STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

In the Matter of Remedial Action by: **Kaiser Aluminum & Chemical Corporation** **Trentwood Site**	**AMENDMENT NO. 2 TO AGREED ORDER** No. 2692

TO: **Kaiser Aluminum Washington, LLC**
(Formerly Kaiser Aluminum & Chemical Corporation)
P.O. Box 15108
15000 East Euclid Avenue
Spokane Valley, Washington 99215-5108

I. AMENDMENT

Agreed Order (Order) No. 2692 dated August 15, 2005, as amended on September 26, 2012, is hereby amended to incorporate the information and requirements contained in this Amendment. This Amendment is issued pursuant to the MTCA, RCW 70.105D.050 (1) and, except as indicated below, does not replace or change any of the existing requirements of the Order, which shall remain in effect.

II. FINDINGS OF FACT

Section V (Findings of Fact) is amended by adding the following facts:

(24) Amended Agreed Order No. 2692 entered into by Ecology and Kaiser on September 26, 2012, required Kaiser to complete several interim remedial actions at the Site, including:

- Determining if natural biodegradation of PCBs is occurring at the Site, as detailed in the report:

Hart Crowser, 2013 (July 9), *PCB Biodegradation Concept Memorandum, Kaiser Trentwood, Spokane Valley, Washington.*

- Excavation and off-site disposal of contaminated soil in multiple locations throughout the Site, as detailed in the report:

Hart Crowser, 2014 (October 1), *Interim Action Construction Completion Report, Near-Surface Soil Excavation and Off-Site Disposal, Kaiser Trentwood, Spokane Valley, Washington.*

- Remedial actions for petroleum in groundwater in applicable areas of the Site, as detailed in the report:

Hart Crowser, 2015 (February 5), *Petroleum in Groundwater Interim Action, Phase 1, 2014 Summary of Free-Phase Product Monitoring and Bail-Down Testing, Kaiser Trentwood, Spokane Valley, Washington.*

- Capping of contaminated soil in multiple locations throughout the Site, as detailed in the report:

Hart Crowser, 2015 (May 27), *Interim Action Construction Completion Report, Soil Capping, Kaiser Trentwood, Spokane Valley, Washington.*

- Excavation and off-site disposal of soils contaminated with PCBs and petroleum in the West Discharge Ravine, as detailed in the report:

Hart Crowser, 2015 (November 6), *Construction Completion Report, West Discharge Ravine Interim Action, Kaiser Trentwood, Spokane Valley, Washington.*

- Evaluation of the practicability of PCB removal from extracted groundwater using an ex-situ Walnut Shell Filtration treatment system, as detailed in the reports:

Hart Crowser, 2016, *Pilot Study – System Startup and Phase 1A Summary Memo, Kaiser Trentwood Facility, Spokane Valley, Washington.*

Hart Crowser, 2017, *Pilot Study Status Report – Year 1, Kaiser Trentwood Facility, Spokane Valley, Washington.*

Hart Crowser, 2018, *Pilot Study Status Report – Year 2, Kaiser Trentwood Facility, Spokane Valley, Washington.*

VI. ECOLOGY DETERMINATIONS

Section VI (Ecology Determinations) is amended by adding the following:

8. Ecology has determined that it is practicable to remove PCBs from extracted groundwater using an ex-situ Walnut Shell Filtration System and that this system could be expanded into a full-scale treatment system. However, new technologies to remove PCBs from extracted groundwater have been identified since the effective date of Amendment No. 1. Preliminary research indicates these new technologies have the potential to be substantially more effective than using an ex-situ Walnut Shell Filtration System. Therefore, Ecology has determined that additional work in the form of certain interim actions is necessary to provide information needed to select the most appropriate cleanup technology for removing PCBs from groundwater at the Site; and, to implement the full-scale treatment of PCBs in groundwater to improve environmental conditions at the Site. Such circumstances are consistent with WAC 173-340-430.

9. Based on the information learned by conducting interim actions as specified above, Ecology is requiring Kaiser to continue to operate the existing interim action treatment system (Amendment No. 1) and to perform the interim actions described in detail in the Scope of Work and Schedule, attached as Exhibit B-A2.

10. Ecology believes that the additional work to be performed as interim actions is in the public interest.

VII. WORK TO BE PERFORMED

Section VII (Work to Be Performed) is amended by adding the following actions:

7. Kaiser shall furnish all personnel, materials and services necessary for, or incidental to, the planning, initiation, completion, and reporting of the interim actions summarized below and further detailed in the Scope of Work and Schedule, attached as Exhibit B-A2.

- Evaluate and install a groundwater extraction network capable of extracting groundwater at a volume and rate to be measured against screening levels identified in Exhibit B-A2 within a reasonable restoration timeframe
- Evaluate potential treatment technologies for PCBs in groundwater at the Site to determine the most appropriate technology to carry forward for full-scale implementation
- Prepare and submit for Ecology's review and approval a Phase 1 Interim Action Completion Report at the conclusion of the two tasks above. The Report shall identify Kaiser's proposed most appropriate treatment technology for full-scale ex-situ treatment of PCBs in groundwater at the Site.
- Following Ecology's approval of the most appropriate treatment technology for full-scale implementation, implement that technology as a full-scale ex-situ treatment system for PCBs in groundwater at the Site

Exhibit B-A2 is incorporated by reference and is an integral and enforceable part of the Order. The work to be performed is to conduct additional interim actions. Kaiser shall commence work and thereafter complete all tasks in Exhibit B-A2 in the time-frames and frame work indicated unless Ecology grants an extension in accordance with Section VIII.K, or unless provided otherwise in the Order. Each Element of Exhibit B-A2 shall be implemented and completed in accordance with MTCA (Chapter 70.105D RCW) and its implementing regulation (Chapter 173-340 WAC) as amended, and all applicable federal, state, and local laws and regulations.

VIII. TERMS AND CONDITIONS OF ORDER

Section VIII (Terms and Conditions of Order) is amended by replacing the applicable language identified sub-section as follows:

A. Public Notices (replace in whole)

Agreed Order No. 2692, Amendment Nos. 1 and 2 to the Order have been the subject of public notice and comment pursuant to WAC 173-340-600.

D. Designated Project Coordinators

The project coordinator for Ecology is:

Jeremy Schmidt
Department of Ecology
Eastern Regional Office
4601 N Monroe
Spokane, WA 99205-1295

The project coordinator for Kaiser is:

Brent Downey
Kaiser Aluminum Washington, LLC
PO Box 15108
Spokane Valley, WA 99215-5108

Effective date of this Amendment: April 29, 2020

KAISER ALUMINUM WASHINGTON, LLC

Jason Walsh
Senior Vice President
Flat Rolled Products
Telephone: 509-927-6307

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY

~~**Kathleen L. Falconer**~~ Ali Furmall
AF ~~**Section Manager**~~ Acting Section Manager
Toxics Cleanup Program
Eastern Regional Office
Telephone: ~~**509-329-3568**~~ 509-329-3436

EXHIBIT B-A2
SCOPE OF WORK (SOW) AND SCHEDULE

SCOPE OF WORK

PURPOSE

The work under this Amendment No. 2 to Agreed Order No. 2692 (AO) involves conducting Interim Actions at the Kaiser Aluminum & Chemical Corporation Trentwood Site (Site) for the extraction and treatment of groundwater contaminated with polychlorinated biphenyls (PCBs).

A remedial action implemented prior to completing the draft Cleanup Action Plan is an interim action and will be implemented in accordance with WAC 173-340-430 and the AO and its amendments. Interim actions:

- are technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance;
- correct a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed; or
- are needed to provide for completion of the remedial investigation/feasibility study or design of the cleanup action.

The Washington State Department of Ecology (Ecology) has determined that this interim action will be designed and implemented in a manner that does not foreclose any other reasonable alternatives for the final cleanup action that may be required for the Site.

Kaiser shall coordinate with Ecology throughout the development of the deliverables associated with this work and during implementation of the interim actions. Kaiser shall keep Ecology informed of any changes and of any issues or problems as they develop.

Kaiser shall prepare electronic copies of the agency-review draft deliverables and submit them, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, to Ecology for review. After incorporating Ecology's comments on the agency-review draft deliverable and after Ecology approval, Kaiser shall prepare two hard copies of the final deliverable and submit them, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, to Ecology. Once approved by Ecology, Kaiser will implement the work according to the approved schedule.

The SOW is divided into nine major tasks:

Task 1. Phase 1 Interim Action Work Plan (IAWP)
Task 2. Phase 1 Permits and Substantive Conditions of Permit-Exempt Laws
Task 3. Phase 1 Interim Action Implementation
Task 4. Phase 1 Interim Action Completion Report (IACR)
Task 5. Phase 2 Full-Scale Pump-and-Treat Interim Action Engineering Design Report (EDR)
Task 6. Phase 2 Permits and Substantive Conditions of Permit-Exempt Laws
Task 7. Phase 2 EDR Implementation
Task 8. Phase 2 Interim Action Completion Report
Task 9. Phase 2 Interim Action Periodic Performance Reports

TASK 1. PHASE 1 INTERIM ACTION WORK PLAN

Kaiser shall prepare a Phase 1 IAWP that details the work for the following actions:

- **Groundwater Extraction Network**

  Conduct field investigations and hydrogeological modeling for the purpose of designing a full scale groundwater extraction network that takes into account seasonal groundwater elevation variability, including extraction wells, pumps and associated electrical and instrumentation systems, extracted groundwater collection and transfer piping, and monitoring and associated infrastructure. The extraction network shall include extraction points beneath the Remelt Building (unless determined technically infeasible by Ecology), where PCB concentrations in groundwater are highest, and in the PCB Plume downgradient from the Remelt Building.

  In an effort to expedite extraction of higher-concentration groundwater, some of this work shall be implemented prior to the completion of the field investigations and hydrogeological modeling that will define the full-scale extraction network. The expedited work shall include 1) the conversion of groundwater monitoring well MW-17s into a minimum six-inch diameter groundwater extraction well, 2) the installation of an additional groundwater extraction well (minimum of six-inch diameter) outside of the Remelt building near MW-31s, and 3) the installation of all plumbing, headworks, and electrical connections necessary to connect these new extraction wells to the existing pilot treatment system building.

  The extraction network shall be designed to extract groundwater at a volume and rate to be measured against screening levels at the Site within a reasonable restoration timeframe. The screening levels and their applicable monitoring points for PCBs in groundwater at the Site are as follows:

- 7 picograms per liter[1], adjusted for area background PCB concentrations as specified in WAC 173-340-720(7)(c), in the following groundwater monitoring wells: MW-17s, HL-MW-32s, HL-MW-23s, MW-12A, MW-23s, MW-27s, MW-28s
- 44,000 picograms per liter, adjusted for area background PCB concentrations as specified in WAC 173-340-720(7)(c), in all Site groundwater monitoring wells *except* the seven monitoring wells listed above and the four monitoring wells listed below
- The area background PCB concentration shall be determined by the procedure set forth in WAC 173-340-709, utilizing the following groundwater monitoring wells: MW-4, MW-5, MW-10, and MW-11

- **Treated Extracted Groundwater Discharge System**

  Increase the capacity of the treated extracted groundwater discharge system components (discharge piping from the Pilot Treatment Testing Building, the discharge infiltration trench, and the discharge pump) such that the system is capable of conveying a reasonable estimate of a full scale active groundwater extraction network flow.

- **Treatment Technology Development – Ultraviolet Light / Hydrogen Peroxide**

  Advance the development of Ultraviolet Light / Hydrogen Peroxide (UV/H2O2) PCB treatment technology (unless technically infeasible) from the current Bench/Laboratory Scale stage of a 5 liter batch reactor that has demonstrated substantial PCB destruction efficiency to the Pilot Scale stage estimated to be in the range of 3 to 5 gallons per minute. If Ecology and Kaiser agree that the results are positive and further development is warranted, then Kaiser shall advance the technology to the Demonstration Scale stage estimated to be in the range of 30 to 50 gallons per minute. If Ecology and Kaiser agree that further development is warranted, then Kaiser shall advance the technology to the Commercial Scale stage which will be compatible with a full scale active groundwater extraction network(s) flow.

- **Treatment Technology Development – Additional Technologies**

  Provide a technical assessment of the potential for advancing the development of the utilization of the technologies identified below and if justifiable, their implementation:

[1] This screening level is based in part on the current PCB human health water quality criterion of 7 picograms per liter. It is not a cleanup level. The cleanup level will be established in a cleanup action plan to be issued by Ecology and may be based on a number of factors, including the applicable PCB human health water quality criterion.

  - Algae based treatment technology for application in the treatment of Walnut Shell Filtration System (WSFS) backwash water and in the direct treatment of extracted groundwater
  - Solvent/Zero Valent Metal technology for application in the treatment of WSFS backwash water and in the direct treatment of extracted groundwater as well as for in-situ passive PCB removal from groundwater utilizing existing monitoring wells
  - As agreed to between Kaiser and Ecology, the pilot testing of other treatment technologies discovered during the Phase 1 Interim Action

- **Treatment Technology Development – Walnut Shell Filtration System**

  Continue operation of the existing WSFS but with an increased throughput with a target rate of 50 gallons per minute or higher and operating with or without amendments, such as castor oil, mineral oil, and Klaraid. Continue to work to identify minimization and management techniques for backwash water.

- **Infrastructure Expansion**

  Expand existing treatment building infrastructure, such as building size, electrical power supply capacity, and any other ancillary systems so that the infrastructure can accommodate the estimated needs for both treatment technology development and full scale treatment system

An agency-review draft Phase 1 IAWP will be submitted for Ecology review and approval. The Phase 1 IAWP will be prepared with detail commensurate with the work to be performed and include, as appropriate:

- Description of the interim action including its purpose, general requirements, and relationship to the (final) cleanup action;
- Summary of relevant information from the Remedial Investigation and Feasibility Study (RI/FS), including at a minimum existing site conditions relative to PCB in groundwater and alternative interim actions considered, if any, and contaminants of concern and screening levels applicable to the interim action;
- Applicable engineering design and construction information, as specified in WAC 173-340-400, including a proposed schedule and personnel roles and responsibilities;
- Identification of potential treatment byproducts from the various pilot systems, their potential concentrations, any regulations that apply to potential treatment byproducts, and any necessary management requirements;
- Health and Safety Plan (HASP) that meets WAC 173-340-810 requirements;
- Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) that meet WAC 173-340-820 requirements;
- Permits required or the substantive requirements;

- Actions proposed for determining the feasibility of groundwater extraction beneath the Remelt building; and,
- Implementation schedule for the IAWP.

TASK 2. PHASE 1 PERMITS AND SUBSTANTIVE CONDITIONS OF PERMIT-EXEMPT LAWS

Kaiser must obtain any necessary permits prior to construction of the Phase 1 Interim Action, or identify substantive requirements of laws for which MTCA creates a permit exemption.

TASK 3. PHASE 1 INTERIM ACTION IMPLEMENTATION

As detailed in the approved Phase 1 IAWP, Kaiser will implement the Phase 1 Interim Action according to the schedule contained in this Exhibit. The schedule may be amended as needed in accordance with Agreed Order Section VIII.K to adapt to developments during the IAWP evaluation of potential treatment technologies.

TASK 4. PHASE 1 INTERIM ACTION COMPLETION REPORT

Upon successful completion of the Phase 1 Interim Action work, an agency-review draft Phase 1 IACR will be prepared as a separate deliverable. The Phase 1 IACR shall include, but not be limited to:

- A summary of the completed work;
- Identifications of any deviations from the IAWP;
- An evaluation of the pilot study results;
- A proposal of the most appropriate treatment technology for PCB removal that can be implemented as a full-scale system in the Phase 2 interim action; and,
- A proposed schedule for full-scale system implementation.

Parameters that shall be evaluated when determining the most appropriate treatment technology shall include achieving screening levels throughout groundwater at the Site within a reasonable restoration timeframe, minimization of the quantity and toxicity of treatment byproducts/waste streams, and the practicability of long-term operation and maintenance of a full-scale treatment system.

TASK 5. PHASE 2 FULL-SCALE PUMP-AND-TREAT INTERIM ACTION ENGINEERING DESIGN REPORT

Kaiser shall prepare a full-scale pump-and-treat Interim Action Engineering Design Report (EDR) for the design, installation, and operation of a full-scale pump-and-treat

remediation system that operates at an extraction and treatment rate capable of achieving screening levels throughout groundwater at the Site within a reasonable restoration timeframe when operated continuously.

An agency-review draft EDR will be prepared and submitted for Ecology review and approval. The EDR will be prepared with detail commensurate with the work to be performed and include, as appropriate:

- Treatment system description and specifications, including intake and discharge sizing and characteristics;
- Groundwater extraction rates and operating strategy;
- Estimated treatment efficiency and treatment system inlet and outlet concentrations;
- Identification of treatment system reagents to be used and estimated consumption;
- Identification of generated waste streams and waste management processes;
- Identification of treatment byproducts, their concentrations, any regulatory requirements applicable to the byproducts, and any necessary management requirements;
- Description of the interim action including its purpose, general requirements, and relationship to the (final) cleanup action;
- Applicable engineering design and construction information, as specified in WAC 173-340-400, including a proposed schedule and personnel roles and responsibilities;
- An updated CMP, as necessary;
- An updated HASP and SAP/QAPP, as necessary;
- Permits required or the substantive requirements; and,
- Implementation schedule for the EDR.

TASK 6. PHASE 2 PERMITS AND SUBSTANTIVE CONDITIONS OF PERMIT-EXEMPT LAWS

Kaiser must obtain any necessary permits prior to constructing the Phase 2 Interim Action, or identify substantive requirements of laws for which MTCA creates a permit exemption.

TASK 7. PHASE 2 INTERIM ACTION EDR IMPLEMENTATION

As detailed in the EDR, Kaiser will implement this interim action according to the schedule contained in this Exhibit.

TASK 8. PHASE 2 INTERIM ACTION COMPLETION REPORT

Upon successful completion of Tasks 1-7, an agency-review draft Phase 2 IACR will be prepared as a separate deliverable. The Phase 2 IACR shall include, but not be limited to: a summary of the work completed, any deviations from the work plan, and a full-scale pump-and-treat Operations and Maintenance Manual (O&M Manual).

TASK 9. PHASE 2 INTERIM ACTION PERIODIC PERFORMANCE REPORTS

Beginning six months after initiating the full-scale pump-and-treat system and on six-month intervals thereafter, Kaiser shall submit Periodic Performance Reports to Ecology that detail:

- System performance metrics and statistics;
- Extraction network metrics and statistics;
- Evaluation of system operation with respect to groundwater monitoring data;
- PCB mass removed from groundwater; and,
- Operation and maintenance reporting as required by the O&M Manual.

SCHEDULE OF DELIVERABLES AND ACTIONS

The schedule for deliverables and actions described in Amendment No. 2 to the Agreed Order and Scope of Work is presented below. If the submission date of any item or notification required by this schedule occurs on a weekend, state or federal holiday, the date for submission of that item or notification is extended to the next business day following the weekend or holiday. Where a deliverable due date is triggered by Ecology notification, comments, or approval, the starting date for the period shown is the date Kaiser received such notification, comments, or approval by certified mail, return receipt requested, unless otherwise noted below. Where triggered by Ecology receipt of a deliverable, the starting date for the period shown is the date Ecology receives the deliverable by certified mail, return receipt requested, or the date of Ecology signature on a hand-delivery form.

Task	Deliverables/Actions	Completion Times
1	Submittal of Agency-review draft Phase 1 IAWP	45 calendar days following the effective date of Amendment No. 2 to AO 2692
	Submittal of Final (revised) Phase 1 IAWP	30 calendar days following receipt of Ecology comments on agency-review draft Phase I IAWP

3	Initiate Phase I IAWP field work	60 calendar days following Ecology approval of final Phase 1 IAWP
	Deadline for completing the work outlined in the IAWP	18 months following initiation of interim action field work or February 28, 2022, whichever is earlier
4	Submittal of Agency-review draft Phase 1 IACR	45 calendar days following completion of Phase 1 IAWP field work
	Submittal of Revised (final) Phase 1 IACR	30 calendar days following receipt of Ecology comments on agency-review draft Phase 1 IACR
5	Submittal of Agency-review draft EDR	45 calendar days following Ecology approval of the final Phase 1 IACR
	Submittal of Revised (final) EDR	30 calendar days following receipt of Ecology comments on agency-review draft EDR
7	Initiation of EDR field work	30 calendar days following Ecology approval of final EDR
	Deadline for initiating operation of the full-scale pump-and-treat system	270 calendar days following initiation of EDR Field Work
8	Submittal of Agency-review draft Phase 2 IACR	60 calendar days after initial operation of the full-scale pump-and-treat system
	Submittal of Revised (final) Phase 2 IACR	30 calendar days following receipt of Ecology comments on agency-review draft Phase 2 IACR
9	Submittal of Phase 2 Interim Action Periodic Performance Reports	As described in Task 9