UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

March 4, 2019

Via Delivery as Email-attachment

Mr. Prashant K. Gupta
Honeywell, Inc.
115 Tabor Road
Morris Plains, NJ 07950

Re: Draft Technical Memorandum: Technical Approach for Phase 4 CO2 Sparging (Cell Building Area), dated February 11, 2019: OU2 (Mercury Cell Buildings and Groundwater): LCP Chemicals National Priorities List Site, Brunswick, Glynn County, GA

Dear Mr. Gupta:

The purpose of this letter is to comment on your submission of the Draft Technical Memorandum: Technical Approach for Phase 4 CO2 Sparging (Cell Building Area), dated February 11, 2019. The EPA is requiring revisions to the Draft Technical Memorandum according to Paragraph 15.b of the Administrative Order on Consent for Removal Action (CERCLA Docket-04-2007-3760). The attached comments must be addressed, and the document revised, before full approval of the work plan will be considered. However, as agreed to in the last project meeting on February 6, 2019 at GEPD offices in Atlanta, Georgia, Honeywell may go ahead with implementation of the planned direct push points and Carbon Dioxide (CO2) injections to initiate the treatment of the Caustic Brine Pool confirmed to still exist under the formal Cell Building Area and north of the CBA during the recent investigations in November 2018 to January 2019. Response to the comments must be submitted to EPA within 30 days from receipt of this letter.

If you have questions regarding the preceding, please contact me at (404) 562-8937.

Sincerely,

Robert H. Pope,
Senior Remedial Project Manager
Superfund Restoration & Sustainability Branch
Superfund Division

cc: J. McNamara, GAEPD

# TECHNICAL REVIEW OF THE DRAFT TECHNICAL MEMORANDUM TECHNICAL APPROACH FOR PHASE 4 CO2 SPARGING (CELL BUILDING AREA) DATED FEBRUARY 2019

## LCP CHEMICALS SITE BRUNSWICK, GEORGIA

## I. GENERAL COMMENTS

1. The Draft Technical Memorandum: Technical Approach for Phase 4 $CO_2$ Sparging (Cell Building Area), LCP Chemicals Site, Brunswick, Georgia, dated February 11, 2019 (the Tech Memo) indicates that "Existing Phase 1-3 sparge wells bordering the CBA [Cell Building Area] will be employed during the Phase 4 treatment as needed," but does not indicate how many existing sparge wells will be used or how existing sparge wells will be selected for use during Phase 4. Figure 1 (Sparge well layout within the cell building area) shows the radius of influence (ROI) for 12 of the existing sparge wells, but it is unclear whether these 12 sparge wells are the existing sparge wells that may be used during Phase 4 or if other existing sparge wells may be used. In addition, the Tech Memo does not provide decision criteria for determining if and/or when existing sparge wells should be used. Revise the Tech Memo to clearly specify which of the existing sparge wells may be used during Phase 4. In addition, revise the Tech Memo to include decision criteria for determining if and/or when existing sparge wells should be used.

2. Based on Figure 1, additional delineation of elevated pH values is needed prior to completion of the Phase 4 sparging. As seen in Figure 1, no pH data is available to the east or west of the two blue locations depicted in the northern portion of the CBA (pH values of 11.92 and 11.95) or to the east of the two purple locations depicted on the eastern side of the CBA (pH values of 10.3 and 10.42). Figure 2 (Geoprobe pH data (January 2019) and planned additional Geoprobe locations) indicates that seven Geoprobe locations will be installed around the two blue locations seen in the northern portion of the CBA. However, given the high pH values, additional step-out locations may be needed to better define the extent of elevated pH values prior to implementation of the Phase 4 sparging. Revise the Tech Memo to propose contingency step-out locations for the northern portion of the CBA in the event that the seven Geoprobe locations are not sufficient to define the extent of elevated pH values. In addition, revise the Tech Memo to propose Geoprobe locations to address the identified data gap east of the two purple locations on the eastern side of the CBA.

3. The "Operations" discussion on page 5 of the Tech Memo states that the linear scale-up method employed during Phase 2 will be used to calculate the $CO_2$ dose for each sparge well. However, it is unclear whether sufficient alkalinity information is available for the CBA to use the scale-up method. For example, Section 3.3.2 (Required $CO_2$ Mass Per Well) of the $CO_2$ Sparging Phase 3 Full-Scale Implementation and Monitoring Report, LCP Chemicals Site, Brunswick, Georgia, dated July 2016 (the Sparging Report) describes the scale-up method, which involves estimating the alkalinity within the ROI for each sparge well using Figure 3-4 (Interpolated alkalinity in the Satilla using data from deep monitoring locations), applying an alkalinity multiplier, and scaling up the $CO_2$ dose using the values provided in Table 3-3 (Alkalinity-$CO_2$ Dose Relationship). Figure 3-4 of the Sparging Report shows that the majority of the wells providing alkalinity data on the alkalinity map are located within the CBP and no wells providing alkalinity data are located within the CBA. Additional alkalinity data for the CBA may be needed to ensure the estimated alkalinity for each sparge well is appropriate since these estimates will be used to calculate $CO_2$ doses. Revise the Tech Memo to discuss whether the available alkalinity data for the CBA area is sufficient to apply the scale-up method for determining $CO_2$ doses. If the available alkalinity data for the CBA area is insufficient, revise the Tech Memo to include collection of additional alkalinity data to address this issue.

4. The Tech Memo states that "All sparge wells will be monitored for pH and conductivity after development," but does not specify the frequency of monitoring. The "Field Measurements During Sparging" discussion on Page 6 indicates that field measurements of pH and conductivity will occur at monitoring wells at a frequency of once to twice per week, but the frequency of monitoring for sparge wells is not specified. In addition, the Tech Memo indicates that "A subset of sparge wells will also be sampled for alkalinity," but does not specify how many sparge wells will be sampled for alkalinity, how the subset of wells will be selected for sampling of alkalinity, or the frequency of sampling for alkalinity. Lastly, Figure 1 in the Tech Memo does not display the locations of the 12 monitoring wells listed in Table 1 (Monitoring points selected for sampling and analysis) that are proposed for sampling. The adequacy of the proposed monitoring well network cannot be evaluated without seeing the location of the monitoring wells relative to the proposed sparge well locations. Revise the Tech Memo to include the following information:

   - Specify the frequency of monitoring for sparge wells;
   - Specify the number of sparge wells that will be sampled for alkalinity;
   - Provide criteria for how the subset of wells will be selected for sampling of alkalinity;
   - Specify the frequency of sampling for alkalinity; and
   - Revise Figure 1 to display the locations of the 12 monitoring wells listed in Table 1 that are proposed for sampling.

5. The last paragraph of the "Operations" discussion states "it is anticipated that sparging will result in some daylighting of shallow groundwater in the work vicinity" and that "Honeywell will implement best management practices ("BMPs") in order to reduce the risk of water from the work area entering to the marsh." However, the text does not indicate whether BMPs will be implemented prior to sparging activities, or if BMPs will only be implemented after daylighting is observed. In addition, if BMPs are to be implemented only after daylighting is observed, then the Tech Memo should specify a schedule to monitor for daylighting. Lastly, it is unclear whether the marsh will be monitored for potential impacts from sparging activities. Baseline sampling, periodic sampling during sparging operations, and post-sparging sampling would be helpful for monitoring potential impacts to the marsh. Revise the Tech Memo to indicate whether BMPs will be implemented prior to sparging activities, or if BMPs will only be implemented after daylighting is observed. If BMPs are to be implemented only after daylighting is observed, revise the Tech Memo to specify a schedule to monitor for daylighting.

## II. SPECIFIC COMMENTS

1. **Figure 1, Sparge Well Layout within the Cell Building Area, Page 3:** Figure 1 uses pink symbols to denote the location of eight 1996 CBA borings with high pH values, but none of the pH values for these corresponding locations are displayed. In addition, it is unclear whether recent sampling has been conducted to confirm the 1996 results (i.e., are current pH values in this area lower, higher, or relatively the same). Revise Figure 1 to include the pH values for the 1996 CBA borings. If this information is not available, revise Figure 1 to include a note indicating that the 1996 data is unavailable. In addition, revise the Tech Memo to indicate whether any recent sampling has been conducted to confirm the 1996 pH results.

2. **Figure 1, Sparge Well Layout within the Cell Building Area, Page 3:** Figure 1 shows two areas outlined in red within the CBA, but the red line is not defined in the figure legend. Revise Figure 1 to define the red line in the figure legend.

3. **Operations, Page 5:** The "Operations" discussion states that longer sparging durations may be needed for some wells, but the Tech Memo does not provide decision criteria for determining when longer durations should be implemented. Revise the Tech Memo to provide decision criteria for determining when durations longer than 4 hours should be implemented.

4. **Monitoring Plan, Pages 5 and 6, and Table 1, Monitoring Points Selected for Sampling and Analysis, Page 6:** The text of the "Monitoring Plan" discussion states that "Specific gravity will be measured in a subset of Satilla wells (see wells in bold italics, Table 1)." However, neither the text nor Table 1 provide rationale for the number of wells proposed for specific gravity measurements or for the locations of specific gravity measurements. Revise the Tech Memo to provide the rationale for the number and location of wells where specific gravity measurements will be conducted.

5. **Monitoring Plan, Pages 5 and 6, and Table 2, Water Quality Analytes and Associated Laboratory Methods, Page 6:** The first paragraph of the "Monitoring Plan" discussion specifies the field parameters (pH, specific conductivity, dissolved oxygen, temperature, and oxidation reduction potential) that will be measured at monitoring wells during pre-sparge monitoring, but does not specify whether the analyses listed in Table 2 will be conducted as part of pre-sparge monitoring. Similarly, the second paragraph of the "Monitoring Plan" discussion states that the analyses listed in Table 2 (pH, alkalinity, total mercury, total dissolved solids, and total metals) will be conducted during post-sparge monitoring but does not specify whether field parameters will be measured. While it is likely that the Tech Memo intends for both measurement of field parameters and sampling for the analyses in Table 2 to occur during pre- and post-sparge monitoring activities, the text should be revised to clarify this. Revise the "Monitoring Plan" discussion to clarify whether both measurement of field parameters and sampling for the analyses in Table 2 will occur during pre- and post-sparge monitoring.

**Comments and Recommendations from the USEPA Region 4 Scientific Support Section**

1. The Scientific Support Section staff reviewed the twelve (12) proposed monitoring well locations selected for Phase 4 $CO_2$ sparging event within the Satilla Aquifer, refer to Table 1 located above. The monitoring well locations located within and along the outer perimeter of the Cell Building area, except for the westside, are adequately located to monitor for groundwater influenced by the $CO_2$ sparging event (i.e. groundwater movement and groundwater geochemistry). The current monitoring plan for the westside of the Cell Building area lacks monitoring well coverage and there are no monitoring wells proposed for monitoring the influence of the sparging event north of B Street. Please add additional monitoring wells along the westside of the Cell Building area and north of B Street to adequately monitor the influence of the $CO_2$ sparging event within the Satilla Aquifer.

2. Honeywell will be implementing BMPs to prevent daylighting of shallow groundwater within the sparging area due to the amount of $CO_2$ gas being injected into the subsurface at the Site. There was no mention or reference to historical documents that $CO_2$ air monitoring will be conducted for worker safety during the sparging event. It is recommended that an air monitoring program should be established for the Site to monitor the $CO_2$ sparging event and for any future potential off gas of $CO_2$.

**Comments and Recommendations from the Georgia Environmental Protection Division**

1) Historical groundwater data was analyzed for each of the wells in the area west of the planned sparging action to examine trends of mercury and pH levels. Based on this review, additional wells were identified that would seem to provide useful information regarding treatment efficacy if added to the analytical program, such as: MW-105A/B/C, MW-110A/B/C, MW-356A/B, MW-360D, MW-501A/B, MW-502A/B, and MW-513A/B. However, there was no discussion in the document regarding the selection of monitoring wells. Please explain why the selected monitoring wells were chosen and others left out. Include a figure showing the relationship of the sparge well layout from Figure 1 against the current monitoring well network, along with proposed locations for additional monitoring wells.

2) With the exception of Figure 2 showing the proposed Geoprobe locations, there is no information in the document regarding the additional delineation that is planned north of B Street. Include a discussion regarding why the number and locations were chosen, total depth, and sampling depth(s) for each boring. An additional soil sampling point is needed to the east of the pH 11.95 boring to bound it on that side. Since it is clear that additional monitoring wells are necessary since there are currently no wells between MW-105/MW-501 and MW-110, indicate which of the borings will be converted into temporary or permanent monitoring wells. Further, for each soil and groundwater sample, indicate the analytical suite that is planned.

3) Page 5, "Well Drilling and Completion", 2nd sentence – EPD assumes that the information referenced is that reflected on Figures 2-9 and 2-10 of the Phase 2 Completion Report. Please verify.