

**WAC 173-340-350 Remedial investigation.** (1) **Purpose.** The purpose of a remedial investigation is to adequately characterize a contaminated site, including the distribution of hazardous substances and the threat they pose to human health and the environment, to enable:

(a) Cleanup standards to be established under Part 7 of this chapter; and

(b) Cleanup action alternatives to be developed and evaluated in a feasibility study under WAC 173-340-351.

(2) **Applicability.**

(a) **Whether required.** A remedial investigation of a contaminated site must be conducted regardless of which administrative option in WAC 173-340-510 is used to conduct remedial action at the site.

(b) **Requirements.** A remedial investigation must comply with the requirements in this section and, as applicable, the following:

(i) For sites where there is a release or threatened release to sediment, the applicable requirements in WAC 173-204-550.

(ii) For sites on the national priorities list, the applicable requirements under the federal cleanup law.

(3) **Timing and phasing.**

(a) Except as otherwise directed by ecology, a remedial investigation must be completed before cleanup standards are established and a cleanup action is selected. An emergency remedial action or an interim action may be conducted before a remedial investigation/feasibility study is completed.

(b) A remedial investigation may be conducted, or required by ecology to be conducted, for the entire site or for separate parts of a site, such as a sediment cleanup unit as defined in WAC 173-204-505.

(c) A remedial investigation and a feasibility study may be conducted, or required by ecology to be conducted, as a single step or as separate steps in the cleanup process.

(d) A remedial investigation may be conducted, or required by ecology to be conducted, in phases. For example, additional remedial investigation may be necessary to fill data gaps identified in earlier investigations or to determine the applicability of a model remedy at a site.

(4) **Administrative options and requirements.** A remedial investigation may be conducted under any of the administrative options for remedial action described in WAC 173-340-510. Reporting and public participation requirements depend on the administrative option used to conduct remedial action.

(a) **Ecology-conducted or ecology-supervised remedial actions.** For an ecology-conducted or ecology-supervised remedial investigation, ecology will provide or require:

(i) A remedial investigation work plan that complies with the requirements in subsection (5)(b) of this section and WAC 173-340-840. For ecology-supervised remedial actions, ecology may require submittal of a work plan for its review and approval;

(ii) A remedial investigation report that complies with the requirements in subsection (5)(g) of this section and WAC 173-340-840. For ecology-supervised remedial actions, ecology may require submittal of a report for its review and approval; and

(iii) Public notice of a remedial investigation report in accordance with WAC 173-340-600(13).

(b) **Independent remedial actions.**

(i) Independent investigations of a site must be reported to ecology in accordance with WAC 173-340-515. Such investigations may need to be reported separately upon completion (see WAC 173-340-515

(4)(a)). Reports must include, as appropriate, the information specified in subsection (5)(g) of this section.

(ii) Ecology will notify the public of an independent investigation report in accordance with WAC 173-340-600(20).

(5) **Steps.** Except as otherwise directed by ecology, a remedial investigation must be conducted in accordance with the following steps.

(a) **Step 1: Identify scope.** Identify the scope of the remedial investigation. The scope depends on many factors, including the nature and extent of contamination, the exposure pathways of concern, the human and ecological receptors potentially impacted by the contamination, the characteristics of the site, the type of cleanup action alternatives likely to be evaluated, and information previously obtained about the site. To determine the scope, do the following:

(i) Identify what information is needed about the site to comply with the requirements in (c) of this subsection and chapter 197-11 WAC, the State Environmental Policy Act rules (see WAC 197-11-250);

(ii) Assemble and evaluate relevant information collected during any prior remedial actions at the site, such as an initial investigation or an interim action. Previously collected information may be relied upon in the investigation to avoid duplication; and

(iii) Identify what additional information needs to be collected during the investigation.

(b) **Step 2: Develop work plan.** Develop a remedial investigation work plan to collect and evaluate the information identified in Step 1. If required by ecology under subsection (4)(a)(i) of this section, submit the work plan for ecology's review and approval.

(i) **Content.** Except as otherwise directed by ecology, include the following in the work plan:

(A) The scope of the investigation identified in Step 1, including a summary of available information about the site and data gaps needing to be addressed by the investigation;

(B) A preliminary conceptual site model, as defined in WAC 173-340-200;

(C) A target concentration for each hazardous substance in each contaminated environmental medium identified in the preliminary conceptual site model under (b)(i)(B) of this subsection;

(D) A sampling and analysis plan meeting the requirements in WAC 173-340-820, including the analytical methods that enable detection of the target concentrations identified in (b)(i)(C) of this subsection;

(E) A health and safety plan meeting the requirements in WAC 173-340-810;

(F) An inadvertent discovery plan meeting the requirements in WAC 173-340-815;

(G) Cleanup action alternatives likely to be considered in the feasibility study, based on available information;

(H) Any studies needed to develop or evaluate cleanup action alternatives in the feasibility study, such as treatability or pilot studies;

(I) A proposed schedule for completing the remedial investigation/feasibility study and, if required, submittal of a report for ecology review and approval; and

(J) Any other information required by ecology.

(ii) **Flexibility.** The work plan should remain flexible and be streamlined when possible to avoid collection and evaluation of unnecessary information. While it may be appropriate to phase investigations at some sites, ecology encourages expedited investigations. For

example, using field screening methods to guide investigations and fast turnaround laboratory analyses to provide real-time feedback may be appropriate at some sites. However, in all cases, sufficient information must be collected and evaluated to meet the purposes in subsection (1) of this section.

(c) **Step 3: Conduct investigation.** Conduct the remedial investigation in accordance with the work plan developed in Step 2.

(d) **Step 4: Complete conceptual site model.** Based on the results of the remedial investigation conducted in Step 3 and any previously obtained information about the site, complete the development of a conceptual site model, as defined in WAC 173-340-200.

(e) **Step 5: Develop proposed cleanup levels.** Based on the conceptual site model completed in Step 4, develop a proposed cleanup level for each hazardous substance within each affected environmental medium at the site in accordance with Part 7 of this chapter.

(f) **Step 6: Determine whether feasibility study is necessary.** Based on the results of the remedial investigation conducted in Step 3 and any previously obtained information about the site, determine whether a feasibility study is necessary under WAC 173-340-351 (2)(a), including:

(i) Whether prior remedial actions conducted at the site constitute a permanent cleanup action; and

(ii) Whether a model remedy may be used as a cleanup action or a cleanup action component at the site.

(g) **Step 7: Report results.** Report the results of the remedial investigation in accordance with subsection (4) of this section. Include the following information in the report:

(i) General information about the site, including:

(A) Project title;

(B) Name, address, and phone number of project coordinator;

(C) Legal description and dimensions of the site;

(D) Current owners and operators; and

(E) Chronological listing of past owners and operators and operational history;

(ii) Maps, figures, or diagrams illustrating relevant existing and historic site features, including:

(A) Sources of releases;

(B) Property boundaries;

(C) Proposed site boundaries, as defined by where hazardous substances exceed the proposed cleanup levels identified in (d)(iv) of this subsection;

(D) Surface topography;

(E) Surface and subsurface structures;

(F) Surface water, wetlands, and undeveloped areas; and

(G) Utility lines and well locations;

(iii) The information collected in Step 3, and any information obtained from prior remedial actions relied on during the investigation. Separately include information on threats to likely vulnerable populations and overburdened communities. Previously obtained information may be summarized and referenced to avoid unnecessary duplication;

(iv) The conceptual site model completed in Step 4;

(v) The proposed cleanup levels developed in Step 5, including:

(A) The basis for the proposed cleanup levels; and

(B) Any regulatory classifications for, or laws applicable to, each environmental medium (see WAC 173-340-710);

(vi) A comparison of the proposed cleanup levels developed in Step 5 to the hazardous substance concentrations in each environmental medium;

(vii) If a feasibility study is determined not to be necessary in Step 6, sufficient documentation to demonstrate the basis of the determination;

(viii) Documentation of the proper management and disposal of any waste materials generated as a result of the remedial investigations in accordance with applicable state and federal laws; and

(ix) Any other information required by ecology.

(6) **Investigations.** A remedial investigation must collect and evaluate sufficient information about a site and the surrounding area to meet the purposes in subsection (1) of this section, including the following as applicable to the site.

(a) **Hazardous substance sources.** Confirmed and suspected releases must be investigated to define the location, estimated quantity, areal and vertical extent, concentration within, and sources of releases. Where relevant, information on the physical and chemical characteristics and the biological effects of hazardous substances must be collected.

(b) **Soils.** Soils must be investigated to adequately characterize:

(i) The areal and vertical distribution and concentrations of hazardous substances in soils; and

(ii) The properties of surface and subsurface soils that are likely to influence the type and rate of hazardous substance migration or to affect the ability to implement cleanup action alternatives.

(c) **Groundwater, geology, and hydrogeology.** Groundwater, geology, and hydrogeology must be investigated to adequately characterize:

(i) The areal and vertical distribution and concentrations of hazardous substances in the groundwater;

(ii) The geologic features affecting the fate and transport of hazardous substances, such as the type, physical properties (such as permeability, density, and fracture characteristics), and distribution of bedrock and unconsolidated materials;

(iii) The hydrogeological features affecting the fate and transport of hazardous substances, such as:

(A) Groundwater flow direction, rate, and vertical and horizontal gradients for affected and potentially affected groundwater;

(B) Groundwater divides;

(C) Areas of groundwater recharge and discharge;

(D) Areas where groundwater interfaces with surface water;

(E) Location of public and private water supply wells; and

(F) Groundwater quality data; and

(iv) The geologic and hydrogeologic features that are likely to affect the ability to implement cleanup action alternatives.

(d) **Surface water, sediments, and hydrology.** Surface water, sediments, and hydrology must be investigated to adequately characterize:

(i) The areal and vertical distribution and concentrations of hazardous substances in surface water and sediments;

(ii) Significant hydrologic features, such as:

(A) Surface drainage patterns and quantities;

(B) Areas of erosion and sediment deposition, including estimates of sedimentation rates;

(C) Surface waters, including flow rates;

(D) Floodplains; and

(E) Actual or potential hazardous substance migration routes towards and within these features; and

(iii) The properties of surface and subsurface sediments that are likely to affect the type and rate of hazardous substance migration, the potential for recontamination, or the ability to implement cleanup action alternatives.

(e) **Air and soil vapor.** The air and soil vapor must be evaluated and, where appropriate, sampled to adequately characterize the potential impacts of vapor migration on subsurface soil gas, on air quality within current and future buildings or other structures, and on outdoor ambient air. Based on contaminant concentrations in soil gas or groundwater, ecology may require expedited sampling of indoor air quality to assess the threat to human health. If the measured indoor air concentrations are higher than applicable cleanup levels, ecology may require an emergency action or an interim action to mitigate the threat to human health.

(f) **Climate.** Sufficient information, based on best available science, must be collected on current and projected local and regional climatological characteristics to determine which could affect the migration of hazardous substances or the resilience of cleanup action alternatives. Relevant characteristics can include temperature extremes, sea level, seasonal patterns of rainfall, the magnitude and frequency of extreme storm events (such as flooding), the potential for landslides, prevailing wind direction and velocity, variations in barometric pressure, and the potential for wildfires.

(g) **Land and resource use.** To determine the exposure or potential exposure of human and ecological receptors, including likely vulnerable populations and overburdened communities, to hazardous substances at the site, sufficient information must be collected on the following:

- (i) The present and proposed land and resource uses of the site;
- (ii) The comprehensive plan and zoning for the site;
- (iii) Any sensitive environments at the site; and
- (iv) Any habitat restoration or resource recovery goals for the site.

(h) **Human receptors.** Sufficient information must be collected on human receptors to determine:

- (i) Whether the receptors are reasonably likely to be exposed or potentially exposed to hazardous substances based on the land and resource uses identified in (g) of this subsection;
- (ii) The impact or potential impact of such exposure; and
- (iii) Whether the receptors include likely vulnerable populations or overburdened communities.

(i) **Natural resources and ecological receptors.** Sufficient information must be collected on natural resources and ecological receptors that are reasonably likely to be exposed or potentially exposed to hazardous substances based on the land and resource uses identified in (g) of this subsection to determine the impact or potential impact of such exposure. This includes any information needed to conduct a sediment evaluation under chapter 173-204 WAC and any information needed to conduct a terrestrial ecological evaluation or establish an exclusion under WAC 173-340-7490 through 173-340-7494.

(i) Where appropriate, a terrestrial ecological evaluation may be conducted so as to avoid duplicative studies of soil contamination that will be remediated to address other concerns, such as protection of human health or aquatic ecological receptors. This may be accomplished by evaluating residual threats to the environment after cleanup action alternatives for human health or aquatic ecological protection have been developed. If this approach is used, the remedial in-

vestigation may be phased. This approach may not be appropriate at a site where a hazardous substance is primarily an ecological concern and will not obviously be addressed by the cleanup action for the protection of human health, such as zinc; or at a site where the development of a human health based cleanup action is expected to be a lengthy process, and postponing the terrestrial ecological evaluation would cause further harm to the environment.

(ii) If a simplified or site-specific terrestrial ecological evaluation is not required under WAC 173-340-7491, the basis for the determination must be included in the remedial investigation report.

(j) **Feasibility study applicability.** To determine whether a feasibility study must be conducted under WAC 173-340-351, sufficient information must be collected during the remedial investigation to determine whether:

(i) Prior remedial actions at the site constitute a permanent cleanup action and meet the criteria in WAC 173-340-330 (5)(a); and

(ii) A model remedy established by ecology may be used as a cleanup action or a cleanup action component at the site under WAC 173-340-390.

(k) **Cleanup action alternatives.** If a feasibility study must be conducted under WAC 173-340-351, sufficient information must be collected during the remedial investigation to develop and evaluate cleanup action alternatives in the feasibility study, such as treatability or pilot studies.

[Statutory Authority: Chapters 70A.305 and 70A.355 RCW. WSR 23-17-159 (Order 18-09), § 173-340-350, filed 8/23/23, effective 1/1/24. Statutory Authority: Chapter 70.105D RCW. WSR 01-05-024 (Order 97-09A), § 173-340-350, filed 2/12/01, effective 8/15/01; WSR 91-04-019, § 173-340-350, filed 1/28/91, effective 2/28/91; WSR 90-08-086, § 173-340-350, filed 4/3/90, effective 5/4/90.]