14 February 2024

Katie Daugherty, Project Manager, Northwest Region
Oregon Department of Environmental Quality
700 NE Multnomah St., Suite 600
Portland, Oregon 97232-4100

Re: Alternative Path Forward
Arkema Inc. Facility, Portland, Oregon

Dear Ms. Daugherty:

Legacy Site Services LLC (LSS), agent for Arkema Inc. (Arkema), acknowledges the Oregon Department of Environmental Quality's (DEQ) 19 January 2024 letter proposing an alternative to the September 2023 Draft *Feasibility Study* (the FS[1]), prepared by Environmental Resources Management, Inc. (ERM) for the Arkema Facility. The DEQ's letter proposes an alternative approach to the FS, including a data gaps investigation and interim removal action measures (IRAMs). LSS appreciates DEQ's recognition of the need for current data and that DEQ's alternative approach to the FS for the most part aligns closely with the remedy selection approach proposed in the FS.

LSS agrees with the DEQ's stated objectives to:

1. Expedite the necessary cleanup action to address high-risk and/or well-defined contamination.
2. Decrease potential uncertainty in the FS by filling data gaps and conducting additional performance monitoring.

However, LSS disagrees with DEQ's statement that the FS *"does not meet the minimum requirements described in the Scope of Work to the Order."* The FS conforms to the *Final Modification Revised Upland Feasibility Study Work Plan* (FSWP) (DEQ 2019) and three interim deliverables that LSS developed in collaboration with the DEQ. LSS's objections to DEQ's process, assumptions and requirements, which culminated in the FS, are well documented in the following submittals: LSS's letter to DEQ, 27 February 2019; *Revised Hot Spot Evaluation*, April 2021; *Feasibility Study Work Plan*, January 2022; *Draft Feasibility Study*.

[1] The September 2023 FS is considered draft because it was not adopted into a DEQ staff report. For brevity, the September 2023 draft FS is referred to in this letter as "the FS."

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September 2023, among other related communications. The remainder of this letter replicates sections of the DEQ's 19 January 2024 letter in italic and states our preliminary responses. This letter outlines topics to be discussed during a planned 22 February 2024 meeting with the DEQ. The IRAM discussion refers to phases defined in the FS. The data gaps discussion refers to investigations discussed in the FS to fill data gaps or to develop information to design the remedies. On agreement between LSS and the DEQ, future work plans will provide details of the investigations and IRAMs.

Proposed Alternative Path Forward

DEQ proposes the following alternative path forward:

1. *Implement four IRAMs consisting of:*

a. *IRAM 1 – Acid Plant Soil/NAPL ISS and Groundwater ISCR - Insitu Solidification and Stabilization (ISS) combined with enhanced insitu chemical reduction (ISCR) of non-aqueous phase liquid (NAPL) in soil and groundwater (located within Acid Plant Area (functional unit [FU]-4 and FU-9). The FS recommends ISS of NAPL and enhanced ISCR as the remedial action for Acid Plant groundwater and coincident ISS of NAPL in Acid Plant soil. (Note. the FS recommends implementing this action as part of the first phase of the remedial action [Section 9.4 #2].)*

LSS response:

DEQ IRAM 1 is essentially Phase 1, Action 2 of the FS. The actions listed by the DEQ for IRAM 1 are those outlined in the FS for DNAPL and high concentrations of monochlorobenzene in soil and groundwater on Lot 4 in FU-4 (soil) and FU-9 (groundwater).

- The FS states: Immobilize and treat groundwater hot spots in FU-9 (i.e., DNAPL in Acid Plant Area) by ISCR/ISS and solidify hotspots in the vadose zone soil of FU-4 overlaying FU-9. Excavation is also an option for vadose-zone NAPL.
- The DEQ letter states: Acid Plant Soil/NAPL (ISS) and Groundwater ISCR and Insitu Solidification and Stabilization (ISS).[2]

LSS acknowledges that certain investigations and testing will be necessary, including additional investigation to refine the DNAPL area and bench or pilot testing to develop the injection design. See additional discussion of data gaps investigations below.

b. *IRAM 2 - Enhanced ISCR of perchlorate and hexavalent chromium located within Chlorate Plant Area/Salt Pads (FU-10). (Note. the FS recommends implementing this action as part of the first phase of the remedial action [Section 9.4 #4].)*

LSS response:

[2] Both ISCR and ISCO are candidate technologies. Bench-scale testing will determine the best method.

DEQ IRAM 2 is Phase 1, Action 4 of the FS (Sections 9.4 and 9.4.1). The actions listed by the DEQ for IRAM 2 are those outlined in the FS to treat perchlorate and hexavalent chromium hot spots in FU-10 (Chlorate Plant Area/Salt Pads).

- The FS states: Treat or immobilize via ISCR injection programs in FU-10 (Chlorate Plant Area/Salt Pads).
- The DEQ letter states: Enhanced ISCR of perchlorate and hexavalent chromium located within Chlorate Plant Area/Salt Pads (FU-10).

The FS recommended that treatment of FU-10 should be a Phase 1 remedial action, which aligns with DEQ's request that IRAM 2 be implemented as part of the first phase of the interim remedial actions.

However, recent data (Integral Quarter 1 2021 sampling, submitted to EPA December 2023) indicate substantial reductions of both perchlorate and hexavalent chromium concentrations in the Chlorate Plant Area/Salt Pads (FU-10). Accordingly, it is possible that no additional treatment will be necessary to attain hot-spot concentrations or risk-based cleanup levels. A comprehensive round of groundwater sampling or focused additional investigation is warranted to refine the extent of hot spots that require treatment. See additional discussion of data gaps investigations below.

c. *IRAM 3 - Remove all currently known human health direct contact hot spots not addressed by other IRAMs.*

LSS response:

The actions listed by the DEQ for IRAM 3 align with those of Phase 1, Action 1 of the FS to address human health direct-contact hot spots in soil in FU-2 and in FU-3 (Lots 1 and 2, western areas of Lots 3 & 4).

- The FS states: Install caps and implement institutional controls for soil in FU-2 and FU-3.
- The DEQ letter states: Remove all currently known human health direct contact hot spots not addressed by other IRAMs.

The objectives of both DEQ IRAM 3 and the actions in FS Phase 1 are to mitigate risk associated with human health direct contact and other exposure pathways in soil. Notwithstanding that agreement, LSS observes the following:

- It may not be necessary to remove (i.e., excavate) hot spots to mitigate exposure risk. Capping or other treatment (e.g., as associated with other IRAMs) may also mitigate the risk of direct human exposure.
- It may not be necessary to treat all direct exposure hot spots, as delineated in the HSE and the FS.

The human health direct exposure hot spots delineated in the HSE are arsenic (trespasser), DDx, and TCDD (workers). Technical considerations for an IRAM to meet the objectives of DEQ IRAM 3 include the following:

- Engineering or institutional controls may be effective treatment of direct contact risks, instead of removal.
- Some of the human health soil direct contact hot spots are already covered by existing caps.
- The arsenic human health soil hot spot is widely dispersed, arsenic is naturally occurring in soil, and the former plant operation did not involve the use of arsenic. Remediation of naturally occurring metals is not an Arkema consideration.
- Most DDx human health soil hot spots are in the Acid Plant Area (FU-4) and will be addressed by IRAMs 1 and 4.
- The TCDD soil hot spot is widely dispersed on upland lots and along the riverbank. Capping may be protective of TCDD direct exposure, instead of removal. The riverbank hot spots will be addressed by the in-water remedy and are not a subject of the upland FS.

Pre-design investigations, overlay of existing caps, and overlay of other IRAMs will refine the treatment method and area of IRAM 3.

d. *IRAM 4 - Enhanced ISCR of dissolved chlorinated VOCs and perchlorate located within Northern Groundwater Barrier Wall Area (FU-8) and Acid Plant (FU-9) groundwater. The FS recommends ISCR injections and enhanced ISCR to address chlorinated VOCs these areas. (Note. the FS recommends implementing this action in Acid Plant groundwater (FU-9) as part of the first phase of the remedial action [Section 9.4 #2] and in Northern Groundwater Barrier Wall Area groundwater (FU-8) as part of the second phase of remedial action [Section 9.5].)*

LSS response:

FUs -8 and -10 are Shallow, Intermediate, and Deep Zone groundwater in the northern riverside portion of Lots 3 and 4, and are generally bounded by the groundwater barrier wall. LSS infers that the objectives of DEQ IRAM 4 align with Phase 2, Action 2 of the FS, which are to treat or immobilize high VOC concentrations in FU-8 groundwater that form a "halo" around the DNAPL and in other areas on Lots 3 and 4. The FS recommended treatment for FU-8 is ISCR injection.[3]

- The FS states: Treat or immobilize high VOC concentrations in groundwater in the Acid Plant Area (FU-8) by ISCR injection, pending the results of the Phase 1 performance evaluation of ISCR/ISS in FU-9.
- The DEQ letter states: Enhanced ISCR of dissolved chlorinated VOCs and perchlorate located within Northern Groundwater Barrier Wall Area (FU-8) and Acid Plant (FU-9).

The FS describes Phase 2, Action 2 (DEQ IRAM 4) of the FS, as a "polishing" step pending the results of the Phase 1 performance evaluation of the FU-9 remedy (i.e., the DEQ IRAM 1). The

[3] Both ISCR and ISCO are candidate technologies. Bench-scale testing will determine the best method.

FU-8 alternative includes ISCR injections to treat specific areas, with the design of the FU-8 alternative based on the results of treating the DNAPL in FU-9 (IRAM 1).

The rationale of the phased approach to FU-8 is that the DNAPL in FU-9 is the secondary source of the high VOC concentrations in FU-8, treating the DNAPL will result in decreasing VOC concentrations informing the scope of the remedy in FU-8, and ongoing pumping by the GWET system will continue to recover contaminant mass.

2. *Collecting pre-design data to support each IRAM design and implementation. Pre-design data may include (but is not limited to) additional delineation/refinement of nature and extent, documentation of current conditions, and treatability testing.*

LSS response:

LSS agrees with DEQ's modified approach in lieu of the FS that proposes to collect pre-design data to support each IRAM.

DEQ IRAMs 1, 2, and 3 are potential Phase 1 remedial actions, as described in the FS. The FS Phase 1 actions were developed to treat source areas with high concentrations and then assess the impacts of treatment to inform necessary actions in later remedy phases, but only after first verifying the need with contemporary data. Accordingly, the phasing in the FS aligns with the DEQ's objectives of the alternative approach.

As described in the FS, the Phase 1 pre-design investigations would provide data to demonstrate contemporary distribution and concentrations; address uncertainties associated with the soil leaching to groundwater, groundwater to surface water transport, and direct contact exposure pathways; and provide the design basis for the ISCR/ISS programs.

The following are objectives of pre-design investigations and testing for the Phase 1 remedial actions (aligning with DEQ IRAMs 1 through 3), as described in Section 9.4.1 of the FS:

- Collect contemporary data to delineate current soil and groundwater impacts in target areas.
- Assess site-specific leaching of COCs from soil to groundwater and subsequent transport in groundwater to exposure points in the river.
- Assess attenuation of COCs in soil and groundwater over time and distance to estimate concentrations at a point of exposure.
- Estimate COC flux from upland groundwater to the river and the resulting concentrations in the river (porewater or water column).
- Assess attenuation of COCs through a possible in-water remedy.

The pre-design investigations described in the FS support the FS Phase 1 remedial actions and align with the DEQ IRAMs 1, 2, and 3, as follows:

- Acid Plant Area ISCR/ISS, DEQ IRAM 1: Provide the design basis of the remedy, including lateral and vertical extent of the remedy, ISCR or ISCO amendment selection

and dosing, ISS amendment selection and mix design, application methods, and identification of constructability constraints (e.g., subsurface obstructions). Bench scale and pilot testing are likely components of the pre-design tasks.

- Chlorate Area/Salt Pads ISCR injection, DEQ IRAM 2: Evaluate the current need for, and subsequent design basis of, ISCR or ISCO injections, including lateral and vertical extent of the injection program, ISCR amendment selection and dosing, application methods, application rates and radius of influence, and implementation constraints. Bench scale and pilot testing are likely components of the pre-design investigation.
- Soil Hot Spots, DEQ IRAM 3 (not specifically enumerated in the FS): Inventory areas of the site that have already been capped and will mitigate direct exposure and potentially mitigate leaching to groundwater of both COCs and naturally occurring metals, and refine leaching-to-groundwater analysis. Then, refine the conceptual model and assess contaminant transport and attenuation to identify target treatment concentrations at compliance points on the riverbank as compatible with cleanup concentrations in transition zone sediments in the Willamette River.

After LSS and the DEQ agree on concepts of the IRAMs and pre-design investigations, work plans will identify detail of sampling and analysis to refine the nature and extent of contamination and current conditions, and refine hot spots as needed to design and implement IRAMs.

3. *Collecting performance monitoring data associated with the groundwater IRAMs. The FS recommends conducting performance monitoring as part of the first phase of the remedial action.*

LSS response:

LSS agrees. Section 9.4.3 of the FS outlined concepts of performance monitoring of Phase 1 remedial actions. Ongoing groundwater monitoring assesses the groundwater SCM performance. Pre-design investigations for groundwater remedies will incorporate and expand on the existing monitoring program. The IRAM design will detail performance monitoring and evaluation criteria. IRAM performance monitoring inform the next phases of the remedy after the IRAMs.

4. *Collecting additional performance monitoring of the groundwater source control measure to inform evaluation of its effectiveness and long-term reliability and confirm its role as an element of the final remedy. The groundwater extraction enhancement (GEE) implemented in 2022 has not yet achieved its design objectives.*

LSS response:

The *Groundwater Source Control Measure (SCM) Performance Monitoring Plan* (ERM 2014) and monthly progress reports detail methods, criteria, and data for operation of the Groundwater SCM. The monthly progress reports tabulate data and recommend process changes. Annual System Effectiveness Evaluation Reports compile the performance data, discuss measures to improve performance, evaluate hydraulic capture by the GW SCM, and propose actions to improve performance. LSS will continue to monitor the GW SCM's operation and performance.

LSS completed upgrades to the Groundwater SCM in January 2024. Subsequent monthly reports and System Effectiveness Evaluation Reports will document the resulting performance.

5. *Completing a robust FS data gaps investigation in parallel with the IRAM consisting of:*

a. *Collecting additional data to refine the understanding of the nature and extent of contamination in Lots 1 and 2. Sampling in Lots 1 and 2 must include investigation of historical waste disposal areas, including the brine waste piles and brine residue ponds, asbestos pond and trenches, and DDT trench. The FS recommends conducting additional investigation of soil and groundwater in Lots 1 and 2 as part of the first phase of the remedial action.*

LSS response:

LSS believes that much of the additional investigation and analysis identified by the DEQ is complete, or additional investigation deemed necessary can be completed concurrently with the IRAMs. LSS also acknowledges that certain additional investigations may be needed to refine the nature and extent of contamination on Lots 1 and 2 to distinguish Arkema COC sources from trespass sources. The 13 February 2024 "Trespass Memo" identified contamination on Lots 1 and 2 that originates from upgradient and offsite sources. Additional investigations of Lots 1 and 2 will focus on the nature and extent of Arkema COCs to distinguish sources and the need for additional actions to mitigate risk.

The *Remedial Investigation Report* (ERM 2005) identified Arkema waste management areas (Appendix A, Figure 4-1) and described interim actions for the waste disposal areas identified by the DEQ.

- Brine Residue Pile. The brine residual piles contained calcium carbonate and magnesium hydroxide waste from the former salt pads. A 1989 interim action excavated visible residue and over-excavated an additional 6 inches of soil. Excavated soil was accepted by Waste Management's Hillsboro Landfill for use as daily cover.

  Given the previous excavation and the waste characterization, it is not clear to LSS that additional investigation of the brine residual pile is necessary to delineate the nature and extent of Arkema contamination or to design IRAMs or a final remedy.

- Brine Residue Pond. A 1992 interim action excavated visible brine residue and disposed of the material at Hillsboro Landfill. Testing characterized the material for disposal. The plant also analyzed fresh brine residue for metals in 1995 and 1996 by the toxicity characteristic leaching procedure. The 1995 testing detected only lead, but at concentrations two orders of magnitude lower than the applicable regulatory limit, and the 1996 test detected no TCLP metals.

  Given the testing results and results of the brine pile excavation, it is not clear to LSS that additional investigation of the Brine Residue Pond is necessary to delineate the nature and extent of Arkema contamination or to design IRAMs or a final remedy.

- Asbestos Pond and Trenches. A 1992 interim action excavated visible residue of the Asbestos Pond and trenches and over-excavated an additional 6 inches of soil. The only

known hazardous substances associated with the Asbestos Pond is asbestos. Asbestos is not a COC in the HSE or the FS.

Given the excavation of the Asbestos Pond and trenches, and that asbestos is not an FS COC, it is not clear to LSS that additional investigation of the Asbestos Pond is necessary to delineate the nature and extent of Arkema contamination or to design IRAMs or a final remedy. A future revised FS will acknowledge the possible presence of residual contamination in soil, including asbestos, and propose a contaminated materials management plan to test excavated materials and protect workers during future site work.

- DDT Trench on Lot 1. A 1994 interim action excavated the DDT Trench (CH2MHILL 1995). Sampling identified Arkema COCs DDT and chlorobenzene; but chlorobenzene concentrations in pre-excavation samples were below cleanup levels, so chlorobenzene was not a targeted contaminant of interest during the interim action.

  Given the excavation of the DDT Trench, it is not clear to LSS that additional investigation of the DDT Trench is necessary to delineate the nature and extent of Arkema contamination or to design IRAMs or a final remedy. The FS will acknowledge the possible presence of residual contamination in soil, including DDT, and propose a contaminated materials management plan to test excavated materials and protect workers during future site work. LSS may propose additional focused investigation of DDT on Lots 1 and 2 to assess the extent of trespass DDT.

b. *Collecting additional data to confirm or adjust the hot spot screening criteria and establish compliance points for soil and groundwater. Establishing groundwater points of compliance must incorporate sediment, transition zone water, and porewater sampling results completed as part of the in-water pre-design investigation. The FS recommends conducting additional investigation of current conditions and evaluating site-specific hot spot screening criteria and compliance points as part of the pre-design investigation in advance of implementing the first phase of the remedial action*.

LSS response:

LSS agrees. As acknowledged by the DEQ, the Arkema HSE and the FS propose additional assessment to identify action levels at a point of compliance on which to base upland cleanup actions. Section 4 of the HSE and Sections 6.4.1, 9.3, and 9.4.1 of the FS listed objectives of the Phase 1 pre-design investigations (see LSS response to DEQ 2) consistent with the DEQ's alternative approach to the FS. LSS believes that previous investigations and analysis, or as proposed herein and conducted concurrently with the IRAMs, will identify refined hot-spot screening criteria and establish groundwater points of compliance.

As directed by the DEQ, the HSE developed hot spots by screening upland groundwater concentrations directly against surface water criteria, and the FS assumes that the point of compliance for groundwater recharge to surface water is the transition zone porewater. This method resulted in large hotspots at low concentrations for some COCs that are unlikely to leach from the soil (e.g., pesticides). LSS (2019), the HSE, and the FS list objections to the conservative approach and the numerical remedial action objectives.

In response to LSS's 2019 letter, the DEQ acknowledged the following:

During remedial design, LSS may propose methods to assess leaching to groundwater and develop site-specific remedial action levels for both the groundwater and the leaching to groundwater pathways. A technical memorandum will describe proposed sampling and analysis to refine soil action levels and remediation volumes in the design. Additional pre-design sampling will be incorporated into the RD/RA.

Sections 6.4.1 and 9.3 of the FS list data and analyses to support the approach proposed by LSS and acknowledged by the DEQ, including the following:

- Pre-design sampling of soil and groundwater to assess contemporary concentrations and design remedial actions.
- Supplemental assessment of leaching from soil to groundwater and transport to a point of exposure in the river. Additional testing, including the following, will refine the extent of leaching to groundwater hot spots and potential exposures in the river:
    - Sampling, modeling, or empirical testing of site- and COC-specific leaching-to-groundwater hot spots. Section 4.0 of the HSE described limitations of the EPA partitioning model used to develop leaching-to-groundwater hot spots in the FS and identified alternative methods to estimate the fate and transport of pesticides and other COCs through soil to groundwater.
    - Modelling or sampling to characterize transport, flux, and attenuation of COCs in groundwater over time and distance to estimate concentrations at a point of exposure (porewater or water column), as compared to Portland Harbor cleanup levels.
    - Review of pre-design investigations and analysis for the in-water remedy to assess attenuation of COCs through a possible in-water cap to achieve risk-based concentrations at the in-water compliance point.

The analysis will evolve by screening and refining the approach based on preliminary results. For example, preliminary screening and sensitivity analysis will identify upland areas and COCs that will be the focus of the assessment.

An IRAM work plan will describe the details. The testing and results will inform the IRAM design and a future revised FS.

c. Collecting data to support monitored natural attenuation as a viable remedial action for groundwater in Lots 3 and 4-Shallow/Intermediate (FU-7), Lots 3 and 4-Deep/Basalt (FU-11), and Lots 1 and 2 Deep/Basalt (FU-12).

LSS response:

The FS describes "natural attenuation" as processes including sorption, volatilization, biodegradation, oxidation, reduction, advection, dispersion, and dilution that will reduce the

concentration, toxicity, and mobility of contaminants in soil and groundwater over time. Section 7.3.15 of the FS describes the Monitored Natural Attenuation treatment technology.

The Trespass Memo (ERM 2024) indicates that COCs in the Gravel/Basalt unit (FU-11 and FU-12) are trespass plumes from Rhone Poulenc. Accordingly, COCs in the Gravel/Basalt units would benefit and attenuate by treatment of upgradient sources at their respective source areas and will be the responsibility of others. Monitored natural attenuation is the recommended alternative in FU-7, -11, and -12 because the COC concentrations are relatively low; treatment in upgradient, downgradient, or overlying FUs will further reduce the concentrations; and slow contaminant flux over long transport distances will allow for attenuation. LSS acknowledges the need to collect data to support natural attenuation as a primary treatment technology for the FUs and COCs retained after the IRAMs.

LSS believes that previous investigations and analysis, or as conducted concurrently with the IRAMs, will support monitored natural attenuation. An IRAM work plan will further describe the process and methods to assess natural attenuation of COCs for FUs -7, -11, and -12.

d. Conducting a sitewide investigation to resolve data gaps in current dataset for COIs/COCs, such as a lack of data for the 2,4'DDD, DDE and DDT isomers, PCB congener, and per-and polyfluoroalkyl substances (PFAS).

LSS response:

See DEQ comment and response 2. LSS acknowledges the value of additional investigation to delineate the nature and extent of certain COIs/COCs. LSS observes the following with respect to the specific constituents listed above:

- DDx. The HSE defined DDx at the sum of 2,4' and 4,4'-DDD, DDE, and DDT isomers. Historical analyses of DDD, DDE, and DDT included only 4,4'-isomers. Appendix E of the 2009 Baseline Ecological Risk Assessment used regression analysis to estimate concentrations of 2,4,- isomers from the concentrations of 4,4'- isomers. This method of estimating 2,4'- isomer concentrations was a suitable surrogate for the DDx analysis. The HSE used the regression to estimate the 2,4'-isomer concentrations in the soil and groundwater data. LSS, therefore, does not consider 2,4'-DDx isomer concentrations in historical soil and groundwater data to be a data gap. Future analyses will include 2,4,- isomers.

- PCBs. The Arkema risk assessments identified PCBs as human health and ecological COCs. The Arkema HSE did not identify PCB hot spots in soil or groundwater, and the FS, therefore, did not identify technologies and alternatives to treat PCBs.

  A 2009 Rhone Poulenc sampling event showed high PCB concentrations in Rhone Poulenc source areas and in monitoring wells just southwest and upgradient of Arkema. Given the transport distance from the Rhone Poulenc source to the detections just upgradient of Arkema, it is likely that PCBs have also been transported in groundwater under NW Front Avenue to Arkema. The FS and the 13 February 2024 "Trespass Memo," therefore, conclude that PCBs in groundwater on Arkema are a trespass plume from the Rhone Poulenc site. Although the Arkema HSE did not identify PCBs as COCs

to be addressed in the FS, future sampling from existing or new wells could detect PCBs at hot-spot concentrations. If so, those detections would indicate a trespass plume of PCBs in groundwater.

- PFAS. PFAS have never been used in any processes at the Site. PFAS were never used as a fire extinguishing medium; only water, carbon dioxide, or Type ABC fire extinguishers were used. PFAS have never been COIs or COCs at Arkema. LSS understands PFAS are ubiquitous and persistent in the environment. Accordingly, if PFAS were detected, it would require finding its source, which may be difficult. LSS will sample groundwater for PFAS constituents during a comprehensive pre-IRAM groundwater sampling event.

In addition to the specific COC datagaps the DEQ identifies in comments 5 a) through d) above, recent monitoring data (Integral Quarter 1 2021 sampling, submitted to EPA December 2023) fill the temporal data gap and indicate decreases in COC concentrations over time sitewide. ERM compared the groundwater data used to develop the HSE and the FS to the 2021 groundwater data. The preliminary data comparisons show that concentrations of some COCs have decreased substantially in the decades since the data used for the HSE and the FS. The following are examples:

- The HSE data from 2006-2007 showed widespread chromium VI hot spots in Shallow and Intermediate zones on Lot 4, with isolated hots posts in the Deep Zone. The 2021 data show no remaining chromium VI hot spots in any zone.
- The HSE showed perchlorate hot spots in the Shallow, Intermediate, and Deep Zones on Lot 4, and the 2021 data show a residual hot spot only in the Deep Zone.

These examples demonstrate that certain hots spots identified in the HSE that were delineated using outdated data may no longer be hot spots and show the value of additional investigation, such as comprehensive contemporary groundwater sampling. Some of the wells used for the HSE were abandoned to install the Groundwater Extraction and Treatment (GWET) system, and new wells may be needed, or alternative data or interpolation may be used to fill the spatial gaps. Future sampling will use methods to provide data of quality to meet the hot spot and IRAM objectives and mitigate sampling biases, such as turbidity in the samples.

An IRAM work plan will describe the scope of additional sitewide investigation to design actions to mitigate risks identified in the risk assessment.

e. Conducting additional investigation to assess vapor intrusion risk.

LSS response:

The Human Health Risk Assessment (Integral 2008) identified vapor intrusion as a potential human exposure route with potentially unacceptable risks. Table DE-7 of the HSE screened detections of COCs against DEQ vapor intrusion risk-based concentrations and hot-spot concentrations for chloroform and dichlorobenzene, which were the only identified vapor intrusion COCs. Although there were detections of chloroform at concentrations above the vapor intrusion risk-based concentrations, no detections exceeded the hot-spot criterion. Table HSE-6 of the HSE identified no indoor work (vapor intrusion) hot spots.

The DEQ IRAMs and later remedies to be identified in a future FS will address areas of soil where detections of chloroform and dichlorobenzene exceed DEQ vapor intrusion risk-based concentrations. A residual risk assessment conducted as part of the remedy design and execution will identify the risk of residual contamination after completing the remedy. Accordingly, LSS believes that no additional investigation of vapor intrusion risk is necessary now.

Rationale

The proposed alternative path forward has the following advantages:

- *Accelerates cleanup of highest risks (i.e., NAPL) and other well documented hot spots (chlorinated VOCs, perchlorate, and hexavalent chromium in lots 3 and 4).*
- *Reduces DDx co-solvency with chlorobenzene and potentially improves GWET influent characteristics.*
- *Improves near-term source control status in the stranded wedge outside of the GWBW.*
- *Reduces FS/remedy selection uncertainty by:*
    - *Potentially reduces COC list in certain FUs*
    - *Incorporating empirical evidence to evaluate effectiveness and long-term reliability of the IRAM and groundwater source control measure.*
    - *Improving the characterization of Lots 1 and 2, including collecting data more contemporaneously with the in-water pre-design investigation and collecting enough information to support a trespass determination.*
    - *Improving the identification and delineation of hot spots.*
    - *Improving the ability to identify necessary institutional controls to support remedial actions.*
- *Reduces the likelihood of a post-ROD administrative change (i.e., ESD or ROD Amendment).*
- *Reduces the scope/magnitude of post-ROD cleanup actions.*
- *Provides a clearer path to site closure.*

LSS response:

LSS acknowledges and agrees with the DEQ's rationale and welcomes the alternative approach. Hot spots in the HSE are based on outdated data, and contemporary data may demonstrate that some of the hot spots delineated in the HSE and mandated in the FS (e.g., perchlorate, perchlorate, and hexavalent chromium hexavalent chromium) are no longer hot spots. Certain inferences made from historical data may reflect limitations or biases of previous sampling and analytical methods or influence of turbidity on the results. Future sampling will use current state-

of-the-art methods to provide data of quality to meet the hot spot and IRAM objectives and mitigate sampling biases, such as turbidity in the samples.

Meeting

LSS and the DEQ have scheduled a 22 February 2024 meeting to discuss our preliminary response to the alternative approach and details of the broad responses outlined in this letter. Once LSS and the DEQ agree to the general approach, work plans will provide details of the schedule, design, and execution of the proposed IRAMs and investigations.

Sincerely,

Todd SLATER

J. Todd Slater
Assistant Vice President