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January 16, 2019

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Ms. Bobbi Coleman
South Carolina Department of Health and Environmental Control
Assessment Section, UST Management Division
Bureau of Land and Waste Management
2600 Bull Street
Columbia, South Carolina 29201

Subject: **Response to Comments in SCDHEC Letter Titled, "Reviews of Misc. Reports, Annual Report and Response to Comments", dated December 11, 2018**
Plantation Pipe Line Company
Lewis Drive Remediation Site
Belton, South Carolina
Site ID #18693, "Kinder Morgan Belton Pipeline Release"

Dear Ms. Coleman,

On behalf of Plantation Pipe Line Company (Plantation), CH2M HILL Engineers, Inc. (CH2M), a wholly owned subsidiary of Jacobs Engineering Group Inc. (Jacobs), has prepared this response to comments received from the South Carolina Department of Health and Environmental Control (SCDHEC) in the letter date-stamped December 11, 2018 and logged in by Plantation on December 18, 2018. Each SCDHEC comment is presented below, followed by Plantation's response.

Comment 1: *In the future, field data sheets will be provided on a standardized form and a discussion of field observations (i.e. odors, sheens, seeps, biota changes) will be provided in quarterly reports, regardless of the nature of the visit, should any environmental changes be noted. If a sheen or seep is observed it will be noted and the action taken documented. These forms should include a designated space for all pertinent information to include current and recent weather events that could impact results, site conditions, etc. The Department noted in the November 19, 2018 conference call that the Department cannot agree with the statement that the hydrocarbon sheen noted in a depressed area caused by the settlement of the recovery trench adjacent to Brown's Creek naturally biodegraded and did not migrate to Brown's Creek as laboratory analysis collected at SW-12 documents a release to Brown's Creek in the area of the trench during this time period.*

Response: Noted. A standardized field data sheet has been developed and will be used during future sampling events. Plantation does not understand the 2nd part of this comment. No there is no direct scientific justification correlating the observed sheen to the analytical results of SW-12. Regardless of what type of sheen this is, this area is monitored regularly.

Comment 2: *In the future, a discussion of influence from the air sparge system (i.e. bubbling, air sparging, pressure, etc), in any monitoring well will be documented and discussed within the next quarterly report.*

Response: Noted. Bubbling or other qualitative observation will be provided in the gauging table.

Comment 3: *Every effort will be made to not to collect any environmental samples during rain events to reduce the possibility of bias in samples.*

Response: Noted. Sampling has never occurred during a rain event. Current practice is to not collect surface water samples if there has been a rain event of greater than 1-inch in the preceding 48-hours.

Comment 4: *In the future, notation will be provided on Table 3 (Groundwater Elevation and Product Thickness Data) when a well is not bracketing the water table. The Department requests that in areas where monitoring points/wells are not bracketing the water table, the ability to determine the extent of free phase petroleum be discussed in the quarterly report text. The following locations are of concern due to multiple events where the water table was not bracketed and their location relative to a receptor or the current product plume and/or the dissolved concentration within the well: MW-38, MW-40, RT-2A-RT2f, RT-2G, RT-2I, RT-2J, RT-2K, RT-2L, MW-11, MW-2, MW-9, and MW-45.*

Response: Agreed. This information will be provided in the gauging table. Future results will note instances where the water table did not bracket the well screen. In most cases these occurrences have been temporary due to the long period of record and seasonal variation. Most locations are not critical to understanding the impacts of receptors at the site. The RT locations were not installed as monitoring wells. They are recovery trench points, installed to monitor and recover product and are no longer useful.

Comment 5: *In the future, Product Thickness Trend Graphs and Groundwater Analytical Trend Graphs will be enlarged for better evaluation.*

Response: Plantation provides all reports in digital as well as paper format and requests that if SCDHEC would like to better see the graphs that the digital file be enlarged.

Comment 6: *Plantation Pipeline will provide iso-concentration maps and product thickness maps for the surficial aquifer and the bedrock aquifer for March 2017, September 2017, March 2018, September 2018, and henceforth going forward. These maps are anticipated by December 30, 2018.*

Response: Noted. As discussed via telephone with Mihir Mehta in December 2018, the maps mentioned above will be provided along with the next quarterly report, but as a stand-alone submittal. These semiannual maps will be provided henceforth.

Comment 7: *Monthly gauging of all existing wells with quarterly groundwater sampling of all monitoring wells with the exception of MW-7, MW-1 SB, MW-17B, MW-20, MW-26, MW-34, MW-36, MW-37, MW-38, MW-39, MW-40, and MW-41 which will be sampled monthly. An updated Groundwater Monitoring Well Plan Table is anticipated by December 30, 2018. The Department requests that groundwater collected from all newly installed monitoring wells be sampled monthly for the first 4 sampling events. Based upon those initial monthly events, sampling frequency would be evaluated.*

Response: Plantation agrees to sample newly installed monitoring wells monthly for the initial 4 samples events. Proposes to collect samples from the wells listed above every 6 weeks, right in between quarterly events. An updated Groundwater Monitoring Well Plan Table will be included in the next formal report instead of a stand-alone submittal. For newly installed monitoring wells, sampling frequency will be every six weeks. After 5 events, sampling frequency will be reevaluated.

Comment 8: *During annual maintenance of the air sparge system, when the system is turned off, groundwater sampling will be conducted.*

Response: Agreed.

Comment 9: *Surface water sampling and analysis will continue monthly at all surface water sampling locations with the exception of FP-1, FP-2, FP-3, and SW-6. FP-1, FP-2 and FP-3 have never had contaminant detections and surface water locations will continue to be monitored both upstream and downstream monthly. SW-6 has not had adequate water for sampling since this location was selected and other surface water locations are sampled downstream monthly.*

Response: Plantation proposes that a select group of surface water sampling locations (SW-02, SW-04, SW-05, SW-12, SW-13, and SW-14) be monitored every six weeks, between the quarterly sampling events. The full list of locations, excluding FP-1, FP-2, FP-3, and SW-06, will continue to be monitored quarterly.

Comment 10: *All bubblers within Brown's Creek will be turned off 24 to 48 hours prior to conducting surface water sampling.*

Response: Agreed. Plantation will turn bubbler off 24 hours between surface water sampling.

Comment 11: *The addition of oxygen releasing compounds to supplement the existing remedial measures will be evaluated in the area of Cupboard Creek. This evaluation is anticipated by December 30, 2018.*

Response: A conceptual plan has been developed and Plantation would like to present it to SCDHEC in the next scheduled meeting since it is just a concept. Also, implementation of the plan is dependent upon the near-term dissolved concentrations in that area and it may not be necessary.

Comment 12: *Routine monitoring reports will be provided quarterly. Should there be a change in environmental conditions at the site; the Department should be notified immediately.*

Response: Agreed. Plantation will notify SCDHEC if there is significant change in product levels or hydrocarbon concentrations.

Comment 13: *An evaluation of the method used to collect dissolved oxygen (DO) will be evaluated to include low flow purging and sampling of monitoring wells and measurement of DO using a flow through cell with stable DO values recorded and provided in the quarterly reports. Low flow purging and sampling would aid in collecting ground water samples representative of the aquifer where screens do not bracket the water table.*

Response: An in-well DO meter is currently used and considered capable of providing DO values representative of the aquifer. See *Region 4 Science and Ecosystem Support Division (SESD) Operating Procedure (OP) for Field Measure of Dissolved Oxygen, SESDPROC-106-R3.* (EPA, 2014). This DO measuring technique is effective at this and other Plantation sites.

Comment 14: *Visual inspection of the full site as a whole, to include Cupboard Creek and Brown's Creek, will continue and any issues will be reported in each quarterly report. Should any issues need immediate action, the Department should be notified as soon as possible. If any action is taken by Plantation Pipe Line, notification should be provided to the Department immediately and included within the next quarterly report.*

Response: Noted.

Comment 15: *A proposal to conduct additional assessment in the areas south and west of MW-46 and the area east of MW-38 will be provided by December 30, 2018.*

Response: Noted. Proposal and map are included as an attachment.

Comment 16: *Neither MW-17 nor MW-19 will be abandoned. These monitoring wells will remain on the routine monitoring schedule.*

Response: Noted.

Comment 17: *Concentration trends will be evaluated to determine areas where additional remediation and monitoring is needed. Trend evaluation should include bubbling, pressure, and other signs of impact from the air sparge system that may impact results and each monitoring well's ability to monitor the impact of the air sparge system on the plume.*

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Response: Plantation is constantly evaluating the effectiveness of the system as it is installed and will share any compelling observations with SCDHEC in regular meetings and/or reports.

Comment 18: *Evaluating the bedrock monitoring network's ability to monitor groundwater as the fracturing that is bracketed in bedrock wells across the site varies, providing all bedrock geologic logs with one or more geologic cross sections was discussed. It was noted that well logs for groundwater monitoring wells MW-44B, MW-45B could not be located in the Department's file and would need to be provided. Contaminant levels in existing bedrock wells will continue to be monitored to evaluate the effects of air sparging.*

Response: Boring logs/well construction diagrams for MW-44B and MW-45B are included as an attachment to this correspondence. Additional cross sections and bedrock geologic logs are available in previous reports.

Additional Comment 1: *Please note, measureable free phase petroleum product must be evacuated per the June 16, 2017 and December 14, 2017 correspondence (Coleman to Aycock).*

Response: Noted. Product is recovered continuously at the site, using passive skimmers and petroleum absorbent socks. Product collection from these devices is conducted monthly.

Additional Comment 2: *The Department should be notified a minimum of four days prior to any environmental work being conducted.*

Response: Agreed. Plantation will make every effort to notify SCDHEC of planned environmental work with four days' notice.

If you have any further questions or concerns, please call me at (919) 760-1777, or Mr. Jerry Aycock/ Plantation at (770) 751-4165.

Regards,

CH2M HILL Engineers, Inc.

William M. Waldron, P.E.
Program Manager

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File

Attachments:

MW-44, MW-44B, MW-45, MW-45B Well Logs

BORING NUMBER MW-44

CH2M Hill

CLIENT Plantation Pipe Line Company
PROJECT NAME Lewis Drive Release Site
PROJECT NUMBER 669228
PROJECT LOCATION Belton, South Carolina
DATE STARTED 1/23/17 **COMPLETED** 1/23/17
GROUND ELEVATION _____ **HOLE SIZE** 6.25" inches
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY P. Ferringer/CLT **CHECKED BY** _____
AT END OF DRILLING ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					0.5 (SM) TOPSOIL, SILTY SAND; brown, moist, organic rich.	Portland I/II with 3-5% Bentonite
					(CL) CLAY with SAND; yellowish brown, moist, medium plasticity, trace coarse sand, <10% very fine to fine sand, no odor.	2" Sch40 PVC Casing
						3/8" Bentonite Chips
5	SPT SPT01	1-2-2-2 (4)	PID = 0			GP#1 Sand
					Reddish brown, dry, non-cohesive, non-plastic, less sand.	
					Some mica.	0.010 Slot Sch40 PVC
					9.0	
10	SPT SPT02	25-50/0"	PID = 0		(SW) WEATHERED ROCK with SAPROLITE, WELL GRADED SAND with CLAY; dry, very dense, very fine to medium sand, micaceous, no odor. 10.0	

Bottom of borehole at 10.0 feet.

BORING NUMBER MW-44B

CH2M Hill

CLIENT Plantation Pipe Line Company
PROJECT NAME Lewis Drive Release Site
PROJECT NUMBER 669228
PROJECT LOCATION Belton, South Carolina
DATE STARTED 1/23/17 **COMPLETED** 1/25/17
GROUND ELEVATION _____ **HOLE SIZE** 10.25/4 inches
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Wire Line/Air Rotary
AT TIME OF DRILLING ---
LOGGED BY P. Ferringer/CLT **CHECKED BY** _____
AT END OF DRILLING ---
NOTES Core logged wet.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					0.5 (SM) TOPSOIL, SILTY SAND; brown, moist, organic rich.	
					(CL) CLAY with SAND; yellowish brown, moist, medium, medium plasticity, trace coarse sand, <10% very fine to fine sand, no odor.	
5						Portland I/II with 3-5% Bentonite
					9.0 (SW) WEATHERED ROCK with SAPROLITE, WELL GRADED SAND with CLAY; brown, dry, very dense, very fine to medium	
10					10.0 sand, micaceous, no odor.	4" Steel Casing
	RC NQ1				BEDROCK, BIOTITE GNEISS; moderate, grey and black with orange oxidation, gneissic, foliated, moderate decomposition, slightly disintegrated, moderately fractured. FRACTURE; joint, <5 degrees, very narrow, not healed, oxidized, undulating, wet with minor seepage. FRACTURE; joint, <5 degrees, very narrow, not healed, oxidized, undulating, wet with minor seepage. FRACTURE; joint, <5 degrees, very narrow, not healed, oxidized, undulating, wet with minor seepage. FRACTURE; joint, <5 degrees, very narrow, not healed, oxidized, undulating, wet with minor seepage. FRACTURE; joint, <5 degrees, very narrow, not healed, oxidized, undulating, wet with minor seepage. Slight decomposition, competent, intensely foliated, quartz, plagioclase, biotite, amphibole. FRACTURE; joint, <5 degrees, extremely narrow, not healed, oxidized, smooth, damp. FRACTURE; joint, <5 degrees, extremely narrow, not healed, oxidized, smooth, damp. FRACTURE; joint, <5 degrees, extremely narrow, not healed, oxidized, smooth, damp. FRACTURE; joint, <5 degrees, extremely narrow, not healed, oxidized, smooth, damp. Fresh, competent, unfractured, trace pegmatitic quartz, ~30 degree foliation. No pegmatitic quartz. Increasing quartz and plagioclase. Large pegmatitic quartz and plagioclase crystals.	
15						
20						

(Continued Next Page)

BORING NUMBER MW-44B

CH2M Hill

CLIENT Plantation Pipe Line Company **PROJECT NAME** Lewis Drive Release Site

PROJECT NUMBER 669228 **PROJECT LOCATION** Belton, South Carolina

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
20	RC HQ1				BEDROCK, BIOTITE GNEISS; moderate, grey and black with orange oxidation, gneissic, foliated, moderate decomposition, slightly disintegrated, moderately fractured. *(continued)* Trace augen texture.	
25						← Open Borehole
30	RC HQ2				Intensely foliated, fresh, unfractured, less large quartz and plagioclase crystals, increasing biotite.	
35					Large quartz veins, biotite rich. Augen texture. Quartz veins dipping 5-30 degrees, trace augen texture. No quartz veins, increasing augen texture.	
					37.1 Bottom of borehole at 37.1 feet.	

BORING NUMBER MW-45

CH2M Hill

CLIENT Plantation Pipe Line Company
PROJECT NAME Lewis Drive Release Site
PROJECT NUMBER 669228
PROJECT LOCATION Belton, South Carolina
DATE STARTED 1/26/17 **COMPLETED** 1/26/17
GROUND ELEVATION _____ **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY P. Ferringer/CLT **CHECKED BY** _____
AT END OF DRILLING ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					(SC) TOPSOIL, CLAYEY SAND; olive brown, moist, loose, non-cohesive, very fine to coarse sand, trace organics, no odor.	Portland I/II with 3-5% Bentonite
					1.5 (CL) CLAY; reddish brown, dry to moist, stiff, cohesive, low plasticity, <10% very fine to medium sand, trace manganese nodules and veinlettes.	3/8" Bentonite Chips
						2" Sch40 PVC Casing
						GP#1 Sand
					Trace mica, less manganese.	
5	SPT SPT01	4-5-4-6 (9)			Red, non-cohesive, >15% sand, micaceous, tan clay veins.	
					Moist, trace thin lamination, increasing silt.	0.010 Slot Sch40 PVC
10	SPT SPT02	4-4-5-5 (9)			10.5 (SM) SAPROLITE, SANDY SILT with CLAY; reddish brown, dry to moist, stiff, non-cohesive, very fine to fine sand, micaceous.	
					Trace weathered rock fragments.	
					14.0	
15	SPT SPT3	10-50			15.0 (SW) WEATHERED ROCK, WELL GRADED SAND; biotite gneiss, moist, dense to very dense, trace rock fragments, very fine to coarse sand, trace oxidation, no odor.	

Bottom of borehole at 15.0 feet.

BORING NUMBER MW-45B

CH2M Hill

CLIENT Plantation Pipe Line Company
PROJECT NAME Lewis Drive Release Site
PROJECT NUMBER 669228
PROJECT LOCATION Belton, South Carolina
DATE STARTED 1/25/17 **COMPLETED** 1/27/17
GROUND ELEVATION _____ **HOLE SIZE** 10.25/4 inches
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger/Wire Line/Air Rotary
AT TIME OF DRILLING ---
LOGGED BY P. Ferringer/CLT **CHECKED BY** _____
AT END OF DRILLING ---
NOTES Core logged wet.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					(SC) TOPSOIL, CLAYEY SAND; olive brown, moist, loose, non-cohesive, very fine to coarse sand, trace organics, no odor.	
					1.5 (CL) CLAY; reddish brown to red, dry to moist, stiff, cohesive, low plasticity, <10% very fine to medium sand, trace manganese nodules.	
5	SPT SPT01	4-5-5-6 (10)	PID = 0			
					Trace mica.	
10	SPT SPT02	4-5-4-5 (9)	PID = 0		10.5 Less clay, increasing mica.	4" Steel Casing
					(SM) SAPROLITE, SANDY SILT with CLAY; reddish brown, dry, stiff, non-cohesive, very fine to fine sand, micaceous. Intensely banded, trace weathered rock lenses.	Portland I/II with 3-5% Bentonite
					14.0	
15	SPT SPT03	7-50	PID = 0		(SW) WEATHERED ROCK, WELL GRADED SAND; biotite gneiss, moist, dense to very dense, trace rock fragments, very fine to coarse sand, trace oxidation, no odor.	
					15.6 BEDROCK, BIOTITE GNEISS; strong, grey and black, intensely foliated, slight decomposition, competent, trace disintegration, slightly fractured, trace large quartz crystals. FRACTURE; joint, <5 degrees, extremely narrow, oxidized, undulating, dry with staining. FRACTURE; joint, 20 degrees, extremely narrow, oxidized, smooth, damp. 5mm thick biotite band. Fresh, no discoloration or disintegration, increasing plagioclase and biotite bands.	
	RC NQ1					
20					Strong, unfractured, increasing amphibole and biotite, <2 degree foliation.	
	RC HQ1					
25						

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BORING NUMBER MW-45B

CH2M Hill

CLIENT Plantation Pipe Line Company **PROJECT NAME** Lewis Drive Release Site

PROJECT NUMBER 669228 **PROJECT LOCATION** Belton, South Carolina

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
25	RC HQ2				BEDROCK, BIOTITE GNEISS; strong, grey and black, intensely foliated, slight decomposition, competent, trace disintegration, slightly fractured, trace large quartz crystals. *(continued)* Trace augen texture <5mm diameter. Less amphibole.	
30	RC HQ3				Trace quartz and plagioclase >1cm diameter. 5-10 degree foliation, quartz crystals <2 cm diameter.	← Open Borehole
35	RC HQ4				0.1' thick biotite layer. Quartz and plagioclase layers <1 cm thick.	
40					40.3	

Bottom of borehole at 40.3 feet.