UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

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BOULEVARD CHICAGO, IL
60604-3590

Via Electronic Mail

May 25, 2023

Michael Gerdenich
BASF Corporation
1609 Biddle Avenue
Wyandotte, Michigan 48192-3729

Re: Comprehensive Interim Measure Remedy Selection
BASF North Works, EPA ID: MID064197742

Dear Mr. Gerdenich:

On September 2, 2022, Arcadis submitted on behalf of the BASF Corporation, the *Draft Basis of Design Report Preliminary 30% Design Perimeter Barrier Remedy* (Preliminary Design). The Preliminary Design was submitted in response to EPA's April 24, 2018 correspondence directing BASF to develop and submit comprehensive proposals for alternative remedies at the BASF North Works Facility, based on a site-wide perimeter barrier to contain contaminated groundwater and sediment on-site and systems to treat that groundwater prior to any discharge to adjacent property or the Detroit River. Prior to the development and submittal of this Preliminary Design, BASF completed work under EPA approved work plans to fill data gaps and conduct necessary studies to prepare the Preliminary Design.

EPA has completed the review of the Preliminary Design and BASF's proposals for constructing a comprehensive groundwater remedy and on-site groundwater treatment system. Of note, given the significant decisions necessary for the development from a 30% design to a final design, one of the conditions of EPA's remedy selection of the Preliminary Design is for BASF to move forward and prepare an intermediate 60% design prior to a final design. Within 30 days of receiving this letter, BASF must present a plan for EPA concurrence outlining the schedule for the 60% design submittal.

EPA is selecting the following interim measures, as detailed in the Preliminary Design, with the enclosed comments and conditions, which are to be incorporated in both BASF's 60% design and ultimately, the final design. (Attachment A). EPA does not anticipate development of the

60% intermediate design to significantly change the schedule presented in the Preliminary Design.

The following are selected for the comprehensive groundwater interim measure:

- Barrier Wall Components
    - Northern Boundary: Installation of a new steel sheet pile wall from Biddle Avenue to the Detroit River.
    - Northern Shoreline with the Detroit River: Maintenance of the existing steel sheet pile wall with enhancements to ensure watertight seal through wall joints, bolts, seams, etc.
    - South Dock: Installation of a new steel bulkhead wall with tiebacks.
      Rip Rap: Installation of a subsurface soil-cement barrier wall.
    - Southern Boundary: Installation of a subsurface soil-cement barrier wall (continued from Rip-Rap section and around the fire water pond).
- Groundwater Extraction and Conveyance System
    - Installation of a perimeter groundwater drainage system with collection drains and pumps to collect the groundwater and transport to the groundwater treatment system.
- Above Grade Treatment System
    - Construction and operation of an above grade water treatment system that treats the contaminants of concern (COCs) to permitted discharge limits.

To support the continued development of the remedial design, it is important to finalize the Corrective Action Objectives (CAOs). As discussed in Section 3.3. of the Preliminary Design, CAOs are being developed in coordination with BASF, EPA, and Michigan Environment, Great Lakes, and Energy (EGLE). In your Preliminary Design submittal, you proposed to provide CAOs with the final design. However, waiting to submit the CAOs with the final design would not ensure agreement on the objectives to support crucial decision points during the design development. EPA requests that BASF finalize the CAOs within 60 days of this letter.

Additionally, it is necessary that BASF engage with all relevant permitting agencies regarding the plans for this remedy. If any permitting agency does not support the plans, BASF may need to alter their remedial design plans. Within 60 days of this letter, BASF needs to provide preliminary notice to all permitting agencies and provide us with a schedule. BASF must assess the permitting needs for each remedial component of the remedy and provide for EPA's approval a projected schedule for initial calls with regulatory agencies and projected dates for steps in the permitting processes.

EPA appreciates the work BASF has taken, and continues to take, to address the groundwater concerns at the BASF North Works facility, as well as the ongoing coordination between BASF, EPA, and Michigan EGLE on these efforts. Please work with my staff to establish a schedule and process for submittal of the aforementioned deliverables. If you have any questions, please

reach out to Valerie Voisin of my staff at voisin.valerie@epa.gov.

Sincerely,

JOSE CISNEROS Digitally signed by JOSE CISNEROS
Date: 2023.05.25 15:11:52 -05'00'

Jose Cisneros, Manager
Remediation Branch
Land, Chemicals, and Redevelopment Division

cc: Rich Conforti, EGLE

Enclosures

Attachment: EPA Comments on Preliminary Design

General Comments:

1. EPA acknowledges that there are many key decisions points from a preliminary 30% design to a final design. In order to ensure continued agreement on the design elements supporting the selected remedies, BASF must develop an intermediate 60% design. The presentation of the 60% design must be presented in one comprehensive document, or at appropriate steps in the remedial design development process, if agreed to by EPA.
    a. Within 30 days of these comments, BASF must submit a plan for the 60% design for EPA concurrence. This plan should include a schedule for deliverables, design elements, technical details, and key decision points which BASF estimates will be presented in the 60% design.
2. BASF should incorporate their responses to these comments and conditions into the intermediate and final designs for the comprehensive groundwater interim measure remedy.
3. Corrective Action Objectives must be finalized within 60 days of these comments, and the CAOs should be incorporated into all future remedial designs.
4. A conceptual site model should be developed and presented in the 60% design, including how COCs migrate from the source areas to the applicable receptor population(s) based on existing site conditions (geological features, depth to groundwater, etc.) to support the assessment of how the design will attain the performance standards.
5. Engagement with relevant permitting agencies is essential to ensure these selected remedies are permittable. If any permitting agency does not support the plans, or requires currently unanticipated criteria (e.g., treatment criteria), BASF may need to alter their remedial design plans. Within 60 days of this letter, BASF must assess the permitting needs for each remedial component of the remedy and provide EPA a projected schedule for initial calls with regulatory agencies and projected dates for steps in the permitting processes.
    a. Within 60 days of this letter, BASF needs to provide preliminary notice to all permitting agencies and provide EPA with a schedule.
    b. The projected schedule should include monthly updates on permitting progress.
6. BASF should incorporate their responses to these comments and conditions into the intermediate and final designs for the comprehensive groundwater interim measure remedy.

Specific Comments:

<u>Northern Shoreline -- Existing Sheet Pile wall; Wakefield Wall</u>

7. The 30% design does not propose any additional remedial measures along the northern shoreline to supplement the existing sheet pile wall. It is noted in the 30% design that the existing sheet pile wall, constructed in the 1990s, is not sealed and does not have corrosion protection.
    a. Information on utilities, outfalls or other wall penetrations, gaps between the sheet

pile and wakefield wall, or other holes in the sheets are not discussed.

b. The existing sheet pile present in the northern half of the facility shoreline is potentially situated in front of existing overhanging dock structures or pilings with water present behind (landward) of the sheet pile. This condition would not allow for groundwater control at the site. The physical condition of the shoreline should be evaluated to determine areas that have water present behind the sheet pile (landward of sheet pile).
c. The 30% design explains that corrosion loss of up to 40% may occur along the existing sheet pile wall in a 60-to-80-year timeframe. To address this corrosion loss BASF proposes a monitoring and maintenance program however, details of what this program may look like are not provided.

It is not clear, based on the data gaps identified above, how this section of wall will adequately attain the performance standard of containing groundwater. BASF must incorporate into the 60% design how these gaps will be addressed as well as additional remedial measures along the Northern Boundary to ensure to no groundwater migration to the Detroit River. Alternatively, BASF may include a proposal of a thorough performance monitoring plan to verify no groundwater is migrating, with preliminary data to support the proposal. The 60% design should also include contingency plans should the current sheet pile wall not prove viable for containing groundwater.

8. If king piles are not embedded into the bedrock, provide in the 60% design information regarding each subsurface soil unit and how they provide adequate structural support.
9. Section 4.4 states "hydraulic testing and groundwater modeling completed as part of the pre-design investigation concluded that this bulkhead is an effective barrier to groundwater flow." However, since a passive system with a discontinuous drain is proposed, it is not clear if this calibrated groundwater model appropriately modeled the design conditions of the current remedial design. As such, it is not clear if the modeling performed accurately reflects the final design conditions. Please provide clarification in the 60% design to address this issue.

South Dock -- New Steel Bulkhead with tiebacks

10. Develop alternative design elements for the steel bulkhead design at South Dock. Include design of connections and walers for the bulkhead wall as well as utility information to support the southern alignment.
11. To better support the design of the bulkhead wall along the South Dock, additional investigations along the alignment must be conducted to obtain greater certainty of the clay profile for each alignment and to allow for greater efficiency in the required pile lengths.
12. In support of the south dock bulkhead wall design, additional modeling using more sophisticated methods (e.g., p-y, finite element, or similar methods) to assess the options, including the use of lightweight backfill and placement of a buttress in front of the bulkhead wall, to provide lateral resistance may need to be added to the 60% design.
13. An approximate 12-foot gap in the rear Wakefield wall within the overhanging dock area was previously identified by divers contracted by GLNPO. An evaluation of the effect of the gap in the wall on the remedial design to ensure groundwater containment is needed.

14. Water has been identified in the area under the over-hanging dock structure. This area is proposed to be filled following placement of sheet pile along the outer-most edge of the shoreline at the concrete bulkhead. The approach to placing fill in this area was not detailed in the 30% design. It has been described that holes would be cored in the decking and fill placed via the holes. Further detail on the approach and process for filling in the area behind the sheet-pile wall is necessary. Holes or voids in the current walls and the implications of repairing or determining the extent of their impacts further inland should be evaluated. This is especially important when concerned with the integrity of those walls or considerations for the foundation of new structures. These details effectiveness of this approach must be discussed in detail in the 60% design.
15. The Bulkhead Cross Section drawing in Appendix A of the 30% design shows the new sheet pile wall anchor wall; however, the 30% design does not discuss if the soil properties are adequate for the structural requirements of the anchor wall. The 60% design must include an anchor wall alignment review and necessary adjustments must be incorporated to the design to facilitate groundwater recovery in the collection trench.
16. Section 4.3.3.3 states, "The use of construction quality monitoring results to adapt the construction methods and/or the construction monitoring methods may be needed to achieve installation of the steel bulkhead wall." However, the 30% design lacks details on the monitoring method. For example, potentially measuring hydraulic head, within and outside the wall; groundwater quality, within and outside the wall; settlement of the top surface of the wall; and verticality of the wall. Please include in the 60% design the details on proposed monitoring methods and frequency of taking measurements.

Rip Rap – Soil-Cement Barrier

17. The proposed soil-cement wall design discussed in the 30% design lacks the details provided in other sections, such as for the proposed water treatment system, making the 30% design unbalanced. For example, the 30% design does not include the basis for the proposed design thickness (2 feet), the chemical compatibility of wall formulation and the stability of the trench during construction, especially considering the distiller blow-off and peat materials through which it is proposed to be constructed. Include in the 60% design all aspects of the proposed soil-cement wall considered and the supporting details.
18. The first bullet of section 2.2.2 indicates that communication was observed between the river and the unconfined aquifer in the rip rap zone on the south end of the shoreline. However, this is the only time this unconfined aquifer is mentioned, and this section does not contain adequate details on the aquifer to assist in understanding how this affects the remedial design. Also, as previously noted, the Primary Design lacks a conceptual model of the site and contaminant migration, and this rip rap zone unconfined aquifer needs to be described in context of the overall comprehensive groundwater remedy design for the site to allow for an adequate demonstration that the performance standards will be achieved by the offered design. Include in the 60% design expanded sections to address these issues.
19. An assessment of the potential for freeze-thaw damage of the soil-cement wall should be included in the 60% design as well as the high-density polyethylene liner specifications for the soil-cement wall.

Groundwater Extraction and Conveyance System

20. The extraction trench network includes a discontinuous passive perimeter groundwater drainage system; however, it is not clear if this network is adequate to prevent contaminated groundwater from migrating to surface water as the proposed system does not allow for an inward hydraulic gradient at the site. The 60% design should identify how the proposed groundwater extraction remedy will attain the stated performance standard of containing groundwater. Ensure any necessary enhancements to the proposed system to attain the stated performance standard of containing groundwater (i.e., establishment of an inward hydraulic gradient) are clearly identified.
21. *Section 5.1.2* states, "Based on results of the updated groundwater model, the HPT [hydraulic profiling tool] investigation, and groundwater pumping tests, the drainage network will consist of eight collection drains capturing groundwater on the northern, eastern, and southern boundaries of the Site." It goes on to state that "Drain lengths and locations required to hydraulically capture groundwater flux were established based on groundwater model simulations." However, Section 5.1.2 does not describe the specific basis for the selection of eight collection drains, the selected drain lengths, depths, or selected drain locations. Provide details in the 60% design to describe the specific basis for the number of necessary drains, drain lengths, and drain locations and include details on how these aspects of the remedial design were expressly accounted for in the groundwater modeling performed. Include a rationale in the 60% design how these details of the design will ensure they will be effective at containing groundwater.
22. *Section 5.2.1* states that 13 sumps will be installed at intervals of approximately 500 feet along each segment of the collection drainage network. However, Section 5.2.1 does not describe the basis for the selection of 13 sumps. Include this detail in the 60% design to explain how the number of necessary sumps was determined that at a minimum includes the design basis.

Above Grade Treatment System

23. A potential pilot test or other pretreatment option specifically for the ion-exchange system for the above grade treatment system should be further developed in the 60 % design.
24. An evaluation of the need for a retention pond or temporary tank storage for the above grade treatment system must be included in the 60% design.
25. Section 6.2.2 states that the primary COCs based on local POTW limits are mercury, volatile organic compounds, semi-volatile organic compounds, and per- and polyfluoroalkyl substances; however, the POTW limits are not presented in the 30% design to support this statement. Include in the 60% design a section on the POTW limits and correspondence from the POTW on what, if any, pretreatment criteria will be enforced.

Performance Standards

26. Establishing performance standards for each component of the remedy is an essential aspect of the remedial design. Each remedial component previously identified in the remedy selection letter above should have well-developed performance standards in the 60% design. Specific comments to be incorporated in the 60% design are included below.
27. Monitoring:
    a. Provide an Operation and Maintenance (O&M) plan for each component of the remedy, which support the performance standards.
    b. Develop a schedule for monitoring to ensure effectiveness of perimeter barriers and the continued operation of components of the water treatment system.
    c. Specifically include monitoring of water table head at multiple points that is either continuous or collects data on a daily basis.
28. Section 3.4 does not address the need for performance standards related to treatment of contaminated groundwater. Section 3.2 (Proposed Remedy Description) states that the remedy will include an above-grade groundwater treatment system that discharges treated groundwater to the local publicly owned treatment works (POTW). Ensure that performance standards are developed for the treatment and discharge of groundwater and presented in a forthcoming 60% design package. Ensure the documentation is provided from the POTW that indicates adequate capacity is available for the treatment of the contaminated groundwater and what, if any, pretreatment criteria will be enforced.
29. This section does not address the need for performance standards or cleanup goals for groundwater that will support termination of the remedy. State the performance standards or cleanup goals for contaminated groundwater in the 60% design package that will dictate when operation and maintenance of the perimeter barriers and groundwater treatment system is no longer necessary.
30. The proposed remedy is to mitigate groundwater from entering the Detroit River and physically stabilize the site to prevent erosion of fill from the facility to the river, including sediment under the overhanging dock, but no performance standard to attain this corrective action requirement has been developed. Provide a section in the 60% design to specify performance standards or cleanup goals for protecting the Detroit River that will assess the ongoing protection of sediment and surface water in the Detroit River.

Overarching Technical Comments

31. The following Engineering Requirements must be included in the 60% design:
    a. Refinement of the minimum structural requirements calculations;
    b. A Construction Quality Assurance Plan;
    c. Fill data gaps on the location of existing subsurface structures. Provide a detailed section on the details of existing subsurface structures and how to construct this proposed remedy around them.
    d. An interlock table describing process alarm conditions and associated process responses.
32. Section 2.2.2 (Hydrogeologic Investigation) states that the updated groundwater model serves as a design tool estimating flow scenarios for the groundwater collection and above-grade treatment system but does not describe the results and conclusions of the groundwater model simulations. An understanding of groundwater conditions will be

imperative to evaluate attainment of an inward gradient. Include in the 60% design a summary of the groundwater model conditions, results, conclusions and any caveats within Section 2.2.2. Also include an explanation of how they were used in development of the design.

33. No cross-sectional figures are provided to support the description of the subsurface geology presented in Section 2.1 (Geotechnical Investigation). For clarity and completeness, and to support the appropriateness of the basis with respect to the subsurface geology, provide the cross-sections within the 60% design that depict the geology of the site. Also include depth to water table in these cross-sections and indicate where the planned depth of the passive drain system will be installed. Ensure cross-sections showing the alignment of any walls to be constructed via slurry trenches are included in the 60% design.
34. The 30% design does not discuss how the project will be managed. This includes the management approach (i.e., levels of authority and responsibility), lines of communication, and the qualifications of key personnel who will direct the comprehensive groundwater interim measure design and the implementation effort (including contractor personnel). Provide a section in the 60% design Report to entail how the project will be managed.
35. The 30% design proposes to include many details of the design which are integral to the success of the remedy in the final design. Due to the complexity of the proposed design, it is critical that these details be provided in the subsequent 60% design reports. This includes the following, which is not intended to be a comprehensive list:
36. Ensure the cost estimates for the 60% design include O&M costs, performance monitoring and additional pre-design investigation costs.
37. Section 2.1 of the 30% design states that the results of the geotechnical investigation conducted in 2020 were used in the selection of the proposed perimeter barriers; however, this section does not evaluate how the subsurface characteristics and results of the geotechnical investigation impact the design of the remedy in general. Subsequent designs should include a general summary of how the subsurface characteristics and results of the geotechnical investigation impact the design of the remedy. In addition, this section does not identify the depth of groundwater. Subsequent designs should include a clear description of the depths at which the silt, sand, and clay layers were identified, and the depth of groundwater. Ensure cross-sections showing the wall alignment and the results of the geotechnical investigation are included in subsequent design reports.
38. Section 7 of the 30% design indicates that waste soil and groundwater will require characterization prior to disposal or treatment; however, Section 7 does not reference applicable sampling and analysis procedures. EPA would like to ensure that these soils are properly characterized and disposed of at an appropriate facility. Ensure that a sampling and analysis plan is included in future design along with the assumptions used for costing disposal. The process for characterizing these wastes and the disposal method must be detailed in the 60% design.