



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

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June 25, 2018

Mr. Andrew Seitz  
7415 Stibgen Road NW  
Olympia, WA 98502

**Re: VCP Customer Response to Ecology Request for Information on Status of VCP Project for the following Site:**

- **Site Name:** Seitz Property
- **Site Address:** Brian Lane NW, Silverdale, WA 98383
- **Facility/Site No.:** 6865393
- **Cleanup Site ID No.:** 1472
- **VCP Project No.:** NW3037

Dear Mr. Seitz:

The Department of Ecology (Ecology) acknowledges your response as the VCP customer to our letter dated January 16, 2018 regarding the request for information on the status of the **Seitz Property** facility (Site). We have reviewed the following documents that you submitted pursuant to our status request:

1. Letter from Andrew Seitz to Grant Yang, Department of Ecology, March 15, 2018.
2. Letter from Andrew Seitz to Grant Yang, Department of Ecology, February 15, 2018.
3. Letter from Andrew Seitz to Grant Yang, Department of Ecology, January 28, 2018.

While Ecology appreciates your timely response to our status request, we cannot continue to assist you in progressing towards Site cleanup via the Voluntary Cleanup Program (VCP), under the Model Toxics Control Act (MTCA) regulations (Chapter 173-160 WAC), until the following issues are resolved:



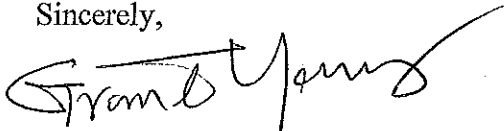
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- Additional Site data must be provided per deficiencies identified in the June 22, 2016 Further Action opinion letter.
- In order to be acceptable for consideration by Ecology, any new Site data must be collected, interpreted, and presented in reports signed by professional scientists or engineers with experience in contaminated Site work. The requirements for such reports are provided in the attached "Remedial Investigation Checklist," Toxics Cleanup Program Publication No. 16-09-006, May 2016. Site data solely described in the text of personal letters from VCP customers does not meet these requirements.

In order to continue participation of this Site in the VCP, Please submit a schedule within 30 days of the date of this letter that specifies dates for retaining professional environmental services and completing additional Site investigation work for review by Ecology under the VCP. Based on your response, Ecology will determine if participation in the VCP is warranted at this time.

If you have any questions regarding this opinion, please contact me at (425) 649-7126.

Sincerely,



Grant Yang, Site Manager  
Toxics Cleanup Program, NWRO

cc: Louise Bardy, NWRO VCP Unit Supervisor, Ecology  
Sonia Fernandez, NWRO VCP Coordinator, Ecology

Enclosure: Remedial Investigation Checklist  
Suggested Report Template for Remedial Investigation Report

## VCP Remedial Action Report Information Checklist

The purpose of this checklist is not to serve as an **outline for reports and other cleanup action information**, but to point out some required elements that all reports should include and to further explain how the information is to be presented. The intent is to enhance clarity and brevity that improves report quality and in turn accelerates the review process.

Remember, to follow the format for a technical report by organizing content to include (1) an **introduction** that includes an outline of what is to follow in the report, (2) a discussion of the **methods** used to evaluate the data to include important equations, uncertainties and limitations of the approach, and reference citations, (3) steps and details used in the **analysis** of these data, (4) discussion of the **results** based on data and the analysis, and (5) **conclusions** [summarize all of the above points].

1	<input checked="" type="checkbox"/>	<b>Site History:</b> Describe the Site from the earliest known time of habitation and/or development. Describe all potential sources of contamination (petroleum storage tanks, manufacturing, chemical storage, etc.) and previous and current uses at the Site.
2	<input checked="" type="checkbox"/>	<b>Figures, Historic and Contamination:</b> These figures constitute the conceptual model that should include plan-view and cross-section diagrams that show potential current and former contaminant sources, the extent of contamination in each media in relation to potential sources and lithology, and general site features including buildings, equipment, and utilities. Contaminant time-series plots, hydrographs, sequential conditions at the Site as characterization and remediation progress may also be included to demonstrate progress and compliance at the Site. Figures should not be cluttered. Figures must be legible and explicable, and include north arrow, scale, complete legend, measurement units and annotated clarification as necessary. <b>THE DOCUMENT TEXT MUST REFERENCE THE FIGURES AND DRAW CONCLUSIONS BASED ON FIGURE-INTERPRETED CONTENT WHEN INFORMATION ON THE FIGURES IS USED AS JUSTIFICATION FOR THAT CONTENT.</b>
3	<input checked="" type="checkbox"/>	<b>Figures, Geologic:</b> Plan-view and cross-sections should include wells, borings, and sampling locations, lithologic contacts, screen intervals, water table elevation contours, contaminant concentrations and extent as a bounding contour in each media, and rose diagram to show direction and magnitude of ground water flow. Cross-section transects should be shown on the plan view map and must accurately represent conditions and appropriate locations to show contaminant distribution on the Site. Boring logs and cross-sections shall be in agreement.

4	<input checked="" type="checkbox"/>	<b>Tables:</b> Include tables that show all data collected at the Site over time. Tables should include cleanup levels or proposed cleanup levels with any contaminant detections and exceedences clearly indicated using bold font, shading or color. Non-detectable levels should be noted as '<' with the numerical detection limit provided rather than 'ND'. Tables should include detailed notes that explain any laboratory designations, assumptions and references.
5	<input checked="" type="checkbox"/>	<b>Terrestrial Ecological Evaluation (TEE):</b> A description of any potential terrestrial habitat in the Site vicinity must accompany all submissions so that appropriate cleanup levels can be established. Provide sufficient detail to justify the analysis or proposed TEE exclusion and selected result. <a href="http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm">www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm</a>
6	<input checked="" type="checkbox"/>	<b>Pathways and Receptors:</b> Identify pathways (surface water, groundwater wells, air, soil direct contact, etc.) and receptors (human, aquatic, terrestrial) within 1 mile of the Site.
7	<input checked="" type="checkbox"/>	<b>On-Site Sources:</b> List all known and potential sources of contamination. Include locations of the sources on maps. This will serve as a template to guide sample collection design at the Site.
8	<input type="checkbox"/>	<b>Off-Site Sources:</b> List any sources that may impact the Site that are from other properties. Define extent of off-Site intrusion into the Site.
9	<input type="checkbox"/>	<b>Analytical Solutions:</b> Include a demonstration of conditions that require a calculated solution (e.g., background concentration, Method B or C calculation, monitored natural attenuation, etc) must take the form a calculation note. This includes a statement of the problem, statement of assumptions and limitations, equations, input and output parameters, explanation of results, and conclusions. <b>THE APPLICANT MUST PROVIDE ADEQUATE DETAIL TO MAKE THE CASE.</b> The solution must include figures and tables to support the results and conclusions. Where using a Department of Ecology spreadsheet application, include discussion of the inputs and outputs, and conclusions referencing back to the appropriate field(s) in the spreadsheet. A copy of the completed spreadsheet should be included as an appendix to the report
10	<input checked="" type="checkbox"/>	<b>Cleanup Levels:</b> Clearly identify cleanup level for each media and rationale for the selected level. If necessary, show calculation of the cleanup level to include a list of the list of the input parameters. If cleanup proposes mixing MTCA Methods for different media, explain the justification. Cleanup selection should also include a reference to the TEE.
11	<input checked="" type="checkbox"/>	<b>Sampling:</b> Include a table of the contaminants to be sampled for in each of the media (soil, ground water, vapor, surface water). Include the Method and

		numerical cleanup level, laboratory method, any special sampling protocols (silica gel [conditionally allowed in soil only], etc.).
12	<input checked="" type="checkbox"/>	<b>Appendices:</b> Append all pertinent information that supports the text, figures and tables including boring logs, well installation diagrams, field-sampling logs, surveying data, laboratory analytical data, hydrogeologic data, and calculations. All appendices must include an introductory section that contains a description of content and explains how to interpret the information for use in the description and analysis of processes at the Site.
13	<input type="checkbox"/>	<b>Summary Statistics:</b> Provide statistics for all datasets (soil, groundwater, air, sediments, surface water). Include minimum, maximum, mean, median, standard deviation, number of samples in each set. For time-series data provide statistics for each sample location. Also provide site-wide summary of all data for each contaminated medium.
14	<input checked="" type="checkbox"/>	<b>Data Entry into EIM:</b> Remember that all data must be loaded into the Ecology <i>Environmental Information Management</i> (EIM) system upon submission of each report to Ecology. This allows the Ecology Site Manger to access data to check results or perform additional analyses with those data.
15	<input checked="" type="checkbox"/>	<b>Licensed Professional Stamp:</b> All project documents (RI, FS, CAP, etc.) that are submitted to Ecology for review must be stamped and signed by a Washington State Licensed Geologist or Engineer as required by Washington State Law (Chapters 18.43 and 18.220 RCW)
16	<input checked="" type="checkbox"/>	<b>The Cleanup Action Selected</b> must meet the minimum requirements in WAC 173-340-360 (2)

# INSTRUCTIONS ON USING THIS SUGGESTED REPORT TEMPLATE

This document presents a suggested template to use when preparing a remedial investigation report. It is designed to meet the requirements of the Model Toxics Control Act (MTCA) described in 173-340-350(7) and 173-340-840 of the Washington State Administrative Code (WAC). This suggested template is not *required* for report submittals, and the content of this template may not be appropriate for limited-scope environmental investigations.

Sections written in **BLUE** provide information, instructions, and other references regarding components of the report. **Delete this text before submitting the report.**

**Note:** All sampling data must be uploaded into Ecology's Environmental Information Management (EIM) database. This allows Ecology to access data, check results, and/or perform additional analyses. For more information on submittal requirements, refer to:

[http://www.ecy.wa.gov/programs/tcp/data\\_submittal/Data\\_Requirements.htm](http://www.ecy.wa.gov/programs/tcp/data_submittal/Data_Requirements.htm)

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The information presented in this document is based on the authority and requirements found in MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC.

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**Delete this page before submitting report.**

# Suggested Report Template Remedial Investigation Report

Report Version: Draft, V.2, etc.

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Site Name: Enter Site Name Here

Site Address: Street Address  
City, State Zip Code

Alternate Location Info: Enter parcel number, latitude/longitude, GPS,  
Quarter Section Township Range.

Ecology Facility Site ID No.: Enter ID Number

Voluntary Cleanup Program Project No.: Enter if applicable

Order No.: Enter if applicable

Consent Decree No.: Enter if applicable

Prepared By:  
Consultant Project Manager  
Consultant Organization  
Street Address  
City, State ZIP Code

Prepared For:  
Site Owner  
Street Address  
City, State ZIP Code

Signature:

Date:

Licensure stamp goes here.  
Reminder: Geologic, Engineering, or  
Hydrogeologic work must be performed  
under the seal of an appropriately  
licensed professional, as required by  
Chapters 18.43 and 18.220, Revised Code  
of Washington (RCW).

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**Update table of contents once report is completed by right-clicking and selecting  
“update field” and then “update entire table”.**

**(POTENTIAL) LIST OF FIGURES**

- Figure 1. Vicinity Map
- Figure 2. Site Map – overall layout
- Figure 3. Site Map – COC concentrations and locations
- Figure 4. Cross Sections
- Figure 5. Site Map – Groundwater contours and elevations
- Figure 6. Site Map – Soil data
- Figure 7. Site Map – Groundwater data
- Figure 8. Conceptual Site Model



**(POTENTIAL) LIST OF TABLES**

Table 1. Sampling Info/Laboratory Methods

Table 2. Cleanup Levels

Table 3. Site Data

**(POTENTIAL) APPENDICES**

Appendix A. Exploratory Logs

Appendix B. Laboratory Analytical Data

Appendix C. Limitations

Appendix D. Other – (e.g. SAP and QAPP)

Lists of Figures, Tables, and Appendices are for example only. Update Figure, Table, and Appendix lists once report is complete by adding or removing Table/Figure/Appendix numbers as needed and updating titles.

**ACRONYMS AND ABBREVIATIONS**

ARAR	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
COC	Contaminant/Chemical of Concern
CSID	Cleanup Site Identification number
CSM	Conceptual Site Model
CUL	clean-up levels
Ecology	Washington State Department of Ecology
FOC	Fraction of Organic Carbon
FSID	Facility Site identification number
MTCA	Model Toxics Control Act
PID	Photoionization detector
PSD	particle size distribution
QAPP	Quality Assurance Project Plan
RCW	Revised Code of Washington
SAP	Sampling and Analysis Plan
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbon
VCP	Voluntary Cleanup Program
WAC	Washington State Administrative Code

**EXECUTIVE SUMMARY**

An Executive Summary is considered necessary for all reports to allow a reader to quickly understand project objectives, scope of work, and all the main findings.

## 1. INTRODUCTION

The purpose, or objective, of the Remedial Investigation (RI) should generally be to characterize the nature and extent of contamination at the Site.

NOTE: Under MTCA, 173-340-200 WAC, a site is defined by the nature and extent of contamination associated with one or more releases of hazardous substances prior to any cleanup of the contamination. A Site is NOT defined by the property or parcel boundary. Refer to *Guidelines for Property Cleanups under the Voluntary Cleanup Program* (Publication No. 08-09-044) for further discussion on the relationship between properties and Sites.

### 1.1. GENERAL SITE INFORMATION

This section should include a concise summary of the following:

- Site Name, address (or other identifier), Facility Site Identification number (FSID), Cleanup Site Identification number (CSID), and Voluntary Cleanup Program (VCP) number (if appropriate).
- Contact information for the following: project consultant, property owner, facility operator, person/entity who contracted the work performed (if different from property owner).

Contact information should include: name, address, phone number, and email address.

- Location information: This section should describe the location of the Site and describe the Site relative to the neighborhood **and** region. Enough information should be provided so that the specific location of the Site, as well as the regional setting, are easily identified.

For example:

- Describe the geographic position, land use, neighborhood setting, and proximity to key regional features, streams, surface water bodies, schools, etc.
- Provide a brief legal description of the Site and any other relevant site location indicators (e.g., Quarter Section Township Range, tax parcels, zoning designation).

### 1.2. SITE HISTORY

This section should include a description of the historical Site usage and features, chronological list of past owners and operators (with contact information if available), and known historical releases, suspected releases, and potential/known sources of contamination at the Site. Include approximate dates or periods of past product and waste spills, identification of the materials spilled, and amount/location of the spill. Include the circumstances of the Site discovery in this section. If this information is lengthy, you may prefer to include it in appendices.

Summarize relevant information from previous site work, specifically:

- The location, nature, extent, and/or magnitude (where known) of Contaminants/Chemicals of Concern (COCs).

- Existing understanding of site history/operations/layout, and potential influences on soil and groundwater contamination.

Use Site plans to illustrate this information (Figures 1, 2, 3+) or, failing this, reference these figures that have appeared in other reports (if so, can include copies in an appendix herein for ease of reference).

### **1.3. SITE USE**

This section should include a summary of the current Site uses and features and any future use plans:

Discuss any permits or violations and the regulatory status of the Site.

## **2. FIELD INVESTIGATIONS**

### **2.1. PREVIOUS ENVIRONMENTAL INVESTIGATIONS**

Summarize background information relevant to the investigation, such as the main findings of previous investigations or the status of interim actions. Discuss, if known, any sampling activity conducted as part of a previous investigation and the reasoning behind the sample locations chosen. Reference these reports as required.

Tabulate and/or append (Table #/Appendix #) existing relevant information (e.g., exploratory borehole logs, geological cross-sections, groundwater monitoring data). Or, if presented elsewhere in previously submitted and readily available reports, clearly reference the data used (including report title, author, date, reference, figure/table/appendix number and page).

### **2.2. SITE CHARACTERIZATION**

Describe in detail the technical scope of the investigation and work performed. For example:

- What investigation methods (e.g., soil vapor survey, test pits, solid stem/hollow stem auguring, direct push) and equipment were used (e.g. photo ionization detector (PID), track hoe excavator)? Provide justification for selected investigation methods used.
- Who carried out the work and who supervised the work?
- The number and location of sample locations, why they were selected, and how these locations are uniquely identifiable (e.g., 14 boreholes designated BH101-BH114, drilled to final depths between 10.2 and 12.5 below ground surface (bgs); refer to sample inventory tables).
- How observations were recorded (soil borings logged in accordance with an appropriate standard) and how this information is reproduced in the report (appended borehole logs, etc.).
- The basis for soil (or soil gas) sample collection in terms of depth and lithology or field screening.
- How groundwater wells were constructed and what materials were used; how they were developed prior to sampling.
- Any other pertinent information (e.g., sample locations were cleared for underground/overhead services by specialist contractor; groundwater and surface water monitoring points were surveyed by "X" to "X" datum).

In a complicated or heavily contaminated site, the investigations could be extensive, using a number of different investigation and sampling methods. In such situations, consideration should be given to covering Scope of Work and Methodology in separate sections, including sampling and monitoring discussed in Section 2.2.1 below.

### **2.2.1. SAMPLING AND MONITORING**

This section should reference the Sampling and Analysis Plan (SAP). The SAP should be appended, if not previously included in a submitted Work Plan.

Describe the sampling strategy. Broadly describe what techniques were selected to implement this and why. Use the preliminary CSM to justify these decisions. This section should include detail on the following:

- The rationale and specific objectives of sampling; include discussion of site COCs and why they were chosen for analysis.
- Justification for the number and location of sampling positions.
- A discussion of the laboratory analyses performed and rationale. Provide justification or explanation for any special sampling protocols (e.g., silica gel cleanup, total petroleum hydrocarbon (TPH) analysis).

Different drivers relevant to different parts of a site may influence the scope of sampling. This should be captured here so that the decisions underpinning the scope of the site investigation are, from the outset, clearly understood. For example, certain areas of hazardous chemical storage/use may have been targeted, plus areas where known historic losses occurred.

For more complex sites, illustrate the sampling strategy via site plans (Figures 3+).

#### **More specifically:**

Use this section to describe how sampling and/or monitoring were undertaken. Provide details on the following:

- Water level monitoring, to be completed prior to sample collection.
- Collection of wellhead parameters (e.g., pH, electrical conductivity, temperature, redox potential, dissolved oxygen) and the techniques and instruments used to measure these.
- Sampling techniques and protocols.
- Sample containers or bottles used.
- Filtration and preservation protocols, mainly needed for waters.
- Dates and number of monitoring events undertaken.
- Sample handling protocols (uniquely labelled, refrigerated, use of coolers with frozen ice packs, logged onto chain of custody form, how delivered to laboratories, etc.).
- Discussion of any deviations from the SAP (e.g., sample collection methods, proposed vs. actual sample locations)

NOTE: Ecology recommends low-flow sampling using peristaltic pumps for shallow groundwater less than 15 feet below ground surface (bgs), or low-flow submersible or bladder pumps for deeper samples. The use of bailers for groundwater sampling is not considered appropriate. Refer to the following documents for reference and

guidance:

- Ecology, revised 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Washington State Department of Ecology, Olympia, WA. 197 pages. Publication No. 10-09-057.  
<https://fortress.wa.gov/ecy/publications/SummaryPages/1009057.html>
- Puls, R.W. and Barcelona, M.J., 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540/S-95/504, April 1996.  
<http://www.epa.gov/remedytech/low-flow-minimal-drawdown-ground-water-sampling-procedures>
- U.S. EPA Region I, 1996. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater samples from Monitoring Wells*, EQASOP-GW 001, Revised January 2010.  
<http://www.epa.gov/sites/production/files/2015-06/documents/EQASOP-GW001.pdf>

### 2.2.2. SITE GEOLOGY

Describe the ground conditions encountered in this section. Specifically, provide details on:

- The nature, depth, thickness, and spatial distribution of key geological strata. Clearly distinguish fill material from natural strata.
- Relate site observations to existing understanding of site geology.
- Illustrate geological understanding in site plans and/or cross-sections. Detailed borehole and well construction logs shall be included in an Appendix.
- If appropriate, provide physical laboratory test data (e.g., Particle Size Distribution (PSD) curves and Fraction of Organic Carbon (FOC) data).

You will likely need physical data to empirically demonstrate that measured soil concentrations have not, and will not, cause an exceedance of the groundwater clean-up levels (CULs). Refer to WAC 173-340-747 for details the on process of deriving soil concentrations for groundwater protection. Section 9 provides information on how to perform an empirical demonstration to show soil concentrations measured at the site will not cause an exceedance of the applicable groundwater cleanup levels established under WAC 173-340-720.

- Ecology, 2016. *Frequently Asked Questions (FAQ's) Regarding Empirical Demonstrations and Related Issues (DRAFT Implementation Memorandum No. 15)*. Washington State Department of Ecology, Olympia, WA. 42 pages. Publication No. 16-09-047.  
<https://fortress.wa.gov/ecy/publications/SummaryPages/1609047.html>

### 2.2.3. SITE HYDROGEOLOGY

Infer and describe the hydrogeological regime from groundwater/surface water monitoring data and your understanding of site geology. Specifically provide details on:

- Which geological media contain groundwater.
- The inferred direction(s) of groundwater flow (consider vertical as well as horizontal flow). This should be based on professionally surveyed wellhead

elevations and measured depths to groundwater.

- Features in the groundwater flow field – mounded groundwater levels, flow divide, boundary effects, sources/sinks, etc.).
- Likely degree of interaction between groundwater and surface water.
- The apparent governing flow regime – intergranular, fissure-flow.
- Hydraulic parameters – hydraulic conductivities, hydraulic gradients, estimated groundwater flow velocity, travel time to potential receptor, etc.

Use contoured site plans and cross-sections to illustrate the site hydrogeology. Tabulate and/or append groundwater/surface water monitoring data, as well as the data and analysis from any hydraulic (well) testing completed.

#### **2.2.4. OTHER SITE INFORMATION**

If applicable, include characterization of sediments, air quality, analysis of possible vapor intrusion pathways, and cultural history/archaeology.

### **2.3. SAMPLING/ANALYTICAL RESULTS**

#### **2.3.1. QUALITY ANALYSES**

This section should reference the Quality Assurance Project Plan (QAPP). The QAPP should be appended, if not previously included in a submitted Work Plan.

Describe the evaluation of analytical data quality. This section should include detail on the following:

- Which laboratories were subcontracted, status of laboratory accreditation for the sample types, and analyses (groups) performed.
- Verify that sample numbers and analyses match the chain-of-custody.
- Confirm timing and condition of samples upon receipt at the laboratory undertaking the analysis, and how long they were in transit.
- Verify that sample preservation and holding times were met.
- Verify that field and laboratory duplicates, matrix spikes, and laboratory control samples were run at the property frequency, and that control limits were met.
- Verify that required detection limits have been achieved.
- Review of laboratory qualifiers which may impact the quality of the analytical data collected.
- Apply additional data qualifier flags, as appropriate, beyond those applied by the laboratory.

Tabulate a comprehensive sample analysis inventory, typically done by sample type, soil, water, vapor, etc.

#### **2.3.2. RESULTS**

Use this section and additional sub-sections, where appropriate and necessary, to present and discuss data by, for example, potential source area, site operational area, by COC group, or geological/hydrogeological unit. Use the CSM and sampling strategy to guide this decision. Describe and relate field and laboratory data with



your previous understanding of potential source areas, groundwater flow, and observations made during the site investigation. Present and consider:

- The nature, magnitude, and extent of COC and other key parameters including regulatory classifications if applicable.
- Evidence for transfer/interactions between different media – leaching, groundwater plume migration, etc.
- Provide detail on the likely fate and transport of all the main COC or COC groups identified beneath and potentially down-gradient of the site,
- Relate this to the previous phase CSM (historical land use, for example).

Tabulate and/or append key data. Annotate site plans and/or geological cross-sections to illustrate the chemical character, magnitude and extent of soil and groundwater contamination.

### 3. CONCEPTUAL SITE MODEL

Discuss and provide figures showing the following:

- Contaminant release – Discuss the source, type, and concentrations of COCs.
- Fate and transport – Evaluate where the contamination is on the site and how it got there. If models are used discuss model methods and input data.
- Exposure pathways – discuss potential and/or actual pathways on the site (e.g., surface water, groundwater, soil, air migration).
- Receptors – Evaluate potential and/or actual receptors at the site (human, terrestrial, aquatic, ecological, etc.)

Describe potential health, environmental, or other impacts of the COCs such as cancer risk. Address site-specific factors (hydrogeologic setting, sensitive receptors, daycare on the property, etc.) important to the site.

NOTE: The New Jersey Department of Environmental Protection has a document on conceptual site models that goes into even greater detail. While not all sections are applicable to sites in Washington State, you may find the guidance very useful.

- NJ DEP, 2011. *Technical Guidance for Preparation and Submission of a Conceptual Site Model*.  
[http://www.nj.gov/dep/srp/guidance/srra/csm\\_tech\\_guidance.pdf](http://www.nj.gov/dep/srp/guidance/srra/csm_tech_guidance.pdf)

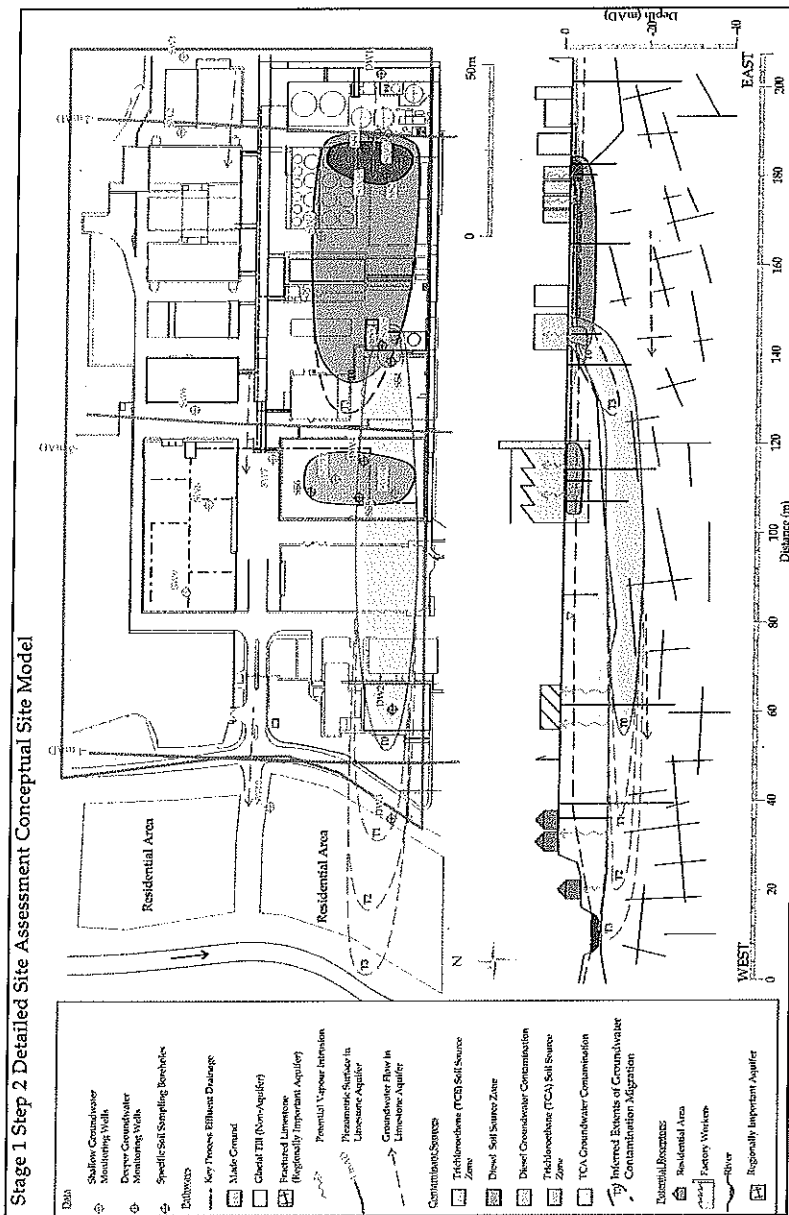
Discuss the updated CSM here with reference to the results and findings of the site investigation above, and make reference to the CSM included as a figure in the report. Note: the CSM may also include a well-constructed matrix or network diagram.

The CSM prepared for the Occidental Chemical Corp Site in Tacoma, WA (FSID: 1212) is an example of a highly complex CSM. The CSM and other information can be found on the Ecology website at:

<https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=4326> and  
<http://www.ecy.wa.gov/programs/hwtr/CleanupSites/Occidental/index.html>

It is unlikely that your CSM will require a level of detail beyond several figures and diagrams

and discussion within the text of the report. The example is provided to illustrate the level of detail commensurate with the complexity of the Site. Your CSM should solidly illustrate the level of complexity found at your Site.



Replace this image with a Conceptual Site Model showing the current understanding of site.

#### 4. PROPOSED CLEANUP STANDARDS

This section should describe the basis for the selection of cleanup levels for each media impacted. Consult WAC 173-340-700 for an overview of cleanup standards. RCW 70.105D.030(2)d requires cleanup standards to be “at least as stringent as all applicable state and federal laws.” If a calculated cleanup level or mixed cleanup levels (e.g., background concentrations, Method B or C calculation) is selected, a demonstration of conditions that require this must be included along with tables and figures supporting this selection. I

Include a discussion of all Applicable or Relevant and Appropriate Requirements (ARARs) proposed and/or selected for the Site. Clearly identify cleanup levels selected for each media,

chemical, location, or action; and provide a comprehensive rationale. A Terrestrial Ecological Evaluation (TEE) should be performed as part of cleanup level selection. The TEE assesses impacts to greenbelts and other natural habitats, wildlife, and receptors per WAC 173-340 - 7491, -7492, or if necessary, -7493. If a TEE is not required per WAC 173-340-7491, include the basis for this determination; if a TEE is required, include a description of the TEE results and append the TEE worksheet.

Check out the following link for more TEE guidance:

<http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm>

#### **4.1. CONTAMINANT-SPECIFIC STANDARDS**

Reference WAC 173-340-703 to determine selection of indicator hazardous substances, if appropriate, at the site.

#### **4.2. SOIL CLEANUP STANDARDS**

Describe the basis for the selection of soil cleanup levels. Factors to consider and discuss are:

- Land use
- Method used to establish cleanup levels
- Basis for the cleanup level using that method
- Protection of human health (human health risk assessment; identify contaminant-specific ARARs)
- Protection of the environment (terrestrial ecological risk assessment; identify contaminant-specific ARARs)
- Protection of other media (ground water, surface water, sediments, air)
- Adjustments
- Point of compliance

#### **4.3. GROUNDWATER CLEANUP STANDARDS**

Describe the basis for the selection of groundwater cleanup levels. Factors to consider and discuss:

- Potability of groundwater
- Method used to establish cleanup levels
- Basis for the cleanup level using that method
- Protection of human health (human health risk assessment; identify contaminant-specific ARARs)
- Protection of other media (surface water, sediments, air)
- Adjustments
- Point of compliance

#### **4.4. CLEANUP STANDARDS FOR OTHER MEDIA (INDOOR/AMBIENT AIR, SOIL GAS, SUB-SLAB SOIL GAS)**

- Cleanup levels (present and describe basis)
- Method used to establish cleanup levels
- Basis for the cleanup level using that method
- Protection of human health (human health risk)

## **5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

### **5.1. SUMMARY AND CONCLUSIONS**

This section must bring together all the above findings in a concise and clear way so that the reader is able to understand the findings of the site investigation. The findings should include a discussion on the phase partitioning for COCs at the Site.

Summarize the updated CSM again here and use technical diagrams to illustrate this. The text should clearly state the main identified contamination source areas, all remaining COCs, the expected fate and transport of these along identified migration pathways, exposure pathways, and the potential receptors that are relevant to the site.

### **5.2. RECOMMENDATIONS**

If the information gathered during the RI is not sufficient to define the Site, further action will be required to investigate the data gaps identified. This may need to be supported by the collection of additional site data.

This section must include a summary of what action is proposed and outline the objectives of the next phase of work. Provide some detail on the scope of further work, which may include:

- Additional investigations that may be needed to better understand the nature, magnitude, and extent of relevant source zones, pathway, and/or receptor characteristics. Include the locations of proposed investigative sampling points to facilitate further decision making.
- Additional investigation needed to evaluate feasibility of potential remedial alternatives.
- Outline proposal for ongoing groundwater monitoring to confirm the findings of the site investigation, including the monitoring locations, frequency, COC, and other parameters to be determined, etc.
- At sites where there is an existing groundwater monitoring program, comment on whether amendments to the number or location of monitoring points, frequency of monitoring, or the analytical schedule are necessary.

Outline a possible interim action or remedial action. This may be expanded on if further Site investigation is necessary. The final cleanup action must meet the minimum requirements outlined in 173-340-360(2) WAC.

## **6. REFERENCES**

The style of cited references should be consistent throughout the document.

The following is list of resources to assist in conducting a remedial investigation and in preparing your report. This list is not exhaustive and should not be interpreted as a sole source of Applicable State and Federal Laws (ARARs) and guidance documents.

- Lombard, S. and C. Kirchmer, 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Washington State Department of Ecology, Olympia, Washington. 48 pages + appendices. Publication No. 04-03-030. <http://www.ecy.wa.gov/biblio/0403030.html>
- Ecology, revised 2013. *Model Toxics Control Act Regulation and Statute*. Washington State Department of Ecology, Olympia, Washington. 324 pages. Publication No. 94-06. <http://www.ecy.wa.gov/biblio/9406.html>
- Ecology, revised 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Washington State Department of Ecology, Olympia, Washington. 197 pages. Publication No. 10-09-057. <https://fortress.wa.gov/ecy/publications/SummaryPages/1009057.html>
- Puls, R.W. and Barcelona, M.J, 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540/S-95/504, April 1996. <http://www.epa.gov/remedytech/low-flow-minimal-drawdown-ground-water-sampling-procedures>
- U.S. EPA Region I, 1996. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater samples from Monitoring Wells*, EQASOP-GW 001, Revised January 2010. <http://www.epa.gov/sites/production/files/2015-06/documents/EQASOP-GW001.pdf>

**GUIDANCE FOR FIGURES**

- Figures should include north arrow, scale, complete legend, measurement units, and annotated clarification as necessary.
- Figures should not be cluttered and must be legible and explicable.
- Document text must reference figures and draw conclusions consistent with information presented on figures.

- Figure 1 Vicinity Map – show property in relation to surrounding region. Area covered by vicinity map should be proportional to site size. Label adjacent properties, streets, regions, and water bodies. Include other applicable items such as surface topography, natural areas, surrounding land uses, location of groundwater supply, and monitoring wells within a one-mile radius.
- Figure 2 Site Map(s) – show overall site layout with existing well, boring, and sampling locations labeled consistently with current and historical site data and sample names used in the report. If multiple names exist for a sampling location or area of the site, indicate this. Include site infrastructure, including historical infrastructure (if significantly different). Include other relevant information including (but not limited to): site and property boundaries, buildings/facilities on site, historical site features, underground storage tanks (USTs), hazardous substance treatment, storage, or disposal areas, previous excavation/interim action activity, etc.
- Figure 3+ Site Map(s) – show current and applicable historical COC locations, concentrations, and estimated vertical and horizontal extents of contamination for site media.
- Figure 4+ Cross-section(s) – show actual/inferred site-specific geology (and hydrogeology). Cross-section transects should be shown on a plan view map. Include applicable information from boring logs; show wells, screened intervals, water levels, and extent and concentration of contamination for all-site media, if applicable.
- Figure 5+ Site Map(s) – illustrate inferred hydrogeological flow regime(s).
- Figure 6+ Site Map(s) – show key soil/soil vapor data by sample location/depth (split as needed into COC or COC groups).
- Figure 7+ Site Map(s) – show key groundwater data by monitoring well location/depth (split as needed into COC or COC groups).
- Figure 8+ Conceptual Site Model (CSM) – show original CSM and any changes to CSM. The CSM figure(s) should contain the following information: (1) site contaminants and sources, (2) the nature and extent of contamination, (3) fate and transport processes, (4) exposure pathways, and (5) potential and/or actual receptors. Illustrative figures (plans and cross-sections) and/or a well-constructed matrix or network diagram are acceptable formats for a CSM, but the lateral and vertical extent of contamination, as currently understood, should be clearly conveyed.

**GUIDANCE FOR TABLES**

- Tables should include cleanup or proposed cleanup levels with any contaminant exceedances clearly indicated using bold font or shading.
- Non-detectible levels should be noted as “U” with the numerical laboratory reporting limit (RL) provided, rather than “ND”; tables should indicate the RL used (Method Detection Limit (MDL), Practical Quantitation Limit (PQL), etc.).
- Tables should include detailed notes that explain any laboratory designations, assumptions, and references.
- All acronyms used in the table should be defined in a section of the notes even if they are defined in the body of the report.

Table 1+	Sampling Information/Laboratory Methods – include site COCs, sampling methods, analytical methods, reporting limits, and any special sampling protocols with justification or explanation (e.g., silica gel cleanup, TPH). Include historical analytical methods and reporting limits, if applicable.
Table 2+	Cleanup Levels – When establishing cleanup levels other than MTCA Method A, include potential ARARs and screening levels as well as the final proposed cleanup values for all applicable site media. Where (1) chemical-specific, (2) location-specific, or (3) action-specific cleanup levels have been established, multiple tables may be necessary for ease of understanding. If calculated values (such as MTCA Method B or C) are used, reference calculations or data used to determine these values.
Table 3+	Site Data – Include historical and current analytical and field-measured data. Tables should include units, sample name, dates of sample collection and lab analysis, sample depth, groundwater elevation, analytical method, analyte, and applicable cleanup levels. Use multiple tables, if necessary, to break data out by media type. If data set is large, consider making an additional summary table of exceedances.

## GUIDANCE FOR APPENDICES

Each appendix should contain a description of content and explain how to interpret the information for use. Not all of the following suggestions will apply to all sites.

- Appendix A      Exploratory logs (borehole/test pit, etc.)
- Appendix B      Laboratory Analytical Data and Chain of Custody
- Appendix C      Limitations - All limitations that apply to the work should be summarized, including references to the originally proposed work plan with project objectives and scope of work. State if these were achieved and the scope of work completed. Where the scope deviated significantly from the originally proposed work plan, this should be summarized herein (if a limitation). State any limits of liability, reliance, etc., that apply.
- Appendix D+     Other appended information may include:
- Legal description of the property.
  - Chronological listing of past owners and operators.
  - Method B or C calculation spreadsheets.
  - Surveying data.
  - Supporting field and/or laboratory data, if not tabulated/appended or referenced elsewhere (hydraulic testing, hydrographs, other party's data, etc.).
  - Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP), if not previously submitted with a Work Plan. WAC 173-340-820 describes the elements to be included in a SAP. If deviations were made from the SAP or QAPP discuss those in the text of the report.
  - Groundwater and soil vapor monitoring records and data, if not explicitly summarized/referenced elsewhere.
  - Details of statistical methods, if used.
  - Copies of previous report figures that help provide further context and/or detailed descriptions of previous investigations/interim actions.