Draft SHARP Tool Manual

Toxics Cleanup Program

Washington State Department of Ecology
Olympia, Washington

March 2023

DEPARTMENT OF
ECOLOGY
State of Washington

Draft publication information

This SHARP Tool Manual describes the SHARP Tool and gives user instructions to conduct site hazard assessments and rankings under the site hazard assessment and ranking process (SHARP).

Related information:

- Publication 94-06 - Model Toxics Control Act, Regulation and Statute: MTCA Cleanup Regulation, Chapter 173-340 WAC, Model Toxics Control Act, Chapter 70.105D RCW, Uniform Environmental Covenants Act, Chapter 64.70 RCW, Revised 2013[1]

- Model Toxics Control Act – Cleanup, chapter 173-340 WAC[2]

- Hazardous Waste Cleanup – Model Toxics Control Act, chapter 70A.305 RCW[3]

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[1] https://apps.ecology.wa.gov/publications/SummaryPages/9406.html

[2] https://apps.leg.wa.gov/wac/default.aspx?cite=173-340

[3] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305

[4] https://ecology.wa.gov/About-us/Who-we-are/Our-Programs/Toxics-Cleanup

[5] mailto:ecyadacoordinator@ecy.wa.gov

[6] https://ecology.wa.gov/About-us/Accessibility-equity

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Map of Counties Served

Region	Counties served	Mailing address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
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Preface

The [Washington Department of Ecology](Ecology) has developed a new site hazard assessment and ranking process called SHARP. We'll use it to help identify the sites that pose the greatest chemical exposure risks to people and other living things. To support this, we've developed the SHARP Tool for assessing and ranking contaminated sites. This document is the companion Manual for the SHARP Tool, which is the new system we'll use for ranking sites.

This new SHARP Tool will support Ecology decision makers to help us direct our resources more efficiently and meaningfully on sites with the greatest need for cleanup action. The 2023 [Model Toxics Control Act (MTCA)][7] rule update requires that we update the outdated Washington Ranking Method (WARM), which has been used to rank sites since 1992 but hasn't been updated since then. SHARP will also be a key part of our work to improve environmental equity under MTCA and the [Healthy Environment for All Act][8] of 2021 (HEAL Act).

The SHARP Tool calculates ranking scores for potential **exposure** to contamination in soil, groundwater, surface water, sediment, and indoor air. It also estimates the **severity** of that exposure. Since SHARP uses only readily accessible information, we can calculate ranking scores fairly quickly. Unlike the WARM process, we'll also be able to re-rank sites as new or better information becomes available.

The SHARP Tool is currently in Microsoft Excel format. After we review comments received during the 2023 public comment period and finalized the content, we will convert it into an application. We'll then develop policy about how we will use the ranking results as separate steps.

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[7] https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-340
[8] https://www.atg.wa.gov/about-heal-act

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Terms

AF	additional factors
CCC	criterion continuous concentration
CLARC	Cleanup Levels and Risk Calculation
CMC	criterion maximum concentration
cPAH	carcinogenic polynuclear aromatic hydrocarbons
CSID	cleanup site ID
DFW	Washington Department of Fish & Wildlife
DNAPL	dense nonaqueous phase liquid
DOH	Washington Department of Health
DNR	Washington Department of Natural Resources
DSARS	Document Storage and Retrieval Software
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
ERTS	Environmental Report Tracking System
FSID	facility site ID
GW	groundwater
HEAL	Healthy Environmental for All Act of 2021
HRS	Hazard Ranking System
IA	indoor air
LC50	50% lethal concentration level
LNAPL	light nonaqueous phase liquid
LUST	leaking underground storage tank
Manual	SHARP Tool Manual
MTCA	Model Toxics Control Act of 1989
PCB	polychlorinated biphenyl
SD	sediment
SHARP	site hazard assessment and ranking process
SI	socioeconomic indicator
SL	soil
SW	surface water
SWAP	Source Water Assessment Program
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCP	Ecology's Toxics Cleanup Program
TEQ	toxicity equivalency quotient
TPH	total petroleum hydrocarbons
TTY	teletypwriter
VCP	Ecology's Voluntary Cleanup Program
WARM	Washington Ranking Method

Chapter 1   Introduction

1.1   Background

This SHARP Tool Manual (Manual) is the Department of Ecology (Ecology) resource used to aid the site hazard assessment and ranking process (SHARP) using the SHARP Tool. The SHARP Tool is Ecology's process to rank sites and satisfy RCW 70A.305.030(2)(b)[9] and its implementing rule, the Model Toxics Control Act of 1989 (MTCA; Chapter 173-340 WAC).[10] The SHARP Tool replaces the Washington Ranking Method (WARM) that has been used to rank sites since 1992 but hasn't been updated since.

One limitation of using WARM is that sites were ranked only once during the cleanup process. Under SHARP, re-ranking can occur at milestones that indicate a significant or important change in site conditions, such as after completing a remedial investigation, an interim action, or other cleanup action. An initial ranking will be performed for all new release discoveries as part of the initial investigation process. Existing sites, whether ranked using WARM or not previously ranked, will be ranked (or re-ranked) using SHARP. SHARP also assesses indoor air and soil contamination, which aren't included in WARM.

SHARP is primarily intended to assist Ecology planning and confirm an appropriate listing of a site on Ecology's Contaminated Sites List. A SHARP ranking score can translate into an overall site assessment level that can be used to guide cleanup decision making. Assessing site exposure pathways using the SHARP Tool is not a substitute for conducting a human health risk assessment.

The SHARP Tool does not constitute policy on how ranking results will be used. Policy and internal guidance will be developed as separate steps.

1.2   Purpose and scope

The SHARP Tool assesses whether an exposure pathway to contamination is complete, or could be complete, for people and other living things for soil, groundwater, surface water, sediment, and indoor air. The SHARP Tool can also evaluate the exposure severity, if an exposure pathway is possible. Ranking results include selecting a relative confidence level that best describes a ranker's confidence in the quantity and quality of only **readily available** information reviewed by the ranker. The SHARP ranking process also includes other information that, while not used as part of the ranking calculations, offers additional useful information about a site.

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[9] https://app.leg.wa.gov/RCW/default.aspx?cite=70A.305.030
[10] https://apps.leg.wa.gov/wac/default.aspx?cite=173-340

1.3 A living process

The SHARP Tool is a "living" system subject to periodic performance reviews and updating to align with current environmental technology awareness, emerging contaminant studies, legislative requirements, and cleanup practices in Washington State.

This Manual will be updated as needed and as the SHARP Tool undergoes updates over its lifetime. At this time, this Manual applies to ranking sites using the **Microsoft Excel** version of the SHARP Tool and will be updated when the future SHARP Tool **application** is developed.

1.4 Ranker qualifications and training

Rankers include Ecology staff, such as initial investigators, site hazard assessors, site managers, and subject matter experts. Using the SHARP Tool doesn't require rankers to be subject matter experts in any or all environmental disciplines. Rather, Ecology subject matter experts are available to help rankers, if needed.

Initial investigators would focus on ranking new sites, whereas existing active sites are better off being ranked by their site managers who may also re-rank their sites over time. Ecology may rank sites using external parties such as through a contract or interagency agreement.

Minimally, rankers are required to have enough relevant education and experience to:

- Follow a standard set of instructions and apply consistent professional judgment.
- Understand the question being asked.
- Collect the appropriate information from specific websites.
- Comprehend applicability of the helpful hint information in the SHARP Tool.
- Know when to seek help from a subject matter expert, when warranted.

Optimally, rankers should have a combination of education and experience in the environmental and natural resources fields to successfully apply the ranking process. Also, a ranker must have a sufficient skill in using Excel to understand how to use its features such as dropdown menus and generally be able to easily navigate between multiple sheets of an Excel workbook.

A SHARP Tool Specialist will be responsible for providing standardized, internal SHARP training across Ecology. Standardized training promotes efficiency, accountability, and consistency in ranking performance and effectively limits regional deviations across Ecology's programs. The SHARP Tool Specialist is responsible for identifying education, experience, and judgment gaps among ranking staff and provide additional assistance where needed.

Chapter 2   Before Ranking a Site

2.1   Equipment and resources needed for ranking

Using SHARP requires a laptop or personal computer with a monitor. Minimal software requirements include Windows 10 and a Microsoft Office package that includes a current version of Excel. Finally, the ranker must have internet access. Ranking can be conducted either remotely or at an Ecology office.

2.2   Recordkeeping practices

After ranking a site using SHARP, a **SHARP Report** can be created and uploaded to Ecology's Document Storage and Retrieval Software (DSARS) database. Documents uploaded to DSARS may be accessible internally and to the public through site webpages that can be accessed by searching Ecology's Cleanup and Tank Search[11] or What's in My Neighborhood.[12] Each SHARP Report is retained as an electronic record, in accordance with Ecology's record retention policies.

2.3   Referencing reviewed sources

Ranking begins by identifying and having access to records, websites, databases, guidance, rules, regulations, and other information sources. Rankers should review enough information to basically understand of a site's environmental conditions, without getting bogged down in details. An efficient records review requires good time management skills and accessing only readily available information without creating a "research project". Rankers will document all the sources of information reviewed in the Site Information Sheet.

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[11] https://apps.ecology.wa.gov/cleanupsearch/reports/cleanup/all

[12] https://apps.ecology.wa.gov/neighborhood/?lat=47.500000&lon=-121.000000&zoom=7&radius=false

Chapter 3   SHARP Tool Structure

The SHARP Tool workbook has eight interactive sheets plus additional two sheets that summarize the results of that interaction. Another sheet offers toxicity information of chemical derived from Ecology's Cleanup Levels and Risk Calculation[13] (CLARC) database. The ranker uses dropdown menus to select answers to questions posed during the ranking process and can enter comments.

Rankers access the sheets by clicking on any of the eleven tabs as shown in Figure 3-1.

Figure 3-1.   All eleven SHARP Tool tabs.

The first two tabs are the Info Tab and the SI Tab, respectively, as shown in Figure 3-2. The Info Tab accesses the Site Information Sheet, and the SI Tab accesses the Socioeconomic Indicators Sheet.

Figure 3-2.   Info and SI Tabs.

The third through seventh tabs access the five environmental media sheets (ranking sheets) for soil (SL Tab), groundwater (GW Tab), surface water (SW Tab), sediment (SD Tab), and indoor air (IA Tab) (Figure 3-3).

Figure 3-3.   SL, GW, SW, SD, and IA Tabs.

The eighth tab (AF Tab) accesses the Additional Factors sheet (Figure 3-4).

Figure 3-4.   AF Tab.

The next two tabs provide summaries of the ranking process in two reporting formats: a text summary as a SHARP 1 Report and an illustrated summary as a SHARP 2 Report. Rankers can access a text-based summary from the SHARP1 Tab. An illustrative summary is accessed from the SHARP2 Tab.
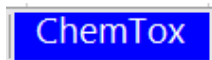
Figure 3-5.   SHARP1 Tab and SHARP2 Tab.

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[13] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC/Data-tables

Finally, the ChemTox Tab accesses the Chemical Toxicity Reference Table, a sortable table of chemicals based on the January 2023 version of the CLARC database.[14]

Figure 3-6.   ChemTox Tab.

ChemTox

The Chemical Toxicity Reference Table:

1. lists chemical names and CAS numbers
2. indicates chemicals volatile enough to be considered a possible source of vapor intrusion that could affect indoor air
3. classifies chemicals as "extremely" or "very" toxic for the purposes of SHARP scoring.

These two toxic categories were designed only to award additional severity points to sites affected by most toxic chemicals, and not to all chemicals considered hazardous substances under MTCA. Users of the ChemTox table should not interpret a chemical that does not warrant an "extremely" or "very" category under SHARP to be exempt from additional investigation or cleanup. Additional information is included in the Appendix of this Manual.

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[14] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC

Chapter 4 SHARP Tool Scoring

Ranking calculations are based on exposure potential (exposure), severity, and confidence levels. This section describes how exposure and severity are used to calculate a ranking score for each environmental medium. Calculations use intelligent logic statements, question relationships, and question interdependencies, and applies threshold values to elevate scores, when appropriate.

Scores are calculated for each environmental medium. Exposure indicates, the degree of completion of an exposure pathway. A complete exposure pathway means humans, plants, and animals can be exposed to contamination under current site conditions.

Ranking scores are expressed as an alpha-numeric pair (e.g., "A1"). The alpha-character indicates the exposure potential for the media. The numeric-character indicates severity. Together the alpha-numeric pair indicates the ranking score for each of soil, groundwater, surface water, sediment, and indoor air.

4.1 Exposure potential assessment

Exposure scores range from "A" to "D", where "A" presents the greatest exposure potential and "D" as the least or none. Exposure scores are described as follows.

- A — complete pathway

  There is documentation of a complete exposure pathway.

- B — possible pathway

  There is a possible exposure pathway. More data are needed to determine if the pathway is complete.

- C — potential future pathway

  There is no complete exposure pathway under current site conditions, but that could be updated if site conditions change. These changes could include things like a change in land use, removal of a cap, or shutdown of a treatment system mitigating exposures.

- D — no source

  A "D" score indicates there is no contamination to require further action in that medium, so there is no exposure source. Media with "D" scores do not get a severity score.

Exposure calculations are fairly complex and are based on the relationships and order of the questions. Different point values are assigned to each response. These values "add up" to calculate an exposure score for each medium.

Not all answers to exposure questions get an individual score or points. Some questions can serve to eliminate a concern (i.e., when a particular medium is not contaminated) or move a ranker forward to a subsequent question in the process.

4.2   Severity assessment

The second half of the double-character ranking score represents the estimated severity of exposure. Severity reflects the estimated intensity of exposure to people and other living things on a scale from "1" to "4", with "1" indicating the greatest severity and "4" the least.

Not all severity questions have equal value. Some offer a higher value of points used in the scoring calculations than others. Tier 1 severity questions yields higher points (10, 6, or 0) than Tier 2 severity questions (5, 3, or 0). Questions about **extremely** toxic chemicals are awarded Tier 1 points, while Tier 2 points are awarded to questions about **very** toxic chemicals.
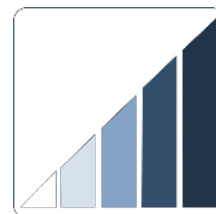
4.2.1   Severity threshold values

A different threshold value is assigned to the severity calculation for each medium and is based on the maximum severity points available. Once that threshold is reached, a threshold value can be used to increase a severity score to a higher level. A severity score of "1" allows comparison of scores for different exposure media. Lesser severity scores of "2", "3", and "4" are based on a linear allocation of points less than the "1" threshold. Thresholds for greatest severity are different for each medium.

4.2.2   SHARP toxicity categories

Based on toxicity, the system used to classify SHARP chemical toxicity values includes the ability to sort chemicals into multiple groups to: 1) allow grouping chemicals by multiple types of toxicity (acute, chronic, or carcinogenicity) when establishing these toxicity groups; and 2) apply the classifications to multiple environmental media. More information is provided in the appendix of this Manual.

4.3   Confidence levels

The ranker uses professional judgment to select a confidence level, based the quality and quantity of information reviewed. Confidence levels are defined as follows.

High

The score is based on site-specific data and information of sufficient quality and quantity to strongly support the score, including field observation. **Additional site-specific information is not needed** to increase the confidence level.

Medium

The score is based on site-specific data and information of limited quality or quantity to support the score, including field observation. **Additional site-specific information is needed** to increase the confidence level.

Low

The score is based on general site conditions and land uses, and information on site operations, processes, and contamination associated with analogous sites. **Site-specific information is needed** to increase the confidence level.

4.4   Comments

Recording comments are optional but highly recommended. Comments provide an important snapshot understanding a site, complete a concept or scenario, help future reviewers, fill information gaps, and simply "sets the stage" of a ranking.

Comment boxes are available on each ranking sheet. In turn, comments entered are automatically transferred into the text-based SHARP1 Report.

Chapter 5   Entering information and answering questions

This chapter provides ranking instructions and tips on how to navigate the SHARP Tool and collect information used to find socioeconomic indicator data, site-specific information, cleanup action information, and other data collection from complex websites. The SHARP Tool offers several links to online information and data sources. Some sites require knowing how to navigate their multiple layers and filters to reach target information.

This chapter also includes instructions for navigating select websites to collect information. Note that websites are continually updated, so these instructions will need to be updated periodically to accommodate such changes.
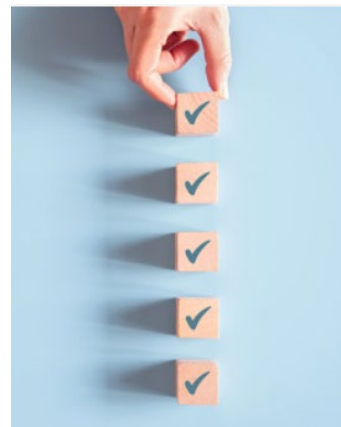
5.1   Where to begin

Begin the ranking process by opening a blank SHARP Tool workbook. Immediately save the file with a new name beginning with the site Cleanup Site ID (CSID), or Environmental Report Tracking System (ERTS) ID, as applicable. Then, start the ranking process by accessing each tab, in order from left to right, beginning with the Info Tab and ending with the AF Tab. Follow the instructions listed in the following sections.

Each ranking sheet asks questions and offers a selection of answers from dropdown menus. Available answers are "yes", "maybe", and "no", with a few exceptions. Use the helpful hints when needed to select the best answer. If the answer is "no" to the first question of a ranking sheet, then the remaining questions will pop up with an automatic "SKIP" alert to indicate that no more questions need to be answered in that sheet. The ranker should then move on to the next worksheet.

5.2   Site Information — Info Tab

Enter baseline information into the Site Information Sheet. This sheet collects basic information that begins the ranking process.

5.2.1   About the Site Information Sheet

The Site Information Sheet has six sections:

1. Ranking or re-ranking checkboxes

    Entering an "x" in one checkbox identify a ranking and in the other checkbox identifies a re-ranking. Check only **one box**.

2. Rank date

   Enter the date the ranking process is completed.

3. Ranker name

   Enter your name as the "ranker of record".

4. Site location

   Provide site location data and identify the real properties/parcels involved. Select a predominant land use of the site following these general guidelines.

   - **Agricultural** land is cultivable, or pasturable, devoted to the controlled use of any form of life to produce food for people and animals, and is often called cropland or farmland. Pastureland is not considered undeveloped.
   - **Commercial** land is used for business activities or commerce.
   - **Industrial** land is used for manufacturing, equipment assembly, materials storage, transportation terminals, and related activities. Designations of using the site for industrial purposes for SHARP ranking does not necessarily mean that the site will meet the definition of an industrial property under MTCA.
   - **Mixed** land use combines more than one land use on a single property, most commonly as a combination of commercial and residential land use.
   - **Recreational** land is used for personal enjoyment.
   - **Residential** land either includes a residence or is a good fit to build one.
   - **Transportation** land allows people to travel from one place to another.
   - **Undeveloped** land is any property that is in its untouched natural state.
   - **Vacant** land has no structures of significant value and is not considered undeveloped by virtue of being unoccupied.

5. Ecology identifiers

   Enter Ecology program identifiers for FSID, CSID, leaking underground storage tank (LUST) IDs, and Voluntary Cleanup Program (VCP) site project numbers. Sites can have multiple FSIDs, CSIDs, LUST IDs, and VCP project numbers. List all that apply.

6. Sources reviewed

   List all reviewed information sources to provide a site baseline. This baseline also time stamps the information available at the time of ranking. Further, the listed sources assist future periodic reviews and re-rankings.

7. Site narrative

Orient a reviewer or reader with a site narrative. This narrative gives a snapshot of site uses, background, and environmental contamination and cleanup history.

5.2.2   Site Information Sheet instructions

Open the Site Information Sheet.

1. Enter an "x" in only one box at the top to indicate an initial ranking or a re-ranking.
2. Complete all fillable, highlighted fields throughout the sheet:
   a. Enter the ranking completion date.
   b. Enter your name.
   c. Add all required and known site information, including location, affected parcels, and land use.
   d. Fill in Ecology project numbers and identifiers.
   e. Information sources:
      i. List all reviewed information and data sources, in order from newest to oldest, using the format: YYYY, author/firm/agency, full or abbrev. Title.
      ii. Consider using known acronyms and clear abbreviations, as needed.
   f. Draft a site narrative, including overflow pages as needed. Include such information as:
      i. background
      ii. site description
         1) contamination source
         2) current occupants/uses of all impacted properties
         3) historical land uses/occupants, if they are the source of contamination
         4) identification/general description/location of notable features on or adjacent to the site location of current or former underground storage tanks, surface water, etc.)
      iii. site characterization (depending on chronology of activities, may make sense to combine characterization and remediation)
         1) summary of previous investigations, if any
         2) media and area impacted
      iv. cleanup activities
         1) cleanup actions completed
         2) applicable cleanup levels
         3) confirmation sampling results and comparison to compliance values
   g. Tip: Keep the narrative at a high level with just enough information to offer a broad understanding and snapshot of site conditions. Don't get stuck "in the weeds".

5.3   Socioeconomic indicators — SI Tab

SHARP collects state-only socioeconomic indicators (local demographics) data using the U.S. Environmental Protection Agency's (EPA) EJScreen.[15] The Socioeconomic Indicators Sheet is the simplest sheet and provides a place to record those data.

5.3.1   About the Socioeconomic Indicators Sheet

EJScreen's nationally consistent data combines environmental and local demographics as socioeconomic indicators. For SHARP, rankers collect data for six socioeconomic indicators: 1) people of color; 2) limited English speaking; 3) low income; 4) less than high school; 5) under age 5; and 6) over age 64.   The index values are relative percentiles that represent how the number of people meeting a sociographic indicator in a community compare to those same indicators in other Washington communities.

These data may be helpful to support Ecology's decision-making where inequitably impacted communities may be at greater risk of exposure. Such communities are represented by index values greater than the 80th percentile for Washington State.

Note that the EJScreen website structure continually changes. Therefore, instructions in this Manual will require periodic updating to keep current with those unpredictable changes. Follow the instructions in the next section to collect the data needed for reporting in the SHARP Tool.

5.3.2   Ranking instructions

Launch EJScreen, and follow these instructions.

1. Once the EJScreen map appears, apply pan and zoom features to locate the area of your site.
2. Hover over the four tab icons to identify "Maps", "Places", "Reports", and "Tools" icons; then click on the "Reports" icon (third from left).
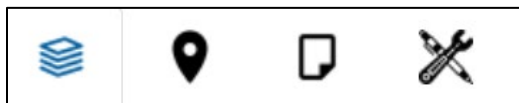

3. Finding your site:
    a. If your site is fairly "small", click on "Drop a Pin", and land the pin in the center of your site.

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[15] https://ejscreen.epa.gov/mapper/
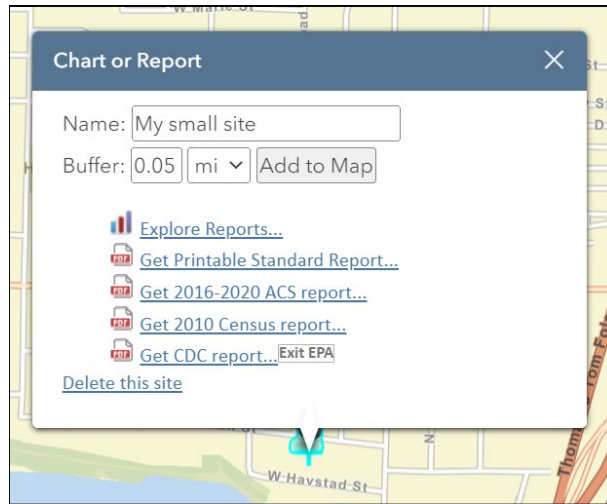
b. If your site is fairly large, or if you would like data representing a larger area, select "Draw an Area" under the "Reports" icon.
   i. Click and release at each corner or along boundary points, and finish by closing the polygon at its beginning point.
   ii. Tip: Without these instructions, "Draw an Area" is not intuitive.
c. When the "Chart or Report" popup appears, enter a 0.5-mile buffer radius, regardless of whether you drop a pin or draw a polygon.
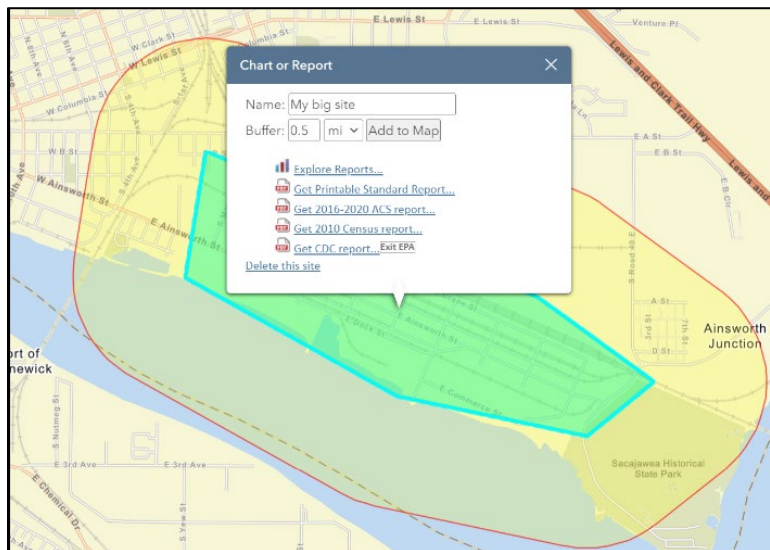
4. Click on "Add to Map".
5. Click on "Explore Reports".
6. In the "Explore Reports" popup, click on the "Socioeconomic Indicators" tab and:
   a. Unselect both the "Demographic Index" and the "Unemployment Rate" boxes.
   b. Unselect the "USA Percentile" box and instead select the "State Percentile" box.
   c. Tip: Make sure the popup window is expanded enough to display the graph bars.
   d. Tip: You can have more than one pin or polygon on your map, but only one "Explore Reports" window can be opened at a time.
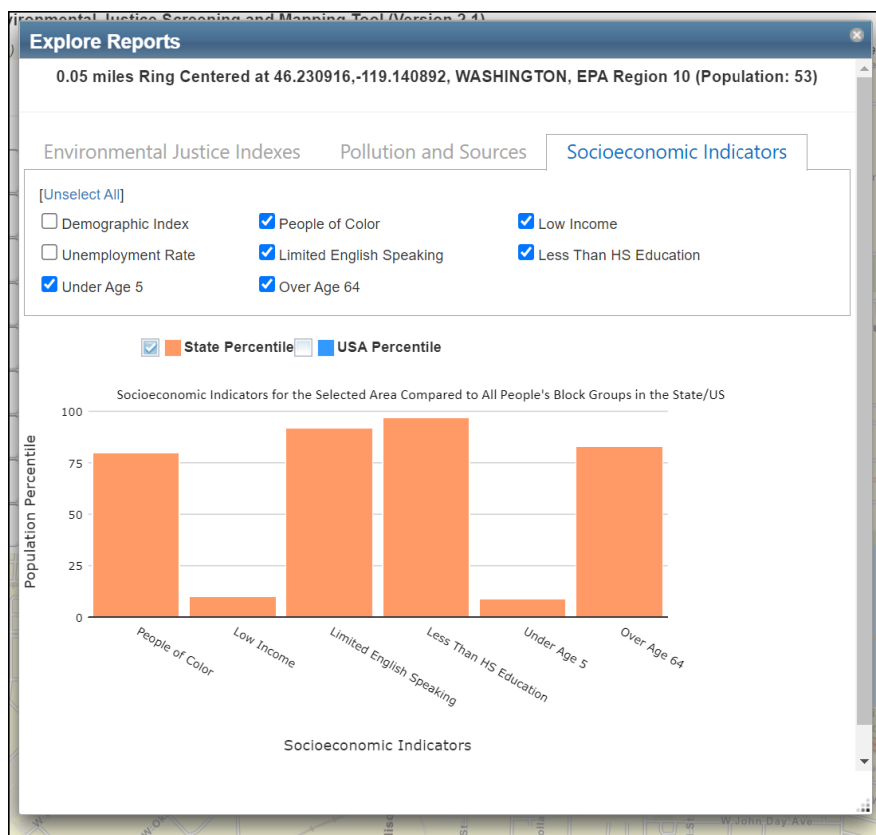
7. Hover over each bar in the graph to see the resulting state percentile for each of the six sociographic indicators of interest.
8. Record each percentile datum in the SHARP Tool's Local Demographics Sheet for each sociographic indicator.

5.4   Ranking sheets

Ranking parameters are assessed using ranking sheets for soil, groundwater, surface water, sediment, and indoor air. The parameters are based on alignment with the MTCA Cleanup Rule and its terms, the Sediment Management Standards (Chapter 173-204 WAC),[16] and other state and applicable regulations. This section describes each ranking sheet and provides instructions for using them.

5.4.1   Ranking instructions

Follow these instructions to answer questions in all five ranking sheets.

1. Skip over any questions with answers automatically flagged as "SKIP".
2. Use the helpful hints or refer to this Manual, as needed.
3. Seek help from the SHARP Tool Specialist or subject matter expert, as needed.
4. Select the best confidence option from the confidence dropdown menu.

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[16] https://app.leg.wa.gov/WAC/default.aspx?cite=173-204

5. Enter useful comments in the "Enter comments" box, as ranking progresses, if helpful.
6. Tips:
    a. Be mindful to continually update any narratives you generate throughout the ranking process.
    b. Comments entered into the comments box automatically populate the SHARP Report for printing.
    c. The SHARP Tool automatically calculates a score for soil exposure and severity and automatically populates the SHARP reports.
    d. If unsure how to answer a question, answer "maybe".
    e. You can go back and change answers later, until the ranking process is completed.
    f. Changing an answers may require re-ranking an entire sheet.
7. Forward to the next ranking sheet, when all exposure questions are answered, a confidence level is selected, and comments are entered (if any).
8. If any exposure questions are not answered, a blank exposure score is displayed as "ExGo" on the ranking sheet and the SHARP reports.
9. If any severity questions are not answered, a blank severity score is displayed as "SvGo" on the ranking sheet.

5.4.2   Soil ranking sheet — SL Tab

WAC 173-340-200[17] defines soil as "a mixture of organic and inorganic solids, air, water, and biota that exists on the earth's surface above bedrock, including materials of anthropogenic sources such as slag, sludge, etc."
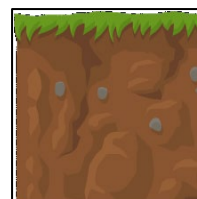
Standard point of compliance for people – 0 to 15 feet

The MTCA standard point of compliance for soil is from ground surface to 15 feet deep for people exposed to contamination via the direct-contact pathway (WAC 173-340-740[6][d]).[18] The risk of exposure to soil contamination is assessed by whether an exposure is immediate, will occur without much effort, or requires some effort to access.

Protecting people coming into direct contact with contaminated soil is based on the scenario where a person incidentally ingests some soil. Small children ingest more soil on average than other people do, based on behaviors and proximity to soil, which puts them at greater risk of severe exposures. Imminent soil exposure (shallower soil) might occur from activities such as walking, pets digging and playing, tree planting, utility installing, gardening, and landscaping.[19]

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[17] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-200

[18] https://app.leg.wa.gov/WAC/default.aspx?cite=173-340-740

[19] https://fortress.wa.gov/ecy/gsp/DocViewer.ashx?did=5789

Without analytical data, soil contamination can be suspected based on signs of discoloration, staining, an oil-like appearance, an unnatural odor, or if site operations suggest surface spills are likely (e.g., from fueling operations or chemical storage).

Conditional point of compliance for plants and animals – 0 to 6 feet

The conditional point of compliance for plants and animals is from 0 to 6 feet deep. While not part of ranking, conducting a simplified terrestrial ecological evaluation[20] may be appropriate for a site.

Consider that a barrier's condition may not be known when assessing physical barriers to contamination. Further, just because an environmental covenant is entered with Ecology does not mean that a physical barrier is still in place or being regularly monitored and maintained under the terms of the covenant.

The following online source supports this ranking sheet.

Ecology

— Draft Technical Document: Terrestrial Ecological Evaluations under the Model Toxics Control Act

   The terrestrial ecological evaluation is a process that evaluates threats posed by contaminants to ecological receptors and is included in MTCA, specifically, WAC 173-340-7490 through 7494.

5.4.3 Groundwater ranking sheet – GW Tab

In WAC 173-340-200 groundwater means "water in a saturated zone or stratum beneath the surface of land or below a surface water". The standard point of compliance for groundwater is throughout the site, from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the site. Confirmed or potential impacts to water supply wells is the most critical groundwater exposure.
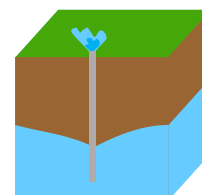
The following online sources support this ranking sheet.

EPA

— Ground Water Issue, Light Liquid Nonaqueous Phase Liquids[21]

   This paper provides an EPA list of common light nonaqueous phase liquids (LNAPL).

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[20] https://apps.ecology.wa.gov/publications/documents/1909051.pdf
[21] https://www.epa.gov/sites/default/files/2015-06/documents/lnapl.pdf

Washington State Department of Ecology

— [Ground Water Issue, Dense Nonaqueous Phase Liquids](#)[22]

This paper provides an EPA list of common dense nonaqueous phase liquids (DNAPL).

Ecology

— [EIM Search](#)[23]

Search our Environmental Information Management System for environmental monitoring data collected across Washington by our scientists and partners.

— [TCP Maps Database](#)[24]

Search this internal database for information on cleanup sites. TCP Maps includes layers from multiple geographic information system sources. Cleanup site symbols are mapped as "awaiting cleanup", "cleanup started", "cleanup complete", and "monitoring".

— [Washington State Well Report Viewer Map Search](#)[25]

Identify the proximity of a site to water supply wells at a 10-year groundwater travel-time distance for a typical exempt domestic well (that pumps at a rate less than 5,000 gallons per day), using a calculated fixed radius method.

Follow these instructions to use the Washington State Well Report Viewer Map.

1. Locate and zoom in to your site or enter the location information.
   a. Tip: Small square symbols represent wells or groups of wells mapped to the nearest ¼-¼ section within a township and range system, so trying to select one square ("well") may represent a single well or a group of wells (see screenshot example).

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[22] https://www.epa.gov/sites/default/files/2015-06/documents/dnapl_issue_paper.pdf

[23] http://ecyeim/search/default.aspx

[24] http://ecyaptcp/tcpmaps/?lat=47.211690&lon=-120.591577&zoom=6

[25] https://appswr.ecology.wa.gov/wellconstruction/map/WCLSWebMap/default.aspx

b. Tip: Use the "Pan" tool to move the map around.
c. Tip: Use the "Select wells" tool to select a specific well or area.
2. Select from a dropdown list of "Report Options" above the map.
a. Select the "Well Types" of interest.
b. Identify the number of "List Results" to view at one time.
3. Use the cursor to draw or redraw a temporary rectangular around the area of interest.
4. Review the information in the "Well Report Search Results" (see screenshot example).

DOH

— Source Water Assessment Program (SWAP) Maps[26]

The DOH SWAP Maps provide access to viewable state drinking water data.

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[26] https://fortress.wa.gov/doh/swap/

Washington State Department of Ecology

1. Bypass the disclaimer and enter site or location information or zoom in to locate the site.
2. Click the "Data" icon (see screenshot example).
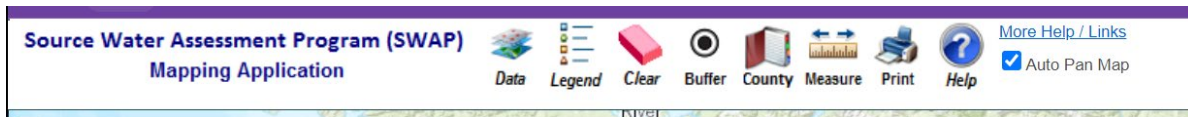
a. For groundwater information: Check the "Group A Time of Travel" box, and under "Sublayers", uncheck all its boxes except "10 Year Time of Travel" (see screenshot example).
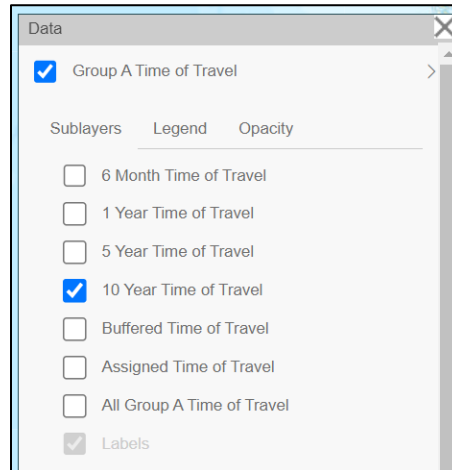
b. For surface water information: Check the "Group A Surface Water Protection Areas", and check all boxes under its "Sublayers".
3. Then check the "Group B Time of Travel" box.
4. Find the site on the map and click on it.
5. Review the information in the next popup box, if available (see screenshot example).
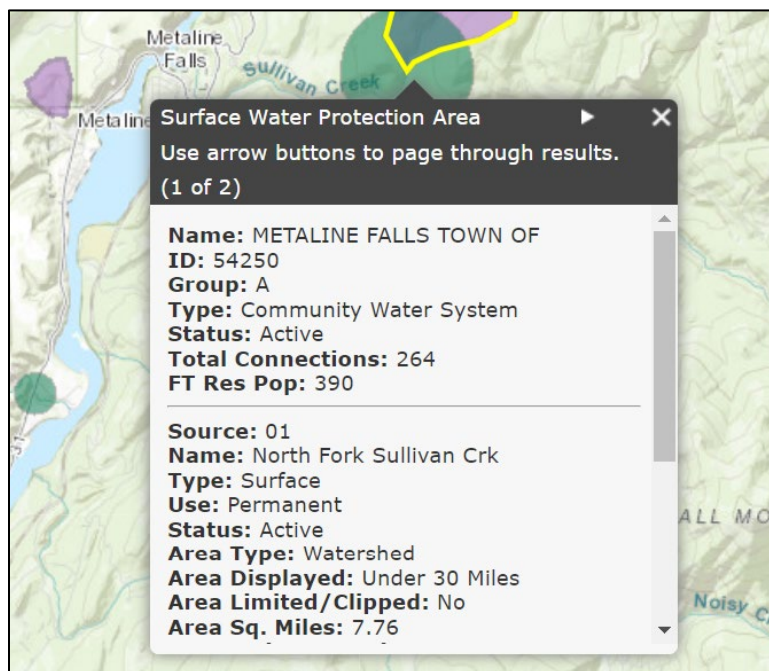
6. Scroll down in the popup, and click on the link for "Open in the Drinking Water Database".
7. Accept the disclaimer.
8. Click on its "Source Information" tab, and then click on the "Exceedances" tab (or others) (see screenshot example).

General Information	Source Information	Samples	Exceedances	Water Quality Monitoring Schedule
Source 01 - North Fork Sullivan Crk				
Source Status	Active	Usage	Permanent	WRIA	Pend Oreille	Intertie Supplying System	NA
Type	Surface	Capacity (gpm)	1,400	Township	39	Intertie Supplying Number	NA
Effective Date	1/1/1970	Treated	Yes	Range	43E		
Inactive Date		Metered	Undefined	Section	23		
DOE Well Tag Number		Well Depth (ft)		Qtr/Qtr Section	SWSW		

9. Use the information to estimate if a public water supply well may be affected by a plume from the site.

5.4.4   Surface water ranking sheet — SW Tab

In WAC 173-340-200, MTCA defines surface water as "lakes, rivers, ponds, streams, inland waters, salt waters, and all other surface waters and water courses within the state of Washington or under the jurisdiction of the state of Washington".
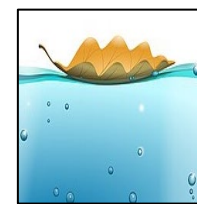
Estimate whether site conditions meet conditions that support surface water conditions, and identify if surface water conditions exist in the area of contamination. If site conditions are not known, aerial or satellite imagery can be useful to identify standing water or characteristics suspected of being supported by surface water conditions.

Ecology's internal TCP Maps[27] includes layers for mapped surface waters using the U.S. Geological Survey's National Hydrography Dataset[28] and the U.S. Fish & Wildlife Service National Wetlands Inventory[29] data. Consider that even if surface water is not yet impacted, an upland contamination source may pose a future risk of contamination to site surface water.

The following information sources support this ranking sheet.

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[27] http://ecyaptcp/tcpmaps
[28] https://www.usgs.gov/national-hydrography/national-hydrography-dataset
[29] https://www.fws.gov/program/national-wetlands-inventory

Washington State Department of Ecology

Washington Department of Fish & Wildlife (DFW)

— [Commercial Wild Stock Geoduck Clam Fishery](#)[30]

The DFW is responsible for biological management and enforcement of DFW regulations of geoduck clams. Use this source to identify whether your site includes a geoduck clam tract.

— Priority Habitat and Species Map Tool [PHS on the Web Map](#)[31]

This interactive map provides basic information about the known location of priority habitats and species in Washington. Data are collected by department biologists and other sources of scientific data about species and habitat locations.

— [Places to Go](#)[32]

Places to Go provides links to several recreation resources such as those used for hunting, fishing, wildlife watching, hiking, horseback riding, boating, swimming, and camping.

— [Public Clam, Mussel, and Oyster Beaches](#)[33]

DFW provides links to information on shellfish harvest locations, shellfish identification, harvest tides, and other information related to shellfish harvesting.

— [State Listed Species](#)[34]

State Listed Species is a published document of state endangered, threatened, and sensitive animals and includes candidate species.

— [Environmental Conservation Online System](#)[35]

This searchable database lists species believed or known to occur in Washington.

DOH

— SWAP Maps (see [SWAP Maps](#) above)

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[30] https://wdfw.wa.gov/fishing/commercial/geoduck

[31] https://geodataservices.wdfw.wa.gov/hp/phs/

[32] https://wdfw.wa.gov/places-to-go/

[33] https://wdfw.wa.gov/places-to-go/shellfish-beaches

[34] https://wdfw.wa.gov/sites/default/files/2020-02/statelistedcandidatespecies_02272020.pdf

[35] https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=WA&stateName=Washington&statusCategory=Listed

Washington State Department of Ecology

— [Commercial Shellfish Map Viewer](#)[36]

This interactive map shows closed parcels, polluted areas, inactive areas, growing areas (approved, conditional, prohibited, restricted, and unclassified) for commercial shellfish harvesting.

— [Shellfish Safety Information](#)[37]

Zoom in and click on a beach or marine area for information about its health status and harvesting seasons. Follow links for information on statewide harvest rules including size restrictions, bag limits, site-specific information, and additional rules.

Ecology

— TCP Maps internal database (see [TCP Maps](#) above)

— [Working with Tribal Governments](#)[38]

Learn how Ecology works with tribes in a government-to-government relationship to protect and manage shared natural resources and to cooperate across jurisdictions. Find out how this relationship relates to your site.
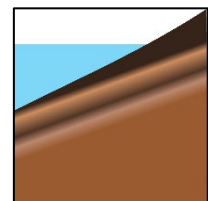
— [Water Rights Search Map](#)[39]

This public user website offers a map and records search for information on groundwater wells, water rights, water uses, etc.

— Washington State Well Report Viewer Map Search (see [Well Report Viewer Map Search](#) above)

5.4.5   Sediment ranking sheet — SD Tab

[WAC 173-204-505](#)(22)[40] defines sediment as, "settled particulate matter located at or below the ordinary high water mark, where the water is present for a minimum of six consecutive weeks, to which biota (including benthic fauna) or humans may potentially be exposed, including that exposed by human activity (e.g., dredging)".

Evaluating impacts to sediment is complex, and sufficient data (e.g., bioassays) often are not collected to quantitatively or qualitatively represent actual site

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[36] https://fortress.wa.gov/doh/oswpviewer/index.html

[37] https://fortress.wa.gov/doh/biotoxin/biotoxin.html

[38] https://ecology.wa.gov/About-us/Accountability-transparency/Government-coordination/Tribal-relations

[39] https://appswr.ecology.wa.gov/waterrighttrackingsystem/WaterRights/default.aspx

[40] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-204&full=true#173-204-505

sediment conditions. As such, consider that sediment areas are not limited to marine waters, estuarine waters, rivers, lakes, streams, wetlands or water retention facilities. Further, sediment is present only if these conditions are met for at least six consecutive weeks annually.

The following information sources support this ranking sheet.

DFW

— Commercial wild stock geoduck clam fishery (see Commercial wild stock geoduck clam fishery above)

— Priority Habitat and Species Map Tool PHS on the Web Map (see PHS on the Web above)

— Places to Go (see Places to Go above)

— Public clam, mussel, and oyster beaches (see Public Clam, Mussel, and Oyster Beaches above)

— Summary of Coastal Intertidal Forage Fish Spawning Surveys: (October 2012 & October 2014[41]

The Washington State legislature funds identifying and mapping marine resources and human interactions with these resources, the weighing of costs and benefits to diverse stakeholders, and the development of long-term utilization plans. The 2012 and 2014 study results helped to identify areas of spawning on the outer Washington coast, with a focus on spawning beaches in the Quinault and Kalaloch-Hoh-Quil beach zones.

— State-Listed Species (see State-Listed Species above)

Washington Department of Natural Resources (DNR)

— Nearshore Habitat Biotic Community Monitoring[42]

Intertidal biological community monitoring data are provided through several listed reports. Monitoring data area evaluated for their intrinsic biodiversity value considering that these communities impact other organisms through the food web. The monitoring data provide useful information on an important indicator of habitat conditions.

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[41] https://wdfw.wa.gov/publications/01701

[42] https://www.dnr.wa.gov/programs-and-services/aquatics/aquatic-science/nearshore-habitat-biotic-community-monitoring

DOH

— Commercial Shellfish Map Viewer (see Commercial Shellfish Map Viewer above)

— Shellfish Safety Information (see Shellfish Safety Information above)

Ecology

— Fish Consumption Rate, Technical Support Document, A Review of Data and Information about Fish Consumption in Washington[43]

This report compiles and evaluates information on fish consumption in Washington to support regulatory decision making about fish consumption resources and safety.

— Water Quality Atlas Map[44]

Ecology assesses and places state waters into one of five categories that describe water quality status. Ecology maps these 303(d)-listed sites on the Water Quality Atlas website for both surface water and sediment locations.

To find out information for the site, follow these instructions.

1. Click on the Filter tab.
2. Open the Spatial Filter Tools menu and enter the city or county.

3. Open the Water Quality Assessment menu.
   a. Select freshwater & marine, freshwater, or marine in the "Environment" field.
   b. Ignore the "Parameter" field.
   c. Check Water under "Medium (Water)" (surface water).
   d. Check Sediment under "Medium (Sediment)".

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[43] https://apps.ecology.wa.gov/publications/SummaryPages/1209058.html
[44] https://apps.ecology.wa.gov/waterqualityatlas/wqa/map/

e. Check **all but box 1** under "Category".

f. Enter the listing ID for "Listing ID", if known.

g. Enter the assessment unit ID for "Assessment Unit ID", if known.

h. Click Apply Filter for a list of results OR zoom in to see if the site is mapped in a 303(d)-listed water body (usually colored red).

National Oceanic and Atmospheric Administration

— [National NMFS ESA Critical Habitat Mapper](#)[1]

This interactive tool helps the public and federal action agencies view critical habitat spatial data. Access the User Guide by clicking on the website's guide icon at the top of the page.

5.4.6 Indoor air ranking sheet — IA Tab

Vapor intrusion is "the process by which these chemical vapors migrate through the soil and into indoor air", according to Ecology's [Guidance for Evaluating Vapor Intrusion in Washington State Investigation and Remedial Action](#) (2022 VI guidance). [45] Indoor air quality can be affected by potentially hazardous vapors that can migrate into buildings from releases to soil or groundwater. People can be exposed to indoor air contamination (vapor intrusion) in buildings used for residential, work, or recreational occupancy.

Vapor intrusion is important for only volatile chemicals. Volatile chemicals are listed in three vapor intrusion screening-level tables in CLARC. The list is the same in the CLARC Vapor Intrusion tables relevant to MTCA cleanup standards for Methods B and C and the Commercial Worker.

Estimating the risk of exposure to indoor air contamination can be complicated by not knowing the vertical or lateral distance from the volatile soil or groundwater contaminant mass or plume. Use site-specific screening values, if contamination distances are well understood. Ecology's 2022 VI Guidance is useful for generating a conceptual site model to help fill data gaps and understand screening distances applied to petroleum and non-petroleum volatile chemicals.

Screening distances are measured from the top or nearest edge of a contamination mass to the nearest, lowest spot of a building (e.g., base of slab-on-grade, crawl space, or basement). Screening distances may need to be increased, if a preferential pathway for vapor movement is identified, such as in utility backfill material. Appendix B of the 2022 VI Guidance may be useful for providing more

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[45] https://apps.ecology.wa.gov/publications/SummaryPages/0909047.html

information. For **trichloroethene** contamination, see specific guidance on screening distances in Appendix A of the 2022 VI Guidance.

Remember that indoor air can also be impacted by chemicals from non-vapor intrusion sources, including products in the building and contributions from outdoor air. Multiple types of samples are collected during a vapor intrusion evaluation to help distinguish the contributions from various sources.

The following information sources support this ranking sheet.

Ecology

— CLARC

    Data tables in the CLARC spreadsheet contain information to help cleanup site managers and other stakeholders determine cleanup levels for contaminated sites.

— Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action

    This guidance is intended to provide potentially liable persons, cleanup site managers, and consultants with a practical approach for assessing vapor intrusion in Washington, where volatile chemicals in the subsurface might pose a threat to indoor air quality

5.5   Additional factors — AF Tab

Additional factors can support understanding a site's environmental conditions including those that may loom large in their future, such as emerging issues, climate change, new chemical exposure studies, and relevant changes in legislative decision making. Answers to additional factors questions are not scored and do not affect any ranking scores. This sheet requires comments. Without comments, a reviewer may not fully understand impacts of these factors on the context of the site ranking.

The following information sources may be helpful in answering additional factors questions.

Ecology

— [Sustainable Remediation: Climate Change Resiliency and Green Remediation-A Guide for Cleanup Project Managers](#)[46]

This guidance helps people make cleanup sites more resilient against the impacts of climate change, like flooding or extreme storms, so the remedy continues to protect our health and communities.
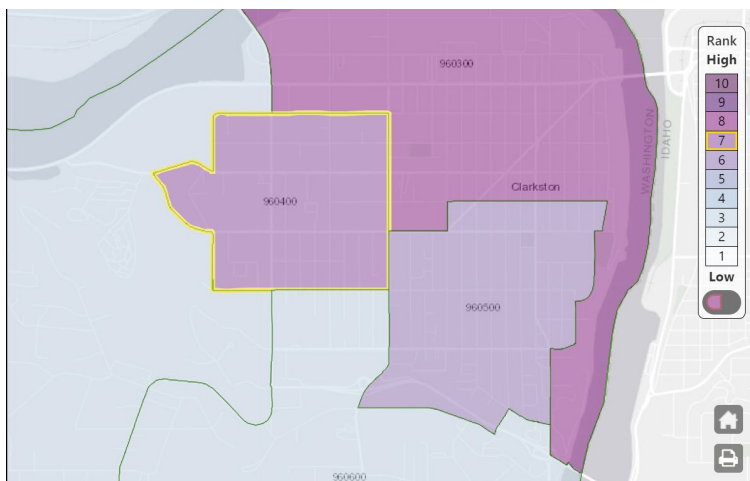
DOH

— [Washington Tracking Network Information by Location Tool](#)[47]

This mapping tool compares the health disparity of communities across Washington and displays information for a variety of topics. This mapping tool presents a community's census block rank between 1 (lowest) and 10 (highest). Each rank value represents 10% of the communities across Washington.

This health disparities rank value is presented in the SHARP Tool for information only and does not affect the ranking scores for the exposure media.

Follow these instructions for the Washington Tracking Network Information Tool.

1. Zoom in to the area of your site, or enter location information.
2. Click on "Environmental Health Disparities V 2.0" on the left.
3. Click on the DOH census tract where the site is located.
4. Note the Rank value on the bar scale on the right and record it in the SHARP Tool.

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[46] https://apps.ecology.wa.gov/publications/SummaryPages/1709052.html
[47] https://fortress.wa.gov/doh/wtnibl/WTNIBL/

5. Review the ranking results.
   a. Make sure all questions are answered.
   b. Review comments and revise as necessary.
   c. Take a "gut check" to see if the scores seem reasonable.
   d. Revise any answers or other information, as needed.

5.6 SHARP reports

A SHARP Report is generated after all questions are answered, comments are entered, and relevant data are recorded. A SHARP Report can be communicated in two ways.

SHARP 1 Report

The SHARP 1 Report is a text summary of ranking results. An example of a blank SHARP1 Report is shown in Figure 5-1. A completed example of a SHARP 1 Report for a fictitious site is depicted in Figure 5-2.

SHARP 2 Report

The SHARP 2 Report is an illustrated summary of ranking results. An example of a blank SHARP 2 Report is shown in Figure 5-3. A completed example of a SHARP 2 Report for a fictitious site is illustrated in Figure 5-4.

Ranking scores displayed as "ExGo" and "SvGo" symbolize that at least one question a ranking sheet has not been answered, meaning a site ranking is not yet completed. When a ranking is completed, the "ExGo" and "SvGo" placeholders will be replaced by ranking scores.

At this time, the configuration and appearance of these reports are controlled by the limitations of the Excel software. The future application will provide a superior report experience.

Figure 5-1.   Example of a blank SHARP 1 Report.

Site

Region/Responsible Unit:

Rank date: 00 Jan 1900
Ranker:

CSIDs
FSIDs

[select one] County
Parcel(s):
Land use: [select one - delete to start over]

VCP #
LUST ID
UST ID

Media Scores			Socioeconomic Indicators	>p80	Additional Factors
Medium	Scores	Confidence	People of Color		
Indoor Air	ExGo SvGo	finish	Low Income		
Groundwater	ExGo SvGo	finish	Less Than High School		
Surface Water	ExGo SvGo	finish	Limited English Speaking		DOH Health
Sediment	ExGo SvGo	finish	Under Age 5		Disparities Rank
Soil	ExGo SvGo	finish	Over Age 64		[menu]

Site summary
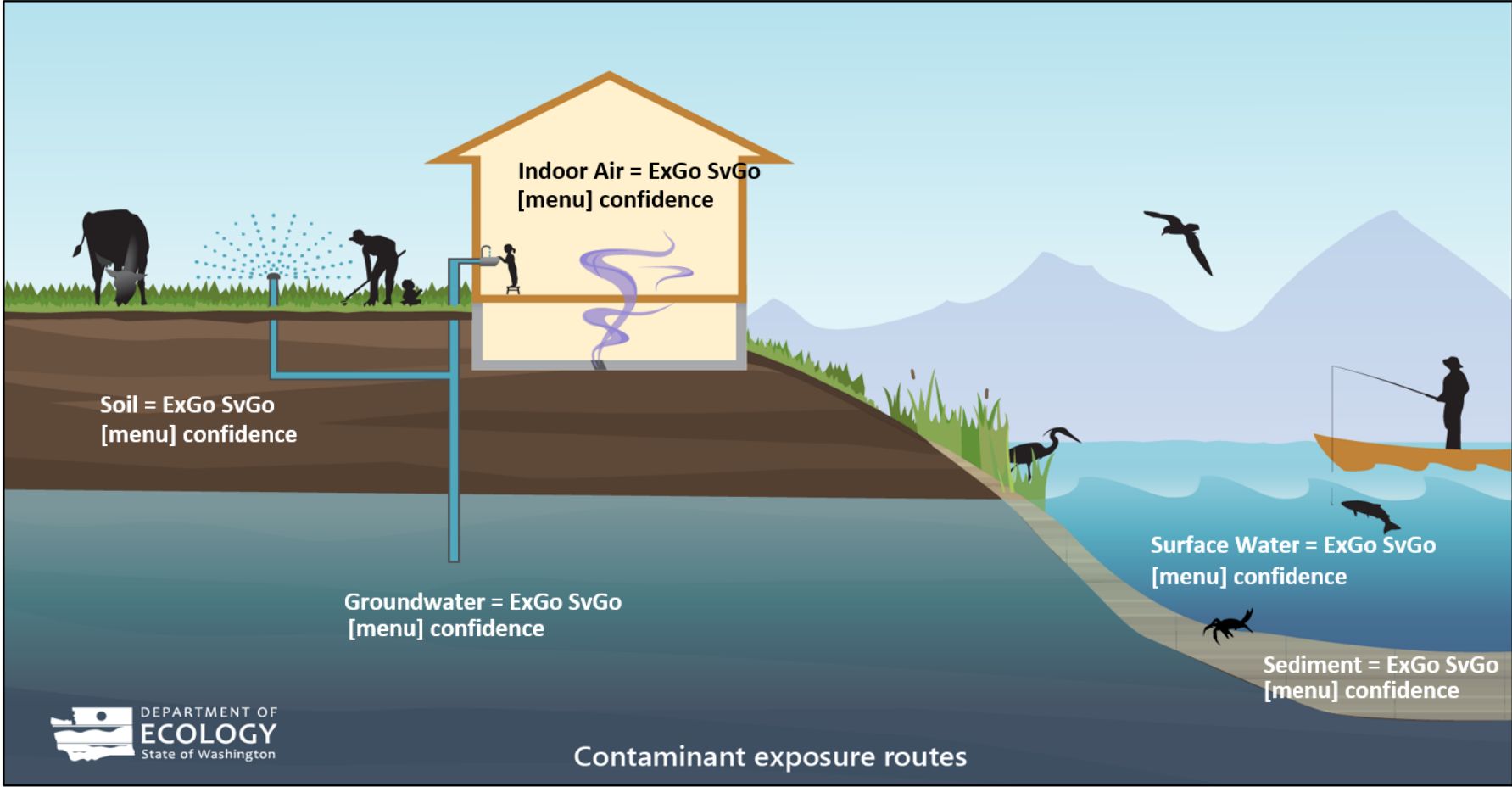
Figure 5-2.   Example fictitious site ranking summarized in a SHARP 1 Report.

Eagle Cap Foundry Site   Initial Ranking Report

| Region/Responsible Unit: | Eastern | | Rank date: 22 Feb 2022 |
| | | | Ranker: Eileen Webb |

2409 W Bruneau		CSIDs 111111
Kennewick 99336		FSIDs 222222
Benton County		VCP # EA033333
Parcel(s): 123456789; 987654321		LUST ID 444444
Land use: industrial		UST ID 555555

Media Scores			Socioeconomic Indicators	>p80	Additional Factors
Medium	**Scores**	**Confidence**	People of Color	66	• Multiple chemical types
Indoor Air	D4	high	Low Income	55	
Groundwater	C2	high	Less Than High School	**83**	• Climate change impacts
Surface Water	A4	medium	Limited English Speaking	**81**	**DOH Health**
Sediment	B4	high	Under Age 5	66	**Disparities Rank**
Soil	C3	medium	Over Age 64	55	8

Site summary

An iron and steel foundry formerly occupied the 8.5-acre site, which operationed from 1965 to 2005, producing custom-fitted castings, alloy steel, and cast iron pipe fittngs and metal parts. Before 1985, the site was undeveloped. The site is located in an area of mixed commercial and industrial use and borders Redrock Creek to the south, Green Giant railroad tracks to the west, and commercial businesses to the north and east. After closing, a number of investigation and cleanup activities were conducted. In 2006, the site owner entered into a Consent Decree with the state for cleanup.

Former site structures included sand silos, a baghouse, an electrical substation, and a paint shed. A fuel pump house remains. Waste streams included silica dust, slag from arc furnaces, bag house dusts, cupola sludge, and cupola scrubber water. Contaminants of concern include heavy metals, PCBs (from three transformers), TPH as gasoline, BTEX, and polynuclear aromatic hydrocarbons (PAHs). Some contamination remains beneath the fuel pump house. The mobility of these compounds in the environment varies from low (for metals and PCB) to high(for BTEX). The toxicity of these compounds also varies, with PCBs, benzene, lead, and carcinogenic PAHs such as benzo(a)pyrene. PCBs were detected in sediment at three of the four outfalls from the site to Redrock Creek.

 In 2007, one gasoline UST was removed followed by petroleum-contaminated soil removal and transport for off-site disposal; groundwater monitoring well installation and monitoring; and sand material transport off site for disposal. Relatively low BTEX concentrations continue to be observed in groundwater samples in excess of MTCA Method B cleanup standards. However, the groundwater plume is contained on site and showing steady decline through attenuation. The remaining soil contamination will be removed after the pump house is removed.

Figure 5-3.   Example of a blank SHARP 2 Report.

Figure 5-4.   Example fictitious site ranking summarized in a SHARP 2 Report.
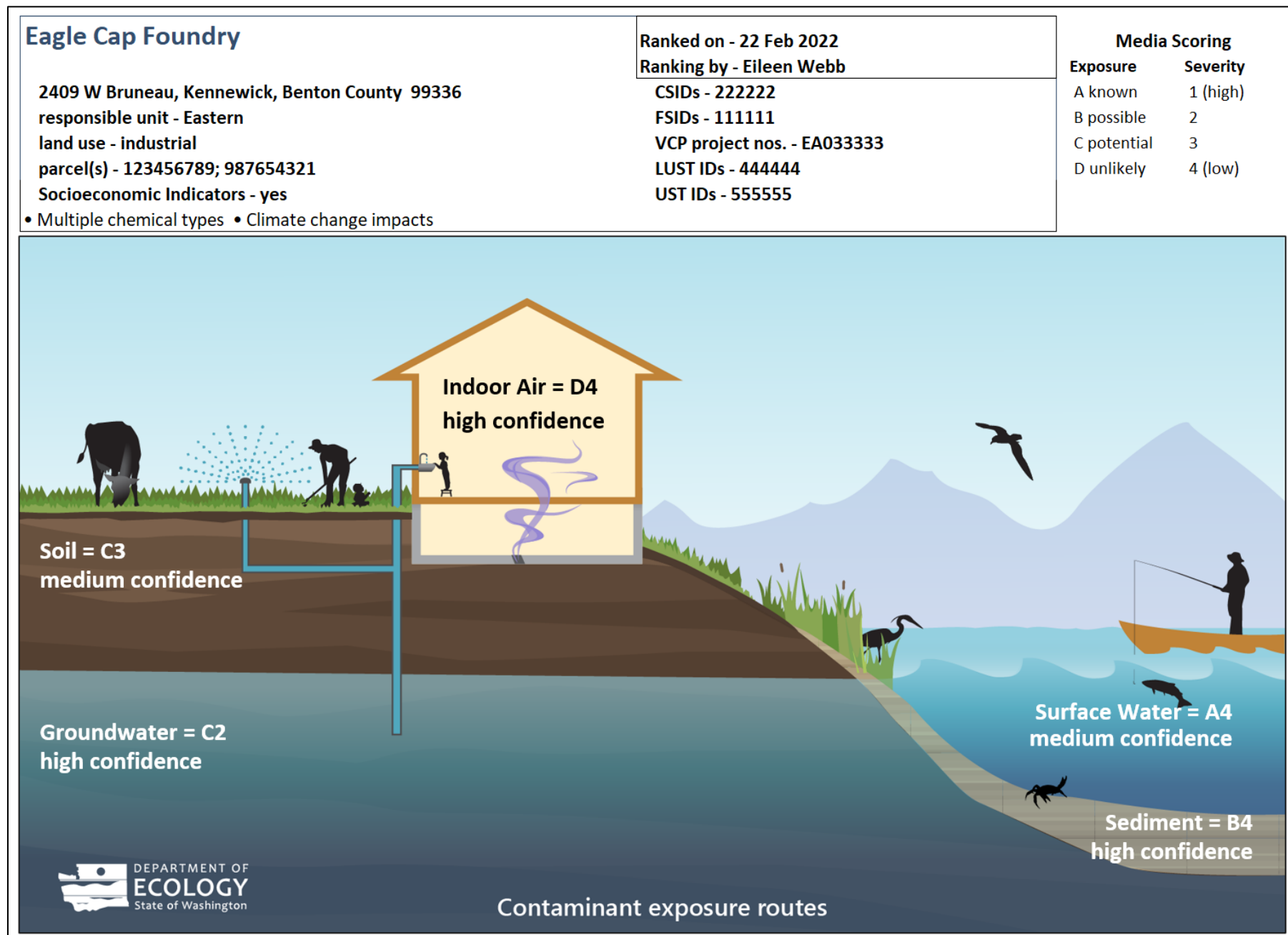
Appendix - SHARP Chemical Toxicity

A.1   Chemical Toxicity Reference Table

SHARP applies a system developed as part of the EPA's Hazard Ranking System (HRS) to establish a toxicity factor value, which in turn is used as part of EPA's site ranking process. Criteria for determining the toxicity factor are summarized in this section and presented in 40 CFR Appendix A to Part 300[48] – The Hazard Ranking System (referred to as "Appendix A" hereafter).

The SHARP "extremely" toxic category corresponds to an HRS toxicity factor score of 10,000. The "very" toxic category corresponds to a toxicity factor score of 1,000. Chemicals with a toxicity factor score of 100, 10, 1, or 0 are not eligible for severity points in SHARP and are indicated by blank cells in the ChemTox table.

The toxicity factor used to determine SHARP toxicity categories applicable to soil, groundwater, and indoor air is based on toxicity to humans. Available values for chronic toxicity of a chemical through oral (reference dose) or inhalation (reference concentration) routes and carcinogenicity (slope factor evaluated in the context of cancer weight-of-evidence category) are assessed, and the highest toxicity factor assigned to those values is selected as the overall toxicity factor. If none of those toxicity values (reference dose, reference concentration, or cancer slope factor) are established for a chemical, a toxicity factor may be assigned using acute toxicity data. Lead and asbestos are not evaluated using these methods but rather are assigned a toxicity factor of 10,000. Additional information, including tables showing cutoffs for toxicity values and associated toxicity factors, is presented in section 2.4 of Appendix A.

The toxicity factor used to determine the SHARP toxicity category for surface water is based on toxicity to aquatic organisms. Appendix A references EPA criteria (Ambient Water Quality Criteria, Ambient Aquatic Life Advisory Concentrations) that either no longer exist or currently exist under a different name, and the current name is used to reference the applicable values here. The evaluation of available toxicity data proceeds in a stepwise fashion. If a criterion continuous concentration (CCC), based on chronic exposures, exists it is used to determine the toxicity factor.

If a CCC is not available, a criterion maximum concentration (CMC) is used to determine the toxicity factor, based on acute exposures. If neither a CCC nor a CMC (or equivalent Washington State water quality criteria, see note 2 below) are also not available, the toxicity

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[48] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-J/part-300/appendix-Appendix A to Part 300

factor is assigned using a 50% lethal concentration (LC50). EPA's [ECOTOX](https://cfpub.epa.gov/ecotox/)[49] database was used to select LC50s evaluated for use in the ChemTox table. Studies considered when selecting the LC50 used to assign a toxicity factor were generally those involving laboratory exposures of aquatic organisms for durations of 1 to 4 days. The lowest LC50 that meets the search criteria will be selected to establish the toxicity factor.

This evaluation is performed concurrently with available toxicity data for a chemical in freshwater and marine water. If values are available for both and they differ, differing toxicity factors may be assigned to the chemical depending on the location of the contamination. If sufficient toxicity data to establish a toxicity factor are available for only freshwater or marine water, the selected toxicity factor will apply to both water types. Additional information are included in section 4.1.4.2.1.1 of Appendix A, including tables showing cutoffs for toxicity values and the associated toxicity factors.

Radioactive substances can be evaluated and assigned a toxicity factor; slight changes to the above procedure for how to do the evaluation are included in section 7.2 of Appendix A.

It is important to note two changes made to the general procedure outlined above when developing the ChemTox table:

1. Acute human health toxicity values were not determined for all chemicals.

   When determining the toxicity category based on human health, applicable to soil, groundwater, and indoor air media, acute toxicity is used only to establish a toxicity factor when both chronic and carcinogenic toxicity values are not available. In general, one of those toxicity values is required for a chemical to appear in the CLARC database, so an assessment of acute toxicity data was not needed.

2. For surface water toxicity, the primary criteria considered are existing water quality criteria.

   The HRS considers only EPA water quality criteria (the CCC or CMC). Since the SHARP Tool is designed for use only in Washington, both EPA and state water quality criteria were considered in the evaluation, in the cases where those values differed.

We anticipate routinely updating the ChemTox table (e.g., adding new chemicals and re-evaluating after a change in available applicable toxicity values) in conjunction with routine updates to the CLARC database, primarily related to human health-based toxicity. Updates to the surface water toxicity category are anticipated to happen less frequently.

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[49] https://cfpub.epa.gov/ecotox/

A.2   Using the ChemTox table to answer severity questions

The following are general notes about the ChemTox table.

- Blank cells indicate that a chemical did not qualify as "extremely" toxic (for all media) or "very" toxic (for only soil, groundwater, and air).

- Answers to severity questions are based on the most toxic chemical at the site. It takes only "extremely" toxic chemical to answer "yes" or "maybe" to that question. A ranker will be prompted to answer the "very" toxic severity question only if no "extremely" toxic chemical is present. Points are added for answering "yes" or "maybe" to only one of these questions, but not for both.

- Some chemicals are known by multiple names, so searching for a chemical by CAS number may be useful.

- Chemicals noted as having the potential for vapor intrusion are based on the list of chemicals on the Vapor Intrusion tabs in CLARC.

- When available, toxicity criteria specific to both freshwater and marine water were considered when establishing the surface water toxicity category. Unless otherwise noted in a table cell, the surface water toxicity category applies to both freshwater and marine water.

The following are chemical-specific notes about the ChemTox table.

- cPAHs

  The carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in MTCA Table 708-2 are standardly evaluated using a toxicity equivalency quotient (TEQ) and not individually for most media. All compounds that should be evaluated this way have a note reminding the user to use the TEQ, and referring them to benzo(a)pyrene, the member of the group used to evaluate toxicity.

- Dioxins/furans

  Chlorinated dioxins and furans (see list in MTCA Table 708-1) are also routinely evaluated using the TEQ. Unlike cPAHs, they are not individually listed in the ChemTox table. Rather, only the member of this group used to evaluate toxicity (2,3,7,8-tetrachlorodibenzo-p-dioxin, or TCDD) is included in the table.

- PCBs

  Polychlorinated biphenyls (PCBs) can be analyzed as either aroclors or congeners (for more information on analytical methods for PCBs, see Implementation Memo 12). Dioxin-like PCBs (see MTCA Table 708-4) can also be evaluated using a TEQ. For the purposes of SHARP scoring, PCBs evaluated using any of the available methods should all be scored using the polychlorinated biphenyls row in this table.

- Petroleum hydrocarbons

  The bulk hydrocarbon (TPH in any range) portion of a petroleum mixture is not classified as Extremely or Very toxic. Be sure to also evaluate individual components of the mixture that may have been included in the overall analysis (benzene, naphthalene, cPAHs, etc.)