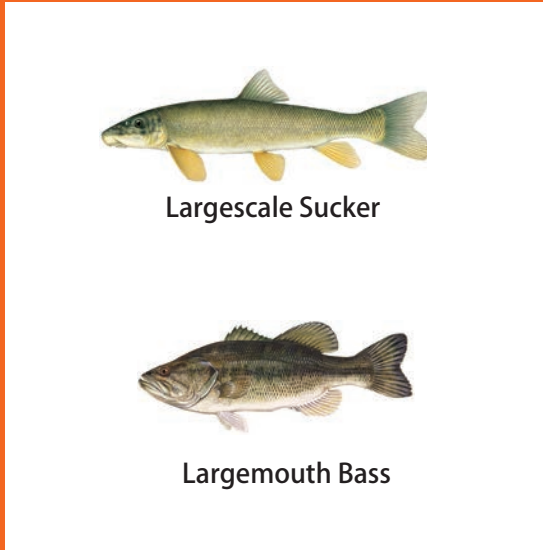




Fish are part of a healthy diet. Following these tips will help you reduce the contaminants you eat. Mercury cannot be removed from fish.

- Before cooking remove the skin and fat.
- Eat younger and smaller fish.
- Eat a variety of fish.

erituous, but certain fish in the Upper Columbia River contain contaminants (and PCBs) that can harm your health.

**Children are most at-risk.**

**Women who are or might become pregnant, nursing mothers, and children under 18 should avoid all of this advisory.**

<p><b>LIMIT</b></p>  <p>Longnose Sucker Kokanee Smallmouth Bass</p>	<p><b>CAUTION</b></p>  <p>Largescale Sucker Largemouth Bass</p>	<p><b>How to Use this Table</b></p> <p><b>Women under age 46 and children under age 18 should eat from either the green or yellow column.</b></p> <p><b>Examples:</b></p> <p><b>If a child eats 1 serving of kokanee and 1 serving of rainbow trout, no other fish should be eaten that week.</b></p> <p><b>If an 18-year-old man eats 3 servings of walleye in a week, no other fish should be eaten that week.</b></p>
<p><b>1 serving per week</b></p> <p><b>OR</b></p> <p><b>2 servings per month</b></p> <p><b>OR</b></p> <p><b>Combination of 1 serving per week and 2 servings per month of these 5 fish</b></p>	<p><b>Largescale Sucker</b> <b>Largemouth Bass</b></p>	<p><b>DO NOT EAT</b></p> <p><b>Northern Pikeminnow</b></p>  
<p><b>1 serving per week</b></p> <p><b>OR</b></p> <p><b>2 servings per month</b></p> <p><b>OR</b></p> <p><b>Combination of 1 serving per week and 2 servings per month of these 5 fish</b></p>	<p><b>Largescale Sucker</b> <b>Largemouth Bass</b></p>	<p><b>DO NOT EAT</b></p> <p><b>Northern Pikeminnow</b></p>  

healthy diet.  
will reduce the amount of chemical contaminants (like PCBs) that collect in the fat of fish. Fat is reduced; it builds up in fish meat (the fillet).  
Remove the skin, fat, and internal organs.  
Eat smaller fish (within legal limits).  
Avoid eating fish.



**Questions?**  
Department of Health  
Toll Free: 1-877-485-7316  
Visit: [www.doh.wa.gov/fish](http://www.doh.wa.gov/fish)

Updated from DOH 334-329 June 2015  
Fish illustrations © Joseph R. Tomelleri  
Available in other formats for people with disabilities  
1-800-525-0127 (TDD/TTY call 211).  
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## Fish, Mussels and Crayfish Consumption

The draft Human Health Risk Assessment (HHRA) used data from fish sampling conducted in 2005, 2009, 2016 and 2018. The HHRA found that for recreational visitors and residents:

- Cancer benchmarks for metals and other chemicals of potential concern were not exceeded.
- For children, non-cancer benchmarks for methylmercury, thallium and TEQ (dioxins/furans plus dioxin-like PCBs) for some fish species were exceeded.
- For adults, no chemicals exceeded non-cancer benchmarks. Cumulative risk (summing the effect of all chemicals of potential concern) exceeded non-cancer benchmarks for burbot, kokanee, rainbow trout, smallmouth bass, sucker, walleye, and whitefish.
- Fish consumption was not found to be a major contributor to overall lead risk exposure for recreational visitors or residents.










The Washington State’s Department of Health (WDOH) and Department of Ecology continue to encourage Upper Columbia River Valley residents and anglers to follow the Fish Consumption Advisory for the Upper Columbia River and Lake Roosevelt. The advisory provides guidance to safely eat fish in these waters (see pages 10-11).

By following the advisory to safely consume fish, WDOH also encourages the public to receive the benefits of eating these fish as an important part of their diet. Consumption is considered an important source of low-fat high-quality protein, omega-3 fatty acids and vitamins such as D and B2 (riboflavin). These and other nutrients contained in fish can lower blood pressure and help reduce the risk of a heart attack or stroke. The WDOH motto is Eat Fish, Be Smart, Choose Wisely.

The WDOH advisory also places northern and signal crayfish in the healthy choice consumption category. High consumers of crayfish should eat no more than ten meals per month. Mussels and clams are in the “do not consume” category due to bacterial/viral concerns and contaminants.

### CHILD RECREATIONAL VISITOR

#### Contaminants Exceeding Human Health Benchmark by Species

To safely consume fish, follow the Washington Department of Health Fish Advisory (see pages 10-11).		
● Healthy Choice    ● Limit    ● Caution		
FISH SPECIES		CONTAMINANTS Exceeding Benchmark
● Kokanee		Thallium
● Rainbow Trout		Thallium
● Whitefish		Thallium, TEQ
● Burbot		Methylmercury
● Smallmouth Bass		Methylmercury, Thallium
● Walleye		Methylmercury, Thallium
● Sucker		Methylmercury, TEQ, Lead

TEQ: Dioxins/furans plus dioxin-like PCBs



## Swimming and Surface Water

**The draft Human Health Risk Assessment (HHRA) found that cancer and non-cancer benchmarks were not exceeded for surface water.** As an exposure pathway, the quality of surface water is safe for swimming and other recreational activities.

In 2009 and 2010 surface water samples were collected from nine transects (one shore of the river to the other). Transects were distributed from the Canadian border to above Grand Coulee Dam. Surface water samples taken represented different depths, river flows and recreational conditions, e.g.—a disturbed sample to represent a child kicking up mud and beach sediment as they play.



## Air Quality

**For Upper Columbia Valley downwind air inhalation exposure from Teck's Trail Smelter, cancer and non-cancer benchmarks used in the HHRA were not exceeded.**

This is consistent with a 2010 report that focused on dust created by seasonally exposed wind storms entraining dried Lake Roosevelt sediments. Prepared for the U.S. Department of Interior by Industrial Economics Incorporated (IEC), the report found that human inhalation of airborne sediment particles along the reservoir containing lead and other heavy metals are within EPA's acceptable risk standard for cancer and non-cancer health effects resulting from both acute and chronic exposures.

In addition, the HHRA used 2002-2009 air monitoring data from an Upper Columbia Valley monitoring station near Northport. The station collected data on arsenic, cadmium, lead, zinc and particulate size. EPA concluded that concentrations



in the air were lower than data from sampling in the same location that dated back to 1994. This is attributed to operational improvements made at the Trail smelter, including significant upgrades completed in 1997 that reduced emissions to five percent of previous levels.

EPA chose not to conduct any further air monitoring for the HHRA based on results from

previous air monitoring and analysis. Ecology disagreed with this decision, stating in a 2017 fact sheet, "Collecting new, reliable measurements of metal particles in the air within the Upper Columbia Valley will be the best way to understand current conditions." At public meetings, community members have expressed similar viewpoints, repeatedly requesting continuance of air monitoring.



## Determining Future Cleanup or Other Actions

**Results from the Human Health Risk Assessment (HHRA) and the Baseline Ecological Risk Assessment (BERA) will be integrated into a Remedial Investigation (RI) report.**

The RI will inform next steps to protect human health and the environment. Based on risk, EPA and TAI will complete a feasibility study to evaluate potential remedial alternatives. Additional treatability studies may be required to help inform the evaluation between remedial alternatives.

Strategies for addressing lead in soil to protect people commonly include replacement or capping of soils. For the UCR site, EPA and TAI are also evaluating using soil amendments to reduce exposure to lead in surface-soil where removal or capping may not be appropriate, such as open space lands.

The timing and completion of one or more possible treatability studies to address identified human health and ecological risks is uncertain. The BERA, for instance, is not expected to be complete until 2022. Time will then be needed to integrate information from the HHRA and BERA into the RI. In addition, the length of time needed for a Feasibility Study is uncertain because it is an iterative process that may require further data collection or treatability studies. As a result, residents are unlikely to see additional cleanup or other actions for at least 3-4 years unless further voluntary cleanup actions are planned and agreed to prior to a Feasibility Study.

In the meantime, citizens interested in soil sampling or taking precautionary measures to avoid lead exposure are encouraged to visit Ecology's Dirt Alert program web site ([ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Dirt-Alert-program](http://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Dirt-Alert-program)).



## Calculating Lead, Cancer, and Non-Cancer Human Health Risks

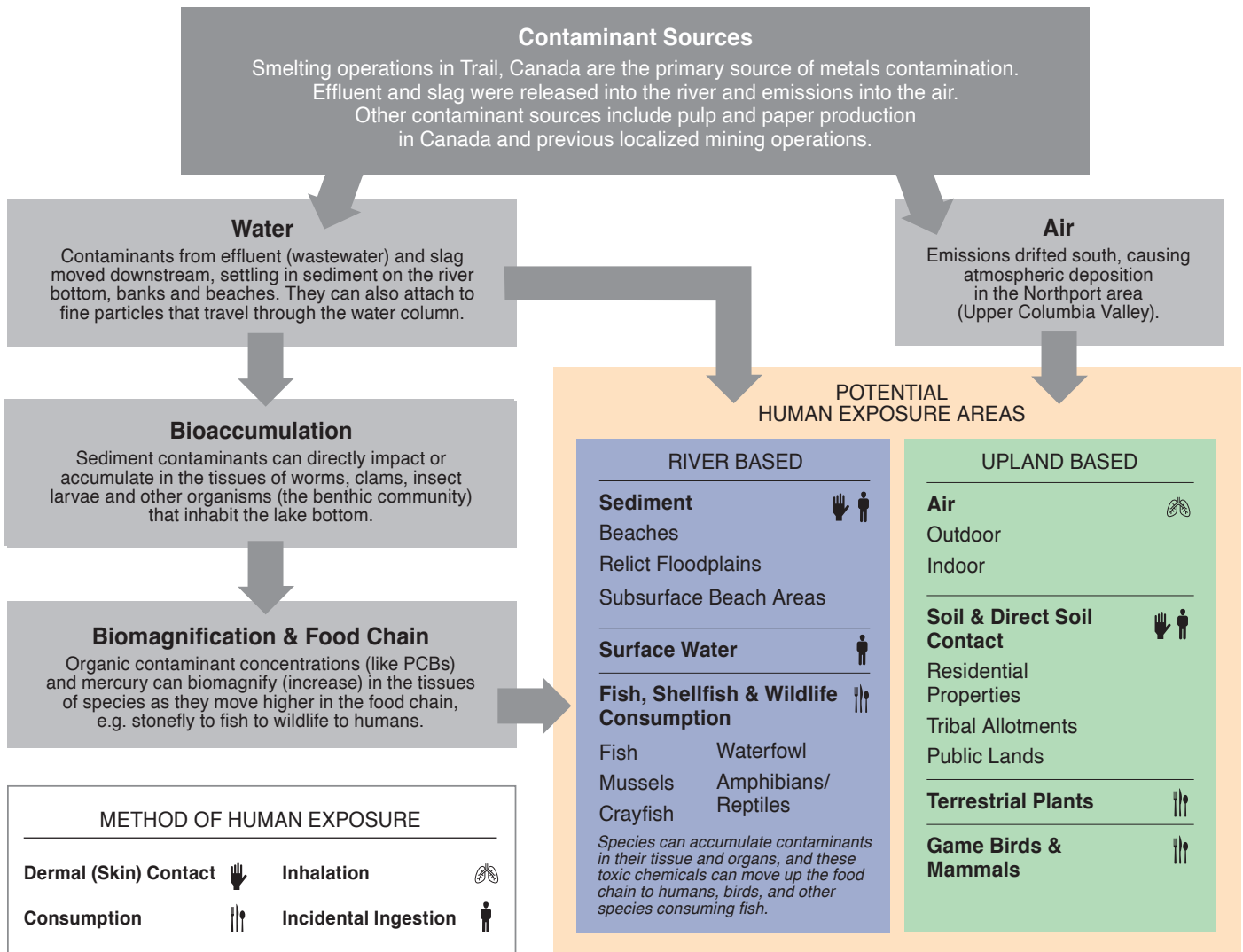
The graphic below shows exposure pathways to people from chemicals entering the UCR and settling in the Upper Columbia Valley.

Depending on the pathway, exposure to chemicals of concern could come by ingestion (oral), dermal (skin), or inhalation (breathing-in). For each population of concern (residents, recreational visitors,

workers and tribal members), multiple exposure pathways were evaluated. The range of chemicals evaluated included metals, pesticides, human-made compounds like PCBs and PBDEs contained in industrial and household products, and toxic substances like dioxins/furans that are a byproduct of burning waste or produced as part of a manufacturing process.

The Human Health Risk Assessment (HHRA) uses the outcome of site-specific investigations to calculate possible lead, cancer, and non-cancer human health risks. Critical to informing calculations was an extensive Recreational Uses Survey conducted in 2010-2011 that showed how often recreational users in the Upper Columbia Valley consume fish, visit beaches, and participate in other recreational activities.

### Upper Columbia Human Health Risk Assessment Exposure Pathways



# Human Health Risk Assessment

## Calculating Lead Risk

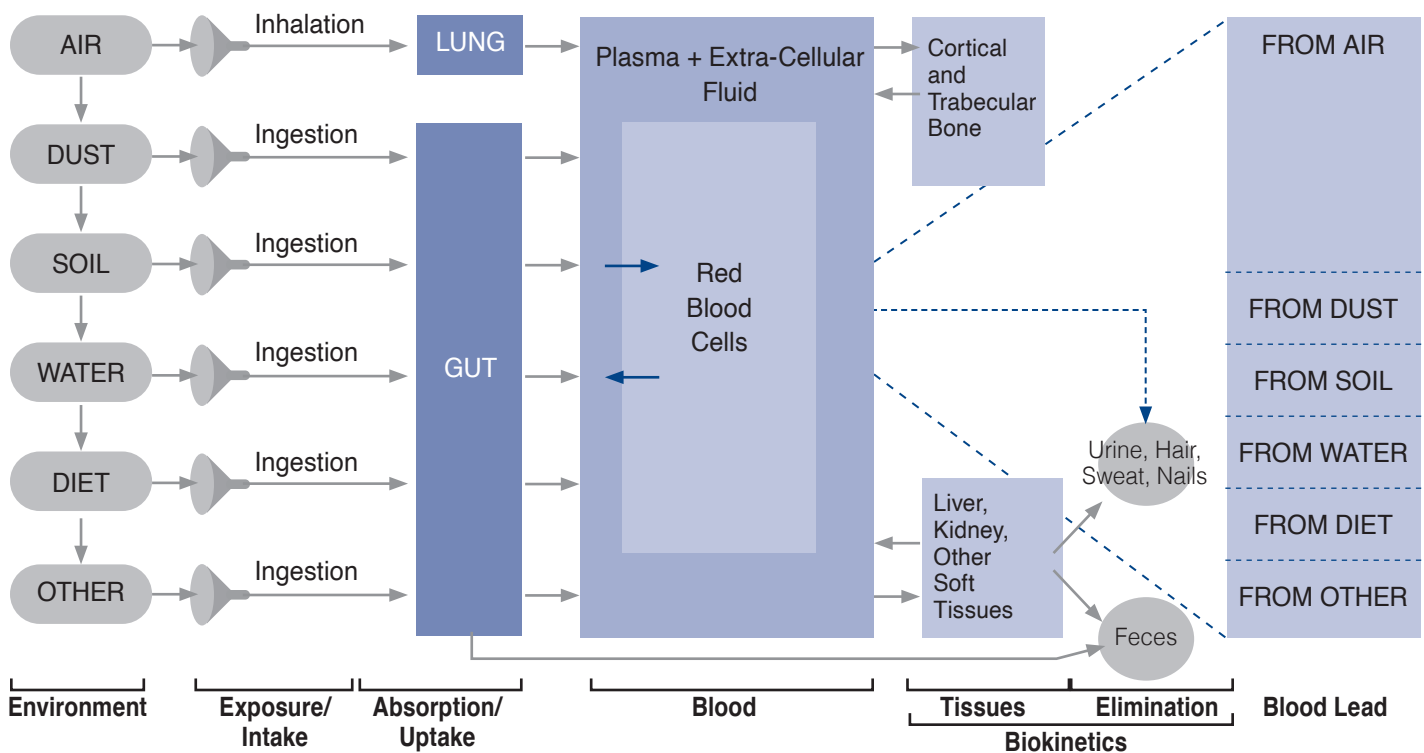
EPA assesses lead risk by calculating the probability of exposure to lead through a combination of dietary intake, air, dust, and soil. Lead is particularly dangerous to children under six because their growing bodies absorb more lead than adults. Numerous studies show exposure negatively affecting the development of brain and other body functions.

The widely used Integrated Exposure Uptake Biokinetic (IEUBK) model was used by EPA to estimate blood lead levels in children. This model is commonly used by risk assessors to calculate possible lead exposure risks. The graphic below shows exposure pathways evaluated, then the use of complex mathematical computations to characterize risk.

The section Upper Columbia Valley Lead Exposure summarizes findings and risks from this modeling.



## IEUBK Modeling of Blood Lead Levels in Children



Source: EPA, 1994a. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.

## Calculating Cancer Risk

**EPA assesses cancer risk by calculating the probability of excess exposure to one or more chemicals of concern.**

For this investigation, cancer risks were considered acceptable if there was less than a 1 in 10,000 chance of someone being sufficiently exposed to a cancer causing chemical. Numerically, this is expressed as  $10^{-4}$ . For each population group, cancer risks were also summed across all cancer-causing chemicals and exposure pathways.

No results exceeded the 1 in 10,000 chance that would trigger a human health concern.

## Calculating Non-Cancer Risk

**EPA uses a Hazard Quotient and Hazard Index as benchmarks to assess non-cancer risks from exposure to one or more chemicals.**

- Individual chemical. When calculations show a Hazard Quotient (HQ) of  $< 1$ , then no adverse health effects are expected. Conversely, if the  $HQ > 1$ , then adverse health effects are possible.
- More than one chemical. When calculations show a Hazard Index (HI) of  $< 1$ , then no adverse health effects are expected. Conversely, if the  $HI > 1$ , then adverse health effects are possible.

Sections on the Upper Columbia Valley and Fish Consumption summarizes when non-cancer risks were exceeded.

## Northport Soil Cleanup

**In August 2020, EPA began soil cleanup of 10 residential properties and 5 common use areas in the town of Northport.** Common use areas include Lyn Kaste Gould Memorial Park, the play area at the Northport Community Garden, and lawns at the Northport Community Library, Northport American Legion vacant lot and the Northport Welcome Center.

Soil at these properties will be replaced because the lead levels are a potential threat to people's health, especially young children. All cleanup actions are

done with the consent of property owners, and the work is expected to be completed in the fall of 2020.

EPA's 2004 soil cleanup in Northport addressed properties with lead levels near or above 1,000 parts per million (ppm). Based on advances in scientific understanding of lead exposure risks to young children and babies, EPA lowered the removal action level for lead in soil to 700 ppm. This is the same level EPA used when overseeing work conducted by Teck American to cleanup 18 residential properties outside of Northport town limits from 2015-2018.



**EPA and its contractor excavate and remove lead-contaminated soil at the Lyn Kaste Gould Memorial Park in the town of Northport.**

*Images Courtesy of U.S. EPA*



# Precautionary Measures

## Metals in Contaminated Soil

People in contact with soil potentially contaminated with lead and other metals are encouraged to take precautionary measures to protect their health. These metals can enter the body when eaten or breathed, with young children being the most vulnerable. Concerned residents can consult their family physician.

EPA, Ecology, and the Northeast Tri County Health District advise residents to take the following precautionary measures:

### INSIDE YOUR HOME

Remove or leave shoes outside your home to avoid tracking in polluted soil.



Wash hands and face thoroughly after working or playing in the soil, especially before cooking and eating.

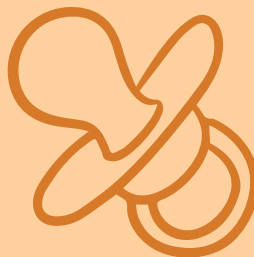
Use soap and water to wash – avoid hand sanitizer.



Damp mop and wipe surfaces often to control dust.

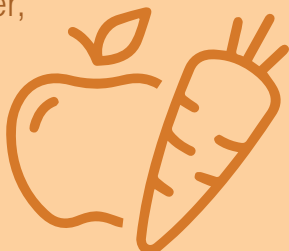


Wash toddler toys and pacifiers often.



After working in areas you know or believe have lead pollution in the soil, wash dirty clothes separately from other clothes.

Scrub vegetables and fruits with soap and water, or peel them.



Repair painted surfaces in homes. Homes built before 1980 may contain lead-based paint. Older paint flakes can be a source of lead.

Eat a balanced diet. Iron and calcium help keep lead from becoming a problem in the body.



This precautionary information for inside and outside your home was adapted from Northeast Tri County Health District outreach material. For more information, please contact them at 509-684-2262, or [www.netchd.org](http://www.netchd.org). Ecology's Dirt Alert web site is another good source of information.



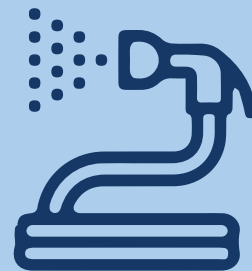
## OUTSIDE YOUR HOME

Keep children from playing in dirt you know is polluted with metals.



Cover bare patches of dirt with bark, sod, decking or other materials, or fence off areas if you know they're polluted with metals.

Dampen dusty soils before gardening or digging so you don't breathe in the dust.



Wear gardening gloves.



Do not eat or drink in metals-polluted areas.



Grow your fruit and vegetables in raised beds with clean soil, or mix plenty of compost and other amendments in your garden soil to decrease the amount of pollution in the soil.

Avoid railroad ties or pressure-treated lumber, they can contain chemicals that pollute soil.

Do not plant food crops under the roof overhang of your home, where pollution may accumulate.

Wipe pets' paws before entering the home, and wash them regularly to remove dust from fur.





Committed to the environmental  
and economic well being of  
our communities

## Lake Roosevelt Forum Members

Area Residents and Communities  
Bonneville Power Administration  
Bureau of Reclamation  
Colville Confederated Tribes  
Ferry County  
Lincoln County  
National Park Service  
Spokane Tribe of Indians  
Stevens County  
Teck American Incorporated  
Upper Columbia United Tribes  
Washington Department of Ecology  
Washington Department of Fish and Wildlife

Photo courtesy of Foster Fanning

## Stay Informed

**The Upper Columbia River (UCR) Remedial Investigation and Feasibility Study (RI/FS) is very complex, spans hundreds of square miles, and is occurring over many years.** In 2006, the United States reached an agreement with Teck Cominco Metals Ltd. (now called Teck Metals Ltd.) and Teck Cominco American Incorporated (now called Teck American Incorporated) to conduct the RI/FS. Studying the issues of concern, however, began many years before and helps inform current activities.

Under this agreement, EPA prepared the Human Health Risk Assessment and oversees all RI/FS activities to ensure that they meet regulatory standards. EPA decisions are made with input by the UCR “Participating Parties.” These include the Colville Confederated Tribes, the Spokane Tribe of Indians, the State of Washington (represented by the Washington Department of Ecology), and the U.S. Department of the Interior. Interior agencies include the Bureau of Reclamation, the National Park Service, Bureau of Indian Affairs, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey. Although not listed in the agreement, the Washington State Department of Health is also consulted.

**Here are web sites that provide on-going information, including links to studies and related resources:**

### Lake Roosevelt Forum

Updates, sign-up for electronic newsletter, and general information: [www.lrf.org/enews](http://www.lrf.org/enews)

Print newsletters: [www.lrf.org/about-the-forum/newsletters](http://www.lrf.org/about-the-forum/newsletters)

Public Guides, including direct links to resources: [www.lrf.org/publicguides](http://www.lrf.org/publicguides)

### Environmental Protection Agency (EPA):

<https://www.epa.gov/columbiariver/upper-columbia-river-remedial-investigation-feasibility-study>

**Washington Department of Ecology:** <https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=12125>

**Teck American Incorporated:** [www.ucr-rifs.com](http://www.ucr-rifs.com)

**United States Geological Survey:** <http://wa.water.usgs.gov/projects/roosevelt/>

**Washington Department of Health:** [www.doh.wa.gov/fish](http://www.doh.wa.gov/fish)

**Citizens for a Clean Columbia:** <https://citizensforacleancolumbia.org>

EPA also maintains document repositories at Northport Town Hall, the Colville Public Library, Inchelium Tribal Resource Center, Nespalem Office of Environmental Trust, Grand Coulee Library, Wellpinit, and the Spokane Library.

2206 S. Sherman Street  
Spokane, WA 99203

**509-535-7084 | [info@lrf.org](mailto:info@lrf.org)**  
**[www.lrf.org](http://www.lrf.org)**

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