pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

June 11, 2020

Mr. Gregory D. Martin, P.G.
Roux Associates
402 Heron Drive
Logan Township, NJ 08085

Re: Bishop Tube Site
2019 Remedial Investigation Report
Response to DEP Comment Letter

Dear Mr. Martin:

The Department of Environmental Protection ("DEP") has reviewed the responses to DEP's comments concerning the 2019 Remedial Investigation Report ("2019 RIR), submitted by Roux Associates, Inc. ("Roux"), on behalf of Johnson Matthey Inc. and Whittaker Corporation (the "Bishop Tube Project Team"), on March 20, 2020. DEP utilized a General Technical Assistance Contractor, Groundwater & Environmental Services, Inc. ("GES") to aide in the review of the responses. DEP's evaluation of each response, which incorporates GES technical opinions, is provided below:

DEP has determined that Roux's proposed modifications adequately address comments # 8, 9, 12, 19, 23, 26, 29, 30, 41, 42, 43, 45, and 48.

DEP requests that Roux provide the referenced additional proposed text/figure modifications to address comments #10, 15, 17, 18, 20, 21, 22, 25A, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 44, and 47 for our review. There may be some additional discussion, below, regarding a few of these comments. To facilitate and expedite DEP's review of these proposed revisions, please submit them in advance of submitting the 'Final RIR" and please cross-reference each revision to its comment number.

Section 2.2 – Clarification of RIR and FS Scope

DEP RI Comment #1. The summary of the 2009 requirements indicates that characterization of the onsite vapor intrusion ("VI") pathway is not required. DEP disagrees with this assertion. Under Paragraph 5(b) of the CO&A, characterization of bedrock and overburden groundwater, originating from the former Bishop Tube Property, is required. The vapor intrusion pathway from groundwater contamination associated with the Bishop Tube HSCA Site ("Site"), including areas on the former Bishop Tube Property, shall be conducted in accordance with the January 19, 2019 Land Recycling Program Technical Guidance Manual (TGM), Section IV: Vapor Intrusion.

***ROUX'S RESPONSE:* Consistent with our discussions with DEP, the BT Team agreed that this comment will be addressed by modifying the wording in Section 2.2, Paragraph 1 of the RIR. The following language will be added to the RIR: "The potential for on-Property VI will need to be addressed under Act 2 and is expected to be addressed as part of future redevelopment." This language clarifies that, while not required as part of the RI/FS being completed by the BT Team, addressing this potential exposure pathway is required during redevelopment by others in accordance with Act 2.**

Please modify the suggested language to read: "The potential for on-Property VI will need to be addressed as part of future redevelopment."

Section 5.2 History of Environmental Activities and Regulatory Actions.

DEP RI Comment #2. Please update the text to include references to regulatory actions prior to 1973 and refer to fluoride detections in 1981. According to inspection reports in our records from between 1969 and 1973, predecessors of DEP, including the PA Department of Environmental Resources ("DER") and the PA Department of Health ("DOH"), detected fluoride and certain heavy metals in acid rinse water discharges to the ground surface, surface water, and to a cesspool (i.e., subsurface discharge directly to groundwater).

DEP RI Comment #3. The first bullet implies that samples collected by Gilbert Associates were analyzed for volatile organic compounds ("VOCs"). Our review of the 1973 Gilbert Associates report, which focused on subgrade disposal of acid rinse wastes, suggests that samples were not analyzed for VOCs at that time.

DEP RI Comment #4. The discussion of the United States Geological Survey ("USGS") states that VOCs were not detected. DEP's review of the USGS laboratory report suggests that VOCs were not analyzed at that time.

DEP RI Comment #5. The Preliminary Assessment ("PA"), performed by DER in 1981, should be referenced in this section.

DEP RI Comment #6. The Site Inspection ("SI"), performed by NUS, Inc. in 1985 on behalf of the United States Environmental Protection Agency ("U.S. EPA"), should be referenced in this section.

Section 5.3.2 Baker PA/SI/RI Activities (2000s)

DEP Comment #7. The text (including subsequent sections) uses the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") terms PA and SI to describe Michael J. Baker Inc's ("Baker's") work. As noted above, the PA and SI were completed in 1981 and 1985, respectively. DEP generally refers to the Baker work as "site-characterization." Please modify the text accordingly.

***ROUX'S RESPONSE:* Consistent with our discussions with DEP, the BT Team agreed that Comments #2 through #7 will be addressed by adding the following footnote at the beginning of Section 5.2, Paragraph 1 of the RIR. "Additional information pertaining to the Site history and regulatory actions, may be found in the administrative record." This language clarifies that**

Section 5.2 provides a general summary only and that additional documentation exists for this Site.

For Comments #2 through #7, please delete the reference to DEP's administrative record and modify the suggested language to read: "Additional information pertaining to the Site history and regulatory actions, may be found in the DEP's Regional Files."

The language identified in Comment #3 should be modified to read "The results identified elevated levels of fluoride, nitrates, and selected metals." Please remove the statement "there were no reported observations of VOCs in any of the samples collected." DEP contends that it is misleading for the RIR to single out certain categories of contaminants in the manner suggested that are not discussed in the 1973 Gilbert Report, as if having been analyzed.

For Comment 4, please remove the following language ", there were no reported VOCs in the groundwater sample" and include the following footnote at the end of that bullet: "The BT Team contends that VOCs reported by USGS as "0.0 ug/l" indicates that these compounds were not detected. DEP contends that the "0.0 ug/l" indicates that VOCs were not analyzed. It is DEP's position that, if they were analyzed, results for undetected compounds would have been reported with a method detection limit, not as 0.0 ug/l." Alternatively, remove the language identified by DEP and do not include a footnote, as DEP's Regional Files contain this USGS document.

Section 7.1.2 – Supplemental DEP Site Investigation.

DEP RI Comment #11. AOC-1 (Plant 5 Large Degreaser Area ("LDA")). DEP questions whether the trichlorethylene ("TCE"), detected at location P5 LDA02, is related to the previously identified Plant 5 degreaser. This sample is more than 40 feet from the closest boring which exceeds the soil-to-groundwater MSC in the Plant 5 VDA. Additional pre-design delineation may be necessary to efficiently address soil contamination in this area.

***ROUX'S RESPONSE:* Consistent with our discussions with DEP, the BT Team agreed that the text in the RIR section cited above will be modified and will include a footnote as follows: "DEP believes that pre-design soil delineation may be appropriate for the TCE result at location P5 LDA02 in the future as part of Property redevelopment."**

Please modify the proposed footnote to read as follows: "DEP believes that pre-design soil delineation and remediation may be appropriate..."

Section 7.1.4 – Distribution of COCs in Soil

DEP RI Comment #13. See GES's RIR Comments concerning the depiction of sample depth intervals in Figures 8a – 16. Please provide a response and/or modify the figures accordingly.

***ROUX'S RESPONSE:* Section 2.2 of the RIR states: "As requested by DEP, the Bishop Tube Project Team has included an assessment of existing soil data (largely collected by DEP or others under contract to DEP) in this RIR. The soil data are compared to SHSs as benchmarks for DEP to assess the nature and extent of soil contamination on the Property. It is anticipated that soil conditions for all COCs may be addressed in the future by CDP." Further evaluation of soils conditions is outside the scope of the BT Team's obligations under the CO&A.**

To address this comment, a footnote will be added to the first sentence in Section 7.1.4, as follows: "DEP believes that additional assessment of soils data in the future might identify specific depth intervals that warrant supplemental soil delineation sampling. Such supplemental soil delineation sampling, if warranted, can be incorporated into future pre-design activities as part of Property redevelopment. For example, DEP has identified that supplemental horizontal delineation to the east of soil boring locations LAG-06, LAG-07, and ARPSA03 may be necessary during pre-design activities for a soil remedy in conjunction with Property redevelopment."

This response is intended to address this comment as well as DEP Comment #14 (below).

DEP RI Comment #14. See GES's RIR Comments regarding horizontal delineation of Contaminants of Concern ("COCs") in soil within the north east portion of the Site, between the Plant 8 building and Little Valley Creek. Additional soils delineation may be necessary during pre-design investigation activities.

To address DEP comments 13 & 14: Please modify the proposed footnote as follows: "DEP believes that additional assessment of soils data in the future might identify specific depth intervals that warrant supplemental soil delineation sampling. Such supplemental soil delineation sampling, if warranted, can be incorporated into future pre-design activities as part of future redevelopment and/or response activities. For example, DEP has identified that supplemental horizontal delineation to the east of soil boring locations LAG-06, LAG-07, and ARPSA03 may be necessary during pre-design activities for a soil remedy in conjunction with future redevelopment and/or response activities."

In addition, please revise all text referencing CDP or the property owner to say additional delineation would be performed by the remediator.

Section 7.2.4.3 – CSIA Findings and Conclusions

DEP RI Comment #15. Compound-Specific Isotope Analysis ("CSIA") data should be described and evaluated for all sampled wells rather than only within the discussion of potential additional sources.

ROUX'S RESPONSE: As agreed with DEP, no response is required here because DEP's CSIA comments and the BT Team's response are addressed in DEP Comment #40 below.

Please add a reference in this section to Section 10.0 which will be modified in response to comment #40 below to bolster the evidence regarding PCE degradation. Please provide proposed text revisions to the DEP for review.

Section 7.2.4.3.1 – Identification of Additional Source(s) of CVOCs

DEP RI Comment #16. The text should describe the conditions which are conducive for PCE degradation and discuss evidence (or lack of evidence) of such conditions as a line of evidence for degradation of non-site related PCE as a source of TCE in downgradient wells.

ROUX'S RESPONSE: Natural attenuation of chlorinated ethenes, including PCE, in groundwater may involve one or more physical, chemical or biological mechanisms. The dechlorination of PCE to TCE typically occurs via reductive dechlorination and/or via abiotic reactions. The CSM

presented in the RIR provides evidence that CVOCs sourced from the area of MW-58a would be transported to the "downgradient wells" cited in the comment above. Furthermore, the CSIA data provided in the RIR, discussed below and in Comment #40, produce empirical evidence that TCE from an additional source is found in many of the same "downgradient wells" where PCE is observed (e.g., MW-58A, MW-32, MW-82B, and MW-84B).

The PCE observed near MW-58A (acknowledged by DEP in Comment #40), would produce TCE as its first daughter product by either biotic or abiotic degradation. The degradation of PCE would introduce a different source of TCE with unique □$_{37}$Cl and □$_{13}$C relative to the TCE released on the Property. An evaluation of this unique isotopic signature was discussed in the RIR (see pgs 60 ff.) and is briefly discussed below. Figure 25A in the RIR depicts □$_{37}$Cl vs. □$_{13}$C for TCE and demonstrates the following:

- ***Trend Line 1 on Figure 25A identifies a group of wells where the data demonstrate isotopic enrichment of □$_{37}$Cl vs. □$_{13}$C for TCE. These wells are generally on the Property and downgradient of the Property.***
- ***Trend Line 2 identifies several wells where the □$_{37}$Cl vs. □$_{13}$C for TCE does not fit with the isotopic enrichment data associated with Trend Line 1. MW-58A and downgradient wells MW-32, MW-82B, and MW-84B have a □$_{37}$Cl vs. □$_{13}$C trend for TCE which is off-set from Trend Line 1. Based on the observed introduction of PCE near MW-58A, which has degraded to TCE, an isotopically distinct trend is observed (see "Trend Line 2" on Figure 25A).***

In summary, there are multiple lines of evidence using both the PCE to TCE concentration ratios and CSIA results that demonstrate that the PCE and some portion of the TCE in MW-58A and downgradient wells are derived from sources not associated with the Property. Because a complete discussion is already provided in the RIR and because DEP's CSIA comments are more clearly described later in its comment letter (see DEP Comment #40), no text changes to the RIR are warranted to address this comment.

Please revise the summary sentence in the RIR to read as follows: "In summary, the evaluation of the PCE to TCE concentration ratios and results of CSIA analysis indicate that the PCE and some portion of the TCE in MW-58A and downgradient wells are derived from sources not associated with the Property."

Section 7.2.6.1 – VOCs

DEP RI Comment #18. The second bullet on page 65 indicates that Methylene Chloride should not be considered a COC because it is a "common laboratory contaminant." Methylene Chloride has been used in many industrial processes, including metal cleaning and degreasing. Were current results that exceeded the Residential Used Aquifer (RUA) standard 'B' qualified by the laboratory? Is there additional evidence to support the claim?

ROUX'S RESPONSE: ***See the response to Comments #17A and #17C, above.***

DEP and GES disagree with certain assertions related to de minimis concentrations for 1,4-dioxane and methylene chloride but agrees with the proposal to address each in the risk assessment. With regard to inclusion of the additional COCs, Roux has agreed to evaluate them (with reservations). This evaluation will occur throughout the revised RIR. DEP requests that Roux provide the proposed text for review along with references to where the revisions will be made in the RIR.

Section 7.2.6.3 – Metals

DEP RI Comment #20. A review of data tables presented with the 2019 and 2015 RI Reports suggests that thallium was not analyzed in samples collected by Roux. What is the explanation for this apparent lack of analysis? Explain how thallium has been characterized sufficiently.

ROUX'S RESPONSE: ***As described in Section 7.1.4.3 of the RIR, the soil results for thallium are de minimis in terms of concentration relative to the most stringent soil standards. For the 108 soil samples analyzed for thallium at this Site, this compound exceeded the Residential Direct Contact ("RDC") Medium-Specific Concentration ("MSC") of 2 mg/kg in only one sample (SDA04 [3-4] from 2001), at a concentration of 2.1 mg/kg with a "B" qualifier indicating that the reported value is less than the Contract Required Detection Limit but greater than the Instrument Detection Limit. None of the 108 soil samples exceeded the Residential Used Aquifer ("RUA") Soil to Groundwater ("SGW") MSC of 14 mg/kg or Non-Residential Direct Contact ("NRDC") MSC of 32 mg/kg (surface soil, 0 to 2 feet) or 190,000 mg/kg (subsurface soil, 2 to 15 feet), respectively.***

As described in Section 7.2.6.3 of the RIR, for the 33 permanent monitoring wells sampled for thallium in groundwater, thallium exceeded the RUA/NRUA MSCs of 2 ug/l in only four wells and all exceedances were from a single July 2003 sampling event. As also noted in the RIR, the July 2003 results were not reproducible, i.e., all sampling events prior and subsequent to the July 2003 sampling event were non-detect for thallium. The groundwater results for thallium are provided on the tables in Appendix B of the RIR and the four exceedances are depicted on Figure 35 of the RIR.

As agreed by DEP, the soil and groundwater data do not indicate a release of thallium to these media at the Property. Thallium was analyzed historically by Baker and as part of DEP's 2018 AOC investigation and the data were screened by Roux as part of the RIR. The thallium results are presented in Appendices A and B of the RIR for soil and groundwater, respectively. These results indicate that thallium was sufficiently characterized and is not a COC for the Site. For these reasons, analyses for thallium were not completed by Roux in subsequent phases of the investigation. No modifications to the thallium findings contained in the RIR are necessary.

DEP disagrees with Roux's determination that no modifications to thallium findings are necessary. DEP's meeting notes indicate that additional explanation would be provided. DEP believes that thallium could be included in future groundwater and pre-design soil sampling events to confirm its absence. Please provide proposed language for review.

Section 7.3 – Vapor Intrusion Investigation

DEP RI Comment #22. Please review and respond to the GES comment under header "Vapor Intrusion Investigation" (GES's RIR Comments, pg. 11), regarding development of a conceptual site model for the VI pathway.

ROUX'S RESPONSE: ***The CSM for this Site is described in 10 pages (Section 11.0 of the RIR) and has evolved and been refined over time. Section 11.0 describes Source Areas (11.1), Geology and Hydrogeology (11.2), the Nature and Extent of COCs by Media (11.3), and Potential Exposure Pathways (11.4). Although specifically directed by DEP not to define IA as a "media" under Act 2, Roux does address the VI pathway under the groundwater media (see Section 11.3.2.4 – Vapor Intrusion) and under the pathway assessment (see Section 11.4.4 – Potential Inhalation Exposure to VOCs in Indoor Air).***

While the BT Team believes the necessary documentation already exists in the CSM and throughout the RIR to adequately address the VI pathway, we have agreed to add additional text to

the CSM related to VI pathway. The BT Team intends to insert this supplemental text in Section 11.4.4 – Potential Inhalation Exposure to VOCs in Indoor Air. As agreed with DEP, the expanded text will highlight BT Team's use of empirical indoor air sampling data to directly assess current potential VI exposure pathways. In addition, the supplemental text will indicate that future monitoring may be warranted to address future changes in Site conditions, inclusive of new development in areas of the Site that are currently undeveloped.

Please propose the supplemental text that you intend to insert into Section 11.4.4. In Section 7.3 please summarize that supplemental text and add a reference to Section 11.4.4.

Section 9.1 – Groundwater Vapor Intrusion Cumulative Risk Assessment

DEP RI Comment #24. Please review and respond to the first bullet under the header "Vapor Intrusion Assessment – Groundwater Vapor Intrusion Cumulative Risk Assessment" (GES's RIR Comments, pg. 11), regarding evaluation of overburden wells only. The groundwater fate and transport modeling effort was intended, in part, to account for discharge of groundwater from the bedrock to overburden in areas downgradient of the former Bishop Tube property (as observed near Little Valley Creek, at the Site).

***ROUX'S RESPONSE:* DEP clarified this comment as follows:**

- ***Where an overburden aquifer overlies a bedrock aquifer, there is no need to evaluate the potential VI threat to an overlying occupied structure from the bedrock aquifer. This is consistent with the VI TGM, earlier discussions with DEP and the overall analysis provided in the RIR.***
- ***However, where an overburden aquifer is absent, VOCs in the shallow bedrock aquifer (i.e., the first encountered or shallowest groundwater) shall be evaluated for the potential VI threat to an overlying occupied structure (subject to separation distance and other VI considerations).***
- ***Under these data handling protocols, Roux will assess the potential for VI to overlying occupied structures using the groundwater quality for two bedrock monitoring wells (MW-81 and MW-83) where there is no overburden aquifer and other relevant conditions exist. Applicable text, tables, figures and appendices will be revised to address DEP's comment as, described in more detail in the response to DEP Comment #25A, below.***

The proposed revision addresses only locations where no groundwater is present in the overburden above the contaminated area. Please add the following footnote to address potential areas of groundwater discharge: "The Groundwater Vapor Intrusion Cumulative Risk Assessment evaluated all first water-bearing zones; however, the presence of potential discharge locations to surface water that may be connected to the deep bedrock aquifer are unknown and, therefore, were not evaluated."

DEP RI Comment #25. Please review and respond to the second bullet under the header "Vapor Intrusion Assessment – Groundwater Vapor Intrusion Cumulative Risk Assessment" (GES's RIR Comments, pp. 11 - 12), regarding screening data presented in Tables 25 and 26 of the RIR.

<u>ROUX'S RESPONSE:</u> After discussion with DEP, it was evident that a response to this comment a) will necessarily incorporate responses to several other comments and b) will be addressed most effectively by updating both the groundwater VI screening and the groundwater VI cumulative risk assessment.

As noted in response to Comment #22 (above), the BT Team will expand the discussion of the VI pathway in the CSM to include a) an emphasis on BT Team's use of empirical indoor air sampling data to directly assess current potential VI exposure pathways and b) clarification that future monitoring may be warranted to address future changes in Site conditions that may occur, inclusive of potential new development in areas of the Site that are currently undeveloped.

As described in the RIR, some localized areas of the Site have a depth to groundwater of less than five feet below ground surface ("bgs") or below the lowest level of an occupied structure. Additionally, some properties have sumps in their basements, providing potential preferential pathways for VI. For these reasons, and with substantial discussion with DEP over the course of the VI investigations, the BT Team collected empirical IAQ data for its VI investigation.

Comment #25A notes that groundwater screening values ("SV GW") are not available for use if there are actual or potential preferential pathways or if groundwater is less than 5 feet below foundation level. To address this comment, the BT Team will revise its shallow groundwater vapor intrusion screening to incorporate the following criteria:

- ***Where detected in shallow groundwater, the 11 VOCs described in the response to Comment #17A (above) will be added to the list of COCs to be screened.***
- ***Where an overburden aquifer is absent and shallow bedrock monitoring well data represent the shallowest groundwater (as clarified in response to Comment #24, above) these shallow bedrock monitoring wells will be added to the list of wells to be screened.***
- ***In addition to 1/10th of the SV GW, the BT Team will add 1/10th of the GW MSCs as secondary screening criteria on Tables 25 and 26. Exceedances of the more stringent of the two criteria will be carried forward to the groundwater vapor intrusion cumulative risk assessment.***
- ***These modifications address DEP Comment #25A and several other comments as cited above or below.***

Revising the shallow groundwater vapor intrusion screening approach will require:

- **Revised screening of the groundwater database;**
- **Preparation of revised Tables 25 and 26;**
- ***Preparation of a revised Appendix O (including an estimated 120 Groundwater VISL Calculator Sheets and a new results summary table);***
- **Preparation of revised Figures 43 and 44; and**
- ***Revised text where necessary to describe the revised protocol and modify any findings or conclusions……***

…. DEP clarified that this comment relates to the screening completed for Tables 25 and 26. The revised screening to be completed in response to DEP Comment 25A (above) will address Comment #25B.

The Site COC list employed in preparing Tables 25 and 26 was previously agreed with DEP3. While the BT Team is herein agreeing to expansion of the list4 (see response to Comment #10 above), should this expanded COC list result in any remedial obligations that would not otherwise be required (e.g., background MTBE found in groundwater), then the BT Team reserves its right to demonstrate why one or more COCs are not Site-related.

Comment #25B suggests, in referring to 2016 correspondence with DEP, that the BT Team followed an outdated version of the VI TGM. In fact, the BT Team proactively followed a draft version of the VI TGM, guided by DEP's representation that the 2016 draft VI TGM would be

finalized largely unchanged. This proved to be correct: the portion of the current VI TGM cited in Comment #25Bis unchanged from the draft version considered by the BT Team in 2016.

DEP clarified that indoor air contaminants not derived from vapor intrusion of Site COCs (e.g., indoor storage of combustion engines or the presence of an indoor heating oil tank) are not subject to inclusion in indoor air cumulative risk calculations or potential mitigation measures.

Consistent with our discussions with DEP, the BT Team agreed that RIR changes to address Comment #25B are as follow:

- ***Footnote #84 will be revised to read "As clarified in the Bishop Tube Project Team's letter dated May 13, 2016, and as confirmed by DEP [during the December 19, 2019 meeting], only Site-related [COCs] need to be considered as part of the cumulative risk assessment for VI." [Note that only the portions in brackets are new.] As noted above, the shallow groundwater vapor intrusion screening will include the additional 11 VOCs, although it has not been established that these are Site COCs. The BT Team has conservatively elected to treat them as such in the interest of expediting completion of the RI/FS process and obtaining an Act 2 liability release that includes them. The BT Team reserves its right to demonstrate why one or more COC is not Site-related.***

25A. Please provide the additional details related to the screening of the groundwater database, the revised Tables 25 and 26, the revisions to Appendix O, the revised figures, and any proposed text revisions.

25B. To clarify the handling of non-COCs detected in indoor air samples, please add a footnote and table notation that states that the inherent risk due to background air contaminants is not included in the indoor air cumulative risk calculations for the Site-related COCs.

Section 9.2 – Indoor Air Vapor Intrusion Cumulative Risk Assessment

DEP RI Comment #27. Please review and respond to the second and third bullets under the header "Vapor Intrusion Assessment – Indoor Air Quality Criteria" (GES's RIR Comments, pg. 10), regarding evaluation of cumulative risks associated with other exposure pathways at the former Bishop Tube property, 54 Conestoga Road, and other properties within the Site's boundary.

ROUX'S RESPONSE: ***This comment was clarified to be about the 54 Conestoga Road property and whether the EPA RSL for carcinogenic values based on a 10-5 cancer risk should be employed. Selecting this RSL for 54 Conestoga Road was appropriate because VI is the only potentially complete exposure pathway for this property, as explained in the RIR and below.***

In the RIR the EPA RSL for carcinogenic values based on a 10-5 cancer risk was used for one compound, vinyl chloride. The screening value used was 1.7 ug/m3 (see Table 27 of the RIR). All of the vinyl chloride results shown on Table 27 for 54 Conestoga Road were non-detect with a reporting limit ("RL") of 0.51U ug/m^3 and a method detection limit ("MDL") of 0.097 ug/m^3 (see analytical data packages in Appendix C of the RIR). Thus, vinyl chloride properly screened out of the cumulative risk assessment in accordance with Section IV of the TGM.[5]

The BT Team fundamentally disagrees with GES that because a POET system might fail then drinking water must be a current, complete path of exposure at 54 Conestoga Road. Properly designed, operated and maintained POET systems are an effective engineering control used for pathway elimination in numerous remedial actions. Similarly, many public water supply systems treat their water prior to distribution. By extension, all treated public water supplies may have treatment failures and would also be a presumed path of exposure. The GES position is not defensible.

Regarding GES' comment about a potential outside spigot, Roux has never observed one, but we cannot state with complete confidence that such a spigot does not exist. Since DEP has been attempting to schedule a meeting at 54 Conestoga Road with the new owner, DEP and Roux, an inspection at that time will address this issue. If a spigot is identified during the inspection and it is confirmed to bypass the POET, actions to address this risk will be proposed in revisions to the FS…….

…. The intent and meaning of this comment was clarified as identifying potential concerns related to unique conditions on the Bishop Tube Property itself (e.g., additional exposure pathways such as a soil direct contact pathway) and/or potential future changes in land use (and more specifically, changes in groundwater use). On December 19, 2019, a consensus was reached among DEP, GES and the BT Team that changes in groundwater use from future development would require reassessment of the VI pathway and potentially of IAQ conditions at that time. The FS Report contemplates that each remedial alternative would include a long-term monitoring program which would require regular assessment of potential changes in land use (inclusive of potential changes in groundwater use). Potential changes in groundwater use of interest with respect to potential VI exposure would be installation of groundwater extraction wells either within the area of the Site or outside the Site if the extraction rates could affect conditions beneath the Site.

- ***The BT Team proposes the following language to address DEP's request for additional language in this section similar to that added in response to Comment #26: "In the context of potential future material changes in groundwater use or conditions (either due to new extraction wells or some other material change in groundwater use or conditions) it may be necessary to assess or reassess whether VI is an actual exposure pathway producing an actual IAQ concern. If such future changes in groundwater use or conditions were to occur, a receptor evaluation may be necessary. Furthermore, as part of a future remedial action performance monitoring plan to demonstrate the continued absence of IAQ concerns, supplemental IAQ monitoring may be warranted for 54 Conestoga Road and/or other properties." This proposed wording is also relevant to several related comments below.***

To provide the proper supporting documentation for pathway elimination and justify the use of the 10^{-5} cancer risk for vinyl chloride, please propose text describing the routine operation and maintenance procedures, sampling frequency, and effectiveness of the POET system at 54 Conestoga Road.

Please note that it is not appropriate to compare a private water well that is equipped with a POET system to a regulated treated public water supply. Public water systems are regulated by DEP under the authority of PA's Safe Drinking Water Act.

DEP RI Comment #28. Please respond to the three comments under the header "Vapor Intrusion Assessment – Indoor Air Vapor Intrusion Cumulative Risk Assessment" (GES's RIR Comments, pp. 12 – 14), regarding data selection, temporal variability, and overall assessment of the pathway.

ROUX'S RESPONSE: ***Consistent with our discussions with DEP, the BT Team and DEP agreed that although exposure pathways are not currently complete, future changes in conditions could potentially result in complete exposure pathways. As agreed with DEP, a) current data screening criteria have been clarified and modified and b) language to describe potential future VI exposure risk will be added to the RIR. The BT Team has acknowledged that the selected remedial action should include a) monitoring for changes in land use (i.e., new or modified occupied structures), b) monitoring for changes in groundwater use or conditions, and c) continued monitoring of certain currently occupied structures (e.g., 54 Conestoga Road) to ensure continued protectiveness. The changes proposed and issues addressed in response to these and other***

related comments are provided in the responses to DEP Comments #23, 24, 25A, 25B, 26, 27A, and 27B, above.

The reason for selecting specific sampling events for the IAQ data utilized in the indoor air vapor intrusion cumulative risk assessment should also be provided to clarify why data were selected during the same heating season, a recent timeframe (i.e., multiple heating seasons within recent years), or from historical timeframes. Please provide the proposed text modifications for DEP review.

Section 10.0 Groundwater Fate and Transport Analysis/Appendix S – Groundwater Modeling Report

DEP RI Comment #39. Refer to GES's RIR Comments discussion under the header 'Delineation of Impacts to Groundwater' (GES RIR Comments, pages 3 - 8) and respond to the opinions outlined in the three bullets regarding the presentation of groundwater modelling results (GES's RIR Comments, pp. 7 – 8).

***ROUX'S RESPONSE:* DEP's comment above is two-fold: first, whether a boundary condition should be included for the north – south preferential groundwater transport zone (i.e., surficial expression as the tributary to LVC) immediately east and just north of the Property; and second, explanation of simulated groundwater transport laterally beneath residential properties to the east of the Property. These two questions are discussed below.**

First: The primary objective of the fate and transport modeling was to provide an additional line of evidence to estimate the point at which TCE complies with its groundwater MSC now and in the future (i.e., define the downgradient Site boundary) in the distal portion of the plume (i.e., to the northeast of wells MW-81 and MW-83). Including a hydraulic boundary along the north-south trending tributary to LVC would compromise the conservative nature of the model by restricting the quantity of TCE mass leaving the Property. As the model is currently constructed, there is no boundary condition that limits the quantity of TCE mass that leaves the Property. Accordingly, the model construct does not restrict the quantity of TCE that can travel to the northeast and contribute to the distal extent of the simulated plume. As agreed, the BT Team will not be adding a north-south groundwater discharge boundary condition. (Additional information related to this subject is provided in response to DEP Comment #47.)

Second: Empirical data, not model output, were used to establish the lateral extent of the Site to the east and west. The 5 ug/l TCE contour simulated by the model to the east of the Property is produced as a function of two factors: 1) intentionally eliminating a known groundwater discharge boundary on the eastern side of the Property (the tributary to LVC) to conservatively simulate unrestricted TCE transport from the Property to the downgradient plume (as noted above); and 2) numerical dispersion generated by mathematical computations in the model.

Consistent with our discussions with DEP, the BT Team agreed that specific language will be added to the RIR to clarify the intent, use and simulated results of the model to address this comment. The BT Team proposes the following:

- ***Revise the text of the RIR clarifying the construction and intent of the model (as described above);***
- ***Revise the text of Appendix S (Groundwater Modeling Report) a) clarifying the construction and intent of the model in Section 2.0 (as noted above), and b) adding a note to the findings of the model (Section 8.0 of Appendix S) stating that the construct of the model was formulated to conservatively answer questions regarding the location of the distal/leading edge of the TCE plume by sacrificing the accuracy of lateral plume boundary simulations. The lateral extent of the TCE plume and Site was defined by empirical groundwater quality data in the context of the Conceptual Site Model; and***

- ***As noted under the response to DEP Comment #47, a data gap regarding groundwater quality in the area immediately to the northeast of the Property is expected to be addressed in the future as part of pre-design activities……***

…. The sensitivity analysis was consistent with the Modeling WP. The results were not surprising: adjusting certain values lengthens or shortens the simulated distance of the downgradient extent of the Site.[8] Clarification of the selected values for retardation coefficient and porosity is provided below:

- ***The value selected for the TCE retardation coefficient was principally informed by an analysis of temporal and spatial changes in groundwater quality data downgradient from the Property. In the context of these data, a retardation coefficient of 9 best approximated matrix diffusion and other sorption processes that are active in the bedrock aquifer. As noted in Section 6.1 of Appendix S of the 2019 RIR, varying the fraction of organic carbon in the aquifer can produce values for retardation coefficient between 4 and 16. As a point of comparison, the calibrated/selected value falls between common values for equivalent porous media.***
- ***The value for porosity was based on peer-reviewed literature for fractured bedrock.***

DEP expressed that the purpose of the comment was to identify that a further modeled downgradient extent for TCE in groundwater exceeding 5 ug/l (under the more conservative parameters used for the sensitivity analysis) could result from adjusting certain parameters (e.g., retardation coefficient) and this might result in a potential VI exposure at the downgradient edge of the plume. DEP requested that the BT Team consider output from the model sensitivity analysis to determine whether simulated TCE concentrations would result in a hypothetical exceedance of the VI pathway in the building located at 50 Morehall Road. This will be addressed in the revised RIR, as follows.

- ***The text of Appendix S (in the sensitivity analysis) will be updated to evaluate a hypothetical VI pathway (using the VISL calculator) between the simulated groundwater TCE concentrations and the building at 50 Morehall Road. This supplemental analysis will be based on the simulated distribution of TCE (developed during model sensitivity analysis) that resulted in the downgradient extent of the TCE plume extending an additional 236 feet…***

….. The principal objective of model calibration was to establish the best fit between simulated and observed concentrations of TCE in nine monitoring wells distributed across the Site (as outlined in Section 6.1 of Appendix S of the 2019 RIR). Model calibration should not be skewed to conform with any one individual data point but rather achieve the best fit considering all calibration targets (i.e., for all nine monitoring wells in aggregate). As discussed with DEP, the calibration of the model is appropriate as presented in Appendix S of the RIR. Accordingly, further modifications to model calibration are not required in the RIR.

The proposed text revisions appear to address DEP's comment; however, Figure 46 is misleading and should be revised to differentiate between the manually interpreted and simulated Site boundary. Please provide the proposed text revisions and a revised figure for review.

Section 11.3.2.5 Natural Attenuation

DEP RI Comment #44. It is recognized that concentrations have decreased from previous sampling results in some down-gradient wells. However, a statistically significant data set for groundwater does not currently exist that can be used to establish trends. Trend analysis should be qualified in the text.

ROUX'S RESPONSE: ***A total of 34 wells were included in the Mann-Kendall statistical evaluation for TCE and TCA provided in Appendix B and discussed in Sections 7.2.7 and 11.3.2.5. All wells included in this analysis were sampled during at least 8 events (with 2 exceptions) which is sufficient for determining trend using this method. Trend assessment using this statistical test was presented as one of several lines of evidence to identify stable or decreasing trends in the RIR.***

Additional monitoring of groundwater quality will be necessary in the future and was contemplated and included in the remedial alternatives outlined in the FS. Such future monitoring is expected to confirm the observed stable or declining trends described in the RIR. As requested by DEP and discussed in Comment #21, the BT Team agreed to replace the term "demonstrated" with "probable" or "probably", as applicable in the text of the RIR. Based on a preliminary search of the RIR text, this will result in adjustment to the language in at least five sections of the RIR: three in Section 7.2.7; one in Section 11.3.2.5; and one in Section 12.0.

In addition to the proposed text modifications, a footnote or text addition should note that additional data collection and statistical analysis will be required to account for temporal variation in groundwater analytical data. The Mann--Kendall test does not account for temporal variability. Please propose text modifications and provide them for review.

Section 11.3.3 – Surface Water and Sediment

DEP RI Comment #46. Please review and respond to the sixth bullet under "Additional Groundwater Comments" (GES's RIR Comments, pg. 9), which recommends tracer testing and evaluation of base flow conditions.

ROUX'S RESPONSE: ***Groundwater quality within the Site has been sufficiently characterized through the collection of empirical data. Further, multiple lines of evidence, including a) groundwater trends; b) CSIA results; and c) CVOC ratios, were used to establish a comprehensive and sound CSM. The TCE fate and transport model presented in the RIR was based on, and further supported, these lines of evidence. In addition, the stream studies conducted established points of groundwater discharge to surface water at the Site (i.e., gaining and losing segments). These data obviate the need for a tracer study as suggested by GES.***

DEP agreed that a tracer test was not necessary for this Site, principally because it would not alter the conclusions of the RIR. It was also agreed that addition of a tracer in the amendment solution for certain proposed remedies, if selected, could be conducted in the future, and was contemplated and included in the pre-design testing of certain remedial options outlined in the FS.

Please provide FS text modification for review and indicate which sections will be modified

Attached for your reference is a document which details GES's technical review of the response to comments document.

We request that Roux provide all of the proposed text revisions, figures, and/or tables no later than 30 days of the date of this letter. Based on prior discussions with Roux, we assume that most of your proposed text revisions are ready for DEP review. We are not seeking responses to each of DEP's comments; we are seeking to finalize the RIR.

If you have any questions or wish to schedule a technical discussion, please feel free to contact Dustin Armstrong at darmstrong@pa.gov or by phone at 484.250.5723.

Sincerely,

/s/ Dustin A. Armstrong Dustin A. Armstrong Digitally signed by Dustin A. Armstrong Date: 2020.06.11 17:28:00 -04'00'

/s/ Richard M. Staron Richard M. Staron Digitally signed by Richard M. Staron Date: 2020.06.11 16:03:11 -04'00'

Dustin A. Armstrong
Environmental Protection Specialist
Environmental Cleanup and Brownfields

Richard M. Staron, P.G.
Professional Geologist Manager
Environmental Cleanup and Brownfields

Enclosure

cc: Mr. Patterson
Mr. R. Patel
Ms. McClennen
Mr. Hartzell, Esq.
Mr. Bram, Esq.
Mr. Nagel (East Whiteland Twp. Manager)
East Whiteland Twp. EAC
Re