September 4, 2015

Ms. Michelle Kaysen
USEPA Region 5, Mail Code LU-9J
77 West Jackson Boulevard
Chicago, IL 60604

RE: Final Vapor Collection System Operation, Maintenance, Monitoring Plan, Hartford Petroleum Release Site, Hartford, Illinois

Dear Ms. Kaysen:

On behalf of Apex Oil Company, Inc. (Apex), Trihydro Corporation (Trihydro) is submitting this final *Vapor Collection System Operation, Maintenance, and Monitoring Plan, Hartford Petroleum Release Site, Hartford, Illinois* (*Vapor Collection System OMM Plan*). Trihydro submitted the draft *Vapor Collection System OMM Plan* to the United States Environmental Protection Agency (USEPA) on June 10, 2015. Subsequently, the USEPA, Tetra Tech (USEPA consultant), Apex, and Trihydro met via teleconference on July 7, 2015 to discuss the *Vapor Collection System OMM Plan* and the USEPA provided written comments in correspondence dated July 24, 2015. Apex provided responses to the comments on August 20, 2015 and the USEPA indicated via email on August 31, 2015 that the responses were acceptable and requested that Apex finalize the *Vapor Collection System OMM* per the response to comments. This final *Vapor Collection System OMM Plan* incorporates the response to comments. In addition, as requested by USEPA, the comments and responses are provided below.

SVE OMM PLAN - GENERAL COMMENTS

USEPA General Comment No. 1: It appears that one of the most important factors limiting soil vapor extraction (SVE) system performance is the occlusion of the SVE well screens by groundwater. Current remedy practice is to utilize a "stinger" to evacuate liquid from an SVE well, which lowers the groundwater level to a depth below the top of the well screen. The evacuated liquid is then trapped inside the SVE vapor collection piping until the vapor flow becomes obstructed. When vapor flow obstruction is observed, the liquid is purged from the vapor collection piping via a process referred to as “line sweeping”, and directed to storage tanks, from which it is periodically disposed of off site. The daily liquid disposal volumes are reported to range from 2,000 to 6,000 gallons. This liquid management practice is logistically difficult and presumably costly. A more effective method of liquid disposal might increase the volumes of liquid that can be removed from the SVE wells (for example, on site treatment and discharge). Increasing the liquid handling capacity will allow greater number of SVE wells to be maintained in an operational state and thus will increase contaminant mass removal rates and the overall SVE system effectiveness. It is recommended that Apex consider the long-term implications of water management and increasing the maximum limit capacity in the context of transitioning the SVE system to

a component of the final remedial strategy. Any changes made to the SVE Treatment System may require a Permit Modification from the Illinois Environmental Protection Agency.

***Apex Response to USEPA General Comment No. 1*:** Apex agrees that the means of managing "evacuated liquid", which generally consists of recovered groundwater that is extracted using the SVE stingers is difficult and costly. However, it is important to clarify that recovered groundwater does not become "trapped inside the SVE vapor collection piping until flow becomes obstructed" but rather is continuously conveyed through the SVE transmission piping to the Thermal Treatment Unit (TTU) on the Premcor facility, where it is stored in a series of frac tanks with a combined capacity of approximately 55,000 gallons.

Since the system was not designed to extract groundwater, the transmission lines were installed by the Hartford Working Group around existing utilities and care was not taken to ensure proper grade for groundwater to flow continuously to the TTU. As such, periodically, the transmission lines become partially obstructed with groundwater, particularly within low lying sections of the system. However, at no point does the transmission system beneath the Village of Hartford become obstructed with groundwater such that vapor extraction is disrupted. Line sweeping has been routinely performed to enhance vapor and groundwater recovery as needed based on vacuum measurements within the vapor collection system. Line sweeping has historically been performed every two weeks.

Apex has further evaluated the need for routine line sweeping. The frequency at which line sweeping enhances system performance depends on many factors including precipitation rates and groundwater elevations within the shallow hydrostratigraphic units (e.g., North Olive and Rand strata) where the majority of the SVE wells are installed. Therefore, Apex is proposing to conduct line sweeping on an as-needed basis dependent on reductions in the system vacuum. Conducting bi-weekly line sweeping does not improve system performance if the vacuum is at or near its capacity (typically between 150 and 160 inches of water) and should only be conducted when vacuums fall below this range. The first two sentences of Section 4.1 of the *Vapor Collection System OMM Plan* will be revised accordingly.

It is important to note that while the current water handing procedures can be cumbersome, the SVE system remains effective at preventing vapor intrusion and has resulted in the recovery of more than one million gallons of volatile petroleum hydrocarbons since 2004. There is currently no means for Apex to construct a groundwater treatment system on the Premcor facility. It is also not feasible to discharge recovered groundwater directly to the City of Wood River Wastewater Treatment Plant through the Village of Hartford combined sewer system. As part of the multiphase remedy framework process, Apex will continue to collaborate with the USEPA regarding alternative options for managing groundwater generated within the SVE system.

USEPA General Comment No. 2: The majority of the 84 currently operational SVE wells are equipped with stingers; 50 wells have Viton® Seal stingers; 21 wells have straw stingers; and 13 wells have flow tube stingers. Of these, only straw stingers allow for rapid and simple stinger depth adjustments; control over the liquid evacuation process; direct wellhead vacuum and well liquid level measurements; and

potential evacuated liquid separation and volume measurements. Technical limitations of Viton® Seal stingers and flow tube stingers seem to be clearly recognized. It is recommended that Apex develop a long term program designed to replace all stingers with straw-type stingers.

> ***Apex Response to USEPA General Comment No. 2*:** Apex agrees that the Viton® stingers and flow tubes have many limitations. There are currently 9 Phase I and II wells and 41 Phase III wells with Viton® stingers, as well as, 13 Phase I and II wells with flow tubes. Replacing the Viton® stingers and flow tubes with straw stingers within the Phase I and II wells will require the entire vault and wellhead components to be removed and replaced as there is not adequate space to install a tee needed to connect the straw stinger to the transmission system. While the Phase III wells currently have a tee installed on the transmission line that would allow for connection of a straw stinger, the tee is located on the downstream side of the Venturi flow meter, which would prevent measurement of the flowrate during recovery using the straw stinger. Therefore, the wellhead configurations will also need to be modified so that the tee is positioned upstream of the Venturi flow meter. Apex is currently evaluating the costs and benefits associated with such modifications.

USEPA General Comment No. 3: Wellhead vacuum levels for the wells with stingers may not be representative of the actual wellhead vacuum inside an SVE well due to friction losses in the stinger tubes. This can be especially pronounced when stingers evacuate liquid from a well. Proper connection locations for vacuum measurement tubes are as follows: below Viton® seal for wells with Viton® stingers; upstream of stinger tube connection to the main vapor line for wells with straw stingers; and below 4-to-2 inch transition for wells with flow tube stingers. It is recommended that Apex develop a long term program to install vacuum measurement tubes in the recommended locations.

> ***Apex Response to USEPA General Comment No. 3*:** Apex agrees with these recommendations and will evaluate changes in the location where vacuum measurements are collected in the context of other wellhead modifications, such as those described in USEPA General Comment No. 2.

USEPA General Comment No. 4: For technical clarity, it would be beneficial to include a block diagram to support the description of the thermal treatment system configuration and its connection with the SVE collection system in the SVE OMM Plan. It is recommended that Apex develop and include a block flow diagram in the SVE OMM Plan.

> ***Apex Response to USEPA General Comment No. 4*:** A block diagram along with detailed drawings are provided as Figures 2 through 5 within the routine operations, maintenance, and monitoring plan for the thermal treatment system, entitled *VCS Operation and Maintenance Manual* (URS 2014).

USEPA General Comment No. 5: Based on Figures B-1 to B-5, it appears that groundwater trigger values (as described in Section 2.1) are selected somewhat arbitrarily. It is recommended that Apex evaluate an approach to calculate groundwater triggers based on actual trend data between the removal rates and the groundwater elevations, or provide additional clarification on the methodology used.

***Apex Response to USEPA General Comment No. 5*:** The trigger elevations presented in Figures B-1 through B-5 were determined based on a qualitative comparison of cumulative vapor recovery rates to groundwater elevations within the Rand stratum. A quantitative approach for establishing trigger elevations for optimizing mass recovery using the SVE system is not possible as the system has been modified repeatedly over the past decade. More importantly operations within individual extraction wells have varied significantly over time. While the rate of mass recovery has been influenced by many factors, groundwater elevations in the Rand stratum appear to be the most predominant.

Recognizing these limitations and that optimization of the SVE system for the purpose of enhancing mass recovery has not previously been proposed for the Hartford Site, establishment of representative triggers is an essential first step. As discussed in Section 2.1 of the *Vapor Collection System OMM Plan*, the selection of the trigger wells was based on multiple criteria including: (1) screen interval comparable to the majority of the SVE wells, (2) spatial distribution across the Hartford Site, and (3) completeness of the fluid level monitoring history. SVE wells were excluded from consideration as trigger locations due to the difficulties in collecting representative fluid level measurements while vapor and groundwater are being extracted. Furthermore, many additional monitoring locations screened in the Rand stratum were not considered due to infrequent fluid level measurements.

As described in Section 2.1 of the *Vapor Collection System OMM Plan*, operation of the SVE system to enhance mass recovery will only be initiated once groundwater elevations have decreased below the trigger elevation in three of the five wells. This is to ensure that shallow groundwater elevations are stable across the Hartford Site and not affected by localized conditions (e.g., increase in groundwater recovery rates in a nearby TPE well). While a more expansive list of trigger locations may appear to provide a more thorough approach, the selected trigger wells and elevations are simply a preliminary indication of when ambient groundwater conditions may be optimal for enhancing mass recovery.

As discussed in Section 2.3, the SVE system will be operated to optimize mass recovery by increasing the vacuum and flow rate within individual wells containing elevated total volatile petroleum hydrocarbon concentrations. Extraction wells installed in the shallow strata with low concentrations will be temporarily shut down or cyclically operated. This allows for higher operating vacuums within wells with higher volatile hydrocarbon concentrations screened within both the shallow strata and the Main Sand stratum, including the multiphase extraction wells MPE-A001 through MPE-A005 (listed on Table 1) which are not considered part of the SVE system. Extraction wells installed into the LNAPL smear zone within the Main Sand will be operated as long as the water table remains below the screened interval and the flow rate is greater than 8 scfm.

It should be noted that Section 2.3 will be revised to identify that wells with volatile hydrocarbon concentrations greater than 100 parts per million by volume (ppmv) will continue to be operated for the purpose of optimizing mass recovery. A summary of the range of total volatile hydrocarbon concentrations measured in the extraction wells from 2014 through mid-2015 has been added to Table 1. This information provides a starting point for determining which wells could potentially be

operated once the initial trigger conditions are reached. However, as previously stated, the volatile hydrocarbon concentration measured at the time of achieving the trigger elevations will dictate whether a well is operated for the purpose of enhancing mass recovery. It is important to note that the proposed initial (groundwater trigger elevations) and secondary (total volatile hydrocarbons greater than 100 ppmv) criteria will be refined based on performance of the SVE system during low water table conditions.

USEPA General Comment No. 6: A description of the groundwater triggers in Sections 2-1 through 2-3 suggests that the groundwater elevations in the selected monitoring locations are the only criteria used to switch operations to the mass recovery mode (operations below trigger elevations). It is recommended that for each particular SVE well, Apex additionally consider contaminant removal rate in making a decision to switch from one mode of operation to another.

***Apex Response to USEPA General Comment No. 6*:** Please refer to Apex's response to USEPA General Comment No. 5.

USEPA General Comment No. 7: Vapor intrusion monitoring results (In-Home and/or Event Based) may suggest that certain SVE wells should be activated to prevent vapor intrusion. It is recommended that Apex add a statement to Section 2.3 to clarify that certain SVE wells could be switched to a vapor intrusion prevention mode if required by the vapor intrusion monitoring results.

***Apex Response to USEPA General Comment No. 7*:** As discussed in Section 2.0, of the *Vapor Collection System OMM Plan*, vapor intrusion events at the Hartford Site have been correlated with a rapid increase in the Mississippi River stage and advective movement of volatile petroleum hydrocarbons associated with increasing groundwater elevations (Trihydro 2014a). These hydraulic conditions are present over short intervals (generally less than one week) during infrequent events (often less than three events each year) typically occurring between March and June (Trihydro 2014c). Vapor intrusion events do not generally correlate with low groundwater elevations. The groundwater trigger levels that were summarized in Section 2.1, represent conditions when vapor intrusion events have not been observed. However, as a protective measure, the following text will be added to the end of the second paragraph of Section 2.3:

"If in-home monitoring results indicate that subsurface conditions are indicative of potential vapor intrusion within a specific structure (i.e., sub-slab concentrations greater than 150 ppmv), the SVE and TPE wells located near the affected structure will be operated in accordance with the procedures described in Section 2.2."

USEPA General Comment No. 8: SVE system flow balance is not completed. It is recommended that Apex compare the sum of all flows measured at the individual SVE wells with the total SVE system flow measured at the thermal treatment system to evaluate an overall accuracy of the SVE wells flow measurements.

***Apex Response to USEPA General Comment No. 8*:** SVE system flow balances will be completed and provided to the USEPA within the semiannual reports described within Section 5 of the *Vapor Collection System OMM Plan.* However, it should be noted that the current methods used to estimate flow rates within the individual extraction wells may result in significant uncertainty in the flow balance estimates, particularly with respect to flow rates estimated within the Phase I and II wells. Extraction flow rates are measured within the individual SVE wells either using a pitot tube or an in-line Venturi flow meter. Flow rate measurements estimated using pitot tubes are only performed within the Phase I and II extraction wells and involves the insertion of a pitot tube into the well casing. The pitot tube that has been used historically for these measurements is approximately 3-feet in length and designed for use within 4-inch ductwork (with the exception of well HSVE-004R, which utilizes an in-line pitot that is installed in the 4-inch transmission pipe within the well vault). In cases where a Phase I and II well has been retrofitted with a stinger, the flowrate measurement is collected by inserting the pitot tube into the stinger. Apex recognizes that these historical methods for collecting air flow measurements from the Phase I and II extraction wells (particularly with respect to those wells retrofitted with a stinger) results in inaccurate flow measurements. Apex is currently evaluating the costs and benefits of several alternatives for measuring flow rates within the SVE and TPE wells at the Hartford Site in the context of other wellhead modifications discussed herein, including the use of different pitot tubes or installing an in-line Venturi flow meter.

USEPA General Comment No. 9: SVE system contaminant mass balance is not completed. It is recommended that Apex calculate and report the contaminants (petroleum hydrocarbons and methane) removal rate for each SVE well, and that the sum of contaminant removal rates measured at the individual SVE wells then be compared with the total SVE system contaminants removal rate to evaluate an overall accuracy of the individual SVE wells measurements.

***Apex Response to USEPA General Comment No. 9*:** Contaminant mass balance for the SVE system will be completed and provided to the USEPA within the semiannual reports as described within Section 5 of the *Vapor Collection System OMM Plan.* It should be noted that the contaminant mass balance estimates are in part based upon the flow rate measured within the individual extraction wells. Therefore, contaminant mass balance estimates will be subject to similar limitations as those described for the SVE system flow rate balance within Apex's response to USEPA General Comment No. 8.

USEPA General Comment No. 10: Liquid volumes generated during sweeping events are important for an assessment of SVE functionality. It is recommended that Apex include liquid volumes generated during each line sweeping event in the semiannual memoranda.

***Apex Response to USEPA General Comment No. 10*:** The volume of groundwater recovered on a daily basis, including during line sweeping events, is currently provided to the USEPA on a weekly basis. This information will also be compiled and included within the semiannual reports described within Section 5 of the *Vapor Collection System OMM Plan*.

SVE OMM PLAN - SPECIFIC COMMENTS

USEPA Specific Comment No. 11: ***Section 1.0 INTRODUCTION,*** Page 1-1, Paragraph 2: *"Vapor recovery has reached asymptotic conditions in areas to the south and west of the site…"* Inclusion of this statement requires a demonstration be provided to substantiate it. Otherwise, it should be omitted.

***Apex Response to USEPA Specific Comment No. 11*:** The statement made in Paragraph 2 of Section 1.0 was previously demonstrated in a report provided to the USEPA in July 2010 by the RAM Group of Gannett Fleming, Inc., entitled *Evaluation of the Effectiveness of the Vapor Extraction System Along East Watkins Street*. This report documented that the SVE wells installed along East Watkins Street (located to the south and west of the site) had reached asymptotic conditions for mass recovery. The text will be modified to include a reference to the aforementioned report.

USEPA Specific Comment No. 12: ***Section 1.3 SVE SYSTEM CONFIGURATION,*** Page 1-3, Paragraph 1: Describe how the cross sections were created to show "the SVE wells relative to the lithology and historic LNAPL distribution…" Historic boring logs, CPT, LIF, etc.

***Apex Response to USEPA Specific Comment No. 12*:** The level of detail necessary for describing the nature of the cross sections shown on Figures 4 through 8 is outside of the scope of the *Vapor Collection System OMM Plan*. Details regarding the development of the three dimensional model and subsequent interpretation of the lithology and historical LNAPL distribution used to develop these cross sections is provided in the *Revised LNAPL Component to the Conceptual Site Model, Hartford Petroleum Release Site* (Trihydro 2014b), as well as, Apex's response to the USEPA comments regarding the three dimensional model dated July 23, 2015.

USEPA Specific Comment No. 13: ***Section 1.3 SVE SYSTEM CONFIGURATION***, Page 1-3, Paragraph (Para) 2: The text states that "*System vacuum is induced using four 75-horsepower blowers with a combined capacity of 3,200 standard cubic feet per minute (scfm)*." It is recommended that Apex include a corresponding vacuum level for the indicated flow capacity. Also, it is recommended that a statement be included to clarify that not all four blowers are operated simultaneously.

***Apex Response to USEPA Specific Comment No. 13*:** The second paragraph of Section 1.3 will be revised to state: "System vacuum is induced using one or more of the four 75-horsepower blowers each with a flow capacity of 800 standard cubic feet per minute (scfm) and a corresponding vacuum of 160 to 170 in-H_2O. Typically, no more than three blowers are operated simultaneously depending on the number of extraction wells being operated and the cumulative flow rate through the SVE system."

USEPA Specific Comment No. 14: ***Section 1.3.3. STINGERS***, Page 1-5, Para 3: The text states: "*In many of the SVE wells that have been retrofitted with a stinger, a port has also been installed to allow dilution air to be introduced into the casing to reduce friction loss in the drop tube and improve the flow of extracted vapors*." Dilution air does not reduce friction loss in the drop tube; rather dilution air increases friction losses as the overall flow increases. The purpose of dilution air is to aid evacuation of

liquid as the soil vapor flow alone may not be enough to carry liquid up the vertical stinger tube. It is recommended that Apex install a dilution air control valve for each dilution port and measure dilution air flow to distinguish between the formation soil vapor flow and ambient air flow.

***Apex Response to USEPA Specific Comment No. 14*:** The sentence will be modified to read "In a subset of the SVE wells that have been retrofitted with a stinger, a port has also been installed to allow dilution air to be introduced into the casing with the intent of improving the flow of extracted vapors." Apex agrees that the current dilution air configuration is not ideal. In most cases the dilution air is introduced simply by drilling a hole through the well cap. This has resulted in ambient air being introduced within the transmission system reducing the mass recovery rates and increasing natural gas usage at the thermal treatment system. Apex is currently evaluating alternatives for introducing dilution air into the TPE wells in the context of other wellhead modifications discussed herein.

USEPA Specific Comment No. 15: *Section 2.1 GROUNDWATER TRIGGERS FOR SVE SYSTEM OPERATION,* Page 2-2, Para 2: *"Operation of the SVE system will be optimized for mass recovery when the groundwater elevation within three of the five selected locations is below the following trigger elevations."* What is the reasoning behind three wells? Was any consideration given to conducting a zone-by-zone process rather than relying on five wells that are spread out across the village?

***Apex Response to USEPA Specific Comment No. 15*:** Please refer to Apex's response to USEPA General Comment No. 5.

USEPA Specific Comment No. 16: *Section 2.2 OPERATIONS WHEN ABOVE TRIGGER ELEVATIONS*, Page 2-2, Para 1: The SVE OMM Plan should indicate which SVE and two phase extraction (TPE) wells will be used during the "above trigger elevations" mode of operation, or expand upon the decision logic to be used for fluid system adjustments.

***Apex Response to USEPA Specific Comment No. 16*:** As discussed in Section 2.2 of the *Vapor Collection System OMM Plan*, when groundwater elevations in the Rand stratum are above the trigger elevations, operation of the SVE system will focus on recovery of volatile petroleum hydrocarbons in the shallow strata (primarily the North Olive and Rand) to mitigate the vapor intrusion pathway. The SVE system is comprised of 118 SVE wells, 114 of which are installed in the shallow strata. As noted on Table 1 within the *Vapor Collection System OMM Plan*, there are four wells installed in the deeper hydrostratigraphic units (primarily the Main Sand stratum) including HSVE-006R, HSVE-105D, HSVE-106D, and HSVE-107D. The screen interval within these four extraction wells is typically submerged when the groundwater is above the proposed trigger levels. Therefore, when groundwater levels in the Rand stratum are above trigger conditions, the SVE system will be operated using as many of the 114 extraction wells that are installed in the shallow stratum that are operable (i.e., air flow above 8 scfm). There are many conditions that factor into wells being operable versus inoperable including occlusion of the well screen with groundwater and reduced permeability associated with increasing water content within the pore space. These conditions can occur because of a rise in the Mississippi river stage, increases in the groundwater elevations, as well as, local

precipitation events. It is difficult to predict how operations will be affected within individual SVE and TPE wells since one or more of these ambient conditions can exist simultaneously.

USEPA Specific Comment No. 17: *Section 2.3 OPERATIONS WHEN BELOW TRIGGER ELEVATIONS*, Page 2-3, Para 1: The SVE OMM Plan should indicate which SVE and TPE wells will be used during the ”below trigger elevations” mode of operation, or expand upon the decision logic to be used for fluid system adjustments.

***Apex Response to USEPA Specific Comment No. 17*:** Please refer to Apex’s response to USEPA General Comment No. 5.

USEPA Specific Comment No. 18: *Section 2.3 OPERATIONS WHEN BELOW TRIGGER ELEVATIONS*, Page 2-3, Para 2: The statement: "*These operational parameters are a best practice based on similar SVE and TPE systems*." is not based on actual data. It is recommended that this statement be deleted.

***Apex Response to USEPA Specific Comment No. 18*:** The first sentence in the Second Paragraph of Section 2.3 will be removed from the *Vapor Collection System OMM Plan*.

USEPA Specific Comment No. 19: *Section 2.3 OPERATIONS WHEN BELOW TRIGGER ELEVATIONS*, Page 2-4, Para 4 and 5: Please expand on the decision logic that will be used to propose whether wells will be *either* removed *or* replaced.

***Apex Response to USEPA Specific Comment No. 19*:** Many of the wells included in the bullet list following Paragraph 3 of Section 2.3, have not operated since installation, except during low water table conditions. A determination for removing or replacing these wells will be considered on a case-by-case basis as ambient conditions allow for operation of these wells (i.e., low groundwater). If the well is not operable or has a limited range of conditions under which it can be operated, Apex will evaluate the spatial distribution of wells in each SVE Effectiveness Zone along with the mass recovery rate to determine if installation of replacement wells are warranted. It is important to note that these evaluations cannot be completed during high groundwater conditions due to well screen occlusion. Apex will continue working with the USEPA in a collaborative manner to identify which of these extraction wells should be removed versus replaced.

USEPA Specific Comment No. 20: *Section 3.0 ROUTINE MONITORING*, Page 3-1, Paragraph 1: Should routine monitoring of the SVE extraction wells be conducted more frequently than on a monthly basis? Please provide additional explanation for the selection of frequency.

***Apex Response to USEPA Specific Comment No. 20*:** Currently, fluid level gauging is performed weekly; while soil vapor screening and flow rate measurements are collected on a monthly basis. Based on data collected by Apex since April, groundwater fluctuations are not significant on a week to week basis but are variable over the course of a month. Therefore, the SVE and TPE wells will be gauged every other week, while soil vapor screening and flow rate measurements will continue to be collected on a monthly basis. This schedule should allow for a balance between routine monitoring

and maintaining well performance. Well performance is maintained by modifying stinger placement, adjusting flow rates, removing silt accumulations, and repairing individual system components.

USEPA Specific Comment No. 21: ***Section 3.2 FLOWRATE MONITORING PROCEDURES***, Page 3-2, Para 2: The text states: "*The pitot tube will be fully inserted into the well and the differential pressure will be recorded.*" It is unclear how a pitot tube could be used to generate accurate flow rate measurements if inserted from the top of the well, as appears to be the process design. The SVE OMM Plan should clarify pitot tube measurement procedures used, preferably with an illustration or schematic drawing.

***Apex Response to USEPA Specific Comment No. 21*:** Apex will revise Section 3.2 to state, "For wells without a Venturi flow meter (includes wells HSVE-001 through HSVE-030 installed during Phase I and II modifications, in addition to replacement well HSVE-004R), a pitot tube that is approximately 3-feet in length and designed for use within 4-inch ductwork (with the exception of well HSVE-004R, which utilizes an in-line pitot that is installed in the 4-inch transmission pipe within the well vault) will be used. In cases where a Phase I and II well has been retrofitted with a stinger, the flowrate measurement will be collected by inserting the pitot tube directly into the stinger. The pitot tube will be connected to the manometer (the top port of the pitot tube will be connected to the high pressure port on the manometer and the side port of the pitot tube will be connected to the low pressure port on the manometer). The pitot tube will be fully inserted into the well or stinger and the differential pressure will be recorded. The differential pressure measurements can vary within the extraction well while collecting flowrate measurements. Therefore, the maximum, minimum, and stable differential pressure measurements will be recorded."

As discussed in the response to USEPA General Comment No. 8, Apex recognizes that these historical methods for collecting air flow measurements from the Phase I and II extraction wells (particularly with respect to those wells retrofitted with a stinger) results in inaccurate flow measurements. Apex is currently evaluating the costs and benefits of several alternatives for measuring flow rates within the SVE and TPE wells at the Hartford Site in the context of other wellhead modifications discussed herein, including the use of different pitot tubes or installing an in-line Venturi flow meter.

USEPA Specific Comment No. 22: ***Section 4.1 LINE SWEEPING***, Page 4-1, Para 1: The text states: "*More frequent line sweeping may be conducted as needed if the system vacuum falls below 80 scfm or there are large fluctuations in the vacuum measurements within the extraction wells (exceeding 40 scfm).*" The SVE OMM Plan should clarify the use of units of flow (scfm) instead of units of vacuum (inches of water column).

***Apex Response to USEPA Specific Comment No. 22*:** The units will be corrected to inches of water column (in-H_2O).

USEPA Specific Comment No. 23: ***Section 4.3 NON-ROUTINE WELL DEVELOPMENT***, Item 1: How will Apex manage any sediment removed from SVE wells during well maintenance activities?

> ***Apex Response to USEPA Specific Comment No. 23*:** Sediment removed during well maintenance is entrained within the groundwater that is simultaneously recovered from the extraction wells. The groundwater and entrained sediments are temporarily stored and subsequently transferred to the frac tanks located at the TTU on the Premcor facility. Periodically, the sediment from the frac tanks is removed, characterized as hazardous or nonhazardous waste, and disposed off-site accordingly. Section 4.3 of the *Vapor Collection System OMM Plan* will be revised accordingly.

USEPA Specific Comment No. 24: ***Section 5 ROUTINE REPORTING,*** Page 5-1, Para 1: The list of routine monitoring and reporting parameters requires clarification. The SVE OMM Plan should include this information in the headings of the tables that will be used for the semiannual routine monitoring reporting or as an example of earlier tabulated data.

> ***Apex Response to USEPA Specific Comment No. 24*:** Each of the routine monitoring results collected from the vapor collection system will be included in the semiannual reports. Examples of the electronic field forms showing the routine measurements that will be collected is provided in Appendix C of the *Vapor Collection System OMM Plan*. In addition, Section 5 of the *Vapor Collection System OMM Plan* will be revised to include a description of additional data analyses that will be provided to the USEPA within the semiannual reports.

USEPA Specific Comment No. 25: ***Table 1***: An additional column should be included indicating if a dilution port is used for wells with stingers to aid liquid evacuation.

> ***Apex Response to USEPA Specific Comment No. 25*:** A column summarizing wells with dilution ports will be added to Table 1.

USEPA Specific Comment No. 26: ***Figure 9***: The figure should be modified to include the exact location where a stinger tube connects to the main vapor line in relation to the flow control valve, sampling port, and flow meter.

> ***Apex Response to USEPA Specific Comment No. 26*:** The location of the tee for connecting a straw stinger to the transmission pipeline within the well vault will be clarified on Figure 9.

Apex will begin implementing the protocols outlined in this final *Vapor Collection System OMM Plan* effective immediately. If you have questions regarding the enclosed final *Vapor Collection System OMM Plan*, please contact me at (513) 429-7452.

Sincerely,
Trihydro Corporation

Paul Michalski, P.G.
Team Leader

24S-008-001

cc: James Sanders, Apex Oil Company, Inc.
Tom Miller, Illinois Environmental Protection Agency
Chris Cahnovsky, Illinois Environmental Protection Agency