



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY  
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July 5, 2018

**Electronic Copy**

Mr. Gil Insley  
Clariant Corporation  
4000 Monroe Rd  
Charlotte, NC 28205

**Re: Further Action at the following Site:**

- **Site Name:** Chemtrade Performance Chemicals US LLC
- **Site Address:** 404 Hendrickson Dr., Kalama, WA. 98625
- **Cleanup Site No.:** 1784
- **Facility/Site No.:** 24634187
- **VCP Project No.:** SW0492

Dear Mr. Insley:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of the Chemtrade Performance Chemicals US LLC facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), chapter 70.105D Revised Code of Washington (RCW).

## **Issue Presented and Opinion**

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This opinion responds to a request for comments/technical assistance contained in the April 24, 2018, Hart & Hickman, “*Summary of Proposed Cleanup Alternatives*,” based on an analysis of whether the remedial action meets the substantive requirements of MTCA, chapter 70.105D RCW, and its implementing regulations, Washington Administrative Code (WAC) chapter 173-340 (collectively “substantive requirements of MTCA”). Ecology concurs that further remedial action is necessary to clean up contamination at the Site.

## **Description of the Site**

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This opinion applies only to the Site, defined by the nature and extent of contamination associated with the release of zinc and cadmium into the environment from industrial operations at Cowlitz County tax parcel 6005041 (the Property). A parcel of real property can be affected by multiple sites. At this time, we have no information that the parcels associated with this Site are affected by other sites.

## **Basis for the Opinion**

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This opinion is based on the information contained in the following documents:

1. CDM, *Phase I and 2 Environmental Site Assessment*, Clariant Corporation Chemical Plant, November 19, 2002.
2. CDM, *Angle Boring Groundwater Analytical Results*, Former Clariant Plant, July 21, 2003.
3. CDM, *Contaminant Delineation*, Former Clariant Corporation Chemical Plant, March 3, 2004.
4. CDM, *Soil Excavation Summary Report*, Former Clariant Corporation Chemical Plant, March 3, 2004.
5. CDM, *Winter 2004 Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, March 24, 2004.
6. Washington State Department of Ecology, *To: Mr. Ronald Walton, Clariant Corporation, From: Mr. Charles Cline, Further action letter pursuant to RCW 70.105D.030(1)(i)*, June 1, 2004.
7. CDM, *Spring 2004—2nd Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, July 9, 2004.
8. CDM, *VCP #SW0492 Evaluation of the Cadmium Plume*, Former Clariant Plant, August 17, 2004.
9. CDM, *Summer 2004—3rd Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, October 18, 2004.
10. CDM, *Fall 2004—4th Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, December 3, 2004.
11. CDM, *Winter 2005—5th Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, April 14, 2005.
12. CDM, *Spring/Summer 2005—6th and 7th Quarters Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, September 14, 2005.
13. CDM, *Screening Level Ecological Risk Assessment*, Former Clariant Corporation Chemical Plant, November 30, 2005.
14. CDM, *Site Conceptual Model for Zinc and Cadmium in Groundwater*, Former Clariant Corporation Chemical Plant, November 30, 2005.
15. CDM, *Fall 2005—8th Quarter Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, January 3, 2006.
16. Washington State Department of Ecology, *Re: Further Action Determination under WAC 173-340-515(5) for the following Hazardous Waste Site: Former Clariant Corporation Chemical Plant*, March 9, 2006.
17. CDM, *Summer—2006 Groundwater Monitoring*, Former Clariant Corporation Chemical Plant, September 29, 2006.

18. CDM, *Piezometer Installation and Groundwater Sampling Report*—February 2007, Former Clariant Corporation Chemical Plant, April 12, 2007.
19. CDM, *Feasibility Study*, Former Clariant Corporation Chemical Plant, October 10, 2008.
20. Washington State Department of Ecology, *Re: Opinion on Proposed Cleanup of the following Site: Former Clariant Corporation Chemical Plant (aka Chemtrade Performance Chemicals US LLC)*, November 10, 2008.
21. Hart & Hickman, *Remedial Action Report*, Former Clariant Corporation Facility, January 19, 2011.
22. Hart & Hickman, *Post-Injection Monitoring Report & RAWP Addendum*, July 5, 2011.
23. Hart & Hickman, *Pilot Test Plan, Former Clariant Corporation Facility*, September 9, 2011.
24. Hart & Hickman, *Pilot Test Report*, Former Clariant Corporation Facility, October 31, 2011.
25. Hart & Hickman, *Additional Remedial Action & Performance Monitoring Report*, Former Clariant Corporation Facility, October 16, 2012.
26. Hart & Hickman, *Geochemical Evaluation Summary & 2013 Remedial Action Work Plan*, Former Clariant Corporation Facility, March 25, 2013.
27. Hart & Hickman, *Pilot Scale Injection Report*, Former Clariant Corporation Facility, May 22, 2014.
28. Hart & Hickman, *Sediment and Sediment Pore Water Sampling Report*, Former Clariant Corporation Facility, September 30, 2015.
29. Washington State Department of Ecology, *Re; Further Action at the following Site: Chemtrade Performance Chemicals US LLC*, February 9, 2017.
30. Hart & Hickman, *From Scott Drury and Steven C. Hart, LG, Attention Mr. Adam Harris, LHG, Re: Response to Opinion, Chemtrade Performance Chemicals US LLC*, May 31, 2017.
31. Hart & Hickman, *Seep Study Work Plan Chemtrade Performance Chemicals US LLC Site*, May 31, 2017.
32. Hart & Hickman, *Soil Sampling Work Plan, Chemtrade Performance Chemicals US LLC Site*, May 31, 2017.
33. Washington State Department of Ecology, *DRAFT Chemtrade Statistical Analysis Memorandum*, To: Adam Harris, Site Manager, From: Arthur Buchan, Toxicologist, Information & Policy Section, Toxics Cleanup Program, June 16, 2017.
34. Washington State Department of Ecology, *Re; Further Action at the following Site: Chemtrade Performance Chemicals US LLC*, June 17, 2017.
35. Hart & Hickman, *Soil Sampling Report, Chemtrade Performance Chemicals US LLC Site*, November 29, 2017
36. Hart & Hickman, *Groundwater Monitoring and Seep Study Report*, Chemtrade Performance Chemicals US LLC Site, November 29, 2017.

37. Hart & Hickman, *Updated Conceptual Site Model*, Chemtrade Performance Chemicals US LLC Site, March 19, 2018.
38. Hart & Hickman, *Summary of Proposed Cleanup Action Alternatives*, Chemtrade Performance Chemicals US LLC, April 24, 2018.

These documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. For access to these documents, please contact Ecology's Public Records Officer at (360) 407-6040. This opinion is void if any of the information contained in these documents is materially false or misleading.

## **Analysis of the Cleanup**

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### **Characterization of the Site.**

Historical site characterization is described in Ecology's February 9, 2017, opinion. In that opinion, Ecology requested a work plan for conducting a seep study at the Site, and requested updating the site conceptual model by evaluating the manufacturing facility as an ongoing source of contamination. Two work plans were subsequently submitted for Ecology review. On June 22, 2017, Ecology issued an opinion reviewing the two work plans, and provided additional information for conducting the proposed work.

Since our June 22, 2017, opinion, Ecology has received the following three reports of the results and analyses, and a summary of proposed remedial proposal for alternatives to be evaluated in a feasibility study for the Site:

- November 29, 2017, *Soil Sampling Report*
- November 29, 2017, *Groundwater Monitoring and Seep Study Report*
- March 19, 2018, *Updated Conceptual Site Model*
- April 24, 2018, *Summary of Proposed FS Cleanup Action Alternatives* (and request for opinion)

Ecology's comments on the four submitted documents, and informal assistance for the project, are provided in this opinion. Based on our review, Ecology does not anticipate that additional environmental sampling will be needed to complete the remedial investigation and feasibility study for the Site. Ecology anticipates that the next steps at this Site will be to:

1. Evaluate Ecology's comments provided in this opinion,
2. Conduct the requested additional evaluation,
3. Finalize appropriate cleanup standards,
4. Complete the feasibility study of proposed remedial alternatives supporting selection of a preferred remedial alternative, and
5. Complete a single decision document for review and opinion with the collated results of interim actions conducted, and the results of the remedial investigation and feasibility study.

**Comments on Characterization of the Site:**

1. **Selecting a Cleanup Action:** Ecology advises that sufficient information appears to have now been collected at the Site to select a cleanup action under WAC 173-340-360 through 173-340-390.<sup>1</sup>
2. **Additional Evaluation:** MTCA also includes requirements for evaluation of the indoor air and sediment pathways.<sup>2</sup> The reported data support that the sediment and indoor air pathways may be incomplete. Please evaluate potential sediment and indoor air impacts. Ecology provides the following technical assistance.

- a. **Sediment:** Using the procedures provided in WAC 173-204-510, please determine and report if the release has resulted in a sediment site of potential concern. Consider the following information.

The data appear to support that the set of sediment sample locations PP-1 through PP-20 (samples SD-1 through SD-10 in Ecology's Environmental Information Management System [EIM]) are chemically and spatially similar, and therefore may be defined as a station cluster for determination of sediment impacts under WAC 173-204, the Washington State Sediment Management Standards.<sup>3</sup>

Ecology notes that analytical samples from samples SD-1 through SD-10 were analyzed for cadmium and zinc chemical concentrations in ten of the twenty sample locations, and that the mean concentrations of both zinc and cadmium from the three highest chemical concentration sample results are less than dry weight sediment cleanup objectives.<sup>4,5</sup> Biological effects criteria were not obtained.<sup>6</sup> Applicable human health and regional background cleanup screening levels may not have been exceeded, nor other toxic, radioactive, biological or deleterious substance criteria, nor the nonanthropogenically affected criteria of WAC 173-204-563.<sup>7</sup> Therefore, the evidence collected for the investigation may be sufficient to support that this sediment site is of low concern,<sup>8</sup> and additional evaluation of sediment impacts at the Site may not be necessary.

- b. **Indoor Air:** Please evaluate the potential for indoor air impacts at the Site, using a tiered approach based on Ecology guidance<sup>9</sup> to determine whether hazardous substances detected in the environment at the Site require additional evaluation. Based on the reported data, it appears less likely that indoor air impacts will be determined to be significant. The data support that the evaluation may result in screening out indoor air concerns from further evaluation.

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<sup>1</sup> WAC 173-340-350

<sup>2</sup> WAC 173-340-750, WAC 173-340-760.

<sup>3</sup> WAC 173-204-510(2)

<sup>4</sup> WAC 173-204-510(2)(a)

<sup>5</sup> WAC 173-204-563, Table VI.

<sup>6</sup> WAC 173-204-510(2)(b)

<sup>7</sup> WAC 173-204-510(2)(c)

<sup>8</sup> WAC 173-204-510(2)(d)

<sup>9</sup> Ecology, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Vapor-intrusion-overview>, retrieved May 23, 2018.

**3. Provide a single collated decision document to inform stakeholders and the public.**

Thirty eight separate documents are in Ecology's Site record for this opinion. The collected data and analyses, together with the proposed remedial alternatives to be evaluated in the feasibility study, indicate that the disproportionate cost analysis may result in regulatory concurrence with a preferred remedial alternative that may include engineered or institutional controls managed by an environmental covenant, and possibly off-property conditional points of compliance abutting surface water. To determine if an off-property conditional point of compliance is appropriate abutting surface water, WAC 173-340-720(8)(d)(i)(G) requires notice of the proposal to natural resource trustees: the Washington State Department of Natural Resources and the United States Corps of Engineers. Regulatory decisions of this type can reasonably lead to significant public concerns.

Therefore, Ecology suggests that for clarity to all stakeholder groups and the public, a single decision document may be most appropriate, collating the major components of the remedial investigation and independent interim actions conducted to date, determining cleanup standards based on land use and the comments in this opinion, describing how each component of MTCA requirements was addressed, evaluating proposed remedial alternatives, and selecting the preferred remedial alternative.

However, it is probably appropriate to wait until there is regulatory concurrence with the proposed preferred remedial alternative before providing a cleanup action plan.

**Establishment of cleanup standards.**

Cleanup Standards consist of:

- Points of compliance.
- Cleanup levels.
- Other regulatory requirements that apply to the Site because of the type of action and/or location of the Site.<sup>10</sup>

The two primary components of cleanup standards are points of compliance and cleanup levels. Points of compliance designate the location on the Site where the cleanup levels must be met. Cleanup levels determine at what level a particular hazardous substance does not threaten human health or the environment.

For independent cleanups conducted under WAC 173-340-515, Ecology may concur with cleanup standards proposed by those conducting the independent cleanup. Please use the technical assistance provided below to determine cleanup standards for each area of the Site. As appropriate, please collate proposed cleanup standards for clarity and ease of future reference.

**Comments on Establishment of Cleanup Standards.**

**1. Industrial Land Use:**

- a. **Site extents within Cowlitz County tax parcel 6005041:** Project documentation provided for this review asserts that the Site is believed to qualify for

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<sup>10</sup> WAC 173-340-700(3)(c)

industrial/commercial land use for the purposes of exposure scenarios.<sup>11</sup> Based on the following analysis, Ecology concurs that Cowlitz County tax parcel 6005041 (the Property) is appropriately classified as an industrial property as defined in MTCA.<sup>12</sup> The Property is (1) zoned for industrial use and (2) has been used for processing or manufacturing of materials, and distribution of manufactured products.<sup>13</sup> The Property is characterized by traditional industrial uses.<sup>14</sup>

The City of Kalama's Comprehensive plan<sup>15</sup> states that Cowlitz County is not planning under chapter 36.70A RCW (Growth Management Act). The City of Kalama reports that it instead plans under RCW 35A.63 (Planning and Zoning in Code Cities). The City of Kalama's urban growth boundary appears to encompass the Property and the Site.

The definition of an industrial property in MTCA<sup>16</sup> provides that for counties and the cities within them not planning under chapter 36.70A RCW, that adjacent properties are also currently used or designated for industrial purposes. To the west of the Property is the Columbia River. To the east of the Property is Hendrickson Drive (tax parcel 6005308) followed by the Burlington Northern Railroad (tax parcel 60061). To the north and south of the Property are commercially zoned parcels (parcels 60054, 600540200) owned by the Port of Kalama. Ecology notes that adjacency to surface water has not precluded previous Ecology concurrence with industrial land use designation per WAC 173-340-200 at other MTCA facilities.

Because of the commercial zoning of adjacent parcels to the north, east, and south of the Property, and because the Site is adjacent to surface water, Ecology also considered the current circumstances of the Property based on the MTCA regulation<sup>17</sup> and the Concise Explanatory Statement.<sup>18</sup> Ecology notes that access to the Property is limited by fences and gates, that the human exposure scenario is based on adult industrial workers at the Property, and that the Property will continue to be used for industrial purposes with limited access.

Based on the definition of industrial property in WAC 173-340-200, the additional factors listed in WAC 174-340-745(1)(a)(i)(A-F), and the additional considerations provided in the concise explanatory statement, Ecology concurs that Cowlitz County tax parcel 6005041 is an industrial property for the purpose of this MTCA cleanup.

- b. **Site extents outside of Cowlitz County tax parcel 6005041:** Ecology does not concur that the area of the Site outside of the fenced areas of tax parcel 6005041 is an industrial property, or should be considered an industrial property for exposure scenarios for the purpose of this MTCA cleanup.

Ecology notes that, as visible on readily available parcel maps and documents submitted for this review, the MTCA Site extends to the west of the western property boundary of Cowlitz County tax parcel 6005041 to the feeder bluffs and riparian zone of the Columbia River. This area of the Site includes the lateral and vertical extents of hazardous

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<sup>11</sup> Conceptual Site Model, Page 5.

<sup>12</sup> WAC 173-340-200

<sup>13</sup> WAC 173-340-200

<sup>14</sup> RCW 70.105D.020(23)

<sup>15</sup> City of Kalama Comprehensive Plan, 2005-2025, <http://www.cityofkalama.com/home/showdocument?id=1098>, retrieved May 16, 2018.

<sup>16</sup> WAC 173-340-200

<sup>17</sup> WAC 173-340-745(1)(a)(i)(A-F)

<sup>18</sup> Publication 01-09-043, Concise Explanatory Statement, MTCA Cleanup Regulation, February 12, 2001, Page 231.

substances measured in sediment, sediment porewater, groundwater and soil to the west of the Property boundary of tax parcel 6005041.

2. **Applicable Laws and Regulations:** Please identify all applicable state and federal laws for the cleanup action (WAC 173-340-710(2)).

3. **Cleanup levels:**

a. **Concurrence with Proposed Cleanup Levels:** Ecology reviewed proposed cleanup levels, and concurs that the following cleanup levels appear appropriate for use at the Site. All proposed cleanup levels must take into account land use at the point of compliance.

Environmental Media	Hazardous Substance	Zinc	Cadmium	
	CAS Number	7440-66-6	7440-43-9	
Soil	Direct Contact (mg/kg)	24,000 <sup>19</sup> 1,050,000 <sup>20</sup>	80 <sup>21</sup> 3,500 <sup>22</sup>	
	Protection of Groundwater Vadose (mg/kg) <sup>23</sup>	5,970	0.69	
	Protection of Groundwater Saturated (mg/kg) <sup>24</sup>	299	0.035	
	Protection of Plants, Animals and Soil Biota <sup>25</sup> (mg/kg)	Plants	86	4
		Soil Biota	200	20
Wildlife		360	14	
Groundwater	Protection of Groundwater Quality <sup>26</sup> (µg/L)	4,800 <sup>27</sup> 10,500 <sup>28</sup>	5 <sup>29</sup> 17.5 <sup>30</sup>	
	Protection of Surface Water Quality (µg/L) <sup>31</sup>	66 <sup>32</sup>	0.7 <sup>33</sup>	
Surface Water	Surface Water Quality (µg/L)			
Air	Protection of Indoor Air (µg/m <sup>3</sup> )	N/A	0.0014 <sup>34</sup>	
Sediment	Sediment (mg/kg) <sup>35</sup>	3,200	2.1	

<sup>19</sup> CLARC, Method B non-cancer

<sup>20</sup> CLARC, Method C non-cancer

<sup>21</sup> CLARC, Method B non-cancer

<sup>22</sup> CLARC, Method C non-cancer

<sup>23</sup> Without additional soil and groundwater temperature data, Ecology concurs with a conservatively protective approach using 13C. See Guidance: [https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil Protective of Groundwater - CLARC Guidance.pdf](https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil%20Protective%20of%20Groundwater%20-%20CLARC%20Guidance.pdf)

<sup>24</sup> CLARC, Soil Protective of Groundwater, Saturated. See Guidance: [https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil Protective of Groundwater - CLARC Guidance.pdf](https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil%20Protective%20of%20Groundwater%20-%20CLARC%20Guidance.pdf)

<sup>25</sup> Without additional requested information, table values from WAC 173-340-900 Table 749-3 are applicable to the Site.

<sup>26</sup> WAC 173-340-900, Table 720-1

<sup>27</sup> CLARC, Method B non-cancer

<sup>28</sup> CLARC, Method C non-cancer

<sup>29</sup> CLARC, Method A

<sup>30</sup> CLARC, Method C non-cancer

<sup>31</sup> Calculated Chronic freshwater aquatic life protection values (WAC 1173-201A-240, Table 240) using 58 mg/l hardness. Value is a chronic 4-day average concentration not to be exceeded more than once every three years on the average.

<sup>32</sup> Calculated using equation:  $\leq (0.986)(e(0.8473[\ln(\text{hardness})] + 0.7614))$ .

<sup>33</sup> Calculated using equation:  $\leq (0.909)(e(0.7852[\ln(\text{hardness})]-3.490))$  at hardness = 100. Conversions factor (CF) of 0.909 is hardness dependent. CF is calculated for other hardnesses as follows:  $CF = 1.101672 - (\ln[\text{hardness}])(0.041838)$ .

<sup>34</sup> CLARC, Air Method B

<sup>35</sup> WAC 173-204, sediment cleanup objectives

**Notes on cleanup levels:**

- i. **Reasonable Maximum Exposure and Future Site Use:** Cleanup levels shall be based on estimates of current and future resource uses and reasonable maximum exposures expected to occur under both current and potential future site use conditions.<sup>36</sup> Please also take into consideration significant public concerns regarding future site use<sup>37</sup> when determining reasonable maximum exposure.<sup>38</sup>
  - ii. **Soil:** Based on land use designations, Ecology concurs that soil cleanup levels for industrial land use are appropriate for that portion of the Site included in Cowlitz County tax parcel 6005041. However, Ecology does not concur that soil cleanup levels for industrial land use are appropriate outside the property boundary or fenced area of Cowlitz County tax parcel 6005041. At this Site, cleanup levels may be determined to be parcel or area-specific.
  - iii. **Groundwater:** Ecology concurs that groundwater cleanup levels protective of surface water beneficial uses and groundwater quality are appropriate.
  - iv. **Surface Water:** Specific surface water cleanup levels need to be proposed. Surface water cleanup levels shall be based on highest beneficial use and reasonable maximum exposure.
- b. **Terrestrial Ecological Evaluation:** Ecology concurs that a simplified terrestrial ecological evaluation is likely applicable to the Site. Ecology also concurs that an industrial exposure scenario is likely appropriate for the industrial property portion of the Site for terrestrial ecological evaluation. However, additional documentation needs to be provided for Ecology to concur that the criteria of WAC 173-340-7491(2)(a) have been met. Specifically, please report how it was determined that:
- i. The Site is not located on, nor directly adjacent to an area where management or land use plans will maintain or restore native or semi native vegetation.<sup>39</sup>
  - ii. The Site is not used by a threatened or endangered species.<sup>40</sup> Please ensure that determination of site use by threatened or endangered species is conducted by a qualified professional knowledgeable and experienced in the geographic area of the Site. Provide that qualified professional's credentials and experience for making the determination to Ecology together with needed reporting.
- c. **Air Quality:** WAC 173-340-750 provides requirements for evaluating the potential for indoor air impacts at MTCA cleanup sites. Air cleanup levels shall be based on reasonable maximum exposure expected to occur under both current and future site use conditions.<sup>41</sup> Air cleanup levels shall be established at concentrations that do not directly or indirectly cause violations of groundwater, surface water, or soil cleanup standards.<sup>42</sup>

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<sup>36</sup> WAC 173-340-708(3)

<sup>37</sup> WAC 173-340-600(8)

<sup>38</sup> WAC 173-340-200, "Reasonable Maximum Exposure"

<sup>39</sup> WAC 173-340-7491(2)(a)(i)

<sup>40</sup> WAC 173-340-7491(2)(a)(ii)

<sup>41</sup> WAC 173-340-750(1)(b)

<sup>42</sup> WAC 173-340-750(1)(d)

**4. Points of Compliance:**

- a. Use the following references to standard points of compliance as a guide to propose appropriate points of compliance for the remedial investigation / feasibility study:

<b>Media</b>	<b>Standard Points of Compliance</b>
<b>Soil-Direct Contact</b>	Based on human exposure via direct contact, the standard point of compliance is throughout the Site from ground surface to fifteen feet below the ground surface. <sup>43</sup>
<b>Soil-Protection of Groundwater</b>	Based on the protection of groundwater, the standard point of compliance is throughout the Site. <sup>44</sup>
<b>Soil-Protection of Plants, Animals and Soil Biota</b>	Based on ecological protection, the standard point of compliance is throughout the Site from ground surface to fifteen feet below the ground surface. <sup>45</sup>
<b>Groundwater</b>	Based on the protection of groundwater quality, the standard point of compliance is throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site. <sup>46</sup>
<b>Groundwater-Surface Water Protection</b>	Based on the protection of surface water, the standard point of compliance is all locations where hazardous substances are released to surface water. <sup>47</sup> Where hazardous substances are released to the surface water as a result of ground water flows, no mixing zone shall be allowed to demonstrate compliance with surface water cleanup levels. <sup>48</sup>
<b>Surface Water</b>	Based on points at which hazardous substances are released to surface waters of the state, unless the department has authorized a mixing zone in accordance with chapter 173-201A WAC. <sup>49</sup>
<b>Air Quality</b>	Based on the protection of air quality, the standard point of compliance is indoor <sup>50</sup> and ambient air throughout the Site. <sup>51</sup>
<b>Sediment</b>	Based on the protection of sediment quality, compliance with the requirements of 173-204 WAC. <sup>52</sup>

- b. **Conditional Points of Compliance:** Establishment of conditional points of compliance at this Property abutting surface water was discussed in Ecology’s February 9, 2017, opinion for the Site. For establishing conditional points of compliance abutting surface water, Ecology will refer to the requirements of WAC 173-340-720(8)(c-d).

While MTCA allows for off-property conditional points of compliance in surface water, the requirements to establish off-property points of compliance are specific and significant. If an off-property conditional point of compliance in surface water is included in the preferred remedial alternative for this Site, please ensure you include details in the feasibility study demonstrating how the cleanup complies with the specific requirements of WAC 173-340-720(8)(d)(1)(A-G).

<sup>43</sup> WAC 173-340-740 (6)(d)

<sup>44</sup> WAC 173-340-747

<sup>45</sup> WAC 173-340-7490(4)(b)

<sup>46</sup> WAC 173-340-720(8)(b)

<sup>47</sup> WAC 173-340-730(6)

<sup>48</sup> WAC 173-340-730(6)(b)

<sup>49</sup> WAC 173-340-730(6)(a)

<sup>50</sup> Based on WAC 173-340-750(1)(a)

<sup>51</sup> WAC 173-340-750(6)

<sup>52</sup> WAC 173-340-760

### **Selection of Cleanup Action:**

A feasibility study for the Site is needed that provides remedial alternatives meeting minimum threshold requirements of MTCA.

### **Comments on Selection of Cleanup Action.**

1. **Proposed Remedial Alternatives:** An outline of seven remedial alternatives to be evaluated in the feasibility study was provided for this review. Ecology provides the following comments:
  - a. **Scope of Proposed Remedial Alternatives:** Ecology concurs that the seven proposed remedial alternatives to be evaluated in the feasibility study appear to encompass a range of alternatives designed to meet the minimum threshold and other requirements of MTCA. Two of the seven remedial alternatives are stated to be expected to result in permanent, irreversible cleanup actions for all hazardous substances in all environmental media at the Site. Several additional alternatives provide permanent remedial alternatives for groundwater contamination at the Site. Additional engineered and institutional controls would be necessary for several of the alternatives throughout the Site. All remedial alternatives must meet the threshold requirements of MTCA.<sup>53</sup>
  - b. **Details of Remedial Alternatives:** Please provide sufficient details for Ecology to understand the major components of each proposed remedial alternative. Include plan view and cross section depictions of the content and extents of proposed remedial actions as appropriate. Delineate areas proposed for industrial cleanup standards, and engineered or institutional controls as appropriate.
  - c. **Reasonable Restoration Timeframes:** In the feasibility study, please provide the expected restoration timeframes for each remedial alternative evaluated. Provide the expected timeframes for each significant remedial component as appropriate to support the overall restoration timeframe. Consider the number of months or years required to attain cleanup levels at points of compliance, or to fully implement a significant component or the majority of remedial construction. Preference should be given for alternatives that require shorter restoration timeframes.
  - d. **Cost Details:** Please provide cost details for major components of each remedial alternative, sufficient for Ecology to understand and concur with projected costs of each remedial alternative.
  - e. **Disproportionate Cost Analysis Weighting.** Please consider weighting each component in the disproportionate cost analysis. One way to do this is to assign a multiplier for each component, and multiply the ranked score by the multiplier, summing up the component scores. Examples of evaluation and relative benefits criteria ranking of alternatives are provided in Ecology guidance.<sup>54</sup>

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<sup>53</sup> WAC 173-340-360(2)(a)

<sup>54</sup> Ecology, *Sediment Cleanup User's Manual II(SCUM II)*, Publication No.: 12-09-057, revised December 2017, Appendix H.1.4, page 486 of 560. Available at: <https://fortress.wa.gov/ecy/publications/SummaryPages/1209057.html>.

2. **Feasibility Study Checklist:** Please use Ecology's enclosed Feasibility Study Checklist<sup>55</sup> to help determine that all needed components of the feasibility study are provided to Ecology for review.
3. **Statistical Analysis of Remaining Contamination**<sup>56</sup>: Ecology staff conducted an independent analysis and provides recommendations relating to statistical methods submitted for Ecology review in the soil sampling work plan (Hart-Hickman, 2017). A copy of the draft memorandum<sup>57</sup> containing Ecology's calculations and results is enclosed with this opinion. The memorandum and accompanying spreadsheet of calculations have also been uploaded to Ecology's electronic document repository for the Site, located at:  
<https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=1784>.
4. **Use of Institutional Controls.** Ecology would like to clarify the use of institutional controls in the MTCA process. Institutional or engineered controls managed by a restrictive environmental covenant do not supplant or alter cleanup standards determined appropriate for the Site. Appropriate cleanup standards, including cleanup levels, points of compliance, and other applicable laws and regulations, are first determined in the remedial investigation. Institutional or engineered controls are used as components of individual remedial alternatives evaluated in the feasibility study to meet the minimum threshold requirements of MTCA, and when using industrial cleanup levels at any site.

Institutional or engineered controls may be determined appropriate through the feasibility study process using a disproportionate cost analysis approach. For example, an institutional control might include specific restrictions on groundwater extraction, ensuring that the pathway for ingesting contaminated groundwater at a site is not completed. An engineered control might include a concrete cap above contamination in soil, limiting the direct contact pathway.

Institutional controls are also necessary when using industrial cleanup levels. If industrial cleanup levels are proposed, please ensure that appropriate institutional controls required under WAC 173-340-440(4)(c) are also proposed in a draft environmental covenant and provided with the feasibility study.

5. **Environmental Covenant:** Institutional or engineered controls are normally managed by an environmental covenant, either as a component of the preferred remedial alternative or due to use of industrial cleanup standards. If an environmental covenant is needed, please include a draft environmental covenant supporting the preferred remedial alternative including all supporting documentation, with the feasibility study. Include all needed components to manage implementation of the institutional or engineered controls.<sup>58</sup>
  - a. Review the covenant procedure at:  
<https://fortress.wa.gov/ecy/publications/documents/1509054.pdf>.
  - b. If a covenant is necessary, the following will also be needed for Ecology review:

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<sup>55</sup> <https://fortress.wa.gov/ecy/publications/documents/1609007.pdf>

<sup>56</sup> Hart-Hickman, *Soil Sampling Work Plan*, May 31, 2017, page 12.

<sup>57</sup> Washington State Department of Ecology, *DRAFT Chemtrade Statistical Analysis Memorandum*, To: Adam Harris, Site Manager, From: Arthur Buchan, Toxicologist, Information & Policy Section, Toxics Cleanup Program, June 16, 2017.

<sup>58</sup> WAC 173-340-440(4)

- i. As determined necessary, a long term monitoring and reporting plan to verify continued protection for impacted media. Include a contingency plan using adaptive management for future evaluation of monitoring results.
- ii. Information on how financial assurances<sup>59</sup> will be met.
- iii. Delineated plan view maps and geologic cross sections showing remaining contamination at the Site where controls are needed, including specific delineation below and above proposed cleanup levels throughout the Site. Include the boundaries of the MTCA facility. Indicate where insufficient data are available to delineate to natural background concentrations. Cross sections need to include concentration isopleths of hazardous substance concentrations, including specific delineation of exceedances of cleanup levels. Include site features, excavations, groundwater and surface water elevations and ranges, preferential pathways, relevant aboveground features, and other needed information.
- iv. A complete title search for impacted properties as part of Exhibit A, legal description.
- v. A land survey of impacted properties and rights-of way, that specifically includes platting and dedications. If contamination is proposed to be left in a right of way exceeding cleanup standards, a subordination agreement with the right of way holder is usually needed for implementing an environmental covenant, unless specifically excluded in a property-specific opinion. Grantor and/or subordinate agreements may be required with adjacent Property owners or right of way holders, determined by the extents of the Site.

## **Limitations of the Opinion**

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### **1. Opinion does not settle liability with the state.**

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

### **2. Opinion does not constitute a determination of substantial equivalence.**

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

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<sup>59</sup> WAC 173-340-440(11); Contact Ecology for additional information.

Mr. Gil Insley  
July 5, 2018  
Page 14

### 3. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

## Contact Information

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Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may request another review of your cleanup. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-process/Cleanup-options/Voluntary-cleanup-program>. If you have any questions about this opinion, please contact me by phone at (360) 407-6528 or e-mail at [adam.harris@ecy.wa.gov](mailto:adam.harris@ecy.wa.gov).

Sincerely,



Adam Harris, LHG  
Toxics Cleanup Program  
Southwest Regional Office

AH: tm

Enclosures (2): A—Feasibility Study Checklist  
B—Washington State Department of Ecology, *DRAFT Chemtrade Statistical Analysis Memorandum*

By certified mail: 9489 0090 0027 6021 4952 27

cc: Scott Drury, Hart & Hickman, PC  
Nicholas Acklam, Ecology  
Ecology Site File

# **Enclosure A**

Feasibility Study Checklist

# Feasibility Study Checklist

## Toxics Cleanup Program



May 2016

Publication No. 16-09-007

### FOR ECOLOGY USE ONLY

Site Name/FSID:

Report Name:

Date Submitted:

Reviewed By:

Review Date:

## Feasibility Study (FS) Checklist Guidance

The Model Toxics Control Act (MTCA) regulation Washington Administrative Code (WAC) 173-340-350(8) broadly describes the elements necessary to complete an FS. The purpose of an FS is to develop and evaluate cleanup action alternatives to enable a cleanup action to be selected for the site. At this point in the cleanup process, all remedial investigation (RI) work should be completed and the site should be fully characterized. When selecting cleanup alternatives, make sure remedies are not selected or dismissed prematurely; the FS process should be performed objectively without a preferred remedy in mind.

This FS checklist is considered guidance based on the MTCA cleanup regulation WAC 173-340. Cleanup project managers with the Washington State Department of Ecology (Ecology) have discretion when reviewing and accepting FS reports as site-specific circumstances dictate the necessary scope and breadth of each report.

**Note:** This document assumes that an FS and disproportionate cost analysis (DCA) are necessary for the site. If concentrations of hazardous substances do not exceed the cleanup level at a standard point of compliance, no further action is necessary, and an FS is not required. If a potentially liable person (PLP) meets the eligibility criteria and appropriately follows the requirements for use of a model remedy, they are not required to conduct an FS or a DCA. If a PLP and Ecology agree on a permanent remedy a DCA is not required [WAC 173-340-360(3)(d)].

In addition, there may be circumstances where selection of the appropriate remedy is straightforward or where a comprehensive remedial action will be implemented so that MTCA Method A cleanup levels are ultimately met throughout the site. If either of these situations apply, Ecology encourages PLPs to discuss their preferred approach with a cleanup project manager.

## Feasibility Study Report Body

### I. Cover Letter

Include a letter describing the submittal and specifying the desired department action or response.

### II. Introduction

For a stand-alone FS, the introduction should include a brief summary of the RI results and previous site investigations; this summary should include the following information, updated with the most recent data:

- a. Brief background of the site, site investigations, and any interim actions.
- b. Results of any additional investigations conducted since completion of the RI.
- c. Conceptual Site Model (CSM). Describe the location, extents, estimated amount, and concentration distribution of contaminants of concern (COC) greater than proposed screening levels for each affected medium.
- d. Preliminary cleanup levels for indicator hazardous substances in each medium.
- e. Proposed point of compliance for each affected medium, if different from the standard.
- f. Applicable local, state, and federal laws

FOR ECOLOGY USE ONLY				Comments
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III. Alternatives

- a. **Identify Remedial Action Objectives.** Describe the cleanup objectives and their compliance with MTCA.
- b. **Identify a Reasonable Number and Type of Alternatives.** Include a brief description of each alternative. Ecology recommends evaluating at least **three** alternatives, taking into account the characteristics and complexity of the facility, including current site conditions and physical constraints. Include at least one permanent alternative, at least one alternative with a standard point of compliance, and a no action alternative if applicable (see WAC 197-11-440(5)). Do not include alternatives that clearly do not meet the minimum requirements per WAC 173-340-360, do not pass the DCA per WAC 173-340-360(3)(e), or are technically impossible to implement.

**Note:** For sites conducting an FS under an order or decree, Ecology makes the final determination of which alternatives must be evaluated in detail in the FS.

IV. Detailed Evaluation and Selection of Alternatives

- a. **Threshold and Other Requirements** [see WAC 173-340-360(2)]. Describe in detail how each alternative meets the criteria outlined below. Alternatives must meet the threshold requirements and use permanent solutions to the maximum extent practicable. If an alternative does not meet these criteria, it should be eliminated from further consideration.
  - i. **Protect human health and the environment.** This is a critical requirement. Consider to what degree the alternative reduces risk, how much time it will take to meet cleanup standards, and any on-site or off-site risks related to implementing the cleanup. If necessary, evaluate residual threats posed by each alternative, and determine if remedies that are protective of human health are also protective of ecological receptors.
  - ii. **Comply with cleanup standards.** See WAC 173-340-700 through 173-340-760.
  - iii. **Comply with applicable state and federal laws.** See WAC 173-340-710.
  - iv. **Provide for compliance monitoring.** See WAC 173-340-410 and WAC 173-340-720 through 173-340-760.
  - v. **Reasonable Restoration Time Frame.** Describe the estimated restoration time frame for each alternative and the basis for this estimate. Discuss the reasonableness of this time frame using the criteria in WAC 173-340-360(4).
- b. **DCA Ranking Criteria.** Compare and contrast each alternative for each of the following criterion [WAC 173-340-360(3)(f)]. Rank each alternative from most to least permanent, based on the evaluation of the criteria below.
  - i. **Protectiveness.** Overall protectiveness of human health and the environment.

<b>FOR ECOLOGY USE ONLY</b>			
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- b. Include COC locations, concentrations, and estimated vertical and horizontal extent of contamination for site media, as applicable. Include any waste materials present on site as well as hazardous substance treatment, storage, or disposal areas (show current and applicable historical features).
- c. Show geologic/hydrogeologic information including soil types, wells, screened intervals, and water levels (cross sections are useful for showing this information). Show groundwater flow direction and gradient.
- d. Show other relevant information including (but not limited to): site and property boundaries, buildings/facilities on site, historical site features, underground storage tanks (USTs), previous excavation/interim action activity, etc.

**III. Conceptual Site Model**

Provide figures showing contaminant release(s), fate and transport, exposure pathways, and potential and/or actual receptors. The lateral and vertical extent of contamination, as currently understood, should be clearly conveyed.

**Feasibility Study Tables**

**General** - Tables should include detailed notes that explain any assumptions or 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 so table information can be quickly understood.

- I. **ARARs.** Include potentially applicable ARAR values, their sources, and whether or not they apply to each alternative.
- II. **Evaluation of Remedial Alternatives.** Include description of each alternative, compliance with the MTCA threshold criteria, and alternative ranking for each DCA criteria.
- III. **Cost/Quantity Summary.** Include any quantity or cost assumptions made for each alternative.
- IV. **Cost Detail for Alternatives.** Itemize costs for each alternative, including (but not limited to) permitting, oversight, labor, disposal, transportation of materials, material costs, incidentals, operations and maintenance, and reporting costs, and provide a total cost for each alternative.
- V. If additional site investigations were conducted after completion of the RI, include sampling information, laboratory methods, applicable cleanup levels, and analytical and field measured data. Group by media type. For larger data sets, consider making a summary table to exceedances. Tables should include cleanup or proposed cleanup levels with any contaminant exceedances clearly indicated using bold font or shading. Non-detectable levels should be noted as “U” with the numerical laboratory reporting limit (RL) provided rather than “ND”.

<b>FOR ECOLOGY USE ONLY</b>				
				<u>Comments</u>
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**Feasibility Study Appendices**

**General.** Appendices 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.

- VI. Contractor bids or other documents showing how quantity and/or cost estimates were made.
- VII. If additional site investigations were conducted after completion of the RI, include exploratory logs, well installation diagrams, field records, analytical laboratory reports, details of field and analytical methods, and any applicable Work Plans, Sampling and Analysis Plans, etc.
- VIII. **Limitations.** Explain any limitations that apply to the work.
- IX. Other documents that provide additional context or contribute to the understanding of the site or remedial alternatives; see suggested report format for additional information.

**Miscellaneous Items**

- X. **Certification (Licensed Professional Stamp).** Engineering, geologic, and hydrogeologic work must be performed under the seal of an appropriately licensed professional, as required by RCW 18.43 and 18.220.
- XI. **Environmental Information Management (EIM).** All sampling data must be uploaded into Ecology’s EIM database. This allows Ecology to access data, check results, and/or perform additional analyses. For more information, reference: Submittal Data Requirements.
- XII. Additional information may be requested by Ecology as required to fully assess remedial alternatives.
- XIII. **Submittal Requirements:** Ecology requests three copies of reports submitted per WAC 173-340-850. Please contact the cleanup project manager for specific submittal requirements.

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To request ADA accommodation or materials in a format for the visually impaired, call Ecology at 509-454-7834, Relay Service 711, or TTY 877-833-6341.

# **Enclosure B**

Washington State Department of Ecology,  
*DRAFT Chemtrade Statistical Analysis Memorandum*



## Chemtrade Statistical Analysis

### Memorandum

To: Adam Harris, Site Manager  
Toxics Cleanup Program  
Southwest Regional Office

From: Arthur Buchan, Toxicologist  
Information & Policy Section  
Toxics Cleanup Program

Date: June 16, 2017

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This memorandum represents a Department of Ecology analysis and recommendation regarding the statistical methods submitted for the Chemtrade Performance Chemicals US LLC site, Kalama, WA (VCP Project No. SW0492).

**Determination:**

The results of this analysis indicate a recommended upper one-sided ninety-five percent confidence limit on the true mean soil concentration (95 UCL) of:

<b>Contaminant</b>	<b>95 UCL</b>
Cd	1.6 mg/kg
Zn	450 mg/kg

This memorandum specifically pertains to the statistical analysis that was performed on the submitted data referenced in this memorandum.

For Questions regarding this Memorandum, please contact:

Arthur Buchan  
Phone: (360) 407-7146  
Email: [abuc461@ecy.wa.gov](mailto:abuc461@ecy.wa.gov)

## Background

The Toxics Cleanup Program (TCP), Policy and Technical Support Unit (PTSU), was requested to submit comments/recommendation regarding the statistical analysis performed on the submitted soil sampling plan: *Soil Sampling Work Plan Chemtrade Performance Chemicals US LLC Site* (Hart-Hickman, 2017). Data used for calculations were derived from Table 2 of the referenced document. Ecology calculations have been electronically attached in .xlsx format.

## Materials and Methods

Two methods were used to calculate a 95 UCL as per WAC 173-340-740(7) (Ecology, 2007) and through guidance provided in *Statistical Guidance for Site Managers* (Ecology, 1992). Methods used through MTCASat 97 meet the requirements under WAC 173-340-740(7) (d) (i) – A confidence interval approach that meets the following requirements..., and through the use of ProUCL, which meets the requirements of WAC 173-340-740(7) (d) (iv) – Other statistical methods approved the department.... Please note that the requirements of WAC 173-340-740(7)(e) should still be met in that: (i) No single sample concentration shall be greater than two times the cleanup level; and (ii) Less than ten percent of the sample concentrations shall exceed the soil cleanup level.

## Results

The following results were indicated based on the submitted set of data (Table 2 of the referenced document):

Contaminant	95 UCL
Cd	1.6 mg/kg
Zn	450 mg/kg

## Discussion

Recommended results were based off of calculations performed through MTCASat. Both MTCASat and ProUCL were used and the methods in MTCASat were preferred because of the ratio of detected vs. non-detected values in the Zn sample set. Non-detected values (below the method detection limit [MDL]) were assigned a value at the MDL because of the number of non-detects in the sample set (< 50%). This is an alternate statistical procedure that appears appropriate as referenced in WAC 173-340-740(7) (v). Please note that the standard method for data sets with <50% censored values would be to use the largest value in the data set in place of an upper confidence limit (WAC 173-340-740(7) (iv)).

*Memorandum:  
Chemtrade Statistical Analysis*

In addition:

- Outliers were included in the data set because there are no provisions in MTCA for excluding “outliers” that cannot be demonstrated to be in error (Ecology, 1992).
- The specific data set used to make statistical calculations may be amended if it is recommended by the Ecology Site Manager that specific pathways should be excluded with the use of an environmental covenant as described in WAC 173-340-440.

**References Cited**

Ecology. (1992). *Washington State Department of Ecology Toxics Cleanup Program: Statistical Guidance for Site Managers*. (Ecology Publication No. 92-54). Lacey, WA: Washington State Department of Ecology, Toxics Cleanup Program.

Ecology. (1997). *MCTAStat 97 (Statistical Program)*. Lacey, WA: Washington State Department of Ecology, Toxics Cleanup Program.

Ecology. (2007). *Model Toxics Control Act statute and regulation, Chapter 173-340 WAC*. (Ecology Publication No. 94-06). Lacey, WA: Washington State Department of Ecology, Toxics Cleanup Program.

Hart-Hickman. (2017). *Soil Sampling Work Plan Chemtrade Performance Chemicals US LLC Site*, VCP Project No. SW0492. Raleigh, NC: Hart-Hickman.

USEPA. (2013). *ProUCL 5.0.00. Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*. United States Environmental Protection Agency.

Date: July 16, 2018

Dept of Ecology:

The following is in response to your July 16, 2018 request for delivery information on your Certified Mail™ item number 9489009000276021495227. The delivery record shows that this item was delivered on July 9, 2018 at 3:15 pm in CHARLOTTE, NC 28205. The scanned image of the recipient information is provided below.

Signature of Recipient :



Address of Recipient :



Thank you for selecting the Postal Service for your mailing needs.

If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,  
United States Postal Service