STATE OF NORTH CAROLINA

MECKLENBURG COUNTY

STATE OF NORTH CAROLINA, *ex. rel.*, NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY,

Plaintiff,

vs.

COLONIAL PIPELINE COMPANY,

Defendant.

IN THE GENERAL COURT OF JUSTICE
SUPERIOR COURT DIVISION
21-CVS-17562

COMPLAINT AND MOTION FOR PRELIMINARY AND PERMANENT INJUNCTIVE RELIEF

The State of North Carolina, complaining of the Defendant, alleges and says:

PARTIES

1. The Plaintiff is the sovereign State of North Carolina. This action is being brought on the relation of the North Carolina Department of Environmental Quality (the Department), the State agency established pursuant to the provisions of N.C.G.S. § 143B-279.1, *et seq.*, and vested with the statutory authority to enforce the State's environmental protection laws, including laws enacted to address the discharge of oil or petroleum products into the environment.

2. Defendant Colonial Pipeline Company ("Colonial"), is a Delaware corporation registered and doing business in North Carolina. Defendant is an interstate carrier of petroleum products, operating a system of petroleum pipelines which, generally, transports refined petroleum products from Houston, Texas to destinations in the eastern United States. Defendant owns and operates a pipeline known as the Colonial Line 1 Pipeline ("the Pipeline") which transects North Carolina, including the Oehler Nature Preserve in Huntersville, Mecklenburg County.

JURISDICTION

3. The Superior Court has jurisdiction over this action for injunctive relief for existing or threatened violations of various laws and rules governing the protection of water quality pursuant to N.C.G.S.§ 143-215.6C. Furthermore, jurisdiction for injunctive relief sought to compel enforcement of a statute or regulation rests in the Superior Court pursuant to N.C.G.S. § 7A-245(a)(2) and N.C.G.S. § 1-493.

VENUE

4. Venue is proper in Mecklenburg County pursuant to N.C.G.S. § 143-215.6C, and N.C.G.S. §§ 1-77, 1-80, and 1-82, because the violations that are the subject of this action for injunctive relief have occurred and are occurring in Mecklenburg County.

NATURE OF THE ACTION

5. This Action is commenced by the State of North Carolina for the purpose of seeking injunctive relief to enforce its oil pollution and water quality laws and rules. Colonial has contaminated North Carolina's groundwater by unlawfully discharging petroleum products from a sub-surface (*i.e.* underground) section of the Pipeline in the Oehler Nature Preserve. The areas impacted by the unlawful discharge of petroleum ("the Site") include both the Oehler Nature Preserve and privately owned property near the Nature Preserve. While Colonial has taken steps to remediate the discharge, Colonial has failed to use best efforts and to do all that is required by law to protect the health and safety of North Carolinians and of the State's environment. In particular:

a. Colonial has failed to provide the Department with statutorily mandated, essential information related to the size of the discharge. Having a clear understanding of the size and scope of the release is essential to planning and directing cleanup efforts

and abating the substantial harm posed to the people and environment of North Carolina by the discharge. In particular:

i. Colonial has failed to provide the Department with an updated estimate of the volume of petroleum discharged from the Pipeline, which is necessary for proper regulatory oversight and remediation of the discharge. As of the time of this filing, more than 1,300,000 gallons of petroleum product have been *recovered* from the Site. The recovered amount of petroleum is already the largest such pipeline release in the history of North Carolina, and is likely the largest inland release in the history of the United States. A substantial, yet unquantified, amount of petroleum remains in the sub-surface, including both undissolved, liquid petroleum "free product" and "aqueous phase" petroleum mixed with groundwater.

ii. Colonial has failed to adequately and appropriately delineate the vertical extent of the petroleum contamination at the Site (i.e., the depth of the petroleum contamination in the soil and groundwater). Determining the vertical extent of the petroleum contamination is necessary to model and predict migration pathways of contaminants and to ensure an effective cleanup.

b. Colonial is not operating the hydraulic control wells at the Site to the maximum feasible extent. The purpose of these wells is to prevent the further spread of contaminated groundwater at the Site. By failing to use all of the hydraulic control wells available at the Site or by failing to run these wells to the fullest extent

possible, Colonial increases the likelihood that the underground plume of petroleum contamination will spread and grow in size.

c. Colonial has failed to adequately investigate the extent of PFAS contamination at the Site resulting from the discharge and related cleanup efforts.

6. For all of the reasons identified in paragraph 5 above, the State is entitled to injunctive relief.

LEGAL BACKGROUND

The Oil Pollution and Hazardous Substances Control Act of 1978

7. The Oil Pollution and Hazardous Substances Control Act of 1978 ("OPHSCA"), N.C.G.S. Chapter 143, Article 21A "promote[s] the health, safety, and welfare of the citizens of this State by protecting the land and the waters over which this State has jurisdiction from pollution by oil, oil products, oil by-products, and other hazardous substances." N.C.G.S. § 143-215.76. OPHSCA authorized the State to create an oil pollution control program (N.C.G.S. § 143-215.78), and to conduct inspections and investigations to determine compliance with, and violations of, OPHSCA (N.C.G.S. § 143-215.79). Additionally, OPHSCA regulates the discharge of oil and hazardous substances through a series of Oil Discharge Controls codified at N.C.G.S. Chapter 143, Article 21A, Part 2.

8. OPHSCA defines "discharge" as "any emission, spillage, leakage, pumping, pouring, emptying, or dumping of oil or other hazardous substances into waters of the State . . . or upon land in such proximity to waters that oil or other hazardous substances is reasonably likely to reach the waters." N.C.G.S. § 143-215.77(4). Waters of the State includes any surface or underground water "which is contained within, flows through, or borders upon this State." N.C.G.S. § 143-215.77(18).

9. OPHSCA creates strict liability for discharges like the one by Colonial that is the subject of this action. Under OPHSCA, it is unlawful "for any person to discharge, or cause to be discharged, oil or other hazardous substances into or upon any waters . . . or lands within this State . . . regardless of the fault of the person having control over the oil or other hazardous substances." N.C.G.S. § 143-215-83(a); *see also Ellison v. Gambill Oil Co.*, 186 N.C. App. 167, 650 S.E.2d 819 (2007), *aff'd*, 363 N.C. 364, 677 S.E.2d 452 (2009) (finding N.C.G.S. § 143-215-83 creates strict liability).

10. "[A]ny person having control over oil or other hazardous substances discharged in violation of [OPHSCA] shall immediately undertake to collect and remove the discharge and to restore the area affected by the discharge." N.C.G.S. § 143-215.84. OPHSCA defines "having control over oil or other hazardous substances" as "any person, using, transferring, storing, or transporting oil or other hazardous substances immediately prior to a discharge of such oil or other hazardous substances onto the land or into the waters of the State, and specifically shall include carriers and bailees of such oil or other hazardous substances." N.C.G.S. § 143-215.77(5).

11. "[E]very person owning or having control over oil or other substances discharged in any circumstances other than pursuant to a rule adopted by the Commission, a regulation of the U. S. Environmental Protection Agency, or a permit required by G.S. 143-215.1 or the Federal Water Pollution Control Act . . . shall immediately notify the Department . . . of the nature, location and time of the discharge and of the measures which are being taken or are proposed to be taken to contain and remove the discharge." N.C.G.S. § 143-215.85(a).

12. The General Assembly authorized the North Carolina Environmental Management Commission ("the EMC") to adopt rules providing for risk-based assessment and cleanup of certain discharges and releases of petroleum. N.C.G.S. § 143-104AA(a)(2)a. Accordingly, the

EMC has promulgated rules at 15A N.C.A.C. Subchapter 2L .0501, *et seq.*, (the "Petroleum Release Rules) "establish[ing] procedures for risk-based assessment and corrective action" of Petroleum releases. 15A N.C.A.C. 2L .0501(a).

13. Under the Petroleum Release Rules, a discharge is "high risk" if, *inter alia*, a water supply well has been contaminated by the discharge, a water supply well used for drinking water is located within 1000 feet of the source of the discharge, or the discharge poses an imminent danger to public health, public safety, or the environment. 15A N.C.A.C. 2L .0506(1).

North Carolina's Water Quality Program

14. The General Assembly created a statewide water quality program through its adoption of N.C.G.S. Chapter 143, Article 21, and the rules promulgated thereunder, for the purpose of protecting and enhancing water quality within North Carolina. N.C.G.S. § 143-211(a) and (b).

15. North Carolina's water quality program prohibits the unpermitted discharge of wastes, including oil and toxic waste, to the waters of the State in violation of the water quality standards adopted by the EMC. N.C.G.S. § 143-215.1(6); *see also* N.C.G.S. § 143-213(18)(c) "other wastes," and § 143-213(18)(3) "toxic waste." OPHSCA also mandates acquisition of a permit pursuant to N.C.G.S. § 143-215.1 prior to discharging oil onto the land or into the waters of the State. N.C.G.S. § 143-215.83(c).

Groundwater Classifications and Standards

16. The General Assembly authorized the EMC to establish a series of classifications and standards for the groundwaters of North Carolina. N.C.G.S. § 143-214.1. Accordingly, the EMC has promulgated rules in 15A N.C.A.C. Subchapter 2L (the "2L Rules") "establish[ing] a series of classifications and water quality standards applicable to the groundwaters of the State."

15A N.C.A.C. 2L .0101(a). "Groundwaters" are defined in the 2L Rules as "those waters occurring in the subsurface under saturated conditions." 15A N.C.A.C. 2L .0102(11).

17. The 2L Rules "are intended to maintain and preserve the quality of the groundwaters, prevent and abate pollution and contamination of the waters of the state, protect public health, and permit management of the groundwaters for their best usage by the citizens of North Carolina." 15A N.C.A.C. 2L .0103(a).

18. The policy section of the 2L Rules provides further that

> [i]t is the policy of the Commission that the best usage of the groundwaters of the state is as a source of drinking water. These groundwaters generally are a potable source of drinking water without the necessity of significant treatment. It is the intent of these Rules to protect the overall high quality of North Carolina's groundwaters to the level established by the standards and to enhance and restore the quality of degraded groundwaters where feasible and necessary to protect human health and the environment, or to ensure their suitability as a future source of drinking water.

15A N.C.A.C. 2L .0103(a).

19. The policy section of the 2L Rules provides further that "[n]o person shall conduct or cause to be conducted, any activity which causes the concentration of any substance to exceed that specified in Rule .0202 of this Subchapter, except as authorized by the rules of this Subchapter." 15A N.C.A.C. 2L .0103(d); *see also* N.C.G.S. § 143-215.1.

20. The groundwater standards set forth in the 2L Rules are "the maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the state, which may be tolerated without creating a threat to human health or which would otherwise render the groundwater unsuitable for its intended best usage." 15A N.C.A.C. 2L .0202(a).

21. "Contaminant" is defined in the 2L Rules as "any substance occurring in groundwater in concentrations which exceed the groundwater quality standards specified in Rule .0202 of the Subchapter." 15A N.C.A.C. 2L .0102(4).

22. With certain exceptions not relevant here, "substances which are not naturally occurring and for which no standard is specified shall not be permitted in concentrations at or above the practical quantitation limit" in groundwaters. 15A N.C.A.C. 2L .0202(c). The "practical quantitation limit" or "PQL" is defined as "the lowest concentration of a given material that can be reliably achieved among laboratories within specified limits of precision and accuracy by a given analytical method during routine laboratory analysis." 15A N.C.A.C. 2L .0102(15).

23. "Natural conditions" are defined in the 2L Rules as "the physical, biological, chemical and radiological conditions which occur naturally." 15A N.C.A.C. 2L .0102(16).

24. The goal of required corrective action for groundwater contamination for discharges classified as "high risk" under the Petroleum Release Rules is restoration to the level of the groundwater standards set forth in Rule .0202. 15A N.C.A.C. 2L .0507(d). The responsible party for such discharges "shall comply with the assessment and cleanup requirements of Rule [15A N.C.A.C.] .0106(c), (g), and (h)." *Id.*

25. "Any person conducting or controlling an activity that has not been permitted by the Department and that results in an increase in the concentration of a substance in excess of the standard . . . shall . . . submit a report to the Secretary [of the Department] assessing the cause, significance, and extent of the violation." 15A N.C.A.C. 2L .0106(c)(3).

26. Pursuant to the 2L Rules, the "[i]nitial response required to be conducted prior to or concurrent with the assessment required" as set forth above "shall include" among other things,

> (2) abatement, containment, or control of the migration of contaminants; (3) removal, treatment, or control of any primary pollution source such as buried waste, waste stockpiles, or surficial accumulations of free products; (4) removal, treatment, or control of secondary pollution sources that would be potential continuing sources of pollutants to the groundwaters, such as contaminated soils and non-aqueous phase liquids.

15A N.C.A.C. 2L .0106(f).

27. The site assessment conducted pursuant to the requirements of 15A N.C.A.C. 2L .0106(c) shall include, *inter alia*, "(1) the source and cause of contamination; [and] (4) the horizontal and vertical extent of soil and groundwater contamination and all significant factors affecting contaminant transport." 15A N.C.A.C. 2L .0106(g).

28. The corrective action plan for restoration of groundwater quality submitted pursuant to the requirements of 15A N.C.A.C. 2L .0106(c) shall include:

> (1) A description of the proposed corrective action and reasons for its selection; (2) Specific plans, including engineering details where applicable, for restoring groundwater quality; (3) A schedule for the implementation and operation of the proposed plan; and (4) A monitoring plan for evaluating the effectiveness of the proposed corrective action and the movement of the contaminant plume.

15A N.C.A.C. 2L .0106(h).

Standard for Injunctive Relief Under N.C.G.S. § 143-215.6C

29. The Department may request the Attorney General to commence an action for injunctive relief when there is a violation or threatened violation of any of the provisions of Part 1, Article 21, Chapter 143 of the North Carolina General Statutes, or a rule implementing that Part. N.C.G.S. § 143-215.6C. N.C.G.S. § 143-215.6C authorizes filing such actions in the superior court of the county wherein the violation occurred or where a defendant resides.

30. When the State brings an action to vindicate the public interest pursuant to a statute that provides for injunctive relief to abate violations of law, the usual test for issuance of injunctions need not be met. *See State ex rel. Morgan v. Dare To Be Great, Inc.*, 15 N.C. App. 275, 189 S.E.2d 802 (1972) (negating the general rule that there will be no equitable relief if there is an adequate remedy at law when the statutory scheme provided the State with injunctive relief under the circumstances presented). For example, the State is not required to show actual injury,

such as irreparable harm, in order to obtain injunctive relief, including a preliminary injunction. *State ex rel. Edmisten v. Challenge, Inc.*, 54 N.C. App. 513, 521-22, 284 S.E.2d 333, 338-39 (1981) (explaining that irreparable harm need not be established by the State as long as the statutory conditions for issuance of a preliminary injunction exist). Rather, it must show only that the acts or practices complained of adversely affect the public interest. *See id.* An adverse effect on the public interest exists as a matter of law where the statutory conditions for issuance of injunctive relief are present, i.e., where a violation of the applicable statute or regulations exists or is threatened. *Id.* at 522, 284 S.E.2d at 339.

FACTUAL ALLEGATIONS

The Colonial Pipeline and the Pipeline Spill

31. Upon information and belief, Colonial owns and operates a pipeline system which consists of approximately 5,500 miles of hazardous liquid transmission pipeline within the United States. Colonial's pipeline system travels through the states of Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Maryland, Pennsylvania, New Jersey, and New York. The pipeline system delivers a daily average of approximately 100 million gallons of liquid petroleum products through the Southern and Eastern United States.

32. Upon information and belief, Colonial's Line 1 Pipeline is an interstate pipeline, traversing 8 states, beginning in Texas and ending in Virginia. In North Carolina, the Pipeline traverses five counties: Cabarrus, Cleveland, Gaston, Rowan, and Mecklenburg.

33. Upon information and belief, the Pipeline is 40-inches in diameter and was manufactured in 1978 by Bethlehem Steel. It transports refined products, including gasoline.

34. On August 14, 2020, two boys using offroad vehicles in the Oehler Nature Preserve in Huntersville, Mecklenburg County, discovered suspected petroleum product surfacing in

Colonial's pipeline right of way. At 6:42 p.m., Colonial personnel confirmed that petroleum product had been released, and initiated the shutdown of the Pipeline. (Exhibit 1, p. 13)

35. Upon information and belief, Colonial determined the leak originated from a Type A sleeve repair performed in 2004 to reinforce a damaged section of the Pipeline. Type A sleeve repairs involve the placement of a sleeve around the damaged portion of pipe using mechanical fasteners. Type A sleeve repairs are not sealed, nor are they designed to maintain pressure inside the pipeline.

36. Upon information and belief, preliminary indications are that the oil in this case discharged from a crack which formed in the Pipeline where an interaction between the above-referenced Type A sleeve, the original anomaly in the Pipeline (a shallow dent), and the presence of water led to corrosion.

37. Upon information and belief, Colonial has made other repairs using Type A sleeves.

38. Upon information and belief, Colonial has experienced other pipeline failures which resulted in the release of petroleum into the environment, including:

a. In February 2016, in Gwinnett County, Georgia resulting in a reported release of 14 barrels (585 gallons) of gasoline. The release was discovered by a third-party contractor and reported to Colonial personnel. Per Colonial documentation and reporting, the failure mode was "fatigue cracks within an area where a dent was present with significant corrosion (up to 35%) under a Type A sleeve with shrink sleeves on the end that was installed in 2005."

b. In September 2016, outside of Pelham, Alabama resulting in a reported release of 7,370 barrels (309,540 gallons) of gasoline. The failure

mechanism was determined to be a crack in a buckle that formed due to inadequate compaction following a prior repair project. Colonial was made aware of the suspected release by local governmental personnel.

c. In September 2015, in Centreville, Virginia, resulting in the release of approximately 95 barrels (4,000 gallons) of gasoline. The cause of the leak was determined to be a crack which formed in a shallow dent on the bottom side of the pipe.

39. Upon information and belief, Colonial uses a process that is predominantly manual to track volumes of petroleum transported through the subject portion of the Pipeline. Upon information and belief, Colonial does not employ computational pipeline monitoring on the Pipeline. Colonial's monitoring system failed to detect the discharge from the Pipeline

40. The Site of the discharge is classified as high risk under the Petroleum Release Rules based, *inter alia*, on the presence of multiple water supply wells within 1,000 feet of the release and the contaminant mass in the subsurface. (Exhibit 2, p. 10])

41. At the time of the spill, Colonial did not have a permit allowing the discharge of petroleum at the Site.

Spill Response

42. Colonial initially submitted a National Response Center Report (Incident Report 1284598, dated August 14, 2020) and reported an estimate of the size of the spill as 75 barrels due to "equipment failure." (Exhibit 1, p. 13)

43. On August 20, 2020, the Department issued a notice of regulatory requirement to Colonial that the Department had determined Colonial was the party responsible for the release and was therefore responsible for complying with the initial response and abatement action

requirements set forth at 15A N.C.A.C. 02L .0504 and .0505. The August 20, 2020, notice of regulatory requirement is attached hereto and incorporated herein as Exhibit 3.

44. On September 13, 2020, Colonial submitted an initial accident report to the United States Department of Transportation's Pipeline and Hazardous Materials Safety Administration ("PHMSA") dated September 13, 2020, and reported a release volume of 6,490 barrels. Colonial submitted a supplemental report on September 14, 2020, with no change to the estimated release volume. (Exhibit 1, p. 1) A second supplemental report was submitted to PHMSA on February 1, 2021, updating the estimated release volume to 1.2 million gallons (28,571 barrels). (Exhibit 4)

45. On September 25, 2020, the Department issued a notice of violation to Colonial informing it that the release of petroleum at the Site had resulted in exceedances of groundwater quality standards established pursuant to N.C.G.S. § 143-214.1 and promulgated at 15A N.C.A.C. 02L .0202. The September 25, 2020, notice of violation is attached hereto and incorporated herein as Exhibit 5. The September 25, 2020, notice of violation notified Colonial of its obligations to restore "groundwater quality to the level of the aforementioned standards, or as closely thereto as is economically and technologically feasible for protection of human health and the environment pursuant to 15A N.C.A.C. 02L .0106." The September 25, 2020, notice of violation further notified Colonial of its obligation to comply with the assessment requirements set forth at 15A N.C.A.C. 02L .0507(b), .0106(c) and .0106(g).

46. On December 9, 2020, the Department issued a notice of regulatory requirement to Colonial notifying it of its obligation under N.C.G.S. § 143-215.85(a) to "immediately notify the Department . . . of the nature . . . of the discharge" at the Site. The December 9, 2020, notice of regulatory requirement is attached hereto and incorporated herein as Exhibit 6. The December 9, 2020, notice of regulatory requirement directed Colonial to, *inter alia*, provide information related

to Pipeline maintenance, the release, and Colonial's response thereto, as well as a conceptual site model for the Site. A conceptual site model provides a representation of contamination at a site and the physical, chemical and biological processes that control the transport, migration and potential impacts of contamination (in soil, air, ground water, surface water and sediment) to human and environmental receptors. By modeling the impacts of pollution, a conceptual site model helps to guide cleanup efforts at a site.

47. On February 24, 2021, the Department issued a notice of continuing violation to Colonial detailing Colonial's failure to meet its obligations under 15A N.C.A.C. 02L .0507(b), .0106(c) and .0106(g), as detailed in the September 25, 2020 notice of violation. The February 24, 2021, notice of continuing violation is attached hereto and incorporated herein as Exhibit 7. The February 24, 2021 notice of continuing violation identifies numerous deficiencies in the Comprehensive Site Assessment submitted by Colonial to the Department on January 20, 2021, including, *inter alia*, Colonial's failure to determine the vertical extent of petroleum contamination throughout the plume.

48. On April 14, 2021, Colonial informed the Department that the model Colonial had previously used to estimate the size of the petroleum release was inappropriate and that Colonial's estimate of the size of the release would need to be reevaluated. In particular, Colonial had discovered additional petroleum beneath the water table in a portion of the Site.

49. Colonial had not previously accounted for the presence of petroleum beneath the water table in its estimate of the amount of petroleum at the Site. Thus, Colonial's estimated release volume of 1.2 million gallons underestimated the amount of petroleum present in the soil and groundwater at the Site.

50. On April 21, 2021, Colonial sent a letter to the Department stating that Colonial would not be able to complete and submit a revised and updated comprehensive site assessment by the April 26, 2021 deadline set forth in the Department's February 24, 2021 notice of continuing violation. In particular, Colonial stated that it would be unable to provide the Department with the necessary information concerning the horizontal and vertical extent of the contamination at the Site. Colonial also requested an extension of time until August 31, 2021 to provide this information. Colonial's April 21, 2021, letter is attached hereto and incorporated herein as Exhibit 8.

51. On May 5, 2021, the Department issued a second notice of continuing violation to Colonial detailing Colonial's continued failure to comply with the requirements set forth in the September 25, 2020, notice of violation. This May 5, 2021, notice of continuing violation is attached hereto and incorporated herein as Exhibit 9. Among other items, the May 5, 2021, notice of continuing violation cites Colonial's continued failure to provide an updated estimate of product volume released to the environment. The May 5, 2021, notice of continuing violation directed Colonial to provide that information to the Department by May 28, 2021. The notice of continuing violation also required Colonial to provide a workplan for defining the vertical extent of contamination at the Site by May 7, 2021, and an updated conceptual site model by June 25, 2021.

52. On May 12, 2021, Colonial provided a partial response to the May 5, 2021 notice of continuing violation by letter to the Department. Colonial's May 12, 2021, letter to the Department is attached hereto and incorporated herein as Exhibit 10. However, this response did not fully satisfy the requirements set forth in the May 5, 2021 notice of continuing violation.

53. On May 28, 2021, Colonial sent the Department a letter stating that it would not be providing a revised volume estimate by the May 28 deadline set forth in the Department's May 5,

2021 notice of continuing violation. Colonial's May 28, 2021, letter to the Department is attached hereto and incorporated herein as Exhibit 11. Although Colonial's May 28 and May 12 letters raised several objections to providing a revised volume estimate, Colonial had previously provided volume estimates to PHMSA and the Department without raising any objections as to their feasibility.

54. Upon information and belief, prior to the spill in this case, the largest inland release of petroleum product in the United States occurred in March 1991 in Minnesota and totaled approximately 1.7 million gallons.

55. As stated in paragraphs 48 and 49 of this complaint, an updated estimate of the volume of the petroleum release in this case would take into account newly identified locations of petroleum product at the Site that were not accounted for in prior estimates. Thus, any new estimate based upon currently available information would result in an upward revision of Colonial's previous estimate of 1.2 million gallons of petroleum released at the Site. Although Colonial is refusing to provide such an estimate at this time, upon information and belief, an updated estimate based upon currently available information would show that the release in this case exceeds 1.7 million gallons and is the largest inland release in our nation's history.

56. In communications with the Department since the date of Colonial's May 28, 2021 letter and up to the filing of this complaint, Colonial has continued in its refusal to provide an updated volume estimate to the Department.

57. In a telephone call on August 18, 2021 and a follow-up email on August 20, 2021, Colonial informed the Department that it would not be providing the complete vertical extent of petroleum contamination at the Site by August 31, 2021 as previously forecast. Colonial instead

requested an extension of time until October 30, 2021 to provide such information. The August 20, 2021 email from Colonial is attached hereto and incorporated herein as Exhibit 12.

58. As of the filing of this complaint, Colonial had recovered more than 1,300,000 gallons of free product from the Site and was continuing to recover free product at a rate of approximately 1,000 gallons per day. This recovered volume is based on Colonial's weekly reports to the Department regarding the amount of product recovered to date. (See also Exhibit 13, pp. 3, 10) Notably, the amount of petroleum already recovered from the Site exceeds Colonial's most recent estimate of the spill volume.

59. Colonial has also provided bills of lading to the Department documenting the amount of free petroleum product transported away from the Site after being recovered by Colonial. The amount of free product shown on these bills of lading exceeds the amount of recovered free product reported to the Department by Colonial. To date, Colonial has not adequately explained the reason for this discrepancy.

60. On October 19, 2021, the Department issued a notice of continuing violation to Colonial. In that notice, the Department again cited Colonial for its failure to determine the vertical extent of the groundwater contamination throughout the contaminant plume, and for its failure to provide an updated estimate of the amount of petroleum released in the spill. The October 19, 2021 notice of continuing violation is attached hereto and incorporated herein as Exhibit 14.

61. Also on October 19, 2021, the Department issued a notice of regulatory requirements to Colonial. In that notice, the Department informed Colonial of its obligation to, *inter alia*, provide detailed estimates of the contaminant mass in the soil expressed in gallons of free petroleum product, and to resolve the discrepancy in reported amounts of petroleum free

product removed from the Site (as described in paragraph 59 of this complaint). The October 19, 2021 notice of regulatory requirements is attached hereto and incorporated herein as Exhibit 15.

62. On October 28, 2021, Colonial responded to the Department's October 19, 2021 notice of continuing violation, and again refused to provide an updated estimate of the size of the spill. The October 28, 2021 response is attached to this complaint as Exhibit 16.

63. On October 30, 2021, Colonial provided a Revised Comprehensive Site Assessment to the Department. (Exhibit 13) In that document Colonial claims to have completed the delineation of the vertical extent of the contamination at the Site. However, further work is still required to accurately define the full vertical extent of the contamination at the Site, including but not limited to further groundwater sampling.

64. As of the filing of this complaint, Colonial has not provided a conceptual site model that includes a full and complete delineation of the vertical extent of the contamination at the Site. A comprehensive conceptual site model is required to ensure that appropriate cleanup and remedial action occurs at the Site.

65. Approximately 117 monitoring wells have been installed at the Site with the purpose of determining the extent and nature of the groundwater contamination.

66. Approximately 92 product recovery wells have been placed at the Site to remove petroleum free product from the subsurface of the Site.

67. Approximately 56 hydraulic control wells have been installed around the perimeter of the release area. The purpose of these wells is to prevent the further spread of contaminated groundwater at the Site.

68. Approximately 40 air sparge wells have been installed at the Site. The purpose of these wells is to aid in removing harmful vapors from the soil and groundwater, and thus to reduce soil and groundwater contamination.

69. Colonial is not currently operating the hydraulic control wells to the maximum feasible extent. Colonial is only using these wells when it becomes necessary to use them for free product recovery, and is not using them for hydraulic control otherwise.

Groundwater

70. The groundwater at the site is classified as GA. *See* 15A N.C.A.C. 02L .0201, .0302. The best use of GA groundwaters is as an "[e]xisting or potential source of drinking water supply for humans." 15A N.C.A.C. 02L .0201(1)(a).

71. Colonial has identified twenty water-supply wells within a 1,500-foot radius of the release area, including thirteen within a 1,000-foot radius of the release area. Upon information and belief, ten of the wells within the 1,000-foot radius have been abandoned since the release while three continue to be used as water-supply wells. (Exhibit 13, p. 11; Exhibit 17)

72. At present, the subsurface area of groundwater contaminated by the discharge at the Site is approximately 11 acres in extent. In the absence of appropriate remedial measures and corrective action, this contaminated groundwater plume will continue to move within the larger groundwater aquifer system and expand in size.

73. In addition to the presence of free product in the subsurface and groundwater, many petroleum-related contaminants have been detected in the groundwater at concentrations above the applicable standards. Petroleum-related contaminants detected in the groundwater at the Site in concentrations in excess of groundwater standards include, but are not limited to, Benzene, 1,2 Dichloroethane, Diisopropyl Ether, Methyl-tert-butyl Ether, Naphthalene, Toluene, Xylene,

Petroleum Aliphatic Carbon Fraction Classes C5-C8 and C9-C12, and Petroleum Aromatics Carbon Fraction Class C9-C10. (See Exhibit 13, p. 6; Exhibit 18)

74. Colonial is currently sampling surface waters on and near the Site semi-monthly and following one inch or greater rainfall events to ensure that the contamination in the groundwater is not impacting surface waters.

75. On October 27, 2021, the Department's Division of Water Resources issued a notice of regulatory requirements to Colonial detailing the type, frequency, and locations for the surface water sampling required to support site assessment and protection of receptors pursuant to 15A NCAC 02L .0106. That notice is attached as Exhibit 19 to this complaint and incorporated by reference herein.

PFAS

76. "PFAS" is the commonly used shorthand for a family of chemicals otherwise known as per- and polyfluoroalkyl substances. PFAS are a group of chemicals known to pose significant risks to human health and the environment. These chemicals are known as "forever chemicals" because they resist biodegradation, persist in the environment, and accumulate in people and other living organisms.

77. As part of the spill response and pipeline repair efforts at the Site, Colonial and/or its contractors used F500 encapsulant as an explosion suppressant.

78. The Department expressed concern to Colonial that the F500 encapsulant and other potential sources could be causing PFAS contamination at the Site, and asked that Colonial conduct sampling to determine whether PFAS was present.

79. Colonial initially resisted the Department's request for PFAS sampling and assured the Department that no PFAS contamination was present in the F500 encapsulant or at the Site generally.

80. Because Colonial was not performing the requested PFAS sampling, the Department informed Colonial that the Department would conduct its own PFAS sampling at the Site.

81. On August 17, 2020, Colonial collected a sample from a container at the Site with F500 product, but no field notes were taken and it was unclear if the material in the container was raw or mixed product. On August 20, 2020, the Department conducted sampling at the Site for PFAS. Colonial was present for the sampling event, and one of Colonial's environmental consultants participated in the sampling event. Samples were collected from containers of raw F500 product and mixed preparations of F500 at the Site. Samples were also collected from surface water present in stormwater drainage ditches at the Site.

82. The Department's field notes from the August 20, 2020 sampling event are attached to this complaint as Exhibit 20 and incorporated by reference. As stated therein, the following media and locations were sampled by the Department during the August 20, 2020 sampling event:

a. F500 encapsulant (raw product) present at the Site contained in 250-gallon totes;

b. F500 encapsulant mixed with water taken from the fire hose of a Huntersville fire truck present at the Site;

c. Surface water present in a puddle on the ground near the fire truck that had been used to mix the F500 encapsulant with water;

d. Surface water taken from a stormwater collection system near the location of the fracture in the Pipeline. Excavation and repair work was being performed on the Pipeline in this area.

83. On September 10, 2020, Colonial collected additional samples from containers of raw and mixed product, but the Department was not notified of this sampling event and was not present. The Department did not learn of this sampling event until March 26, 2021, when Colonial included it as part of a summary of results provided to the Department by email.

84. The Department conducted additional PFAS sampling during the week of October 12, 2020. The Department collected groundwater, recovered petroleum free product, and recovered petroleum contact water samples at this time.

85. Samples of the F500 encapsulant taken from containers of mixed and raw product at the Site showed total PFAS levels ranging from non-detect to 50,260 ng/L. Samples of standing water located in the drainage or stormwater ditches in or around areas where the F500 encapsulant was used showed total PFAS levels ranging from 879-1,512 ng/L.

86. Specific PFAS chemicals detected in the F500 containers and drainage or stormwater ditches at the Site include PFBA, PFHxA, PFOA, PFOS, 6:2 FTS, 8:2 FTS, and PFOSA. The highest concentrations were detected for PFOSA, which was found at up to 16,600 ng/L in a container with F500. The total amount of PFOS and PFOA found in the drainage or stormwater ditches at the Site was as high as 222 ng/L. There are currently no health-based regulatory limits for most PFAS and most environmental media. However, these concentrations are concerning because they are substantially higher than the EPA drinking water health advisory level of 70 ng/L for the sum of PFOA and PFOS.

87. PMPA, another PFAS chemical, was detected in the petroleum, petroleum contact water, and nearby monitoring wells at the Site.

88. The practical quantitation limit for PFAS in North Carolina is 10 ng/L. Groundwater concentrations at the Site of some PFAS compounds have exceeded this practical quantitation limit. For instance, PMPA was detected in groundwater at levels up to 19.6 ng/L.

89. Since the time of the PFAS data collection referenced above, Colonial has not taken appropriate action to determine the full extent of PFAS contamination at the Site.

90. On October 12, 2021, Colonial sent a "position paper" to the Department arguing that PFAS contamination at the Site did not warrant any further investigation. That position paper is attached hereto as Exhibit 21.

91. In the Department's October 19, 2021 notice of regulatory requirements (Exhibit 15), the Department notified Colonial of the requirement to perform weekly sampling of petroleum contact water recovered at the Site using EPA Method 6200B and Method 537.1 for PFAS, including PFOS and PFOA. Similarly, the October 27, 2021 notice of regulatory requirements from the Department's Division of Water Resources required Colonial to perform PFAS sampling of surface waters near the Site using EPA draft Method 1633. (Exhibit 19) As of the filing of this complaint, Colonial has not fully complied with either of these notices of regulatory requirements in regards to PFAS sampling.

CLAIMS FOR RELIEF

Claim I: Violations of Groundwater Standards

92. The allegations contained in paragraphs 1 through 91 are incorporated into these claims for relief as if fully set forth herein.

93. Concentrations of free product and of petroleum-related contaminants in groundwater samples taken from monitoring wells at the Site exceed applicable groundwater standards. Petroleum-related contaminants detected in monitoring wells at levels above the applicable groundwater standards, include, but are not necessarily limited to, Benzene, 1,2 Dichloroethane, Diisopropyl Ether, Methyl-tert-butyl Ether, Naphthalene, Toluene, Xylene, Petroleum Aliphatic Carbon Fraction Classes C5-C8 and C9-C12, and Petroleum Aromatics Carbon Fraction Class C9-C10.

94. Because PFAS was used in Site cleanup efforts, and because PFAS has been detected in drainage ditches, petroleum free product, petroleum contact water, and monitoring wells at the Site, a violation of groundwater standards for PFAS is also a continuing threat.

95. Colonial's failure to correct these violations and threatened violations constitutes a continuing violation of the State's water quality laws that, as a matter of law, adversely affects the public interest. *See Challenge*, 54 N.C. App. at 522, 284 S.E.2d at 339.

96. The State is therefore entitled to preliminary and permanent injunctive relief against Colonial requiring Colonial to prevent and abate Colonial's continued and threatened violations of groundwater standards pursuant to N.C.G.S. § 143-215.6C.

Claim II: Failure to Take Actions Required by 15A N.C.A.C. 2L .0106

97. The allegations contained in paragraphs 1 through 96 are incorporated into these claims for relief as if fully set forth herein.

98. Colonial's failure to submit a report to the Department "assessing the cause, significance, and extent of the violation" is a violation of 15A N.C.A.C. 02L .0106(c). Colonial has failed to provide the Department with a current, revised estimate of the volume of petroleum

released from the Pipeline at the Site, and Colonial has failed to fully delineate the vertical extent of the contamination at the Site.

99. Colonial's failure to adequately identify "(1) the source and cause of contamination; [and] (4) the horizontal and vertical extent of soil and groundwater contamination and all significant factors affecting contaminant transport" in its site assessment is a violation of 15A N.C.A.C. 2L .0106(g). Colonial has failed to provide the Department with a current, revised estimate of the volume of petroleum released from the Pipeline at the Site, and Colonial has failed to fully delineate the vertical extent of the contamination at the Site.

100. Colonial's failure to adequately engage available resources to recover non-aqueous phase petroleum (free product) and to prevent the further spread of contaminated groundwater at the Site is a violation of 15A N.C.A.C. 02L .0106(f). By failing to use all of the hydraulic control wells available at the Site and by failing to run these wells to the maximum feasible extent, Colonial increases the likelihood that the underground plume of petroleum contamination will spread and grow in size.

101. Colonial's failure to correct these violations constitutes a continuing violation of the State's water quality laws that, as a matter of law, adversely affects the public interest. *See Challenge*, 54 N.C. App. at 522, 284 S.E.2d at 339.

102. The State is therefore entitled to preliminary and permanent injunctive relief against Colonial requiring Colonial to abide by the applicable groundwater quality rules pursuant to N.C.G.S. § 143-215.6C.

PRAYER FOR RELIEF

Wherefore, the Plaintiff, State of North Carolina, prays that the Court grant to it the following relief:

1. That the Court accepts the verified complaint as an affidavit upon which to base all orders of the Court.

2. That the Court preliminarily, and upon final judgment permanently, enter a mandatory injunction requiring Colonial to take corrective action in compliance with OPHSCA and the State's water quality laws, including:

   a. Remove, treat or control any source of petroleum, PFAS, and other contaminants that have the potential to contaminate groundwater in accordance with a plan as approved by the Department and with such conditions as the Department shall deem necessary.

   b. Provide a description to the Department of "the cause, significance, and extent of the violation", "the source and cause of contamination", and the "horizontal and vertical extent of soil and groundwater contamination" at the Site, including:

      i. a current, revised estimate of the volume of petroleum released from the Pipeline; and

      ii. a comprehensive Conceptual Site Model for the petroleum release and PFAS contamination including receptors and incorporating all the available site information, including but not limited to, the resistivity survey, vapor intrusion investigation, air monitoring, noise monitoring, springs, boring logs, drilling information, optical image profiling information, free product volume estimation, horizontal and vertical extent of soil and groundwater

contamination, geophysical logging information, hydraulic information, etc.

c. Complete site assessment activities and submit and receive approval for a plan and proposed schedule for corrective action to the Department as required by 15A N.C.A.C. 2L .0106. The corrective action plan should include, *inter alia*, a monitoring plan for evaluating the effectiveness of the proposed corrective action and the movement of the contaminant plume.

d. As part of the site assessment and protection of receptors required by 15A N.C.A.C. 2L .0106, conduct monthly sampling of nearby surface waters for petroleum, pH, conductivity, dissolved oxygen, Volatile Organic Compounds using EPA Method 8260D, total lead using EPA Method 6010D at 19 locations, and PFAS at select locations as detailed in the Division of Water Resources notice of regulatory requirements issued to Colonial on October 27, 2021.

e. Take appropriate action to abate the violations of N.C.G.S. § 143-215.1 and groundwater standards at the Site pursuant to a corrective action plan and schedule approved by the Department.

f. Use best efforts to obtain any permits or approvals necessary for the completion of site assessment activities or required corrective action.

g. Provide a sufficient explanation to the Department for the discrepancy between the amount of recovered petroleum free product reported to the Department and the amount shown on the relevant bills of lading.

3. That the Court preliminarily, and upon final judgment permanently, enter a mandatory injunction requiring Colonial to take corrective action to remediate all threatened releases of petroleum, including:

a. Provide to the Department the GPS coordinates and location of all Type A collar repairs made on the Colonial Pipeline System in North Carolina, assess soil and groundwater within 50 feet of those repairs, and submit soil and groundwater assessment reports to the Department.

b. Remove and replace any Type A collars with alternative repairs if contamination is detected and provide to the Department a monitoring plan for soil and groundwater around Type A collars that remain in place.

c. Provide to the Department any evaluation(s) of the effectiveness and capability of Colonial's leak detection system for the Colonial Pipeline System in North Carolina, including main lines, stub lines, and delivery lines, conducted by Colonial pursuant to any Consent Order or Agreement between Colonial and PHMSA. Similarly, provide any determination of corrective measures to improve the effectiveness of Colonial's leak detection system in North Carolina produced pursuant to any Consent Order or Agreement between Colonial and PHSMA to the Department upon completion.

d. Provide to the Department all documentation and reports regarding visual and technology-assisted inspections of the Colonial Pipeline System in North Carolina.

4. That the Court's order require Colonial to comply in full with the Department's requests for information related to the above.

5. That the Court's order provide that the preliminary and permanent injunctions shall be enforceable by and through the contempt powers of this Court pursuant to Chapter 5A of the North Carolina General Statutes.

6. That this Court retain jurisdiction over this matter for such further orders as may be required to ensure full compliance with the State's Oil Pollution and Hazardous Substances Control Act of 1978, the State's water quality laws, and any other applicable environmental laws of the State.

7. Any other further relief that the Court deems just and proper.

Respectfully submitted this the 1st day of November 2021.

JOSHUA H. STEIN
Attorney General

T. Hill Davis, III
Assistant Attorney General
N.C. Department of Justice
Post Office Box 629
Raleigh, NC 27602
(919) 716-6600
(919) 716-6766 fax
hdavis@ncdoj.gov
State Bar No. 38121

STATE OF NORTH CAROLINA

COUNTY OF WAKE

VERIFICATION

Michael Scott, first duly sworn, deposes and says that he is the Director, Division of Waste Management, North Carolina Department of Environmental Quality; that he has read the foregoing COMPLAINT and is familiar with all of the facts and circumstances stated therein; that the same are true of his own knowledge, except as to those matters and things stated and alleged upon information and belief, and as to those matters and things he believes them to be true.

I affirm, under the penalties for perjury, that the foregoing representations are true.

This the 1st day of November, 2021.

Michael Scott
Director
Division of Waste Management

EXHIBIT
1

NOTICE: This report is required by 49 CFR Part 195. Failure to report can result in a civil penalty not to exceed $100,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed $1,000,000 as provided in 49 USC 60122.		OMB NO: 2137-0047 EXPIRATION DATE: 8/31/202
U.S Department of Transportation Pipeline and Hazardous Materials Safety Administration	**Original Report Date:**	09/13/2020
	No.	20200253 - 34271 (DOT Use Only)

ACCIDENT REPORT - HAZARDOUS LIQUID PIPELINE SYSTEMS

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2137-0047. All responses to the collection of information are mandatory. Send comments regarding this burden or any other aspect of this collection of information, including suggestions for reducing the burden to: Information Collection Clearance Officer, PHMSA, Office of Pipeline Safety (PHP-30) 1200 New Jersey Avenue, SE, Washington, D.C. 20590.

INSTRUCTIONS

Important: *Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the PHMSA Pipeline Safety Community Web Page at http://www.phmsa.dot.gov/pipeline/library/forms.*

PART A - KEY REPORT INFORMATION

Report Type: *(select all that apply)*	**Original:**	**Supplemental:**	**Final:**
		Yes	
Last Revision Date:	09/14/2020		
1. Operator's OPS-issued Operator Identification Number (OPID):	2552		
2. Name of Operator	COLONIAL PIPELINE CO		
3. Address of Operator:			
3a. Street Address	1185 SANCTUARY PARKWAY SUITE 100		
3b. City	ALPHARETTA		
3c. State	Georgia		
3d. Zip Code	30009-4765		
4. Local time *(24-hr clock)* and date of the Accident:	08/14/2020 18:20		
5. Location of Accident:			
Latitude / Longitude	35.414106, -80.806185		
6. National Response Center Report Number (if applicable):	1284598		
7. Local time *(24-hr clock)* and date of initial telephonic report to the National Response Center (if applicable):	08/14/2020 19:42		
8. Commodity released: *(select only one, based on predominant volume released)*	Refined and/or Petroleum Product (non-HVL) which is a Liquid at Ambient Conditions		
- Specify Commodity Subtype:	Gasoline (non-Ethanol)		
- If "Other" Subtype, Describe:			
- If Biofuel/Alternative Fuel and Commodity Subtype is Ethanol Blend, then % Ethanol Blend:			
- If Biofuel/Alternative Fuel and Commodity Subtype is Biodiesel, then Biodiesel Blend e.g. B2, B20, B100			
9. Estimated volume of commodity released unintentionally (Barrels):	6,490.00		
10. Estimated volume of intentional and/or controlled release/blowdown (Barrels):			
11. Estimated volume of commodity recovered (Barrels):	3,094.00		
12. Were there fatalities?	No		
- If Yes, specify the number in each category:			
12a. Operator employees			
12b. Contractor employees working for the Operator			
12c. Non-Operator emergency responders			
12d. Workers working on the right-of-way, but NOT associated with this Operator			
12e. General public			
12f. Total fatalities (sum of above)			
13. Were there injuries requiring inpatient hospitalization?	No		
- If Yes, specify the number in each category:			
13a. Operator employees			
13b. Contractor employees working for the Operator			
13c. Non-Operator emergency responders			
13d. Workers working on the right-of-way, but NOT associated with this Operator			
13e. General public			
13f. Total injuries (sum of above)			

14. Was the pipeline/facility shut down due to the Accident?	Yes
- If No, Explain:	
- If Yes, complete Questions 14a and 14b: *(use local time, 24-hr clock)*	
14a. Local time and date of shutdown:	08/14/2020 18:43
14b. Local time pipeline/facility restarted:	08/19/2020 21:00
- Still shut down? (* Supplemental Report Required)	
15. Did the commodity ignite?	No
16. Did the commodity explode?	No
17. Number of general public evacuated:	0
18. Time sequence *(use local time, 24-hour clock)*:	
18a. Local time Operator identified Accident - effective 7- 2014 changed to "Local time Operator identified failure":	08/14/2020 18:20
18b. Local time Operator resources arrived on site:	08/14/2020 18:42
PART B - ADDITIONAL LOCATION INFORMATION	
1. Was the origin of the Accident onshore?	Yes
If Yes, Complete Questions (2-12)	
If No, Complete Questions (13-15)	
- If Onshore:	
2. State:	North Carolina
3. Zip Code:	28078
4. City	Huntersville
5. County or Parish	Mecklenburg
6. Operator-designated location:	Milepost/Valve Station
Specify:	ROW
7. Pipeline/Facility name:	L01
8. Segment name/ID:	Charlotte to Kannapolis
9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)?	No
10. Location of Accident:	Pipeline Right-of-way
11. Area of Accident (as found):	Underground
Specify:	Under soil
- If Other, Describe:	
Depth-of-Cover (in):	36
12. Did Accident occur in a crossing?	No
- If Yes, specify type below:	
- If Bridge crossing –	
Cased/ Uncased:	
- If Railroad crossing –	
Cased/ Uncased/ Bored/drilled	
- If Road crossing –	
Cased/ Uncased/ Bored/drilled	
- If Water crossing –	
Cased/ Uncased	
- Name of body of water, if commonly known:	
- Approx. water depth (ft) at the point of the Accident:	
- Select:	
- If Offshore:	
13. Approximate water depth (ft) at the point of the Accident:	
14. Origin of Accident:	
- In State waters - Specify:	
- State:	
- Area:	
- Block/Tract #:	
- Nearest County/Parish:	
- On the Outer Continental Shelf (OCS) - Specify:	
- Area:	
- Block #:	
15. Area of Accident:	
PART C - ADDITIONAL FACILITY INFORMATION	
1. Is the pipeline or facility:	Interstate
2. Part of system involved in Accident:	Onshore Pipeline, Including Valve Sites
- If Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances, specify:	
3. Item involved in Accident:	Pipe
- If Pipe, specify:	Pipe Body
3a. Nominal diameter of pipe (in):	40
3b. Wall thickness (in):	.312

3c. SMYS (Specified Minimum Yield Strength) of pipe (psi):	60,000
3d. Pipe specification:	API 5L
3e. Pipe Seam , specify:	DSAW
- If Other, Describe:	
3f. Pipe manufacturer:	Bethlehem Steel
3g. Year of manufacture:	1978
3h. Pipeline coating type at point of Accident, specify:	Coal Tar
- If Other, Describe:	
- If Weld, including heat-affected zone, specify. If Pipe Girth Weld, 3a through 3h above are required:	
- If Other, Describe:	
- If Valve, specify:	
- If Mainline, specify:	
- If Other, Describe:	
3i. Manufactured by:	
3j. Year of manufacture:	
- If Tank/Vessel, specify:	
- If Other - Describe:	
- If Other, describe:	
4. Year item involved in Accident was installed:	1978
5. Material involved in Accident:	Carbon Steel
- If Material other than Carbon Steel, specify:	
6. Type of Accident Involved:	Leak
- If Mechanical Puncture – Specify Approx. size:	
in. (axial) by	
in. (circumferential)	
- If Leak - Select Type:	Other
- If Other, Describe:	Under Investigation
- If Rupture - Select Orientation:	
- If Other, Describe:	
Approx. size: in. (widest opening) by	
in. (length circumferentially or axially)	
- If Other – Describe:	

PART D - ADDITIONAL CONSEQUENCE INFORMATION

1. Wildlife impact:	Yes
1a. If Yes, specify all that apply:	
- Fish/aquatic	
- Birds	
- Terrestrial	Yes
2. Soil contamination:	Yes
3. Long term impact assessment performed or planned:	Yes
4. Anticipated remediation:	Yes
4a. If Yes, specify all that apply:	
- Surface water	
- Groundwater	Yes
- Soil	Yes
- Vegetation	
- Wildlife	
5. Water contamination:	Yes
5a. If Yes, specify all that apply:	
- Ocean/Seawater	
- Surface	
- Groundwater	Yes
- Drinking water: *(Select one or both)*	
- Private Well	
- Public Water Intake	
5b. Estimated amount released in or reaching water (Barrels):	3,714.00
5c. Name of body of water, if commonly known:	NA
6. At the location of this Accident, had the pipeline segment or facility been identified as one that "could affect" a High Consequence Area (HCA) as determined in the Operator's Integrity Management Program?	No
7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)?	No
7a. If Yes, specify HCA type(s): *(Select all that apply)*	
- Commercially Navigable Waterway:	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	

- High Population Area:	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Other Populated Area	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Unusually Sensitive Area (USA) - Drinking Water	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Unusually Sensitive Area (USA) - Ecological	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
8. Estimated cost to Operator – effective 12-2012, changed to "Estimated Property Damage":	
8a. Estimated cost of public and non-Operator private property damage paid/reimbursed by the Operator – effective 12-2012, "paid/reimbursed by the Operator" removed	$ 0
8b. Estimated cost of commodity lost	$ 351,000
8c. Estimated cost of Operator's property damage & repairs	$ 3,500,000
8d. Estimated cost of Operator's emergency response	$ 2,500,000
8e. Estimated cost of Operator's environmental remediation	$ 2,600,000
8f. Estimated other costs	$ 1,400,000
Describe:	Misc.
8g. Estimated total costs (sum of above) – effective 12-2012, changed to "Total estimated property damage (sum of above)"	$ 10,351,000

PART E - ADDITIONAL OPERATING INFORMATION

1. Estimated pressure at the point and time of the Accident (psig):	183.00
2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig):	673.00
3. Describe the pressure on the system or facility relating to the Accident (psig):	Pressure did not exceed MOP
4. Not including pressure reductions required by PHMSA regulations (such as for repairs and pipe movement), was the system or facility relating to the Accident operating under an established pressure restriction with pressure limits below those normally allowed by the MOP?	No
- If Yes, Complete 4.a and 4.b below:	
4a. Did the pressure exceed this established pressure restriction?	
4b. Was this pressure restriction mandated by PHMSA or the State?	
5. Was "Onshore Pipeline, Including Valve Sites" OR "Offshore Pipeline, Including Riser and Riser Bend" selected in PART C, Question 2?	Yes
- If Yes - (*Complete 5a. – 5f below)* effective 12-2012, changed to *"(Complete 5.a – 5.e below)"*	
5a. Type of upstream valve used to initially isolate release source:	Remotely Controlled
5b. Type of downstream valve used to initially isolate release source:	Remotely Controlled
5c. Length of segment isolated between valves (ft):	93,000
5d. Is the pipeline configured to accommodate internal inspection tools?	Yes
- If No, Which physical features limit tool accommodation? (*select all that apply)*	
- Changes in line pipe diameter	
- Presence of unsuitable mainline valves	
- Tight or mitered pipe bends	
- Other passage restrictions (i.e. unbarred tee's, projecting instrumentation, etc.)	
- Extra thick pipe wall (applicable only for magnetic flux leakage internal inspection tools)	
- Other -	
- If Other, Describe:	
5e. For this pipeline, are there operational factors which significantly complicate the execution of an internal inspection tool run?	No
- If Yes, Which operational factors complicate execution? (*select all that apply*)	
- Excessive debris or scale, wax, or other wall buildup	

- Low operating pressure(s)	
- Low flow or absence of flow	
- Incompatible commodity	
- Other -	
- If Other, Describe:	
5f. Function of pipeline system:	> 20% SMYS Regulated Trunkline/Transmission
6. Was a Supervisory Control and Data Acquisition (SCADA)-based system in place on the pipeline or facility involved in the Accident?	Yes
If Yes -	
6a. Was it operating at the time of the Accident?	Yes
6b. Was it fully functional at the time of the Accident?	Yes
6c. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident?	No
6d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident?	No
7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident?	No
- If Yes:	
7a. Was it operating at the time of the Accident?	
7b. Was it fully functional at the time of the Accident?	
7c. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident?	
7d. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident?	
8. How was the Accident initially identified for the Operator?	Notification From Public
- If Other, Specify:	
8a. If "Controller", "Local Operating Personnel", including contractors", "Air Patrol", or "Ground Patrol by Operator or its contractor" is selected in Question 8, specify:	
9. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Accident?	No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the Operator did not investigate)
- If No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: *(provide an explanation for why the operator did not investigate)*	Not contributing factors.
- If Yes, specify investigation result(s): *(select all that apply)*	
- Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
- Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
Provide an explanation for why not:	
- Investigation identified no control room issues	
- Investigation identified no controller issues	
- Investigation identified incorrect controller action or controller error	
- Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response	
- Investigation identified incorrect procedures	
- Investigation identified incorrect control room equipment operation	
- Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response	
- Investigation identified areas other than those above:	
Describe:	

PART F - DRUG & ALCOHOL TESTING INFORMATION

1. As a result of this Accident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
1a. Specify how many were tested:	
1b. Specify how many failed:	

2. As a result of this Accident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
2a. Specify how many were tested:	
2b. Specify how many failed:	

PART G – APPARENT CAUSE

Select only one box from PART G in shaded column on left representing the APPARENT Cause of the Accident, and answer the questions on the right. Describe secondary, contributing or root causes of the Accident in the narrative (PART H).

Apparent Cause:	G8 - Other Incident Cause

G1 - Corrosion Failure - only one **sub-cause** can be picked from shaded left-hand column

Corrosion Failure – Sub-Cause:	
- If External Corrosion:	
1. Results of visual examination:	
- If Other, Describe:	
2. Type of corrosion: *(select all that apply)*	
- Galvanic	
- Atmospheric	
- Stray Current	
- Microbiological	
- Selective Seam	
- Other:	
- If Other, Describe:	
3. The type(s) of corrosion selected in Question 2 is based on the following: *(select all that apply)*	
- Field examination	
- Determined by metallurgical analysis	
- Other:	
- If Other, Describe:	
4. Was the failed item buried under the ground?	
- If Yes :	
□4a. Was failed item considered to be under cathodic protection at the time of the Accident?	
If Yes - Year protection started:	
4b. Was shielding, tenting, or disbonding of coating evident at the point of the Accident?	
4c. Has one or more Cathodic Protection Survey been conducted at the point of the Accident?	
If "Yes, CP Annual Survey" – Most recent year conducted:	
If "Yes, Close Interval Survey" – Most recent year conducted:	
If "Yes, Other CP Survey" – Most recent year conducted:	
- If No:	
4d. Was the failed item externally coated or painted?	
5. Was there observable damage to the coating or paint in the vicinity of the corrosion?	
- If Internal Corrosion:	
6. Results of visual examination:	
- Other:	
7. Type of corrosion *(select all that apply)*: -	
- Corrosive Commodity	
- Water drop-out/Acid	
- Microbiological	
- Erosion	
- Other:	
- If Other, Describe:	
8. The cause(s) of corrosion selected in Question 7 is based on the following *(select all that apply)*: -	
- Field examination	
- Determined by metallurgical analysis	
- Other:	
- If Other, Describe:	
9. Location of corrosion *(select all that apply)*: -	
- Low point in pipe	
- Elbow	
- Other:	
- If Other, Describe:	
10. Was the commodity treated with corrosion inhibitors or biocides?	

11. Was the interior coated or lined with protective coating?	
12. Were cleaning/dewatering pigs (or other operations) routinely utilized?	
13. Were corrosion coupons routinely utilized?	
Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Tank/Vessel.	
14. List the year of the most recent inspections:	
14a. API Std 653 Out-of-Service Inspection	
- No Out-of-Service Inspection completed	
14b. API Std 653 In-Service Inspection	
- No In-Service Inspection completed	
Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
15. Has one or more internal inspection tool collected data at the point of the Accident?	
15a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: -	
- Magnetic Flux Leakage Tool	
Most recent year:	
- Ultrasonic	
Most recent year:	
- Geometry	
Most recent year:	
- Caliper	
Most recent year:	
- Crack	
Most recent year:	
- Hard Spot	
Most recent year:	
- Combination Tool	
Most recent year:	
- Transverse Field/Triaxial	
Most recent year:	
- Other	
Most recent year:	
Describe:	
16. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
If Yes -	
Most recent year tested:	
Test pressure:	
17. Has one or more Direct Assessment been conducted on this segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident::	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
18. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
18a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
G2 - Natural Force Damage - only one **sub-cause** can be picked from shaded left-handed column	
Natural Force Damage – Sub-Cause:	
- If Earth Movement, NOT due to Heavy Rains/Floods:	
1. Specify:	
- If Other, Describe:	
- If Heavy Rains/Floods:	

2. Specify:	
- If Other, Describe:	
- If Lightning:	
3. Specify:	
- If Temperature:	
4. Specify:	
- If Other, Describe:	
- If Other Natural Force Damage:	
5. Describe:	
Complete the following if any Natural Force Damage sub-cause is selected.	
6. Were the natural forces causing the Accident generated in conjunction with an extreme weather event?	
6a. If Yes, specify: *(select all that apply)*	
- Hurricane	
- Tropical Storm	
- Tornado	
- Other	
- If Other, Describe:	
G3 - Excavation Damage - only one **sub-cause** can be picked from shaded left-hand column	
Excavation Damage – Sub-Cause:	
- If Previous Damage due to Excavation Activity: Complete Questions 1-5 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
1. Has one or more internal inspection tool collected data at the point of the Accident?	
1a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: -	
- Magnetic Flux Leakage	
Most recent year conducted:	
- Ultrasonic	
Most recent year conducted:	
- Geometry	
Most recent year conducted:	
- Caliper	
Most recent year conducted:	
- Crack	
Most recent year conducted:	
- Hard Spot	
Most recent year conducted:	
- Combination Tool	
Most recent year conducted:	
- Transverse Field/Triaxial	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
2. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?	
3. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
4. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident:	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
5. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
5a. If Yes, for each examination, conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	

- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
Complete the following if Excavation Damage by Third Party is selected as the sub-cause.	
6. Did the operator get prior notification of the excavation activity?	
6a. If Yes, Notification received from: *(select all that apply)* -	
- One-Call System	
- Excavator	
- Contractor	
- Landowner	
Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected.	
7. Do you want PHMSA to upload the following information to CGA-DIRT (www.cga-dirt.com)?	
8. Right-of-Way where event occurred: *(select all that apply)* -	
- Public	
- If "Public", Specify:	
- Private	
- If "Private", Specify:	
- Pipeline Property/Easement	
- Power/Transmission Line	
- Railroad	
- Dedicated Public Utility Easement	
- Federal Land	
- Data not collected	
- Unknown/Other	
9. Type of excavator:	
10. Type of excavation equipment:	
11. Type of work performed:	
12. Was the One-Call Center notified?	
12a. If Yes, specify ticket number:	
12b. If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified:	
13. Type of Locator:	
14. Were facility locate marks visible in the area of excavation?	
15. Were facilities marked correctly?	
16. Did the damage cause an interruption in service?	
16a. If Yes, specify duration of the interruption (hours)	
17. Description of the CGA-DIRT Root Cause *(select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well):*	
Root Cause:	
- If One-Call Notification Practices Not Sufficient, specify:	
- If Locating Practices Not Sufficient, specify:	
- If Excavation Practices Not Sufficient, specify:	
- If Other/None of the Above, explain:	
G4 - Other Outside Force Damage - *only one* ***sub-cause*** *can be selected from the shaded left-hand column*	
Other Outside Force Damage – Sub-Cause:	
- If Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation:	
1. Vehicle/Equipment operated by:	
- If Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring:	
2. Select one or more of the following IF an extreme weather event was a factor:	
- Hurricane	
- Tropical Storm	
- Tornado	
- Heavy Rains/Flood	
- Other	
- If Other, Describe:	
- If Previous Mechanical Damage NOT Related to Excavation: Complete Questions 3-7 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
3. Has one or more internal inspection tool collected data at the point of the Accident?	
3a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:	

- Magnetic Flux Leakage	
Most recent year conducted:	
- Ultrasonic	
Most recent year conducted:	
- Geometry	
Most recent year conducted:	
- Caliper	
Most recent year conducted:	
- Crack	
Most recent year conducted:	
- Hard Spot	
Most recent year conducted:	
- Combination Tool	
Most recent year conducted:	
- Transverse Field/Triaxial	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
4. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?	
5. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
6. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident:	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
7. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
7a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
- If Intentional Damage:	
8. Specify:	
- If Other, Describe:	
- If Other Outside Force Damage:	
9. Describe:	

G5 - Material Failure of Pipe or Weld - only one **sub-cause** can be selected from the shaded left-hand column

Use this section to report material failures ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is "Pipe" or "Weld."

Material Failure of Pipe or Weld – Sub-Cause:	
1. The sub-cause shown above is based on the following: *(select all that apply)*	
- Field Examination	
- Determined by Metallurgical Analysis	
- Other Analysis	
- If "Other Analysis", Describe:	
- Sub-cause is Tentative or Suspected; Still Under Investigation (Supplemental Report required)	
- If Construction, Installation, or Fabrication-related:	
2. List contributing factors: *(select all that apply)*	

- Fatigue or Vibration-related	
Specify:	
- If Other, Describe:	
- Mechanical Stress:	
- Other	
- If Other, Describe:	
- If Environmental Cracking-related:	
3. Specify:	
- If Other - Describe:	
Complete the following if any Material Failure of Pipe or Weld sub-cause is selected.	
4. Additional factors: (*select all that apply*):	
- Dent	
- Gouge	
- Pipe Bend	
- Arc Burn	
- Crack	
- Lack of Fusion	
- Lamination	
- Buckle	
- Wrinkle	
- Misalignment	
- Burnt Steel	
- Other:	
- If Other, Describe:	
5. Has one or more internal inspection tool collected data at the point of the Accident?	
5a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:	
- Magnetic Flux Leakage	
Most recent year run:	
- Ultrasonic	
Most recent year run:	
- Geometry	
Most recent year run:	
- Caliper	
Most recent year run:	
- Crack	
Most recent year run:	
- Hard Spot	
Most recent year run:	
- Combination Tool	
Most recent year run:	
- Transverse Field/Triaxial	
Most recent year run:	
- Other	
Most recent year run:	
Describe:	
6. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
7. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident -	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site -	
Most recent year conducted:	
8. Has one or more non-destructive examination(s) been conducted at the point of the Accident since January 1, 2002?	
8a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: -	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	

- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
G6 – Equipment Failure - only one **sub-cause** can be selected from the shaded left-hand column	
Equipment Failure – Sub-Cause:	
- If Malfunction of Control/Relief Equipment:	
1. Specify: *(select all that apply)* -	
- Control Valve	
- Instrumentation	
- SCADA	
- Communications	
- Block Valve	
- Check Valve	
- Relief Valve	
- Power Failure	
- Stopple/Control Fitting	
- ESD System Failure	
- Other	
- If Other – Describe:	
- If Pump or Pump-related Equipment:	
2. Specify:	
- If Other – Describe:	
- If Threaded Connection/Coupling Failure:	
3. Specify:	
- If Other – Describe:	
- If Non-threaded Connection Failure:	
4. Specify:	
- If Other – Describe:	
- If Other Equipment Failure:	
5. Describe:	
Complete the following if any Equipment Failure sub-cause is selected.	
6. Additional factors that contributed to the equipment failure: *(select all that apply)*	
- Excessive vibration	
- Overpressurization	
- No support or loss of support	
- Manufacturing defect	
- Loss of electricity	
- Improper installation	
- Mismatched items (different manufacturer for tubing and tubing fittings)	
- Dissimilar metals	
- Breakdown of soft goods due to compatibility issues with transported commodity	
- Valve vault or valve can contributed to the release	
- Alarm/status failure	
- Misalignment	
- Thermal stress	
- Other	
- If Other, Describe:	
G7 - Incorrect Operation - only one **sub-cause** can be selected from the shaded left-hand column	
Incorrect Operation – Sub-Cause:	
- If Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow	
1. Specify:	
- If Other, Describe:	
- If Other Incorrect Operation	
2. Describe:	
Complete the following if any Incorrect Operation sub-cause is selected.	

3. Was this Accident related to *(select all that apply)*: -	
- Inadequate procedure	
- No procedure established	
- Failure to follow procedure	
- Other:	
- If Other, Describe:	
4. What category type was the activity that caused the Accident?	
5. Was the task(s) that led to the Accident identified as a covered task in your Operator Qualification Program?	
5a. If Yes, were the individuals performing the task(s) qualified for the task(s)?	

G8 - Other Accident Cause - only one **sub-cause** can be selected from the shaded left-hand column

Other Accident Cause – Sub-Cause:	Unknown
- If Miscellaneous:	
1. Describe:	
- If Unknown:	
2. Specify:	Still under investigation, cause of Accident to be determined* (*Supplemental Report required)

PART H - NARRATIVE DESCRIPTION OF THE ACCIDENT

On 8/14/2020 at 18:20, a Colonial employee was notified by a local resident about a possible leak in Colonial's Right-of-way (ROW) approximately 100 feet north (i.e., downstream) of Huntersville-Concord Road in Huntersville, NC. The possible leak location was discovered by utility vehicle riders that were on a trail that crosses the pipeline ROW. The Colonial employee lives in the area and went to inspect the location. Upon inspection, the Colonial employee confirmed a product release visible at the ground surface at 18:42 near mile marker 980 that was believed to be gasoline. The Colonial employee contacted the Colonial Control Center in Alpharetta, GA to provide notification of the visible release and the Control Center initiated shutdown of Lines 1 and 2 at 18:43. The lines were blocked by closing valves upstream of the release location at Colonial's Charlotte Delivery facility (DF) and downstream of the release location at the Kannapolis Station. The Colonial Operations Manager (OM) was notified at 18:44, and the Director of Operations (DO) was notified at 19:00, followed by additional internal notifications that were made to mobilize resources to address the conditions discovered. At 19:42, a NRC notification was made by the Control Center (Report number 1284598), the initial volume was reported at 75 barrels (bbls.), based on the limited information Colonial had at the time. Notifications were also made to Mecklenburg County, US EPA, NCDEQ, and PHMSA. The NRC notification was updated on 8/16/2020 at 17:40, with an estimated release volume of 1500 bbls. based on additional information available to Colonial as a result of the initial response efforts.

Colonial issued an internal Tier 2 response notification at 19:32 to mobilize internal and contractor resources to the site, and established an Incident Command Post to support the response. The leak source was identified on 8/15/2020 at approximately 12:00. Following confirmation of the leak source being on Line 1, Line 2 was authorized to restart on 8/15/2020 at 0:05. The leak source was originating from beneath a prior repair (Type A sleeve) made in 2004 to address a pipeline anomaly identified through a previous integrity assessment. The leak was repaired by installing a Type B pressure containing sleeve over the prior Type A sleeve repair. Line 1 was restarted on 8/19/2020 at approximately 21:00 after repair were completed.

The continued recovery of product and completion of the site characterization will have oversight by the North Carolina Department of Environmental Quality (NCDEQ) and Mecklenburg County.

Updated on 9/14/2020 to correct error in cost estimate.

PART I - PREPARER AND AUTHORIZED SIGNATURE

Preparer's Name	Denise Langley
Preparer's Title	Compliance Coordinator
Preparer's Telephone Number	770.819.3574
Preparer's E-mail Address	dlangley@colpipe.com
Preparer's Facsimile Number	
Authorized Signer Name	Mark Piazza
Authorized Signer Title	Manager Pipeline Compliance
Authorized Signer Telephone Number	678.763.5911
Authorized Signer Email	mpiazza@colpipe.com
Date	09/14/2020

Colonial Pipeline Company

Jeff D. Morrison
Environmental Program Manager

Phone: (770) 819.3566
e-mail: jmorrison@colpipe.com

January 20, 2021

To: Dan Bowser, et al.

Re: **Colonial Pipeline SR 2448/Pipeline ROW**
Incident Number 95827
Huntersville, North Carolina

Dear Dan,

Colonial is pleased transmit the Comprehensive Site Assessment Report (CSA) regarding the above-referenced incident. The report was prepared in conjunction with Apex Engineering, PC.

If you have any questions or require additional information, please contact either myself at 770.819.3566 / jmorrison@colpipe.com or John Culbreath at 704.399.5259 / jculbrea@colpipe.com.

Respectfully,

Jeff D. Morrison
Environmental Program Manager

APEX

Comprehensive Site Assessment Report
SR 2448 / Pipeline Right of Way
Incident Number 95827

Huntersville, Mecklenburg County, North Carolina 28078

January 20, 2021

Apex Job No.: CPC20126

Prepared for:

Mr. John Wyatt
4295 Cromwell Rd. #311
Chattanooga, Tennessee 37421

Prepared by:

Apex Companies, LLC
(dba Maryland Apex Engineering, PC)
5900 Northwoods Business Parkway, Suite 5900-O
Charlotte, North Carolina 28269

Prepared By:

Andrew Street, CHMM, RSM
Senior Project Manager

Reviewed By:

NORTH CAROLINA LICENSED SEAL 2405 TN 1/20/21 GEOLOGIST THOMAS EDWARD NAUMANN

Tom Naumann, PG
Senior Scientist
NC License No. 2405

Matt Gorman, PE
Program Manager
NC License No. 041588

SITE INFORMATION

1. Site Identification

- Date of Report: January 20, 2021
- Facility I.D.: NA Incident Number: 95827 Site Rank: High
- Site Name: Colonial Pipeline Company – 2020-L1-SR2448
- Site Street Address: 14511 Huntersville-Concord Road
- City/Town: Huntersville Zip Code: 28078 County: Mecklenburg County
- Description of Geographical Data Point: 350 Feet Northeast of SR 2448/CPC ROW Crossing
- Location Method: GPS
- Latitude: 35.414106 Longitude: -80.806185

2. Information about Contacts Associated with the Release

- Owner: Colonial Pipeline Company
  Address: 1185 Sanctuary Parkway, Suite 100, Alpharetta, GA Telephone: 678-762-2200
- Operator: Colonial Pipeline Company
  Address: 1185 Sanctuary Parkway, Suite 100, Alpharetta, GA Telephone: 678-762-2200
- Property Owner/Occupant: Mecklenburg County
  Address: 600 E. 4th Street, 11th Floor, Charlotte, NC Telephone: 704-336-3000
- Consultant/Contractor: Apex Companies, LLC
  Address: 5900 Business Park, Ste. 5900-O, Charlotte, NC 28269 Telephone: 704-799-6390
- Analytical Laboratory: Pace Analytical Services, LLC State Certification No.:375
  Address: 9800 Kincey Ave. Suite 100, Huntersville, NC 28078 Telephone: 704-875-9092

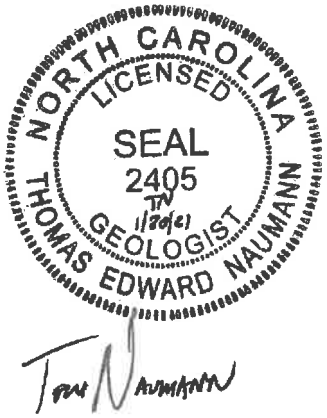
3. Information about Release

- Date Discovered: 8/14/2020
- Estimated Quantity of Release: 1.2 MM gallons (28,571 barrels)*
- Cause of Release: Under Investigation
- Source of Release: Line 1
- Sizes and contents of UST(s) or other containment from which the release occurred: N/A

* Estimated release volume as derived by TRC Environmental Corporation using the American Petroleum Institute LNAPL Distribution and Recovery Model (LDRM). Site-specific values for soil properties, fluid characteristics, and hydraulic conductivity, along with apparent product thickness gauging data were used as input to the LDRM. The site-specific data was provided to the NCDEQ under separate cover.

4. Certification

Apex Companies, LLC (dba Maryland Apex Engineering, PC) is licensed to practice geology and engineering in North Carolina. The geology certification number of the company is C-519. I, Tom Nauman, PG, a Licensed Geologist for Apex Companies, LLC (dba Apex Engineering, PC; Apex) do certify that the information contained in this report is correct and accurate to the best of my knowledge. Further, I hereby attest that certain emergency response information documented in this report was collected by third parties that were not under contract to Apex and/or were not working under my direction or supervision.



EXECUTIVE SUMMARY

Source Information

Incident Number	95827
Date Discovered:	August 14, 2020
Petroleum Product Released:	Gasoline
Source of Release:	Line 1
Volume of Release:	1.2 MM gallons (28,571 barrels)

Description of Incident Number 95827

On August 14, 2020, Colonial Pipeline Company (CPC) and local emergency response agencies were notified of a suspected gasoline release within the CPC right of way (ROW) on the Oehler Nature Preserve near the intersection of Huntersville-Concord Road (Site). Line excavation and inspection in the release area confirmed the source of the release as coming from CPC Line 1 and the released product was confirmed to be gasoline. The release was promptly controlled, and CPC immediately initiated soil excavation and free product recovery efforts.

Hydrogeological Investigation Results (Release Area)

Depth to Groundwater:	Variable - approximately seven to 56 feet below ground surface
Groundwater Flow Direction:	Predominantly north and south with a radial flow component
Horizontal Gradient:	0.038 feet per foot to the north, 0.031 feet per foot to the south
Average Hydraulic Conductivity:	0.42 feet per day to the north, 0.80 feet per day to the south
Groundwater Flow Velocity:	30.66 feet per year to the north, 47.64 feet per year to the south
Depth to Bedrock:	Variable - 20 feet to over 100 feet

Sampling and Investigation Results

Maximum Groundwater Contaminant Concentrations Detected in Monitoring Wells - 2L Exceedances Only(1):

Compound	Maximum Concentration(2) (µg/L)	NC 2L Standard (µg/L)	Gross Contaminant Level (µg/L)
Lead(1)	264	15	15,000
Benzene	4,670	1	5,000
Bromodichloromethane(1)	3.7	0.6	NE
Chloroform	403	70	70,000
Diisopropyl ether	587	70	NE
Dibromochloromethane(1)	0.95	0.4	400
Methyl tert-butyl ether	392	20	20,000
Naphthalene	111	6	6,000
Tetrachloroethene(1)	0.93	0.7	700
1,2,4-Trimethylbenzene	450	400	28,500
Total Xylenes	3,690	500	85,500
Toluene	6,590	600	260,000
C5-C8 Aliphatics	25,900	400	NE

(1) Lead, bromodichloromethane, chloroform, dibromochloromethane, and tetrachloroethene are not attributed to NCDEQ Incident Number 95827
(2) Maximum Concentrations are from the January 2021 data set.
NE Not Established
µg/L micrograms per liter

Receptor Information

Water Supply Wells

Water Supply Wells Present Within 1,500 Foot Search Radius: Eight

Availability of Public Water

Municipal water is available at the Site and in the surrounding area. Select residents within the 1,500 foot radius search radius have elected to remain on private water supply wells.

Surface Water Bodies

The Site is located within the Yadkin Pee-Dee River Basin. North Prong Clarke Creek is located approximately 1,800 feet north of the release area and South Prong Clarke Creek is located approximately 2,700 feet south of the release area, both of which are characterized by the North Carolina Department of Environmental Quality, Division of Water Quality as Class C water bodies. A groundwater seep and ephemeral stream are located approximately 1,200 feet southeast of the release area.

Surrounding Land Use

The area within a 1,500 foot radius of the Site is a mixture of low density residential properties, agricultural properties, and wooded land.

Risk Classification

The risk classification for the Site is high based on the presence of multiple water supply wells within 1,000 feet of the release area and due to the contaminant mass in the subsurface.

Risk Reduction Goals

The risk classification for the Site could be eligible to be re-classified from high to intermediate if the free product mass is reduced and all water supply wells within 1,000 feet of the boundaries of the groundwater plume exceeding 2L Groundwater Quality Standards are abandoned.

Table of Contents

Figures

Tables

Appendices

1.0 INTRODUCTION

A gasoline release was discovered on August 14, 2020 in an area approximately 350 feet northeast of where the Colonial Pipeline Company (CPC) pipelines cross Huntersville-Concord Road (State Road [SR] 2448). The release occurred from the CPC's Line 1. The release is referred to herein as the 2020-L1-SR2448 Release and/or Incident No. 95827. A Site Location Map is provided as **Figure 1** and a Site Plan is provided as **Figure 2**. CPC promptly commenced abatement and corrective action measures in addition to an investigation of the source of the release. This report summarizes the incident response and assessment activities associated with the 2020-L1-SR2448 Release. Apex Companies, LLC (dba Apex Engineering, P.C.; Apex) prepared this Comprehensive Site Assessment (CSA) Report on behalf of CPC for submittal to North Carolina Department of Environmental Quality (NCDEQ).

2.0 SITE HISTORY AND CHARACTERIZATION

2.1 Description of Incident Number 95827

On August 14, 2020, CPC and local emergency response agencies were notified of a suspected gasoline release within the CPC right of way (ROW) on the Oehler Nature Preserve near the intersection of SR 2448 (**Figure 2**). Line excavation and inspection in the release area confirmed the source of the release as coming from CPC Line 1 and the released product was confirmed to be gasoline. The release was controlled expediently, and CPC immediately initiated soil excavation and free product recovery efforts.

2.2 Initial Response and Abatement Actions

CPC and local emergency response agencies were notified of suspected petroleum product surfacing within the CPC right of way on the Oehler Nature Preserve near the intersection of SR 2448 (**Figure 2**) on August 14, 2020 at 18:20. Colonial personnel confirmed a product release at 18:42, believed to be gasoline. Colonial personnel contacted the CPC Control Center in Alpharetta, Georgia to provide notification of the visible release and the Control Center initiated shutdown of Lines 1 and 2 at 18:43. The lines were blocked by closing valves upstream of the release location at CPC Charlotte Delivery Facility and downstream of the release location at CPC Kannapolis Station. Notifications were made to Mecklenburg County, the United States Environmental Protection Agency (EPA), the NCDEQ and the Pipeline and Hazardous Material Safety Administration (PHMSA). CPC mobilized internal and emergency response contractor resources to the Site and established an Incident Command Post to support the response activities. On August 14, 2020, at approximately 24:00, line excavation and inspection confirmed the release was gasoline from CPC's Line 1. The release was promptly controlled, and free product recovery efforts were initiated. CPC recovered approximately 90,930 gallons of free product from the release source location during initial response activities. As outlined in **Section 8.0**, recovery efforts have been ongoing since the release.

2.3 Excavation of Contaminated Soil

Approximately 800 tons of petroleum-impacted soil were excavated beginning on August 14, 2020 during efforts to expose Line 1 and Line 2 and to identify the release location. An excavation measuring approximately 35 feet by 40 feet by 10 feet deep was completed to expose Lines 1 and 2 at the release location and to install a reinforcing, steel sleeve over the damaged section of pipe. Based on soil sample results and the tonnage of soil removed, an estimated 1,257 gallons of product was recovered through the initial soil excavation. Additional product recovery was completed through source area soil removal activities associated with the Line 1 and Line 2 inspection, repair, and recoating activities. Excavated soil was transported to the Charlotte Motor Speedway Landfill located in Concord, North Carolina and operated by Republic Services (Permit No. 1304-MSWLF-1992). Copies of waste manifests for the initial soil excavation were provided in the Initial Abatement Report, and copies of the soil manifests for the Line 1 and Line 2 inspection, repair, and recoat activities will be provided under separate cover.

Pipeline excavation sampling was completed prior to backfilling of Line 1. Confirmation samples were collected at the excavation base and sidewalls on 25 foot spacing. Each soil sample was assigned a unique identification number and the sample location was surveyed. Soil samples underwent analysis for the presence of volatile organic compounds (VOCs) by EPA Method 8260D and volatile petroleum hydrocarbons (VPH) by the MADEP Method by Pace Analytical, LLC (Pace). Pipeline excavation soil sampling results are depicted on **Figure 3** and summarized in **Table 1**. Copies of laboratory analytical reports are provided in **Appendix A**. Residual petroleum soil impacts

exceeding NCDEQ Maximum Soil Contaminant Concentrations (MSCCs) will be addressed as part of a Corrective Action Plan (CAP) for Incident No. 95827. Line 2 confirmation samples were collected at Line 2 following completion of excavation and inspection activities and prior to backfilling. Line 2 soil sampling results will be presented in the February 2021 Monthly Monitoring Report.

3.0 RECEPTOR INFORMATION

Under the NCDEQ Risk Based Corrective Action framework, corrective action objectives for impacted-groundwater at the Site are based on risk classification criteria and the associated remedial goals established under North Carolina 15A NCAC 2L .0506 regulations. The risk classification for a site is based on multiple factors, including the distance from the source area of a release to receptors such as surface water bodies and water supply wells (WSWs). The risk classification for the Site is 'high risk' due to the presence of multiple WSWs within 1,000 feet of the release (**Figure 4**). Groundwater remediation goals for sites classified as high risk are the 2L Groundwater Quality Standards.

3.1 Public Water Supplies

Properties within a 1,500 foot radius of the release area obtain potable water from public water supply or private WSWs (**Figure 4**). Water services for the Town of Huntersville are provided by the City of Charlotte. Field reconnaissance and the Mecklenburg County geographic information systems database were utilized to evaluate for the presence of WSWs within a 1,500-foot radius of the release area, and to evaluate if each property in the search area was connected to the public water supply.

The primary source of water for Mecklenburg County is Mountain Island Lake, an impoundment of the Catawba River. The site is not located within a water supply watershed. No public water supply sources were identified within a 1,500-foot radius of the release source area.

3.2 Water Supply Wells

Thirteen WSWs have been identified within a 1,500-foot radius of the release area. Four wells have been abandoned since the release occurred. The WSW located at 14015 Asbury Chapel Road has been taken out of service and will be utilized as a deep groundwater monitoring well. Eight WSWs, including one inactive dug well and one inactive well with an inoperable pump remain within 1,500-foot radius of the release source area. Well abandonment records not previously provided to NCDEQ are included in **Appendix B**.

3.3 Surface Water

The Site is located within the Yadkin Pee-Dee River Basin. North Prong Clarke Creek is located approximately 1,800 feet north of the release area and South Prong Clarke Creek is located approximately 2,700 feet south of the release area, both of which are classified as Class C water bodies by the NCDEQ Division of Water Resources, meaning that they are protected for non-drinking water purposes such as biological integrity, fishing, and infrequent secondary recreational purposes (i.e., wading). A groundwater seep and ephemeral stream are located approximately 1,200 feet southeast of the release area. The ephemeral stream flows to South Prong Clarke Creek. The North and South Prong Clarke Creek, respectively, and the unnamed ephemeral tributary to South Prong Clarke Creek are shown on **Figure 4**.

3.4 Wellhead Protection Areas

There are currently no wellhead protection areas as defined by 42 USC 300h-7(e) in the vicinity of the Site.

3.5 Subsurface Structures

Line 1 and Line 2 were identified as potential utility pathways for vapor migration. During the line inspection and recoat activities, soil around the lines was excavated north and south of the release area and replaced with clean backfill. Utilities located along Huntersville-Concord Road include a water line, a natural gas line, and a telecommunication line at estimated depths of approximately three feet. Depth to water in proximity to the utility lines is over 30 feet.

4.0 LAND USE SURVEY

The area within a 1,500 foot radius of the Site is a mixture of low density residential properties, agricultural properties and wooded land. The release occurred on the Oehler Nature Preserve. Properties within the survey area are zoned for residential single family and agricultural use.

5.0 GEOLOGY AND HYDROGEOLOGY

5.1 Regional Geology

Mecklenburg County is located within the Charlotte Belt of the Piedmont physiographic province. The Piedmont province is characterized by rolling hills and moderately steep valleys formed by stream erosion of upland areas. Average relief is less than 100 to 150 feet between the upland areas and the stream valleys.

The regional geology is described in the context of several lithotectonic belts of the Piedmont between the Blue Ridge to the west and the Coastal Plain and Triassic Basin to the east. The Charlotte Belt is primarily composed of plutonic rocks with some areas of metavolcanics rocks (Goldsmith, Milton, & Horton Jr., 1988). Rocks within the Belt vary in age and degree of metamorphism. Metasedimentary rocks are uncommon. The rocks of this portion of the Charlotte Belt are part of a granite/diorite complex, in which the diorite country rock is inter-penetrated by the granite (Legrand & Mundorff, 1952). The quartz diorite unit is described as containing quartz diorite and varieties of gneiss (Wilson, 1983). It should be noted that the unit described as quartz diorite may, due to the origin of the unit with multiple intrusions of various composition and mapping limitations where outcrops are uncommon, contain areas of tonalite, granodiorite, and granite; as well as metamorphic rocks such as gneiss and schist, but this is referred to herein as quartz diorite for consistency. The quartz diorite bedrock is covered by a mantle of saprolite.

Saprolite, the product of in-place chemical weathering of crystalline bedrock, is a general term used to describe a thoroughly decomposed crystalline rock and is described in published data (Legrand H. E., 2004; Wilson, 1983) in this area. Quartz-rich granitic rocks generally weather to a sandy saprolite and more feldspathic plutonic rocks, such as diorite, generally weather to a clayey saprolite. Saprolite often retains some of the original rock fabric, such as foliation and mineral grain differentiation.

5.2 Regional Hydrogeology

A typical hydrogeologic unit in the Piedmont province is characterized as a single water-bearing zone formed by the saprolite overburden (residuum) and the underlying consolidated bedrock. Saprolite is formed from in-situ chemical weathering of the parent bedrock and exhibits relic structures and textures of the parent rock. Recharge of the surficial water table occurs through infiltration by rainfall. However, infiltration through fine-grained surficial soil is limited and a large component of rainfall is lost to runoff. The saprolite hydrostratigraphic unit acts as a reservoir to receive and store water that discharges to nearby surface water bodies and recharges the underlying bedrock unit.

Generally, groundwater flow in a fractured crystalline bedrock system with a saprolite overburden is characterized by higher storage and lower conductivity (or higher porosity and lower permeability) in the overburden and higher conductivity and lower storage (or higher permeability and lower porosity) in the fractured bedrock. Thus, groundwater stored in the saprolite is the primary source of recharge of the underlying fractured bedrock aquifer. Legrand (2004) describes two components of groundwater flow into this type of system: (1) flow through the regolith parallel to the bedrock surface and (2) flow into the bedrock via interconnected fractures where they intersect the regolith. Discharge generally occurs at springs or seeps or as basal flow into bodies of water (including perennial and ephemeral streams). This flow along the base of the regolith in the transitional zone of saprolite and weathered rock and has been described as the most permeable part of the groundwater system (Harned & Daniel, III, 1989; Schaeffer, 2018) and the primary lateral transmitter of groundwater and groundwater contaminants (Harned & Daniel, III) in similar Piedmont groundwater systems. This transitional zone is the result of less advanced weathering than the overlying regolith, causing extensive fracturing along the bedrock surface. Porosity within this zone is moderate relative to the overlying saprolite and underlying bedrock, but permeability is relatively higher than both. Thus, there are often three distinct hydrostratigraphic units: the saprolite, the transition zone, and the bedrock.

5.3 Site Geology

Based on a review of the 1985 Geologic Map of North Carolina (NCDNR), the Site is underlain by metamorphosed quartz diorite. This unit is described as foliated to massive. Based on a review of the NRCS Soil Survey, the primary mapped soil units are the Cecil sandy clay loam, the Enon sandy loam, and the Wilkes loam. All of these are saprolitic and derived from the weathering of granites or diorites or metamorphosed varieties (NRCS, 2020).

A review of soil boring logs for the Site indicates a saprolite overburden throughout the study area with thicknesses varying from 20 feet to over 100 feet. This soil is generally described as clayey near the surface, underlain primarily by a thick sequence of silty clay and silty sand, and with greater amounts of very fine to medium silty sand observed at times with weathered bedrock fragments in the transitional bedrock interface. Soil in the clayey stratum are nearly always red or reddish, transitioning to brown and gray in the silty stratum. Soils are generally micaceous, particularly in the silty stratum and pyrite was observed more often near the bedrock interface or in the weathered rock. The phaneritic texture of the underlying rock and gneissic banding is apparent in the lower two saprolite strata. There is a general lack of schistosity, but foliation was observed infrequently. The study area is generally undisturbed with the exception of the pipeline and Huntersville-Concord Road. Thus, the bedrock overburden can be described as saprolite entirely and fill is generally not present except as pipeline or other utility or road sub-grade backfill. A cross section reference map, along with A-A' and B-B' cross sections are provided as **Appendix C**.

Based on approximate depths to bedrock as noted during drilling using sonic and hollow-stem auger methods, and electrical resistivity survey results submitted under separate cover, depths to bedrock indicate that bedrock is at its highest elevation in the immediate area of the release extending to the south across Huntersville-Concord Road. Bedrock depths roughly descend in all directions from the immediate release area.

5.4 Site Hydrogeology

The recovery well pumping system was shut down for approximately 24 hours on December 26, 2020 to facilitate gauging of the monitoring and recovery well network under steady state conditions. Surficial groundwater at the Site is estimated to flow in a general northerly and southerly direction. The monitoring well and recovery well gauging data is presented in **Table 2** and **Table 3**, respectively. A groundwater potentiometric surface map is provided as **Figure 5** and a free product distribution map is provided as **Figure 6**.

Depth to groundwater at the site ranges from less than 10 feet below ground surface at the north limit of the study area, where the ground surface lies at lower elevations, to over 50 feet below ground surface in the vicinity of MW-41 and MW-55, where the competent bedrock is encountered at greater depths. The water table occurs primarily in the saprolite unit; however, bedrock rises locally above the water table in some areas of the Site. The potentiometric map indicates that groundwater elevations are highest proximal to the release area flowing north and south in a radial pattern. The calculated water table gradient to the north, based on the December 26, 2020 gauging event, is approximately 0.038 feet/foot as measured perpendicular to flow from the 700-foot contour line north of RW-17 to the 672-foot contour line near MW-56. The calculated water table gradient to the south, based on the December 26, 2020 gauging event, is approximately 0.031 feet/foot as measured perpendicular to flow from the 702-foot contour line north of RW-10 to the 680-foot contour line near MW-62.

In-situ rising head slug tests were performed by AECOM at 16 monitoring wells encompassing the release area. Two replicate in-situ rising head tests were performed at each of the sixteen monitoring wells evaluated. The average hydraulic conductivity value for each well was calculated. A summary of slug test data is provided as **Table 4**. Slug test data is provided as **Appendix D**. From the release area to the north, hydraulic conductivities at each well tested ranged from of 0.22 to 0.84 feet per day (ft./day). From the release area to the south, hydraulic conductivities at each well tested ranged from of 0.31 to 2.32 ft./day. Wells located north and south of the release source area were grouped to evaluate average hydraulic conductivities in both groundwater flow directions. These data yield an average hydraulic conductivity for the surficial aquifer of 0.42 ft./day to the north and 0.80 ft./day to the south. To estimate the average groundwater flow velocity in the surficial aquifer north and south of the release area, a modified Darcian flow equation were used: Velocity (V) = Hydraulic Conductivity (K) * Horizontal Gradient (I) / Estimated Effective Porosity (n). Based on an average hydraulic conductivity (K) of 0.42 ft./day, an average hydraulic gradient of 0.038 feet/foot, and an estimated effective porosity (n) of 19 percent for saprolite and partially weathered bedrock, the average groundwater velocity (v) to the north of the release area is estimated to be 0.084 ft./day or 30.7 feet per

year. Based on an average hydraulic conductivity (K) of 0.80 ft./day, an average hydraulic gradient of 0.031 feet/foot, and an estimated effective porosity (n) of 19 percent for saprolite and partially weathered bedrock, the average groundwater velocity (v) to the south of the release area is estimated to be 0.130 ft./day or 47.6 feet per year.

6.0 COMPREHENSIVE SITE ASSESSMENT ACTIVITIES

6.1 Soil Assessment Activities

Soil assessment activities were completed during monitoring well and recovery well installation activities. The objective of the work was to delineate petroleum impacts in soil to concentrations below NCDEQ MSCCs. Soil borings were advanced with either a Geoprobe® direct-push drill rig, a sonic drill rig, or utilizing split spoons. The Geoprobe® direct-push drill rig was operated by S&ME, Inc. under the direction of AECOM. The sonic drill rigs were operated by Walker-Hill Environmental and Cascade Drilling LP under the direction of Apex. Split spoon soil sampling was completed by Parratt-Wolff under the direction of Apex. Soil cores were retrieved, and samples were collected from target intervals, placed in airtight containers and allowed to equilibrate for approximately 15 minutes before measuring VOC headspace readings with a photoionization detector (PID). The samples exhibiting the highest headspace readings were typically selected for chemical analysis unless free product was present. In cases where there were no significant PID measurements in a boring, the depth interval corresponding to the terminus of the unsaturated zone was typically selected for chemical analysis.

A total of 111 soil samples were selected from 76 borings and submitted to Pace for laboratory analysis of the following chemical specific parameters in accordance with NCDEQ requirements:

- VOCs by EPA Method 8260D; and
- Volatile Petroleum Hydrocarbons (VPH) by the Massachusetts Department of Environmental Quality (MADEP) Method.

Results of the chemical specific laboratory analysis are summarized in **Table 5** and on **Figure 7**. Laboratory analytical reports are provided in **Appendix A**.

6.2 Groundwater Assessment Activities

Between August 27, 2020 through January 13, 2021, 81 monitoring wells were installed within and along the presumed outer perimeter of the release area. A second round of monitoring well installation was initiated on October 30, 2020 with the objective of completing the horizontal and vertical delineation of petroleum impacted groundwater originating from Incident No. 95827. Monitoring wells were installed utilizing hollow stem auger, air rotary, and sonic drilling methods. Shallow monitoring wells are typically constructed as Type II wells with the well screen bracketing the water table. Deep monitoring wells are constructed with isolation casings extending from ground surface and tremie grouted approximately 10 feet into the consolidated bedrock unit, and an open borehole without casing or screen extends through the isolation casing and into the bedrock unit to allow for geophysical borehole logging. Geophysical borehole logging was performed by Marshall Miller and Associates, Inc. The results of the geophysical borehole logging were utilized to identify the primary water bearing zones within the bedrock unit for isolation and sampling. Groundwater samples were retrieved from the identified zones of interest utilizing packer sampling techniques. Operation of packers was performed by Parrat-Wolff under the direction of Apex. Installation of two-inch inner casing, screen, and filter pack is planned to complete the deep monitoring points as Type III wells in the near term. Boring logs generated after this CSA Report will be provided with the February 2021 monthly submittal.

Well development was performed to evacuate any potable water and sediment introduced during the well drilling and installation process. Monitoring well development was performed by lowering a decontaminated submersible pump into the screen interval of the well, surging the pump to bring sediment into suspension and pumping multiple well volumes until the purge water was generally free of sediment. Drill cuttings and well development fluids were contained for off-site disposal.

Each monitoring well present and without measurable free product at the time of the groundwater monitoring event for this reporting period was sampled between January 4 - January 13, 2021. Prior to collecting groundwater

samples from shallow monitoring wells, each monitoring well was purged of three water column volumes using a dedicated, new high-density polyethylene bailer or a decontaminated stainless steel submersible pump. Deep monitoring wells were sampled by evacuating water in the packer interval, monitoring recharge, and subsequent low flow sampling. If a monitoring well went dry during the purging process, the monitoring well was subsequently sampled after adequate recharge. Field water quality measurements were recorded for pH, temperature, conductivity, dissolved oxygen, and oxidation reduction potential using a calibrated water quality meter. Water quality parameters were recorded in accordance with NCDEQ guidelines. Groundwater samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via chain-of-custody protocol, to Pace. Samples were analyzed for the presence of VOCs by EPA Method 6200, VPH by the MADEP Method, and lead by EPA method 6010D. Groundwater sampling logs are provided in **Appendix E**. Detections of analyzed constituents in monitoring wells are depicted on **Figure 8**. Isoconcentration maps for benzene, diisopropyl ether, methyl-tert butyl ether, naphthalene, toluene, total xylenes, and C_5-C_8 Aliphatics are provided as **Figure 9** through **Figure 15**, respectively. Analytical results are summarized in **Table 6** and copies of the laboratory reports are provided in **Appendix A**. Detections of lead, bromodichloromethane, chloroform, dibromochloromethane, and tetrachloroethene (PCE) are not attributed to Incident Number 95827. As shown on **Figure 9** through **Figure 15**, the horizontal and vertical extent of petroleum impacts is delineated to 2L Groundwater Quality Standards, based on the January 2021 groundwater sampling results.

Weekly WSW sampling was completed by Apex during the reporting period. WSW samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via standard chain-of-custody protocol, to Pace. Samples were analyzed for the presence of VOCs by EPA Method 6200, VPH by the MADEP Method, and lead by EPA method 6010D. WSW sampling results are depicted on **Figure 16** and summarized in **Table 7**. Copies of the laboratory reports are provided in **Appendix A**.

At the time of this submittal, there have been no detections of petroleum constituents in WSW samples. In accordance with NCDEQ guidance, and based on current data, CPC will continue sampling residential WSWs within 1,500 feet of the release area.

7.0 SURFACE WATER INVESTIGATION ACTIVITIES AND RESULTS

Surface water sampling was conducted by Environmental Planning Specialists, Inc. (EPS) at seven locations (SW-1 through SW-7) subsequent to the November Monthly Monitoring Report on December 17, 2020, December 30, 2020, and January 14, 2021. Surface water samples were also collected from groundwater seep location (SW Seep) and the receiving ephemeral stream (SW Confluence) on the above mentioned dates.

Surface water samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via chain-of-custody protocol, to Pace. Samples were analyzed for the presence of benzene, toluene, ethylbenzene, xylenes by EPA Method 8260D and total petroleum hydrocarbons gasoline range organics by EPA Method 8015C. All surface water samples collected to date have been non-detect for the petroleum constituents analyzed. A surface water sample locations map, surface water sampling results, and general surface water parameter measurements are provided in **Appendix F**.

8.0 REMEDIATION ACTIVITIES SUMMARY

8.1 Air Sparge and Soil Vapor Extraction System

Installation of an air sparge and soil vapor extraction system is underway south of the release area to decrease the migration of dissolved phase hydrocarbons south of the release area and recovery well network. At present 14 air sparge wells and 11 soil vapor extraction wells have been installed (**Figure 17**). Vapor recovered from soil vapor extraction wells will be routed through a temporary thermal oxidation unit. Trailer and skid mounted air sparge and soil vapor extraction equipment will be utilized as an interim remedial measure until NCDEQ approval of the CAP for Incident No. 95827.

8.2 Free Product Recovery Activities

A total of 50 vacuum enhanced recovery wells have been installed within the release area. Pneumatic recovery pumps have been placed in the wells and vacuum is applied to the wells to enhance recovery. As of January 16, 2021, approximately 569,003 gallons of gasoline free product and approximately 217,959 gallons of petroleum contact water have been recovered from the recovery well network. Total product recovery during the initial soil excavation (1,257 gallons), the emergency response activities (90,930 gallons), soil vapor recovery (500 gallons), and from the recovery well network is approximately 661,690 gallons.

Recovered free product was transported for reprocessing to the Midwest Gas Company located in Columbus, Ohio. Petroleum contact water has been sent to Aaron Oil Company, Inc. located in Saraland, Alabama, Allied Waste Services of Birmingham, Alabama, and Heritage Crystal-Clean of Concord, North Carolina for recycling and disposal, respectively. Copies of bills of lading and waste manifests covering the reporting period will be provided to NCDEQ under separate cover.

9.0 CONCLUSIONS

A total of 167 wells (81 monitoring wells, 50 recovery wells, 11 hydraulic control wells, and 25 air sparge system wells) were installed at the Site between August 27, 2020 and January 16, 2021. The horizontal and vertical extent of petroleum impacted soil has been delineated (**Figure 7**). The extent of the free product plume has also been delineated by the monitoring and recovery well network. Detections of lead, bromodichloromethane, chloroform, dibromochloromethane, and PCE are not attributed to Incident Number 95827. **Figure 9** through **Figure 15**, depict the horizontal and vertical extent of dissolved phase petroleum impacts, based on the January 2021 groundwater sampling results. The horizontal and vertical extent of free product and dissolved phase petroleum impacts to groundwater have been delineated based on the January 2021 groundwater sampling results. Weekly WSW sampling and bi-weekly surface water sampling continue to show no petroleum constituents. The recommended action for the Site is the preparation of a CAP to address residual petroleum impacts to soil and groundwater associated with Incident Number 95827. Free product recovery activities will continue. As per NCDEQ's Notice dated September 25, 2020, groundwater monitoring reports will be submitted to the NCDEQ Mooresville Regional Office on the 30th of each month until that schedule is revised. A CAP will be submitted to the NCDEQ within the agreed to schedule following approval of this CSA. Copies of Public Notice Letters are provided as **Appendix G**.

10.0 REFERENCES

Apex Companies, LLC (2020). Initial Assessment Report for SR2448/Pipeline ROW.

Winner, M.D. and R.W. Coble (1996). Hydrogeologic Framework of the North Carolina Coastal Plain.

Goldsmith, R., Milton, D. J., & Horton Jr., J. W. (1988). Geologic Map of the Charlotte Quadrangle, North Carolina and South Carolina. USGS.

Harned, D. A., & Daniel, III, C. C. (1989). The transition zone between bedrock and regolith: Conduit for contamination? Proceedings of a Conference on Ground Water in the Piedmont of the Eastern United States.

Legrand, H. E. (2004). A Master Conceptual Model for Hydrogeological Site Characterization in the Piedmont and Mountain Region of North Carolina. NCDENR.

Legrand, H. E., & Mundorff, M. J. (1952). Geology and Ground Water in Charlotte Area, North Carolina. USGS.

NCDNR. (1985). Geologic Map of North Carolina. North Carolina Department of Natural Resources and Community Development.

NRCS. (2020). Custom Soil Resource Report for Mecklenburg County, North Carolina. USDA.

Schaeffer, M. F. (2018). Carolina Piedmont Groundwater System—Existence of the Transition Zone Between Regolith and Bedrock. IAEG/AEG Annual Meeting Proceedings, San Francisco, California.

Wilson, F. A. (1983). Geophysical and Geologic Studies in Southern Mecklenburg County and Vicinity, Open File Report 83-93. USGS.

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

August 20, 2020

Colonial Pipeline Company
7524 Kenstead Circle
Charlotte, NC 28214
Attention: John Culbreath

Re: Notice of Regulatory Requirements
15A NCAC 2L .0504 and 2L .0505
Risk-based Assessment and Corrective
Action for Petroleum Aboveground Storage
Tanks and Other Petroleum Sources

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: 95827
Risk Classification: High

Mr. Culbreath:

Information received by this regional office of the Underground Storage Tank Section (UST Section), Division of Waste Management, on August 14, 2020, confirms a release or discharge of petroleum at the above-referenced location. Furthermore, this office has determined that you are the responsible party for the assessment and cleanup of the release or discharge.

As the responsible party, you must comply with the initial response and abatement action requirements of the Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 2L .0504 and, if applicable, the assessment and reporting requirements of Title 15A NCAC 2L .0505, within the timeframes specified in the attached rules. (Be aware that if Title 15A NCAC 2L .0505 is applicable, you must comply with its requirements even if you do not receive formal notification from the UST Section.)

Initial abatement action requirements include the preparation and submittal of an Initial Assessment Report (IAR), in accordance with Title 15A NCAC 2L .0504 and the most recent version of the Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for Non-UST Petroleum Releases, within 90 days of discovery of the release.

- In order to facilitate free phase product removal at the source of the release, the UST Section requires that prior to finalization of the repair of the affected portion of the pipeline and subsequent backfill of the area, that recovery points be established as close to the pipeline/source as possible. Casings should be set from the base of the excavation to the ground surface, to allow safe access for the drilling of recovery wells.
- Also, co-incident with finalization of repairs, the UST Section advises the construction of an interceptor trench with multiple extraction points downgradient of the release source area to facilitate removal of free phase product and petroleum-impacted groundwater and limit contaminant migration.

Because a release or discharge has been confirmed, a Licensed Geologist or a Professional Engineer, certified by the State of North Carolina, is required to prepare and certify all reports submitted to the Department of Environmental Quality in accordance with Title 15A NCAC 2L .0103(e) and 2L .0111(b).

Please note that before you sell, transfer, or request a "No Further Action" determination for a property that has not been remediated to below "unrestricted use" standards, you must file a Notice of Contaminated Site or Notice of Residual Petroleum with the Register of Deeds in the county where the property is located (North Carolina General Statutes 143B-279.9, and 143B-279.10 or 143B-279.11).

Failure to comply with the State's rules in the manner and time specified may result in the assessment of civil penalties and/or the use of other enforcement mechanisms.

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at the address or telephone number listed below.

Sincerely,

Daniel Bowser, PG
Hydrogeologist
UST Section, Division of Waste Management, NCDEQ
Mooresville Regional Office
(704) 235-2172

Cc: Jeff Morrison, Colonial Pipeline
John Wyatt, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Michael Scott, NCDEQ
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ
Wayne Randolph, NCDEQ
Shawna Caldwell, LUESA- Mecklenburg County Health Department

Colonial Pipeline Company

EXHIBIT
4

Stan Carpenter, P.G.
Interim Director, Environmental

scarpenter@colpipe.com
856-381-4683

February 1, 2021

Via Email

Michael E. Scott
Director
Division of Waste Management
North Carolina Department of Environmental Quality
217 West Jones Street
Raleigh, North Carolina 27699
michael.scott@ncdenr.gov

Re: December 9, 2020 Notice of Regulatory Requirements (NORR)
Colonial Pipeline Company SR2448
Incident No. 95827

Dear Mr. Scott,

As you may recall, as part of Colonial Pipeline Company's (Colonial's) January 23, 2021 response to the North Carolina Department of Environmental Quality's ("NCDEQ's") NORR dated December 9, 2020, Colonial committed to providing NCDEQ with any further, supplemental PHMSA accident reports (Form 7000.1's) submitted to PHMSA relating to the Release.

Pursuant to that commitment, attached please find a Supplemental Form 7000.1 that was submitted to PHMSA today.

Respectfully,

Stan Carpenter

Stan Carpenter, P.G.
Colonial Pipeline Company
Interim Director, Environmental

cc: Jeff Morrison, Colonial
John Wyatt, Colonial
John Culbreath, Colonial
Angie Kolar, Colonial

NOTICE: This report is required by 49 CFR Part 195. Failure to report can result in a civil penalty not to exceed $100,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed $1,000,000 as provided in 49 USC 60122.	OMB NO: 2137-0047 EXPIRATION DATE: 8/31/2020
U.S Department of Transportation Pipeline and Hazardous Materials Safety Administration	**Original Report Date:** 09/13/2020 **No.** 20200253 - 34789 (DOT Use Only)

ACCIDENT REPORT - HAZARDOUS LIQUID PIPELINE SYSTEMS

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2137-0047. All responses to the collection of information are mandatory. Send comments regarding this burden or any other aspect of this collection of information, including suggestions for reducing the burden to: Information Collection Clearance Officer, PHMSA, Office of Pipeline Safety (PHP-30) 1200 New Jersey Avenue, SE, Washington, D.C. 20590.

INSTRUCTIONS

Important: *Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the PHMSA Pipeline Safety Community Web Page at http://www.phmsa.dot.gov/pipeline/library/forms.*

PART A - KEY REPORT INFORMATION

Report Type: *(select all that apply)*	**Original:**	**Supplemental:**	**Final:**
		Yes	
Last Revision Date:	02/01/2021		
1. Operator's OPS-issued Operator Identification Number (OPID):	2552		
2. Name of Operator	COLONIAL PIPELINE CO		
3. Address of Operator:			
3a. Street Address	1185 SANCTUARY PARKWAY SUITE 100		
3b. City	ALPHARETTA		
3c. State	Georgia		
3d. Zip Code	30009-4765		
4. Local time *(24-hr clock)* and date of the Accident:	08/14/2020 18:20		
5. Location of Accident:			
Latitude / Longitude	35.414106, -80.806185		
6. National Response Center Report Number (if applicable):	1284598		
7. Local time *(24-hr clock)* and date of initial telephonic report to the National Response Center (if applicable):	08/14/2020 19:43		
8. Commodity released: *(select only one, based on predominant volume released)*	Refined and/or Petroleum Product (non-HVL) which is a Liquid at Ambient Conditions		
- Specify Commodity Subtype:	Gasoline (non-Ethanol)		
- If "Other" Subtype, Describe:			
- If Biofuel/Alternative Fuel and Commodity Subtype is Ethanol Blend, then % Ethanol Blend:			
- If Biofuel/Alternative Fuel and Commodity Subtype is Biodiesel, then Biodiesel Blend e.g. B2, B20, B100			
9. Estimated volume of commodity released unintentionally (Barrels):	28,571.00		
10. Estimated volume of intentional and/or controlled release/blowdown (Barrels):			
11. Estimated volume of commodity recovered (Barrels):	15,754.00		
12. Were there fatalities?	No		
- If Yes, specify the number in each category:			
12a. Operator employees			
12b. Contractor employees working for the Operator			
12c. Non-Operator emergency responders			
12d. Workers working on the right-of-way, but NOT associated with this Operator			
12e. General public			
12f. Total fatalities (sum of above)			
13. Were there injuries requiring inpatient hospitalization?	No		
- If Yes, specify the number in each category:			
13a. Operator employees			
13b. Contractor employees working for the Operator			
13c. Non-Operator emergency responders			
13d. Workers working on the right-of-way, but NOT associated with this Operator			
13e. General public			
13f. Total injuries (sum of above)			

14. Was the pipeline/facility shut down due to the Accident?	Yes
- If No, Explain:	
- If Yes, complete Questions 14a and 14b: *(use local time, 24-hr clock)*	
14a. Local time and date of shutdown:	08/14/2020 18:43
14b. Local time pipeline/facility restarted:	08/19/2020 21:00
- Still shut down? (* Supplemental Report Required)	
15. Did the commodity ignite?	No
16. Did the commodity explode?	No
17. Number of general public evacuated:	0
18. Time sequence *(use local time, 24-hour clock)*:	
18a. Local time Operator identified Accident - effective 7- 2014 changed to "Local time Operator identified failure":	08/14/2020 18:20
18b. Local time Operator resources arrived on site:	08/14/2020 18:42
PART B - ADDITIONAL LOCATION INFORMATION	
1. Was the origin of the Accident onshore?	Yes
If Yes, Complete Questions (2-12)	
If No, Complete Questions (13-15)	
- If Onshore:	
2. State:	North Carolina
3. Zip Code:	28078
4. City	Huntersville
5. County or Parish	Mecklenburg
6. Operator-designated location:	Milepost/Valve Station
Specify:	ROW
7. Pipeline/Facility name:	L01
8. Segment name/ID:	Charlotte to Kannapolis
9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)?	No
10. Location of Accident:	Pipeline Right-of-way
11. Area of Accident (as found):	Underground
Specify:	Under soil
- If Other, Describe:	
Depth-of-Cover (in):	36
12. Did Accident occur in a crossing?	No
- If Yes, specify type below:	
- If Bridge crossing –	
Cased/ Uncased:	
- If Railroad crossing –	
Cased/ Uncased/ Bored/drilled	
- If Road crossing –	
Cased/ Uncased/ Bored/drilled	
- If Water crossing –	
Cased/ Uncased	
- Name of body of water, if commonly known:	
- Approx. water depth (ft) at the point of the Accident:	
- Select:	
- If Offshore:	
13. Approximate water depth (ft) at the point of the Accident:	
14. Origin of Accident:	
- In State waters - Specify:	
- State:	
- Area:	
- Block/Tract #:	
- Nearest County/Parish:	
- On the Outer Continental Shelf (OCS) - Specify:	
- Area:	
- Block #:	
15. Area of Accident:	
PART C - ADDITIONAL FACILITY INFORMATION	
1. Is the pipeline or facility:	Interstate
2. Part of system involved in Accident:	Onshore Pipeline, Including Valve Sites
- If Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances, specify:	
3. Item involved in Accident:	Pipe
- If Pipe, specify:	Pipe Body
3a. Nominal diameter of pipe (in):	40
3b. Wall thickness (in):	.312

3c. SMYS (Specified Minimum Yield Strength) of pipe (psi):	60,000
3d. Pipe specification:	API 5L
3e. Pipe Seam , specify:	DSAW
- If Other, Describe:	
3f. Pipe manufacturer:	Bethlehem Steel
3g. Year of manufacture:	1978
3h. Pipeline coating type at point of Accident, specify:	Coal Tar
- If Other, Describe:	
- If Weld, including heat-affected zone, specify. If Pipe Girth Weld, 3a through 3h above are required:	
- If Other, Describe:	
- If Valve, specify:	
- If Mainline, specify:	
- If Other, Describe:	
3i. Manufactured by:	
3j. Year of manufacture:	
- If Tank/Vessel, specify:	
- If Other - Describe:	
- If Other, describe:	
4. Year item involved in Accident was installed:	1978
5. Material involved in Accident:	Carbon Steel
- If Material other than Carbon Steel, specify:	
6. Type of Accident Involved:	Leak
- If Mechanical Puncture – Specify Approx. size:	
in. (axial) by	
in. (circumferential)	
- If Leak - Select Type:	Crack
- If Other, Describe:	
- If Rupture - Select Orientation:	
- If Other, Describe:	
Approx. size: in. (widest opening) by	
in. (length circumferentially or axially)	
- If Other – Describe:	

PART D - ADDITIONAL CONSEQUENCE INFORMATION

1. Wildlife impact:	Yes
1a. If Yes, specify all that apply:	
- Fish/aquatic	
- Birds	
- Terrestrial	Yes
2. Soil contamination:	Yes
3. Long term impact assessment performed or planned:	Yes
4. Anticipated remediation:	Yes
4a. If Yes, specify all that apply:	
- Surface water	
- Groundwater	Yes
- Soil	Yes
- Vegetation	
- Wildlife	
5. Water contamination:	Yes
5a. If Yes, specify all that apply:	
- Ocean/Seawater	
- Surface	
- Groundwater	Yes
- Drinking water: *(Select one or both)*	
- Private Well	
- Public Water Intake	
5b. Estimated amount released in or reaching water (Barrels):	726.00
5c. Name of body of water, if commonly known:	NA
6. At the location of this Accident, had the pipeline segment or facility been identified as one that "could affect" a High Consequence Area (HCA) as determined in the Operator's Integrity Management Program?	Yes
7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)?	Yes
7a. If Yes, specify HCA type(s): *(Select all that apply)*	
- Commercially Navigable Waterway:	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	

- High Population Area:	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Other Populated Area	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Unusually Sensitive Area (USA) - Drinking Water	
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	
- Unusually Sensitive Area (USA) - Ecological	Yes
Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?	Yes
8. Estimated cost to Operator – effective 12-2012, changed to "Estimated Property Damage":	
8a. Estimated cost of public and non-Operator private property damage paid/reimbursed by the Operator – effective 12-2012, "paid/reimbursed by the Operator" removed	$ 5,689,001
8b. Estimated cost of commodity lost	$ 1,542,263
8c. Estimated cost of Operator's property damage & repairs	$ 299,500
8d. Estimated cost of Operator's emergency response	$ 2,930,000
8e. Estimated cost of Operator's environmental remediation	$ 11,257,200
8f. Estimated other costs	$ 3,104,399
Describe:	Miscellaneous costs to support the response.
8g. Estimated total costs (sum of above) – effective 12-2012, changed to "Total estimated property damage (sum of above)"	$ 24,822,363

PART E - ADDITIONAL OPERATING INFORMATION

1. Estimated pressure at the point and time of the Accident (psig):	183.00
2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig):	673.00
3. Describe the pressure on the system or facility relating to the Accident (psig):	Pressure did not exceed MOP
4. Not including pressure reductions required by PHMSA regulations (such as for repairs and pipe movement), was the system or facility relating to the Accident operating under an established pressure restriction with pressure limits below those normally allowed by the MOP?	No
- If Yes, Complete 4.a and 4.b below:	
4a. Did the pressure exceed this established pressure restriction?	
4b. Was this pressure restriction mandated by PHMSA or the State?	
5. Was "Onshore Pipeline, Including Valve Sites" OR "Offshore Pipeline, Including Riser and Riser Bend" selected in PART C, Question 2?	Yes
- If Yes - (*Complete 5a. – 5f below)* effective 12-2012, changed to *"(Complete 5.a – 5.e below)"*	
5a. Type of upstream valve used to initially isolate release source:	Remotely Controlled
5b. Type of downstream valve used to initially isolate release source:	Remotely Controlled
5c. Length of segment isolated between valves (ft):	93,000
5d. Is the pipeline configured to accommodate internal inspection tools?	Yes
- If No, Which physical features limit tool accommodation? (*select all that apply)*	
- Changes in line pipe diameter	
- Presence of unsuitable mainline valves	
- Tight or mitered pipe bends	
- Other passage restrictions (i.e. unbarred tee's, projecting instrumentation, etc.)	
- Extra thick pipe wall (applicable only for magnetic flux leakage internal inspection tools)	
- Other -	
- If Other, Describe:	
5e. For this pipeline, are there operational factors which significantly complicate the execution of an internal inspection tool run?	No
- If Yes, Which operational factors complicate execution? (*select all that apply*)	
- Excessive debris or scale, wax, or other wall buildup	

- Low operating pressure(s)	
- Low flow or absence of flow	
- Incompatible commodity	
- Other -	
- If Other, Describe:	
5f. Function of pipeline system:	> 20% SMYS Regulated Trunkline/Transmission
6. Was a Supervisory Control and Data Acquisition (SCADA)-based system in place on the pipeline or facility involved in the Accident?	Yes
If Yes -	
6a. Was it operating at the time of the Accident?	Yes
6b. Was it fully functional at the time of the Accident?	Yes
6c. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident?	No
6d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident?	No
7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident?	No
- If Yes:	
7a. Was it operating at the time of the Accident?	
7b. Was it fully functional at the time of the Accident?	
7c. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident?	
7d. Did CPM leak detection system information (such as alarm (s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident?	
8. How was the Accident initially identified for the Operator?	Notification From Public
- If Other, Specify:	
8a. If "Controller", "Local Operating Personnel", including contractors", "Air Patrol", or "Ground Patrol by Operator or its contractor" is selected in Question 8, specify:	
9. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Accident?	No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the Operator did not investigate)
- If No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: *(provide an explanation for why the operator did not investigate)*	Not contributing factors.
- If Yes, specify investigation result(s): *(select all that apply)*	
- Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
- Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
Provide an explanation for why not:	
- Investigation identified no control room issues	
- Investigation identified no controller issues	
- Investigation identified incorrect controller action or controller error	
- Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response	
- Investigation identified incorrect procedures	
- Investigation identified incorrect control room equipment operation	
- Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response	
- Investigation identified areas other than those above:	
Describe:	

PART F - DRUG & ALCOHOL TESTING INFORMATION

1. As a result of this Accident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
1a. Specify how many were tested:	
1b. Specify how many failed:	

2. As a result of this Accident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
2a. Specify how many were tested:	
2b. Specify how many failed:	

PART G – APPARENT CAUSE

Select only one box from PART G in shaded column on left representing the APPARENT Cause of the Accident, and answer the questions on the right. Describe secondary, contributing or root causes of the Accident in the narrative (PART H).

Apparent Cause:	G8 - Other Incident Cause

G1 - Corrosion Failure - only one **sub-cause** can be picked from shaded left-hand column

Corrosion Failure – Sub-Cause:	
- If External Corrosion:	
1. Results of visual examination:	
- If Other, Describe:	
2. Type of corrosion: *(select all that apply)*	
- Galvanic	
- Atmospheric	
- Stray Current	
- Microbiological	
- Selective Seam	
- Other:	
- If Other, Describe:	
3. The type(s) of corrosion selected in Question 2 is based on the following: *(select all that apply)*	
- Field examination	
- Determined by metallurgical analysis	
- Other:	
- If Other, Describe:	
4. Was the failed item buried under the ground?	
- If Yes :	
□4a. Was failed item considered to be under cathodic protection at the time of the Accident?	
If Yes - Year protection started:	
4b. Was shielding, tenting, or disbonding of coating evident at the point of the Accident?	
4c. Has one or more Cathodic Protection Survey been conducted at the point of the Accident?	
If "Yes, CP Annual Survey" – Most recent year conducted:	
If "Yes, Close Interval Survey" – Most recent year conducted:	
If "Yes, Other CP Survey" – Most recent year conducted:	
- If No:	
4d. Was the failed item externally coated or painted?	
5. Was there observable damage to the coating or paint in the vicinity of the corrosion?	
- If Internal Corrosion:	
6. Results of visual examination:	
- Other:	
7. Type of corrosion *(select all that apply)*: -	
- Corrosive Commodity	
- Water drop-out/Acid	
- Microbiological	
- Erosion	
- Other:	
- If Other, Describe:	
8. The cause(s) of corrosion selected in Question 7 is based on the following *(select all that apply)*: -	
- Field examination	
- Determined by metallurgical analysis	
- Other:	
- If Other, Describe:	
9. Location of corrosion *(select all that apply)*: -	
- Low point in pipe	
- Elbow	
- Other:	
- If Other, Describe:	
10. Was the commodity treated with corrosion inhibitors or biocides?	

11. Was the interior coated or lined with protective coating?	
12. Were cleaning/dewatering pigs (or other operations) routinely utilized?	
13. Were corrosion coupons routinely utilized?	
Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Tank/Vessel.	
14. List the year of the most recent inspections:	
14a. API Std 653 Out-of-Service Inspection	
- No Out-of-Service Inspection completed	
14b. API Std 653 In-Service Inspection	
- No In-Service Inspection completed	
Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
15. Has one or more internal inspection tool collected data at the point of the Accident?	
15a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: -	
- Magnetic Flux Leakage Tool	
Most recent year:	
- Ultrasonic	
Most recent year:	
- Geometry	
Most recent year:	
- Caliper	
Most recent year:	
- Crack	
Most recent year:	
- Hard Spot	
Most recent year:	
- Combination Tool	
Most recent year:	
- Transverse Field/Triaxial	
Most recent year:	
- Other	
Most recent year:	
Describe:	
16. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
If Yes -	
Most recent year tested:	
Test pressure:	
17. Has one or more Direct Assessment been conducted on this segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident::	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
18. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
18a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
G2 - Natural Force Damage - only one **sub-cause** can be picked from shaded left-handed column	
Natural Force Damage – Sub-Cause:	
- If Earth Movement, NOT due to Heavy Rains/Floods:	
1. Specify:	
- If Other, Describe:	
- If Heavy Rains/Floods:	

2. Specify:	
- If Other, Describe:	
- If Lightning:	
3. Specify:	
- If Temperature:	
4. Specify:	
- If Other, Describe:	
- If Other Natural Force Damage:	
5. Describe:	
Complete the following if any Natural Force Damage sub-cause is selected.	
6. Were the natural forces causing the Accident generated in conjunction with an extreme weather event?	
6a. If Yes, specify: *(select all that apply)*	
- Hurricane	
- Tropical Storm	
- Tornado	
- Other	
- If Other, Describe:	
G3 - Excavation Damage - only one **sub-cause** can be picked from shaded left-hand column	
Excavation Damage – Sub-Cause:	
- If Previous Damage due to Excavation Activity: Complete Questions 1-5 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
1. Has one or more internal inspection tool collected data at the point of the Accident?	
1a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run: -	
- Magnetic Flux Leakage	
Most recent year conducted:	
- Ultrasonic	
Most recent year conducted:	
- Geometry	
Most recent year conducted:	
- Caliper	
Most recent year conducted:	
- Crack	
Most recent year conducted:	
- Hard Spot	
Most recent year conducted:	
- Combination Tool	
Most recent year conducted:	
- Transverse Field/Triaxial	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
2. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?	
3. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
4. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident:	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
5. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
5a. If Yes, for each examination, conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	

- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
Complete the following if Excavation Damage by Third Party is selected as the sub-cause.	
6. Did the operator get prior notification of the excavation activity?	
6a. If Yes, Notification received from: *(select all that apply)* -	
- One-Call System	
- Excavator	
- Contractor	
- Landowner	
Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected.	
7. Do you want PHMSA to upload the following information to CGA-DIRT (www.cga-dirt.com)?	
8. Right-of-Way where event occurred: *(select all that apply)* -	
- Public	
- If "Public", Specify:	
- Private	
- If "Private", Specify:	
- Pipeline Property/Easement	
- Power/Transmission Line	
- Railroad	
- Dedicated Public Utility Easement	
- Federal Land	
- Data not collected	
- Unknown/Other	
9. Type of excavator:	
10. Type of excavation equipment:	
11. Type of work performed:	
12. Was the One-Call Center notified?	
12a. If Yes, specify ticket number:	
12b. If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified:	
13. Type of Locator:	
14. Were facility locate marks visible in the area of excavation?	
15. Were facilities marked correctly?	
16. Did the damage cause an interruption in service?	
16a. If Yes, specify duration of the interruption (hours)	
17. Description of the CGA-DIRT Root Cause *(select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well):*	
Root Cause:	
- If One-Call Notification Practices Not Sufficient, specify:	
- If Locating Practices Not Sufficient, specify:	
- If Excavation Practices Not Sufficient, specify:	
- If Other/None of the Above, explain:	
G4 - Other Outside Force Damage - *only one **sub-cause** can be selected from the shaded left-hand column*	
Other Outside Force Damage – Sub-Cause:	
- If Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation:	
1. Vehicle/Equipment operated by:	
- If Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring:	
2. Select one or more of the following IF an extreme weather event was a factor:	
- Hurricane	
- Tropical Storm	
- Tornado	
- Heavy Rains/Flood	
- Other	
- If Other, Describe:	
- If Previous Mechanical Damage NOT Related to Excavation: Complete Questions 3-7 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.	
3. Has one or more internal inspection tool collected data at the point of the Accident?	
3a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:	

- Magnetic Flux Leakage	
Most recent year conducted:	
- Ultrasonic	
Most recent year conducted:	
- Geometry	
Most recent year conducted:	
- Caliper	
Most recent year conducted:	
- Crack	
Most recent year conducted:	
- Hard Spot	
Most recent year conducted:	
- Combination Tool	
Most recent year conducted:	
- Transverse Field/Triaxial	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
4. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?	
5. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
6. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident:	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site:	
Most recent year conducted:	
7. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?	
7a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	
- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
- If Intentional Damage:	
8. Specify:	
- If Other, Describe:	
- If Other Outside Force Damage:	
9. Describe:	
G5 - Material Failure of Pipe or Weld - only one **sub-cause** can be selected from the shaded left-hand column	
Use this section to report material failures ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is "Pipe" or "Weld."	
Material Failure of Pipe or Weld – Sub-Cause:	
1. The sub-cause shown above is based on the following: *(select all that apply)*	
- Field Examination	
- Determined by Metallurgical Analysis	
- Other Analysis	
- If "Other Analysis", Describe:	
- Sub-cause is Tentative or Suspected; Still Under Investigation (Supplemental Report required)	
- If Construction, Installation, or Fabrication-related:	
2. List contributing factors: *(select all that apply)*	

- Fatigue or Vibration-related	
Specify:	
- If Other, Describe:	
- Mechanical Stress:	
- Other	
- If Other, Describe:	
- If Environmental Cracking-related:	
3. Specify:	
- If Other - Describe:	
Complete the following if any Material Failure of Pipe or Weld sub-cause is selected.	
4. Additional factors: (*select all that apply*):	
- Dent	
- Gouge	
- Pipe Bend	
- Arc Burn	
- Crack	
- Lack of Fusion	
- Lamination	
- Buckle	
- Wrinkle	
- Misalignment	
- Burnt Steel	
- Other:	
- If Other, Describe:	
5. Has one or more internal inspection tool collected data at the point of the Accident?	
5a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:	
- Magnetic Flux Leakage	
Most recent year run:	
- Ultrasonic	
Most recent year run:	
- Geometry	
Most recent year run:	
- Caliper	
Most recent year run:	
- Crack	
Most recent year run:	
- Hard Spot	
Most recent year run:	
- Combination Tool	
Most recent year run:	
- Transverse Field/Triaxial	
Most recent year run:	
- Other	
Most recent year run:	
Describe:	
6. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
7. Has one or more Direct Assessment been conducted on the pipeline segment?	
- If Yes, and an investigative dig was conducted at the point of the Accident -	
Most recent year conducted:	
- If Yes, but the point of the Accident was not identified as a dig site -	
Most recent year conducted:	
8. Has one or more non-destructive examination(s) been conducted at the point of the Accident since January 1, 2002?	
8a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted: -	
- Radiography	
Most recent year conducted:	
- Guided Wave Ultrasonic	
Most recent year conducted:	
- Handheld Ultrasonic Tool	
Most recent year conducted:	
- Wet Magnetic Particle Test	
Most recent year conducted:	

- Dry Magnetic Particle Test	
Most recent year conducted:	
- Other	
Most recent year conducted:	
Describe:	
G6 – Equipment Failure - only one **sub-cause** can be selected from the shaded left-hand column	
Equipment Failure – Sub-Cause:	
- If Malfunction of Control/Relief Equipment:	
1. Specify: *(select all that apply)* -	
- Control Valve	
- Instrumentation	
- SCADA	
- Communications	
- Block Valve	
- Check Valve	
- Relief Valve	
- Power Failure	
- Stopple/Control Fitting	
- ESD System Failure	
- Other	
- If Other – Describe:	
- If Pump or Pump-related Equipment:	
2. Specify:	
- If Other – Describe:	
- If Threaded Connection/Coupling Failure:	
3. Specify:	
- If Other – Describe:	
- If Non-threaded Connection Failure:	
4. Specify:	
- If Other – Describe:	
- If Other Equipment Failure:	
5. Describe:	
Complete the following if any Equipment Failure sub-cause is selected.	
6. Additional factors that contributed to the equipment failure: *(select all that apply)*	
- Excessive vibration	
- Overpressurization	
- No support or loss of support	
- Manufacturing defect	
- Loss of electricity	
- Improper installation	
- Mismatched items (different manufacturer for tubing and tubing fittings)	
- Dissimilar metals	
- Breakdown of soft goods due to compatibility issues with transported commodity	
- Valve vault or valve can contributed to the release	
- Alarm/status failure	
- Misalignment	
- Thermal stress	
- Other	
- If Other, Describe:	
G7 - Incorrect Operation - only one **sub-cause** can be selected from the shaded left-hand column	
Incorrect Operation – Sub-Cause:	
- If Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow	
1. Specify:	
- If Other, Describe:	
- If Other Incorrect Operation	
2. Describe:	
Complete the following if any Incorrect Operation sub-cause is selected.	

3. Was this Accident related to *(select all that apply)*: -	
- Inadequate procedure	
- No procedure established	
- Failure to follow procedure	
- Other:	
- If Other, Describe:	
4. What category type was the activity that caused the Accident?	
5. Was the task(s) that led to the Accident identified as a covered task in your Operator Qualification Program?	
5a. If Yes, were the individuals performing the task(s) qualified for the task(s)?	

G8 - Other Accident Cause - only one **sub-cause** can be selected from the shaded left-hand column

Other Accident Cause – Sub-Cause:	Unknown
- If Miscellaneous:	
1. Describe:	
- If Unknown:	
2. Specify:	Still under investigation, cause of Accident to be determined* (*Supplemental Report required)

PART H - NARRATIVE DESCRIPTION OF THE ACCIDENT

On 8/14/2020 at 18:20, a Colonial employee was notified by a local resident about a possible product release in Colonial's Right-of-way (ROW) approximately 100 feet north (i.e., downstream) of Huntersville-Concord Road in Huntersville, NC. The possible product release location was discovered by utility vehicle riders that were on a trail that crosses the pipeline ROW. The Colonial employee lives in the area and went to inspect the location. Upon inspection, the Colonial employee confirmed a product release visible at the ground surface at 18:42 near mile marker 980 that was believed to be gasoline. The Colonial employee contacted the Colonial Control Center in Alpharetta, GA to provide notification of the visible release and the Control Center initiated shutdown of Lines 1 and 2 at 18:43. The lines were blocked by closing valves upstream of the release location at Colonial's Charlotte Delivery facility (DF) and downstream of the release location at the Kannapolis Station. The Colonial Operations Manager (OM) was notified at 18:44, and the Director of Operations (DO) was notified at 19:00, followed by an internal Tier 2 response notification at 19:32 to mobilize internal and contractor resources to the site, and established an Incident Command Post to support the response. At 19:43, a NRC notification was made by the Control Center (Report number 1284598). The initial volume was reported at 75 barrels (bbls.) based on the limited information Colonial had at the time. Notifications were also made to Mecklenburg County, US EPA, NCDEQ, and PHMSA. The NRC notification was updated on 8/16/2020 at 17:40, with an estimated release volume of 1500 bbls. based on additional information available to Colonial as a result of the initial response efforts. Following confirmation of the product release source being on Line 1 (product released was confirmed to be gasoline vs. Line 2 distillate products), Line 2 was authorized to restart on 8/15/2020 at 0:05. The product release source was identified on 8/15/2020 at approximately 12:00. The product release source was originating from beneath a prior repair (Type A sleeve) made in 2004 to address a pipeline anomaly identified through a previous integrity assessment. The product release was repaired by installing a Type B pressure containing sleeve over the prior Type A sleeve repair on 8/19/2020. Line 1 was restarted on 8/19/2020 at approximately 21: 00 after the repair work was completed.

Supplemented on 9/14/2020 to update estimated cost of commodity lost.

Supplemented on 2/01/2021 to include updated estimated volume released, based on the API LNAPL Distribution and Recovery Model, and estimated volume reaching groundwater, consistent with definitions of groundwater and free product as provided in NCDEQ regulations and guidance. Updates also provided for estimated property damage.

Product recovery and site characterization activities continue with oversight by NCDEQ. Additionally, the impacted section of pipe was removed on 11/10/2020 and sent to an independent third-party laboratory for metallurgical analysis. Field observation and the preliminary analysis identified a through-wall crack as the source of the release, although a final determination of the direct cause will be made once the technical analyses are complete. A supplemental report will be issued following completion of the technical analysis.

PART I - PREPARER AND AUTHORIZED SIGNATURE

Preparer's Name	Mark Piazza
Preparer's Title	Manager - Pipeline Compliance
Preparer's Telephone Number	6787635911
Preparer's E-mail Address	mark.piazza@colpipe.com
Preparer's Facsimile Number	
Authorized Signer Name	Mark Piazza
Authorized Signer Title	Manager - Pipeline Compliance
Authorized Signer Telephone Number	6787635911
Authorized Signer Email	mark.piazza@colpipe.com
Date	02/01/2021

EXHIBIT
5

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

September 25, 2020

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
7524 Kenstead Circle
Charlotte, NC 28214
Attention: John Culbreath

Re: Notice of Violation
N.C. Gen. Stat. § 143-214.1
15A NCAC 02L .0202

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: **95827**
Risk Classification: High

Dear Mr. Culbreath:

Information received by the Mooresville Regional Office (MRO) of the Underground Storage Tank Section (UST Section), Division of Waste Management, of the Department of Environmental Quality (the Department), on August 14, 2020, confirms a release or discharge of petroleum at the above-referenced location. The MRO has determined that you are the responsible party for the assessment and cleanup of the release or discharge.

Information provided to the Department thus far regarding the release or discharge of petroleum at the above-referenced location indicates that the groundwater quality standards established pursuant to N.C. Gen. Stat. § 143-241.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202 have been exceeded. Based on the information provided at this time, exceedances of various constituents of petroleum including, but not limited to the following have been identified: benzene, toluene, xylene, and ethylbenzene.

REQUIRED CORRECTIVE ACTIONS:

Restoration of groundwater quality to the level of the aforementioned standards, or as closely thereto as is economically and technologically feasible for protection of human health and the environment pursuant to 15A NCAC 02L .0106 is required.

Based on the above referenced authority, detailed information on the risks associated with your release must be submitted monthly. Submit the following detailed information in a groundwater monitoring report in accordance with the *UST Section Guidelines for Assessment for Non-UST Releases* on the 30th of each month to the UST Section in the MRO:

- Analytical results from soil sampling, monitoring well sampling, surface water sampling, and water supply well sampling.
- Groundwater flow information including potentiometric maps.
- Hook-up of properties to public water and any water supply well, monitoring well, and recovery well abandonment details.
- Soil boring information, monitoring well records, and recovery well records.
- Plume delineation information.
- Status of free product recovery efforts.
- Soil excavation, transportation, and disposal records.

Based on the determination that the risk posed by the discharge or release at the subject site is high, you must comply with assessment requirements pursuant to 15A NCAC 02L .0507(b) and .0106(c) and (g) and the most recent version of the *UST Section Guidelines for Assessment for Non-UST Releases*, by January 20, 2021. A responsible party who submits a Comprehensive Site Assessment (CSA) Report must provide a summary of this report to the local Health Director and the chief administrative officer of the political jurisdictions within 5 days of submitting the CSA Report to the Division of Waste Management as specified in 15A NCAC 02L .0114(a).

Penalties may be assessed for the violations described within this Notice of Violation. Your prompt attention to the items described herein is required. Failure to comply with the State's rules, in the manner and time specified, may result in the assessment of civil penalties and/or the use of other enforcement mechanisms available to the State. Each day that a violation continues may be considered a separate violation.

Because a release or discharge has been confirmed, a Licensed Geologist and/or a Professional Engineer, certified by the State of North Carolina, is required to prepare and certify all reports submitted to the Department of Environmental Quality in accordance with 15A NCAC 02L .0103(e) and 2L .0111(b).

Please note that before you sell, transfer, or request a "No Further Action" determination for a property that has not been remediated to below "unrestricted use" standards, you must file a Notice of Contaminated Site or Notice of Residual Petroleum with the Register of Deeds in the county where the property is located (N.C. Gen. Stat. § 143B-279.9, and 143B-279.10 or 143B-279.11).

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at 919-707-8200.

Sincerely,

Michael E. Scott
Director
Division of Waste Management, NCDEQ

cc: Jeff Morrison, Colonial Pipeline
John Wyatt, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Michael Scott, NCDEQ
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ
Wayne Randolph, NCDEQ
Dan Bowser, NCDEQ
Bobby Williams, Town of Huntersville
Shawna Caldwell, LUESA- Mecklenburg County Health Department

EXHIBIT
6

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

December 9, 2020

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
7524 Kenstead Circle
Charlotte, NC 28214
Attention: John Culbreath

Re: Notice of Regulatory Requirements
N.C.G.S. § 143-215.79
N.C.G.S. § 143-215.85(a)

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Mecklenburg County
Incident: 95827
Risk Classification: High

Dear Mr. Culbreath:

As authorized by N.C.G.S. § 143-215.79, the Department of Environmental Quality (the Department) is conducting an investigation into the release or discharge of petroleum reported on August 14, 2020, at the above referenced location ("the Release"). Furthermore, the Department determined that Colonial Pipeline ("you") is the responsible party for the assessment and cleanup of the Release. As the responsible party, and pursuant to N.C.G.S. § 143-215.85(a), you are required to "immediately notify the Department . . . of the nature . . . of the discharge."

On September 13, 2020, you informed the Department that you estimated the extent of the Release as 272,580 gallons of petroleum. On October 30, 2020, you submitted your Initial Abatement Report to the Department that contained information indicating your previous estimates were no longer accurate. The Department subsequently directed you to provide

an updated estimate. As you are aware, the Department is still awaiting this updated estimate.

At this time, the Department has identified the following information that it needs from you in order to carry out its investigation into the nature of the Release:

- To the extent not already provided, provide copies of all reports and investigative materials generated in response to the Release.
- Provide any findings, data, notes, or other information related to the most recent in-line inspection conducted prior to August 14, 2020 in the pipeline section where the Release occurred.
- Provide all reports or other information related to any maintenance or repair work conducted on or around the pipeline section where the Release occurred since the installation of the pipeline.
- Provide pressure (including pressure sensitivity) and flow rate data collected on or before August 14, 2020 for the pipeline section where the Release occurred.
- Provide complete disposal manifests for all contaminated material removed from the site including, but not limited to: soil, vegetation, and pipeline components. When reporting free product and petroleum contact water on the same manifest, provide volumes distinguishing between the two.
- Provide a copy of your Release Plan.
- Provide the most recent conceptual site model developed or created by you or your contractors.
- Provide a report of all electrical resistivity survey data generated at the site.

The above-identified information shall be provided to the Department by December 23, 2020. If you would like to discuss these requests, I am available at 919-707-8246.

Sincerely,

Michael E. Scott, Director
NC Division of Waste Management
NC DEQ

Cc: Jeff Morrison, Colonial Pipeline
John Wyatt, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Bobby Williams, Town of Huntersville
Shawna Caldwell, LUESA- Mecklenburg County Health Department

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

February 24, 2021

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
7524 Kenstead Circle
Charlotte, NC 28214
Attention: John Culbreath

Re: Notice of Continuing Violation
N.C. Gen. Stat. § 143-214.1
15A NCAC 02L .0202

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: **95827**
Risk Classification: High

Dear Mr. Culbreath:

On September 25, 2020, the Underground Storage Tank Section (UST Section), Division of Waste Management (DWM), of the Department of Environmental Quality (the Department) sent you a Notice of Violation (NOV) for the discharge of petroleum at the above referenced location. Information provided by Colonial Pipeline to the department shows petroleum concentrations above the groundwater quality standards established pursuant to N.C. Gen. Stat. §143-241.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202.

REQUIRED CORRECTIVE ACTIONS:

Colonial Pipeline must restore groundwater quality to the level of the aforementioned standards, or as closely thereto as is economically and technologically feasible for protection of human health and the environment pursuant to 15A NCAC 02L .0106.

The September 25, 2020 NOV outlined the steps that Colonial Pipeline must take to meet the requirements of restoration of groundwater quality to the level of the forementioned standards, sample and protect water supply wells and surface water, and determine the horizontal and vertical extent of petroleum contamination throughout the plume. Specifically, the Department directed you to provide a Comprehensive Site Assessment (CSA) pursuant to 15A NCAC 02L .0507(b) and .0106(c) and (g) and the most recent version of the *UST Section Guidelines for Assessment for Non-UST Releases* (Guidelines) by January 20, 2021. The UST Section received the CSA on January 20, 2021. The UST Section has reviewed the CSA and found that the CSA has several deficiencies. The list provided below details the deficiencies the UST Section has identified at this time and the actions that are required to remedy those deficiencies:

1. The Resistivity Survey including a summary of the results was not included in the CSA. Include the Resistivity Survey Report as an attachment to the CSA, summarize the results in the CSA discussion, and reference the Report as an attachment.
2. The Vapor Intrusion Report including a summary of the results was not included in the CSA. Include the Vapor Intrusion Report as an attachment to the CSA, summarize the results in the CSA discussion, and reference the Report as an attachment. Also, include a discussion concerning the potential for vapor intrusion into utility conduits and measures that will be implemented to check for potential vapor intrusion into those conduits.
3. Section 2.3 of the CSA does not include a discussion of the soil sent for temporary storage at the Permitted Land-Farm in Shelby, NC that was later excavated and sent to the lined landfill at the Charlotte Speedway. Include a discussion in the CSA concerning the handling of that soil and ultimate disposal location.
4. The CSA did not include a discussion of air monitoring and results from the air monitoring effort at the site. Include a discussion concerning air monitoring and results from the air monitoring effort at the site.
5. The CSA did not include a discussion of noise monitoring and results from the noise monitoring effort at the site. Include a discussion concerning noise monitoring and results from the noise monitoring effort at the site.
6. Soil sampling information for Line 1 was provided at an interval of twenty-five feet spacing. The UST Section Guidelines require soil sampling at ten-foot intervals. Also, the extent of soil contamination along Line 1 was not defined to less than the lowest maximum soil contaminant concentrations (MSCC). Please define the extent of soil contamination along Line 1 to the lowest MSCCs using a ten feet sampling interval.
7. Table 1 did not indicate the correct regulatory limits for C9-C22 aromatics. The correct levels are 31 mg/kg for soil-to-groundwater, 469 mg/kg for residential, and 12264 mg/kg for industrial/commercial. Please amend Table 1 to reflect the correct levels.
8. The CSA did not include a discussion of the springs, located on the Wilson property, as a receptor. Include a discussion concerning the springs and sampling results. Also, please sample the springs monthly.
9. Please provide a table with receptor information out to 1500 feet from the edge of the free product plume (and less than 2000 feet beyond the pipe release) as well as those water supply wells to the southeast of the release (beyond 2000 feet of the pipe release). Please follow the receptor table format included in the CSA Guidelines (Table B-5). Note, include all the other receptors as indicated in Table B-5 of the CSA Guidelines.
10. Please provide all boring log and well construction information for each monitoring well, recovery well, air sparge well, soil vapor extraction well, and hydraulic control well to date. Some critical boring log information was either not compiled or partially compiled at locations where product was prevalent in the soil column (i.e., RW-16, RW-18, RW-19, RW-20, RW-21, RW-24, RW-25, RW-27, RW-29, RW-30, RW-31, RW-34, RW-36, RW-38). Other boring logs indicated no log (either entirely or partially) or log information is missing but a reason was not provided (i.e., RW-2, RW-3, RW-8, RW-23, RW-26, RW-41 through RW-44, RW-47, MW-12, MW-53, MW-54). The UST Section suggests compiling all drilling and boring log information for all borings wells in a single appendix per the Guidelines, 15A NCAC 2C, and ASTM D5434-12.
11. Please provide all field sampling notes. The UST Section suggests the information be included as a separate appendix.
12. Please provide all Shelby Tube information. The UST Section suggests compiling all Shelby Tube information in one appendix.
13. The recovery well construction and LNAPL elevations, in certain cases, revealed the bottom of the well elevation was coincident with or within approximately 1 foot (based on boring log data) of LNAPL/water interface elevation in wells RW-1, RW-4, R—7, RW-9, RW-10, RW-14, and RW-38. Surface elevations were not provided for RW-41 through RW-48. Based on provided data, in some instances adjusted groundwater elevations were below the bottom of recovery well elevations (i.e., RW-4, RW-10, RW-17). Please provide an explanation and correct accordingly.
14. Additional cross-sections are necessary to clarify or interpret the geological relationship between the LNAPL plume and subsurface geology, dissolved groundwater petroleum contamination, petroleum soil contaminant contamination, and evaluation of subsurface conditions, in accordance with the Guidelines. Additional cross-sections must include one north/south and through the apparent thickest portions of the LNAPL plume, and two geologic cross-sections across Huntersville Concord Road (one drawn along the long axis of the plume and the second, across it at right angles, showing the vertical distribution of the contaminants) in accordance with the Guidelines.
15. Please provide free product volume estimation documentation regarding the LDRM model input/output, calibration, sensitivity analysis and associated laboratory analyses signed and sealed by a North Carolina

Licensed Geologist or Professional Engineer. Also, include the calculations for the estimation of equivalent product volume for soil vapor and soil excavation. The UST Section suggests including the report as one appendix.

16. The CSA did not include a discussion concerning geophysical logging. Include all geophysical logging information and bedrock aquifer characteristics, along with a summary and discussion of this information. The UST Section suggests including the geophysical logging information as an appendix.
17. The UST Section found the highest conductivities from the 16 separate monitoring wells tested were associated with four wells. Those four wells, based on the provided boring logs, each reportedly penetrated the weathered bedrock zone. The remaining test wells did not indicate penetration of the weathered bedrock zone. Those that penetrated the weathered bedrock zone revealed an average conductivity of approximately 3.5 times greater than those that did not. Please reevaluate the hydraulic conductivities and their horizontal and vertical spatial distribution. This information is needed for aquifer characterization, assessment of more transmissive zones for product mitigation and mass flux determination for dissolved phase migration.
18. The primary objective of the CSA is to fully define the horizontal and vertical extent of contamination throughout the plume of contamination. Vertical extent monitoring wells were only installed at the edge of the plume on contamination and not throughout the plume of contamination. Potential impacts to the bedrock have not been fully assessed. Additional vertical extent monitoring wells must be installed throughout the plume of contamination to assess potential impacts to the bedrock aquifer. The UST Section suggests additional vertical extent monitoring wells be installed near the following locations (RW-9/02, RW-12, RW-13, RW-15. RW-16, MW-19, MW-40, RW-3, RW-35/38, RW26/28/MW50, MW8, and MW-42). Also, please assess vertical gradients.
19. Provide a separate vertical extent groundwater flow map and contaminant concentration map. Please include groundwater flow direction arrows in all groundwater flow maps.
20. Please identify all wells with enhanced product recovery (enhanced product recovery through vacuum) and provide specific design and operational details. Including the process train from well to offsite transport.
21. Please provide specific system design and operational details of the air sparge/vacuum extraction system.
22. Please provide a discussion of remediation goals and a preliminary evaluation of remediation alternatives appropriate for the site. Discuss the remediation alternative(s) likely to be selected.

Please submit a revised CSA (complete CSA Document) that includes the items noted in this Notice of Continuing Violation by **April 26, 2021**.

Please continue to sample the monitoring wells monthly, the spring monthly, water supply wells within 1000 feet of the edge of the free product plume (2000-foot line from the point of release) on a weekly basis, water supply wells whose properties intersect the 2000-foot line every 6 months, surface water every two weeks and after rainfall events, maintain the booms, and submit monthly monitoring reports by the end of each month. Please submit the electronic data deliverable (EDD) documentation directly to EQUIS monthly. Also, please continue to perform assessment, product recovery activities, and corrective action at the site until approval of a Corrective Action Plan.

Penalties may be assessed for the violations described within this Notice of Continuing Violation. Prompt attention to the items described herein is required. Failure to comply with the State's rules, in the manner and time specified, may result in the assessment of civil penalties and/or the use of other enforcement mechanisms available to the State. Each day that a violation continues may be considered a separate violation.

Because a release or discharge has been confirmed, a Licensed Geologist and/or a Professional Engineer, certified by the State of North Carolina, must prepare and certify all reports submitted to the Department of Environmental Quality in accordance with 15A NCAC 02L .0103(e) and 2L .0111(b).

Please note that before Colonial Pipeline sells, transfers, or requests a "No Further Action" determination for a property that has not been remediated to below "unrestricted use" standards, Colonial Pipeline must file a Notice of Contaminated Site or Notice of Residual Petroleum with the Register of Deeds in the county where the property is located (N.C. Gen. Stat. § 143B-279.9, and 143B-279.10 or 143B-279.11).

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at 919-707-8246.

Sincerely,

Michael E. Scott
Division Director
Division of Waste Management, NCDEQ

cc: Jeff Morrison, Colonial Pipeline
John Wyatt, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Michael Scott, NCDEQ
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ
Wayne Randolph, NCDEQ
Shawna Caldwell, LUESA- Mecklenburg County Health Department

Colonial Pipeline Company

EXHIBIT
8

Sam McEwen
Director, Environmental

April 21, 2021

To: Vance Jackson via e-mail

Re: **Colonial Pipeline SR 2448/Pipeline ROW**
Incident Number 95827
Huntersville, North Carolina

Dear Vance,

Colonial Pipeline Company (Colonial) would like to thank the North Carolina Department of Environmental Quality (NCDEQ) for meeting with us on April 15, 2021 to continue to discuss our ongoing assessment, remediation and product recovery activities relating to NCDEQ Incident Number 95827. One such ongoing activity is Colonial's response to NCDEQ's February 24, 2021 Notice of Continuing Violation (NOCV), which directed Colonial to submit a revised Comprehensive Site Assessment (CSA) by April 26, 2021.

Colonial is actively working on addressing the items that NCDEQ set forth in the NOCV and is prepared to submit the majority of the items by April 26. There are a few items (specifically, items 6, 14 and 18) that are directly related to ongoing field activities, which will not be completed by April 26. These items relate to or are dependent upon additional soil delineation and well installation. As has been discussed during the standing bi-weekly calls between NCDEQ and Colonial, Colonial is formulating a work plan regarding those two issues for NCDEQ's review. On April 16, 2021, we notified Dan Bowser that Colonial would like to have a meeting with NCDEQ to discuss the work plan. On April 19, 2021, that issue was discussed further, and Mr. Bowser and our technical team agreed that it was important for NCDEQ and Colonial to be aligned on those important issues.

Additionally, further discussion with NCDEQ regarding the results of the Optical Imaging Profile (OIP) work is needed. That work is being conducted in coordination with NCDEQ's technical team to ensure accurate data about subsurface conditions at the site is acquired and that activities are conducted based on science and technology. As NCDEQ is aware, Colonial received the preliminary information from the OIP work on April 14, and on April 15, we had a discussion with NCDEQ about that information. We are continuing to receive further data from that work and will need to review it with NCDEQ in conjunction with our response to items 6, 14 and 18. Completion of those items also is dependent upon NCDEQ's approval of Colonial's work plan. Colonial reasonably believes that the remaining work on these three items will be completed by August 31, 2021. For these reasons, Colonial previously made two verbal requests for an extension of the current deadline. Last week, NCDEQ asked Colonial to formalize those verbal requests in writing, which we are doing today by way of this letter.

I also want to note that, while we understand that NCDEQ expects Colonial to submit one revised CSA, with the exception of the three items outlined above, we are prepared to deliver the other items by April 26. Therefore, we would appreciate direction from NCDEQ on the path forward—i.e., submit the items that we have by April 26 and then provide the other items by August 31, 2021, or wait until August 31, 2021, to submit all of the items in one complete, revised CSA. We trust that if the Department agrees that Colonial should provide some of the items by April 26 and others by an extended deadline, the Department also agrees that this approach will not result in Colonial receiving any type of regulatory action from NCDEQ for submitting an allegedly incomplete filing.

During the extension, to benefit the human health of area residents and the surrounding environment, Colonial is committed to continue performing the following activities:

- Sample the installed groundwater monitoring wells monthly;
- Sample the water supply wells within 1500 feet of the release point on a weekly basis;
- Sample the surface water and spring locations every two weeks and after qualifying rainfall events;
- Maintain the existing boom sites;
- Submit monthly monitoring reports;
- Submit the electronic data deliverable (EDD) documentation directly to EQUIS monthly; and
- Continue to perform other assessment, product recovery activities, and corrective actions at the site.

If you have any questions or require additional information, please contact me.

Respectfully,

Sam McEwen
Director, Environmental

ROY COOPER
Governor
DIONNE DELLI-GATTI
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

EXHIBIT
9

May 5, 2021

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
Attn. John Wyatt
4295 Cromwell Road, #311
Chattanooga, Tennessee 37421

Re: Notice of Continuing Violation
N.C. Gen. Stat. § 143-214.1
15A NCAC 02L .0202

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: **95827**
Risk Classification: High

Dear Mr. Wyatt,

On September 25, 2020, the Underground Storage Tank Section (UST Section), Division of Waste Management (DWM), of the Department of Environmental Quality (the Department) sent you a Notice of Violation (NOV) for the discharge of petroleum at the above referenced location. Information provided by Colonial Pipeline to the Department showed petroleum concentrations above the groundwater quality standards established pursuant to N.C. Gen. Stat.§ 143-241.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202.

REQUIRED CORRECTIVE ACTIONS:

Colonial Pipeline must restore groundwater quality to the level of the aforementioned standards, or as closely thereto as is economically and technologically feasible for protection of human health and the environment pursuant to 15A NCAC 02L .0106.

The September 25, 2020 NOV outlined the steps that Colonial Pipeline must take to restore the groundwater quality to the level of the aforementioned standards, to sample and protect water supply wells and surface water, and to determine the horizontal and vertical extent of petroleum contamination throughout the plume. The UST Section received a Comprehensive Site Assessment (CSA) from you on January 20, 2021. Upon review, the UST Section determined the CSA to be deficient in several areas. On February 24, 2021, the UST Section sent a Notice

of Continuing Violation (NOCV) to you. The NOCV outlined the CSA's deficiencies and directed you to submit a revised CSA correcting those deficiencies by April 26, 2021.

On April 14, 2021, Colonial Pipeline informed the Department that its estimate of the petroleum release submitted in the January 20, 2021 CSA (1.2 million gallons) would need to be reevaluated and that the model that it had been using was not appropriate for providing free product volume estimation. On April 21, 2021, Colonial Pipeline informed the Department that it was prepared to submit some, but not all, of the items required by the February 24, 2021 NOCV. Colonial Pipeline submitted a portion of the information required by the NOCV on April 26, 2021. Items 6, 14 and 18 of the NOCV were not submitted. Colonial Pipeline remains in violation of the requirement to submit a complete CSA.

Based on Colonial Pipeline's April 14, 2021 statement that the estimate of the petroleum release will need to be reevaluated and that the model is inappropriate for providing free product volume estimation, Colonial must submit the following information in the time frame specified:

1. The specific model predictive calculation selected and reasoning by **May 12, 2021.**
2. The following detailed information regarding predictive calculations for the estimation of product volume released to the environment and free product volume estimation by **May 28, 2021**:
    i. A *revised* estimate of total product volume released to the environment based on current information.
    ii. The specific model/predictive calculation selected and reasoning.
    iii. The model/calculation limitations.
    iv. The model assumptions.
    v. The model/calculation domain, grid/cell design, and vertical boundaries.
    vi. All data evaluated for the modeling/calculation effort.
    vii. The initial model/calculation conditions, specific input parameters for the model/calculation effort, and reasoning for those parameters.
    viii. All calibration procedures and calibration results for the modeling/calculation effort.
    ix. All sensitivity analyses and results.
    x. All statistical analyses and results.
    xi. Validation of the model/calculations.
    xii. All predictive simulations/calculations.
3. Workplan for soil sampling for the Line 1 petroleum release by **May 7, 2021** including a timeline.
4. Workplan for defining the vertical extent of contamination throughout the plume of contamination by **May 7, 2021** including a timeline.
5. By **June 25, 2021** please provide an updated Conceptual Site Model (CSM) based on current information for the Colonial Pipeline Company's petroleum release including receptors and incorporating all the available site information, including but not limited to, the resistivity survey, vapor intrusion investigation, air monitoring, noise monitoring, springs, boring logs, drilling information, optical image profiling (OIP) information, updated information on the free product volume estimation, vertical and horizontal extent of soil and groundwater contamination, geophysical logging information, hydraulic information, etc.

Colonial's April 21, 2021 letter requested an extension until August 31, 2021 to satisfy the outstanding requirements of the February 24, 2021 NOCV. **By May 12, 2021**, submit your complete justification (including all supporting information) for the requested August 31, 2021 deadline extension. The additional information should include, amongst other things, milestones for specific updates to be provided to the Department. The Department will consider your request accordingly.

Colonial Pipeline remains in violation of requirements contained in the September 25, 2020 NOV and the February 24, 2021 NOCV. Penalties may be assessed for these violations and also for violations contained in this Notice of Continuing Violation. Your prompt attention to the items described herein is required. Failure to comply with the State's rules, may result in the assessment of civil penalties and/or the use of other enforcement mechanisms available to the State. Each day that a violation continues may be considered a separate violation.

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at 919-707-8246.

Sincerely,

Michael E. Scott
Division Director
Division of Waste Management, NCDEQ

cc: Jeff Morrison, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ
Wayne Randolph, NCDEQ
Shawna Caldwell, LUESA- Mecklenburg County Health Department

Colonial Pipeline Company

EXHIBIT
10

Sam McEwen
Director, Environmental

May 12, 2021

To: Michael Scott via e-mail

Re: **Colonial Pipeline SR 2448/Pipeline ROW**
Incident Number 95827
Huntersville, North Carolina

Dear Mr. Scott:

Enclosed is Colonial Pipeline Company's (Colonial or the Company) response to Items 1 and 6 of the May 5, 2021 Notice of Continuing Violation (NOCV).

Item 1

As requested by NCDEQ, Attachment 1 to this letter is a technical memorandum prepared by Colonial's modeling consultant, TRC Environmental Corporation, detailing Colonial's evaluation and selection of volume estimating models.

Colonial would like to correct any misimpression regarding its selection and use of the American Petroleum Institute's LNAPL (light non-aqueous phase liquid) Distribution and Recovery Model (LDRM) for estimating total product released to the environment. As described in Attachment 1, LDRM is a proven model for estimating volume of product present at a location. Given what was known about the site geology and LNAPL distribution at the time, the LDRM appeared to be an appropriate model. It was Colonial's understanding the NCDEQ was relying on the LDRM to evaluate the Huntersville release volume as well. As has been previously communicated to NCDEQ, the LDRM model estimated approximately 1.2 million gallons of total product released into the environment.

On April 14, 2021, Colonial received initial data from its Optical Image Profiling (OIP) work, and that data was provided to NCDEQ on April 15, 2021. The OIP data indicates that unique geologic and hydrogeologic conditions in the northern portion of the Site have resulted in LNAPL below the water table. This OIP data was collected subsequent to the LDRM model runs. The new data indicates that the model selection needs to be reevaluated to account for the LNAPL below the water table.

Based on TRC's evaluation of available methods for estimating released product volumes and Colonial's present understanding of Site conditions, Colonial believes that using the OIP data and site-specific hydrogeologic data in conjunction with 3-D visualization software would be a more appropriate method for estimating the total volume of product released to the environment. To perform this modeling, additional LNAPL saturation and geological data would need to be collected under static conditions in the northern portion of the Site. To collect the optimal number of representative samples throughout the vertical and horizontal extent of LNAPL, recovery wells and hydraulic controls would need to cease operation for a period of time, possibly for several weeks.

At this time, Colonial believes it would be most protective to postpone collection of the needed saturation and geologic information from the northern area. Additional data collection should occur only after capturing sufficient recoverable free product in order to minimize risks associated with potential migration. Before NCDEQ's requested May 28 deadline, Colonial would like to discuss the timing of these data collection efforts and model selection with NCDEQ, to ensure that we are responsive to NCDEQ's inquiries while also selecting the path forward that is most protective of human health and the environment. Colonial will

continue to evaluate methods for estimating release volume as it follows the science and deploys required resources to protect human health and the environment.

Colonial has been and continues to work on the conceptual site model (CSM). The estimated release volume is not needed to continue or complete the ongoing CSM efforts. In addition, corrective action planning and remediation technology selection will not be influenced by an updated release volume estimate.

Item 6

In response to Item 6 referenced in the May 5, 2021 NOCV, Attachment 2 to this letter a Gantt chart with explanatory text supporting the request for extension to August 31, 2021. As explained in Attachment 2, Colonial has identified ten discrete tasks to be completed to fully respond to NCDEQ's directive to provide a revised CSA. Several of those tasks involve collection of soil and groundwater samples and drilling of additional deep groundwater monitoring wells, as proposed to NCDEQ in the May 7, 2021 work plan. Colonial believes that this schedule is a reasonable sequence of the tasks needed to complete the items NCDEQ requested in the February 24, 2021 NOCV.

As always, Colonial's intent is to be responsive to NCDEQ's requests while continuing assessment and recovery efforts needed to protect human health and the environment. If you have any questions or concerns about today's submission, please do not hesitate to contact me.

Respectfully,

/s/ Sam McEwen

Sam McEwen
Director, Environmental

TRC

1429-116 Rock Quarry Road
Raleigh, NC 27610

T 919.828.3150
TRCcompanies.com

Memorandum

To:	Sam McEwen Colonial Pipeline Company
From:	Chelsea Wenhardt, TRC Environmental Corporation (TRC)
Subject:	Model Evaluation Notice of Continuing Violation, N.C. Gen Stat. § 143-214.1, 15A NCAC 02L .0202 Colonial Pipeline, SR 2488/Pipeline ROW, Huntersville, NC Incident: 95827
Date:	May 12, 2021
CC:	Karen C. Saucier, PhD, TRC
Project No.:	327626.0004

The American Petroleum Institute (API) LNAPL (light nonaqueous phase liquid) Distribution and Recovery Model (LDRM) is a one-dimensional, scenario-based model that is primarily used to simulate performance of proven hydraulic technologies for recovering free product in ground water. LDRM is also capable of using parameters derived from capillary pressure curves in combination with fluid properties and apparent in-well LNAPL thickness to estimate the specific volume of LNAPL present at a point location. The model is limited to three soil layers, assumes that homogeneous hydrogeologic conditions are present, and that LNAPL is in vertical equilibrium with the water table (i.e. LNAPL is not floating on water as a uniform "pancake" with a high saturation percentage).

Previous volume estimates were derived based on use of the LDRM model and data collected between August and December 2020. Additional data collection and interpretation from February – April 2021 revealed that the hydrogeologic and geologic conditions in the northern portion of the Site are highly heterogenous and contain LNAPL mass that is trapped below the water table at potentially high saturations. These findings indicate the assumptions of homogeneity and vertical equilibrium are not accurate for the Huntersville release. Therefore, the LDRM would not be expected to produce a reliable estimate of LNAPL volume for this Site because it cannot account for the LNAPL mass trapped below the water table.

NCDEQ has directed Colonial to provide a revised estimate of the total product volume released to the environment at the Huntersville, NC site based on current information. The limitations observed in the LDRM modeling effort (referenced above) has prompted Colonial to evaluate other model options. Several model options have been identified to calculate these volumes, as described by Lenhard, *et al.*, (2017[1]). These model options include:

- The various models using the apparent LNAPL thicknesses in monitoring wells (*e.g.*, the pancake model),
- More advanced models that calculate the average mobile and residual LNAPL saturations (*e.g.*, the LDRM model[2]),
- Multi-phase flow and transport models (*e.g.*, Pruess and Battistelli, 2002[3] and Lenhard, *et al.*, 2017[1]), and

1 R.J. Lenhard, J.L. Rayner, G.B. Davis. 2017. practical tool for estimating subsurface LNAPL distributions and transmissivity using current and historical fluid levels in groundwater wells: Effects of entrapped and residual LNAPL. Journal of Contaminant Hydrology. 205 (2017)1-11

2 Charbeneau, R.J., 2007. LNAPL distribution and recovery model (LDRM). In: Volume 1: Distribution and Recovery of Petroleum Hydrocarbon Liquids in Porous Media. API Publ. No. 4760. American Petroleum Institute, Washington, D.C.

3 Pruess, K. and A. Battistelli. 2002. TMVOC, A Numerical Simulator for Three-Phase Non-isothermal Flows of Multicomponent Hydrocarbon Mixtures in Saturated-Unsaturated Heterogeneous Media. LBNL,-49375.

- Customized, site-specific models using 3-D visualization software (*e.g.,* Earth Vision and Earth Volumetric Studio) and a distribution of potential input parameters.

Table 1 presents a summary of the available models, inherent assumptions, limitations, and additional data requirements.

It is TRC's recommendation that using the OIP data and site-specific hydrogeologic data in conjunction with 3-D visualization software would be a more appropriate method for estimating the total volume of product released to the environment. As presented in the table, potentially viable options for estimating the volume of free product present in the subsurface requires additional data to be collected during static conditions, are subject to interpretation, will contain a high degree of uncertainty, and are labor intensive. Outside influence on the subsurface systems (i.e. free product recovery) must be suspended for data to be collected under static conditions and remain suspended while the data is being collected. As further explained in the table, application of alternative predictive modeling tools at this time would yield, at best, an estimated total volume of product range with a potentially high degree of uncertainty due to estimated input parameters and other data variables.

Table 1 – Summary of Model Evaluation

Model	Inherent Assumptions	Limitations	Additional Data Needs
"Pancake" Models	• LNAPL saturation is constant across the modeled area ○ i.e. no differentiation between mobile and residual phases • Apparent LNAPL thicknesses in monitoring wells are representative of LNAPL thicknesses in the formation.	• Apparent LNAPL thicknesses are not representative of thicknesses in the formation. • LNAPL that does not appear in a well are not accounted for • Model is not theoretically or practically accurate	None. Model not appropriate.
Vertical Equilibrium Models (*e.g.*, American Petroleum Institute LNAPL Distribution and Recovery Model)	• Up to three soil/geologic layers present • Homogeneous conditions of the porous media • Peak LNAPL saturation occurs above the water table • Apparent in-well LNAPL thickness is representative of the vertical LNAPL distribution in the vadose and saturated zones	• Cannot account for high saturations of LNAPL trapped beneath the water table • Volume estimates are based on a vertical slice at a point location • Limited ability to account for vertical heterogeneity • Accounting for horizontal heterogeneity is subject to user interpretation and limited by data density	None. Model not appropriate.

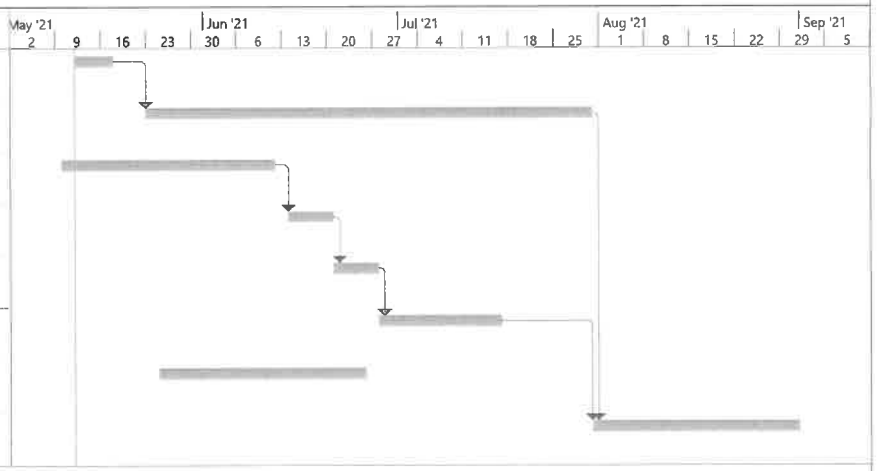
Multi-phase Flow and Transport Models (*e.g.*, Pruess and Battistelli, 2002 and Lenhard, *et al.*, 2017)	• Vertical equilibrium conditions are present
	  ○ Peak LNAPL saturation occurs above the water table
	• LNAPL conditions include residual LNAPL above the water table (S_{or}), residual LNAPL below the water table (S_{oe}), and free, mobile LNAPL (S_{of})
	• LNAPL release history, rainfall recharge, and groundwater elevation fluctuations are known.
	• The hydraulic and multiphase fluid flow properties of the soil, rock, and groundwater are known, so that groundwater/LNAPL migration simulations re-create the saturation path history.
		• The rate and volume of LNAPL released, timing and magnitude of potential fluid saturation path changes from precipitation and water table fluctuations are known
		• Volume estimates are based on a vertical slice at a point location dependent on the parameters such as release history and groundwater elevation changes.
		• Accounting for horizontal heterogeneity is subject to user interpretation and limited by data density
		• Time and labor intensive
			• The rate and volume of LNAPL released, timing and magnitude of potential fluid saturation path changes from precipitation and water table fluctuations are not known and will need to be estimated – creates a high degree of uncertainty
			• Static fluid level measurements – recovery system operation must be paused
			• Hydraulic properties of different geologic materials, especially in the northern portion of the Site
			  ○ Current data provided by one geotechnical boring

Table 1 – Summary of Model Evaluation

Model	Inherent Assumptions	Limitations	Additional Data Needs
Customized approach using 3-D Modeling Software (*e.g.*, Earth Visions, Earth Volumetric Studio, *etc.*)	• The distribution of LNAPL throughout the Site has been fully characterized through OIP investigation • The HPT probe estimates of permeability are representative of soil hydraulic properties and can be used to estimate multiphase fluid flow properties • Location and distribution of LNAPL is fully defined • Can analyze types of analytical and geophysical data in any environment (e.g. soil, ground water, surface water, air, noise, resistivity, *etc.*	• Current data allows for volumetric measurement of impacted area • Input parameters will need to be estimated which will result in a volume range with a high degree of uncertainty • Uncertainties in the fluid saturation properties of each geologic unit will result in uncertainties in the estimated LNAPL volume • Uncertainties in the observed fluid saturations will result in uncertainties in the estimated LNAPL volume • The distribution of LNAPL volume will be based on current observed conditions and the limitations associated with these observations (*e.g.*, ability of the OIP to detect LNAPL presence, estimates of water saturation, *etc.*)	• *In-situ* fluid saturation and hydraulic properties for the different geologic materials – requires numerous data points • Static fluid level measurements – recovery system operation must be paused •

SCHEDULE FOR COMPLETION OF ASSESSMENT RELATED MILESTONES - INCIDENT NUMBER 95827

ID	Task Name	Duration	Start	Finish
1	Complete Soil Vapor Extraction Pilot Test at North Study Area(1)	6 days	Wed 5/12/21	Mon 5/17/21
2	Complete Soil Delineation Sampling for VOCs and VPH(2)	69 days	Sun 5/23/21	Fri 7/30/21
3	Complete Deep Delineation Monitoring Well Drilling(3)	33 days	Mon 5/10/21	Fri 6/11/21
4	Complete Deep Delineation Monitoring Well Geophysical Logging(4)	7 days	Mon 6/14/21	Sun 6/20/21
5	Construct Deep Delineation Monitoring Wells(5)	7 days	Mon 6/21/21	Sun 6/27/21
6	Complete Deep Delineation Monitoring Well Sampling(6)	19 days	Mon 6/28/21	Fri 7/16/21
7	Updated Conceptual Site Model to NCDEQ(7)	32 days	Tue 5/25/21	Fri 6/25/21
8	Revised Comprehensive Site Assessment to NCDEQ(8)	32 days	Sat 7/31/21	Tue 8/31/21



Notes:

1 - The soil vapor extraction test is required to determine radius of influence for soil delineation sample spacing as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827.

2 - Soil samples collected for VOCs and VPH will be utilized for delineation purposes as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827. The timeframe stated for Task 2 includes laboratory analysis. Soil borings may be converted to soil vapor extraction points as a presumptive remedy during implementation of Task 2. Task 2 will pause for completion of Task 3 utilizing the same drill rig.

3 - Task 3 includes drilling of four additional bedrock monitoring wells as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827.

4 - Task 4 includes geophysical logging of four additional bedrock monitoring wells as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827.

5 - Wells will be completed with 2" PVC casings and screens as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827.

6 - Task 6 includes sampling and laboratory analysis of four additional bedrock monitoring wells as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827.

7 - In a letter dated May 5, 2021 NCDEQ made the following request: Please provide an updated Conceptual Site Model (CSM) based on current information for the Colonial Pipeline Company's petroleum release including receptors and incorporating all the available site information, including but not limited to, the resistivity survey, vapor intrusion investigation, air monitoring, noise monitoring, springs, boring logs, drilling information, optical image profiling (OIP) information, updated information on the free product volume estimation, vertical and horizontal extent of soil and groundwater contamination, geophysical logging information, hydraulic information, etc. A CSM is an iterative, 'living representation' of a site that summarizes and helps project teams visualize and understand available information. A CSM update will be provided by June 25, 2021 based on current information available at that time.

8 - Delineation of soil and groundwater impacts as detailed in the Soil and Groundwater Delineation Work Plan dated May 7, 2021 for NCDEQ Incident Number 95827, within the timeframes stated herein is predicated and upon favorable sampling results below NCDEQ Maximum Soil Contaminant Concentrations and 2L Groundwater Quality Standards.

This schedule is contingent upon receipt of access agreements, completion of clearing activities, and specialty contractor and equipment availability.

This schedule does not include any delays related to CPC operations or requirements, access related delays or adverse weather conditions.

If environmental conditions are encountered that preclude completion of soil and groundwater delineation within the anticipated time frames stated above, an updated schedule projecting completion of those activities will be provided to NCDEQ.

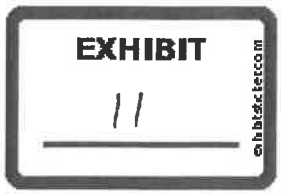
Abbreviations:

VOCs - Volatile organic compounds

VPH - Volatile petroleum hydrocarbons

TPH-GRO - Total petroleum hydrocarbons - gasoline range organics

Colonial Pipeline Company



Sam McEwen
Director, Environmental

May 28, 2021

To: Michael Scott via e-mail

Re: **Colonial Pipeline SR 2448/Pipeline ROW**
Incident Number 95827
Huntersville, North Carolina

Dear Mr. Scott:

Colonial Pipeline Company (Colonial) submits this response to Item 2 of the May 5, 2021 Notice of Continuing Violation (NOCV).

Item 2i – A revised estimate of total product volume released to the environment based on current information.

As of May 25, 2021, Colonial had collected 1,143,109 gallons of free product.[1] Current recovery rates range from 2,600 to 3,300 gallons per day and are trending down from historical rates upward of 5,000 gallons per day. Colonial will continue to provide updated recovered volume information to the North Carolina Department of Environmental Quality (NCDEQ).

As NCDEQ is aware, Colonial initially and appropriately (based on the best available data known to Colonial at the time) selected the LDRM model for estimating the total quantity of product released to the environment. The LDRM model estimated that approximately 1.2 million gallons of total product had been released to the environment. Total product recovered to date, plus assumed future free product recovery (based on current recovery rates), indicate that the LDRM's modeled volume estimate is likely to be exceeded. Also, as Colonial explained to NCDEQ on April 15, Optical Image Profiling (OIP) data collected by Colonial indicates that unique geologic and hydrogeologic conditions exist in portions of the Site, resulting in LNAPL below the water table. Accordingly, LDRM is not as accurate a model as previously believed, based on the additional scientific data received through the OIP technology.[2] Colonial has been evaluating other methods and models to estimate the total quantity of product released to the environment.

In its May 12, 2021 correspondence to NCDEQ, Colonial identified the use of OIP data and site-specific hydrogeologic data in conjunction with 3-D visualization software as a more appropriate method for estimating the total volume of product released to the environment based on currently understood conditions. The basis for this recommendation was provided in Attachment 1 to that letter. That approach would require additional data collection under non-pumping conditions, however, as Colonial and NCDEQ discussed and agreed, those non-pumping conditions (i.e., shutting the free product recovery system down for several weeks) would impair Colonial's and NCDEQ's shared goal of completing free product removal as quickly as possible. Colonial continues to believe it would be most protective of human health and the

[1] Based on recovery data as of May 25, 2021, Colonial has collected 1,045,756 million gallons of free product from the subsurface, 90,930 gallons during initial response activities, 2,273 gallons during soil excavation activities, and 4,150 gallons from soil vapor recovery efforts.

[2] The investment in OIP technology is another step that Colonial has made to help ensure that product that was released is discovered and remediated.

environment to postpone collection of the necessary data for the site-specific OIP modeling approach until sufficient recoverable free product has been removed to minimize risks associated with potential migration.

Although we continue to believe that using environmental data is an appropriate method for calculating the estimated released volume for this incident, Colonial has been evaluating (and continues to evaluate) alternative methods to estimate the total volume released. Those methods are complex and require multiple data points and assumptions, and the calculations from those models then have to be reviewed and validated.

In sum, Colonial's efforts to provide NCDEQ with a revised volume estimate are ongoing, however, given the complexities of those efforts, Colonial will be unable to provide a revised volume estimate by the current May 28 deadline. Colonial proposes a meeting in late June with NCDEQ so that Colonial can update NCDEQ on the progress of Colonial's volume estimation efforts. We suggest that meeting occur after Colonial's delivery of the Conceptual Site Model (CSM) on June 25, as directed in the May 5, 2021 NOCV, in the event that NCDEQ may also have any initial questions regarding the CSM. In the meantime, Colonial will continue to follow the science and deploy required resources to protect human health and the environment as we continue to evaluate other methods to estimate the total volume released into the environment.

Item 2ii – The specific model/predictive calculation selected and reasoning.

Please reference Colonial's May 12, 2021 response to item 1 of the May 5, 2021 NOCV.

Item 2iii - The model/calculation limitations.

Limitations associated with using the OIP data, site-specific data, and 3D visualization software include:

- Although current data allows for volumetric measurement of impacted area:
  - Input parameters will need to be estimated which will result in a volume range with a high degree of uncertainty;
  - Uncertainties in the fluid saturation properties of each geologic unit will result in uncertainties in the estimated LNAPL volume; and
  - Uncertainties in the observed fluid saturations will result in uncertainties in the estimated LNAPL volume.
- The distribution of LNAPL volume will be based on current observed conditions and the limitations associated with these observations (e.g., ability of the OIP to detect LNAPL presence, estimates of water saturation, etc.).

Item 2iv - The model assumptions.

Volumes provided are based on direct field measurements of recovery. Signification model assumptions will be provided at the time at which the modeling results are provided to NCDEQ.

Item 2v - The model/calculation domain, grid/cell design, and vertical boundaries.

Model/calculation domain, grid/cell design, and vertical boundaries are unknown at this time.

Item 2vi - All data evaluated for the modeling/calculation effort.

All recovery data collected through April 30, 2021 has been provided to NCDEQ in previously documented submittals. Colonial will continue to provide recovery data to NCDEQ on a monthly basis. Recovery data through the date of the modeling effort will be evaluated for the modeling/calculation effort. All applicable data evaluated for the modeling/calculation effort will be provided when results are provided to NCDEQ.

Item 2vii - The initial model/calculation conditions, specific input parameters for the model/calculation effort, and reasoning for those parameters.

Initial model/calculation conditions, specific input parameters for the model/calculation effort, and reasoning for those parameters will be provided at the time the modeling results are provided to NCDEQ.

Item 2viii - All calibration procedures and calibration results for the modeling/calculation effort.

Any calibration procedures and any calibration results for the modeling/calculation effort will be provided to NCDEQ at the time that the modeling results are provided to NCDEQ.

Item 2ix - All sensitivity analyses and results.

Any sensitivity analyses or results will be provided at the time that the modeling results are provided to NCDEQ.

Item 2x - All statistical analyses and results.

Any statistical analyses or results will be provided at the time that the modeling results are provided to NCDEQ.

Item 2xi - Validation of the model/calculations.

Any validation of the model/calculations will be provided at the time at which the final modeling results are provided to NCDEQ.

Item 2xii - All predictive simulations/calculations.

Any predictive simulations/calculations will be provided at the time at which the modeling results are provided to NCDEQ.

Colonial Pipeline Company

As always, Colonial's intent is to be responsive to NCDEQ's requests while continuing assessment and recovery efforts needed to protect human health and the environment. If you have any questions or concerns about today's submission, please do not hesitate to contact me.

Respectfully,

Sam McEwen
Director, Environmental

1185 Sanctuary Parkway, Suite 100 Alpharetta, Georgia 30009-4765
P.O. Box 1624 Alpharetta, Georgia 30009-9934

colpipe.com | Follow us:

From: Morrison, Jeff <JMorrison@colpipe.com>
Sent: Friday, August 20, 2021 1:42 PM
To: Jackson, Vance <vance.jackson@ncdenr.gov>
Subject: [External] Status Update on Field Efforts

EXHIBIT
12

Vance, thank you for your time on the phone Wednesday. As discussed, Colonial intends to seek an extension for submittal of the Revised CSA and Items 14 and 18 of the February 24, 2021 Notice of Continuing Violation (NOCV).

As NCDEQ is aware, Colonial continues to actively work towards completing the specific requests outlined in the February 24, 2021 and May 5, 2021 NOCVs. The 3 identified tasks necessary to complete and submit to NCDEQ the Revised CSA are Items 6, 14, and 18. An update on these Items is as follows:

Item 6 (Soil Delineation) - Colonial is pleased to confirm to NCDEQ that Item 6 is complete as we received the remaining outstanding analytical data results on August 16, 2021. Colonial is preparing the data to be submitted to NCDEQ in a stand-alone summary report. Colonial anticipates submitting this information to NCDEQ by August 31, 2021.

Items 14 (Cross-Sections) and 18 (Horizontal and Vertical Delineation) – Colonial is pleased to confirm to NCDEQ that horizontal delineation is complete. Efforts to establish vertical delineation are currently ongoing. Vertical delineation along the perimeter of the site is established with one exception. Colonial is actively drilling in this area to establish vertical delineation. Additionally, vertical delineation in close proximity to the Release Site is actively ongoing. These efforts have required the utilization of a larger drill rig capable of reaching the target depths within the competent bedrock that the previously utilized drill rig was unable to accomplish. As such, additional logistics have been required to accommodate the deeper drilling efforts. Upon completion of the vertical delineation, appropriate cross-sections will be developed for the Revised CSA.

Based on current site conditions, the following proposed schedule has been developed:

- It is anticipated that the current delineation drilling will achieve target depths (anticipated to be between 130 – 150 feet bgs), and that the new wells will be developed, geophysical logged, and constructed by September 17, 2021.
- These wells will then be developed, sampled, surveyed, and the analytical data received (and reviewed to make a delineation determination) by October 8, 2021.
- If delineation is determined to be complete, the Revised CSA (which will be a comprehensive submittal) is anticipated to be prepared and submitted to NCDEQ by October 30, 2021. [Note: If delineation remains pending, this schedule may need to be re-evaluated.]

Colonial will communicate to NCDEQ on progress of the above activities and will advise NCDEQ if any of above dates are at risk as the tasks are completed.

Colonial proposes the following schedule of document submittals through the submission of the Revised CSA:

- 8/30/2012 – Submit Monthly Monitoring Report (MMR) for August
- 8/31/2021 – Submit Soil Delineation report
- 9/30/2021 – Submit MMR for September
- 10/30/2021 – Submit Revised CSA
- 10/30/2021 – Submit MMR for October

Thank you in advance of your reply.

Sincerely,
Jeff

Jeff D. Morrison
Environmental Program Manager

Colonial Pipeline Company
3925 Anderson Farm Road
Austell, Georgia 30106
Office: 770.819.3566

Colonial Pipeline Company

EXHIBIT
13

Sam McEwen
Director, Environmental

October 30, 2021

To: Michael Scott *(via e-mail michael.scott@ncdenr.gov)*

Re: **Colonial Pipeline SR 2448/Pipeline ROW**
Incident Number 95827
Huntersville, North Carolina

Dear Mr. Scott,

Consistent with the extension request in our August 27, 2021 letter, Colonial Pipeline Company (Colonial) is pleased to transmit the Revised Comprehensive Site Assessment Report (CSA) regarding the above referenced incident. The report was prepared in conjunction with Apex Engineering, PC.

As always, Colonial's intent is to be responsive to NCDEQ's requests and to continue its work to protect human health and the environment. If you have any questions or concerns about today's submission, please do not hesitate to contact me.

Respectfully,

Sam McEwen

Sam McEwen
Director, Environmental

APEX

Revised Comprehensive Site Assessment Report
SR 2448 / Pipeline Right of Way
Incident Number 95827

Huntersville, Mecklenburg County, North Carolina 28078

October 30, 2021

Apex Job No.: COL054-0314051-21000948

Prepared for:

Mr. John Wyatt
4295 Cromwell Rd. #311
Chattanooga, Tennessee 37421

Prepared by:

Apex Companies, LLC
(dba Maryland Apex Engineering, PC)
5900 Northwoods Business Parkway, Suite 5900-O
Charlotte, North Carolina 28269

Prepared By:

Andrew Street, CHMM, RSM
Senior Project Manager

Reviewed By:

Tom Naumann, PG
Senior Scientist
NC License No. 2405

NORTH CAROLINA LICENSED SEAL 2405 GEOLOGIST THOMAS EDWARD NAUMANN 10/5/21

Matt Gorman, PE
Program Manager
NC License No. 041588

SITE INFORMATION

1. Site Identification

- Date of Report: October 30, 2021
- Facility I.D.: NA Incident Number: 95827 Site Rank: High
- Site Name: Colonial Pipeline Company – 2020-L1-SR2448
- Site Street Address: 14511 Huntersville-Concord Road
- City/Town: Huntersville Zip Code: 28078 County: Mecklenburg County
- Description of Geographical Data Point: 350 Feet Northeast of SR 2448/CPC ROW Crossing
- Location Method: GPS
- Latitude: 35.414106 Longitude: -80.806185

2. Information about Contacts Associated with the Release

- Owner: Colonial Pipeline Company
  Address: 1185 Sanctuary Parkway, Suite 100, Alpharetta, GA Telephone: 678-762-2200
- Operator: Colonial Pipeline Company
  Address: 1185 Sanctuary Parkway, Suite 100, Alpharetta, GA Telephone: 678-762-2200
- Property Owner/Occupant: Mecklenburg County
  Address: 600 E. 4th Street, 11th Floor, Charlotte, NC Telephone: 704-336-3000
- Consultant/Contractor: Apex Companies, LLC
  Address: 5900 Business Park, Ste. 5900-O, Charlotte, NC 28269 Telephone: 704-799-6390
- Analytical Laboratory: Pace Analytical Services, LLC State Certification No.:375
  Address: 9800 Kincey Ave. Suite 100, Huntersville, NC 28078 Telephone: 704-875-9092

3. Information about Release

- Date Discovered: 8/14/2020
- Estimated Quantity of Release: See Footnote below.
- Cause of Release: Corrosion Fatigue
- Source of Release: Line 1
- Sizes and contents of UST(s) or other containment from which the release occurred: N/A

Footnote: Colonial currently estimates that the release exceeded 1.2 million gallons of product. Using API's LDRM methodology, Colonial provided to NCDEQ the estimate of 1.2 million gallons released. See Comprehensive Site Assessment Report dated January 20, 2021. Colonial notified NCDEQ that this estimate would likely need to be adjusted upward. See letter to Michael Scott dated May 28, 2021. Records provided to NCDEQ on Colonial's ongoing remediation efforts (i.e., the monthly monitoring reports) confirm that the release exceeded 1.2 million gallons. See Monthly Monitoring Report submitted July 30, 2021. As we have explained in our response to NCDEQ's October 19, 2021 Notice of Continuing Violation, it is technically infeasible to provide a reliable calculated estimate of the total release volume without stopping or substantially modifying Colonial's ongoing remediation efforts at the site for a substantial period of time to collect additional data. As NCDEQ knows, Colonial's remediation efforts have been and continue to be highly productive, currently removing in excess of a thousand gallons of free product per day. Requiring Colonial to stop or substantially modify remediation activities in order to collect additional data could result in the further expansion and migration of contamination, which would in turn increase risk of receptor exposure and prolong cleanup efforts. Moreover, a calculation of the released volume is not needed for horizontal and vertical delineation of the impacted groundwater or soils, or for implementation of corrective action. In these circumstances, delaying remediation activities for the collection of additional data to calculate the release volume would not be most protective of the public health and environment.

4. Certification

Apex Companies, LLC (dba Maryland Apex Engineering, PC) is licensed to practice geology and engineering in North Carolina. The geology certification number of the company is C-519. I, Tom Nauman, PG, a Licensed Geologist for Apex Companies, LLC (dba Apex Engineering, PC; Apex) do certify that the information contained in this report is correct and accurate to the best of my knowledge. Further, I hereby attest that certain emergency response information documented in this report was collected by third parties that were not under contract to Apex and/or were not working under my direction or supervision.

Tom Naumann

NORTH CAROLINA LICENSED SEAL 2405 GEOLOGIST THOMAS EDWARD NAUMANN
10/30/21

EXECUTIVE SUMMARY

Source Information

Incident Number	95827
Date Discovered:	August 14, 2020
Petroleum Product Released:	Gasoline
Source of Release:	Line 1
Volume of Release:	See Footnote below[1]

Description of Incident Number 95827

On August 14, 2020, Colonial Pipeline Company (CPC) and local emergency response agencies were notified of a suspected gasoline release within the CPC right of way (ROW) on the Oehler Nature Preserve near the intersection of Huntersville-Concord Road (Site). Line excavation and inspection in the release area confirmed the source of the release as coming from CPC Line 1 and the released product was confirmed to be gasoline. The release was promptly controlled, and CPC immediately initiated soil excavation and free product recovery efforts.

Hydrogeological Investigation Results (Release Area)

Depth to Groundwater:	Variable – less than 10 to over 50 feet below ground surface (bgs)
Groundwater Flow Direction:	Predominantly north and south with a radial flow component
Horizontal Gradient:	0.022 feet per foot to the north, 0.005 feet per foot to the south
Average Hydraulic Conductivity:	0.51 feet per day to the north, 0.88 feet per day to the south
Average Overburden Hydraulic Conductivity:	0.33 feet per day to the north, 0.52 feet per day to the south
Groundwater Flow Velocity (Overburden):	13.7 feet per year to the north, 5.4 feet per year to the south
Depth to Bedrock:	Variable - 20 feet to over 100 feet

[1] Colonial currently estimates that the release exceeded 1.2 million gallons of product. Using API's LDRM methodology, Colonial provided to NCDEQ the estimate of 1.2 million gallons released. See Comprehensive Site Assessment Report dated January 20, 2021. Colonial notified NCDEQ that this estimate would likely need to be adjusted upward. See letter to Michael Scott dated May 28, 2021. Records provided to NCDEQ on Colonial's ongoing remediation efforts (i.e., the monthly monitoring reports) confirm that the release exceeded 1.2 million gallons. See Monthly Monitoring Report submitted July 30, 2021. As we have explained in our response to NCDEQ's October 19, 2021 Notice of Continuing Violation, it is technically infeasible to provide a reliable calculated estimate of the total release volume without stopping or substantially modifying Colonial's ongoing remediation efforts at the site for a substantial period of time to collect additional data. As NCDEQ knows, Colonial's remediation efforts have been and continue to be highly productive, currently removing in excess of a thousand gallons of free product per day. Requiring Colonial to stop or substantially modify remediation activities in order to collect additional data could result in the further expansion and migration of contamination, which would in turn increase risk of receptor exposure and prolong cleanup efforts. Moreover, a calculation of the released volume is not needed for horizontal and vertical delineation of the impacted groundwater or soils, or for implementation of corrective action. In these circumstances, delaying remediation activities for the collection of additional data to calculate the release volume would not be most protective of the public health and environment.

Sampling and Investigation Results

Maximum Groundwater Contaminant Concentrations Detected in Monitoring Wells - 2L Exceedances Only[1]:

Compound	Maximum Concentration[2] (µg/L)	NC 2L Standard (µg/L)	Gross Contaminant Level (µg/L)
Benzene	2,500	1	5,000
Bromodichloromethane[1]	2.2	0.6	NE
Diisopropyl ether	160	70	70,000
Dibromochloromethane[1]	0.41J	0.4	400
Methyl tert-butyl ether	42	20	20,000
Naphthalene	48	6	6,000
Toluene	4,000	600	260,000
Total Xylenes	2,680	500	85,500
Vinyl Chloride[1]	0.22J	0.03	30
C5-C8 Aliphatics	12,000	400	NE
C9-C12 Aliphatics	1,400	700	NE
C9-C10 Aromatics	1,400	200	NE

(1) detections of bromodichloromethane, dibromochloromethane and vinyl chloride are not attributed to Incident No. 95827.
(2) Maximum Concentrations are from the September 16- October 11, 2021 data set.
NE Not Established
µg/L micrograms per liter
J Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

Receptor Information

Water Supply Wells

Water Supply Wells Present Within 1,500 Foot Search Radius: Seven

Availability of Public Water

Municipal water is available at the Site and in the surrounding area. Select residents within the 1,500 foot radius search radius have elected to remain on private water supply wells.

Surface Water Bodies

The Site is located within the Yadkin Pee-Dee River Basin. North Prong Clarke Creek is located approximately 1,800 feet north of the release area and South Prong Clarke Creek is located approximately 2,700 feet south of the release area, both of which are characterized by the North Carolina Department of Environmental Quality, Division of Water Quality as Class C water bodies. A groundwater seep and ephemeral stream are located approximately 1,200 feet southeast of the release area.

Surrounding Land Use

The area within a 1,500 foot radius of the Site is a mixture of low density residential properties, agricultural properties, and wooded land.

Risk Classification

The risk classification for the Site is high based on the presence of water supply wells within 1,000 feet of the release area.

Risk Reduction Goals

The risk classification for the Site could be eligible to be re-classified from high to intermediate if the free product mass is reduced and all water supply wells within 1,000 feet of the boundaries of the groundwater plume exceeding 2L Groundwater Quality Standards are abandoned.

Table of Contents

Figures

Tables

Appendices

1.0 INTRODUCTION

A gasoline release was discovered on August 14, 2020 in an area approximately 350 feet northeast of where the Colonial Pipeline Company (CPC) pipelines cross Huntersville-Concord Road (State Road [SR] 2448). The release occurred from the CPC's Line 1. The release is referred to herein as the 2020-L1-SR2448 Release and/or Incident Number (No.) 95827 (the Site). This revised Comprehensive Site Assessment (CSA) Report presents the results of the soil, soil vapor, groundwater and surface water investigation activities, and delineation findings associated with Incident No. 95827. An Initial Assessment Report was submitted to the North Carolina Department of Environmental Quality (NCDEQ) on October 30, 2020. A CSA and Revised CSA Items were submitted to NCDEQ on February 20, 2021 and April 26, 2021, respectively. Monthly Monitoring Reports (MMRs) were sent to NCDEQ on November 30, 2020, December 30, 2020, January 29, 2021, March 12, 2021, March 30, 2021, April 30, 2021, June 2, 2021, June 30, 2021, July 30, 2021, August 30, 2021, September 30, 2021, and October 30, 2021. A Conceptual Site Model Report was submitted to NCDEQ on June 25, 2021. Soil delineation sampling results were submitted to NCDEQ in a transmittal dated August 31, 2021 and appended on October 8, 2021. Apex Companies, LLC (dba Maryland Apex Engineering, P.C.; Apex) prepared this Revised CSA on behalf of CPC for submittal to NCDEQ. A Site Location Map is provided as **Figure 1** and a Site Plan is provided as **Figure 2**.

2.0 SITE HISTORY AND CHARACTERIZATION

2.1 Description of Incident Number 95827

On August 14, 2020, CPC and local emergency response agencies were notified of a suspected gasoline release within the CPC right of way (ROW) on the Oehler Nature Preserve near the intersection of SR 2448 (**Figure 2**). Line excavation and inspection in the release area confirmed the source of the release as coming from CPC Line 1 and the released product was confirmed to be gasoline. The volume of gasoline free product released to the unsaturated subsurface provided enough head pressure to displace and descend to the lower transmissive transitional stratum (zone immediately above bedrock) and spread radially in multiple directions from the release site, which was at a shallow (i.e., higher) bedrock location relative to the greater area. The volume of the release and orientation of the bedrock surface was sufficient for free product movement upgradient and cross-gradient in addition to downgradient. A portion of the released free product surfaced and flowed overland to the northwest. The terms free product and light non-aqueous phase liquid (LNAPL) are used interchangeably herein to represent separate phase gasoline.

2.2 Initial Response and Abatement Actions

The release was promptly controlled on August 14, 2020, and free product recovery efforts were initiated. CPC recovered approximately 90,930 gallons of free product from the release source location during initial response activities. To date, over 8,000 tons of petroleum-impacted soil have been removed from the site and properly disposed. A total of 89 vacuum enhanced recovery wells and 56 hydraulic control wells have been installed within the release area **(Figure 2)**. Pneumatic recovery pumps are operated in the wells, and vacuum is applied to the wells to recover petroleum vapor and to enhance free product recovery. As of October 20, 2021, approximately 1,222,803 gallons of gasoline free product and approximately 4,774,655 gallons of petroleum contact water have been recovered from the well network. Total product recovery during the soil excavation activities (2,273 gallons), the emergency response activities (90,930 gallons), soil vapor recovery (5,834 gallons), and from the installed well network (1,222,803 gallons) is approximately 1,321,840 gallons.

CPC initially and appropriately (based on the best available data known to CPC at the time) selected the LNAPL Distribution and Recovery Model (LDRM) for estimating the total quantity of product released to the environment. The LDRM model estimated that approximately 1.2 million gallons of total product had been released to the environment. Total product recovered to date, plus assumed future free product recovery (based on current recovery rates), indicate that the LDRM's modeled volume estimate has been exceeded.

2.3 Excavation of Contaminated Soil

Approximately 800 tons of petroleum-impacted soil were excavated beginning on August 14, 2020 during initial efforts to expose Line 1 and Line 2 and to identify the release location. An excavation measuring approximately 35 feet by 40 feet by 10 feet deep was completed to expose Lines 1 and 2 at the release location and to install a reinforcing, steel sleeve over the damaged section of pipe. Based on soil sample results and the tonnage of soil

removed, an estimated 1,257 gallons of product was recovered through the initial soil excavation. Additional product recovery was completed through source area soil removal activities associated with the Line 1 and Line 2 inspection, repair, and recoating activities. Soil was transported to the Environmental Soil, Inc. land application facility located in Lattimore, North Carolina (Permit Number SRU100038) between August 16 and August 27, 2020. At the request of NCDEQ, the soil was later transferred by to the Charlotte Motor Speedway Landfill located in Concord, North Carolina and operated by Republic Services (Permit Number 1304-MSWLF-1992) between October 9, 2020 and October 16, 2020. As of October 16, 2020, the transfer of soil to the Charlotte Motor Speedway Landfill was completed. Except for the above-mentioned soil that was later transferred to the Charlotte Motor Speedway Landfill, excavated soil has been transported to the Charlotte Motor Speedway Landfill located in Concord, North Carolina and operated by Republic Services (Permit No. 1304-MSWLF-1992). Copies of waste manifests are provided as **Appendix A**.

Source area soil was excavated during pipeline inspection and repair work. The post excavation soil samples were collected from the exposed excavation base and sidewalls on 25 foot spacing prior to backfilling. Each soil sample was assigned a unique identification number and the sample location was surveyed. Soil samples underwent analysis for the presence of volatile organic compounds (VOCs) by EPA Method 8260D and volatile petroleum hydrocarbons (VPH) by the Massachusetts Department of Environmental Protection (MADEP) Method by Pace Analytical, LLC (Pace). Pipeline excavation soil sampling results are depicted on **Figure 3** and summarized in **Table 1**. Copies of laboratory analytical reports are provided in **Appendix B**. Soil delineation activities are further described below in Section 6.1. Residual petroleum soil impacts exceeding NCDEQ Maximum Soil Contaminant Concentrations (MSCCs) will be addressed as part of a Corrective Action Plan (CAP) for Incident No. 95827.

3.0 RECEPTOR INFORMATION

Under the NCDEQ Risk Based Corrective Action framework, corrective action objectives for impacted-groundwater at the Site are based on risk classification criteria and the associated remedial goals established under North Carolina 15A NCAC 2L .0506 regulations. The risk classification for a site is based on multiple factors, including the distance from the source area of a release to receptors such as surface water bodies and water supply wells (WSWs). The risk classification for the Site is 'high risk' due to the presence of WSWs within 1,000 feet of the release (**Figure 4**). A summary of water supply well and receptor information is provided as **Table 2**. Groundwater remediation goals for sites classified as high risk are the 2L Groundwater Quality Standards. TRC Companies (TRC) prepared a potential current and future exposure pathways diagram for Incident No. 95827 (**Appendix C**).

3.1 Public Water Supplies

Properties within a 1,500 foot radius of the release area obtain potable water from public water supply or private WSWs (**Figure 4**). Water services for the Town of Huntersville are provided by the City of Charlotte. Field reconnaissance and the Mecklenburg County geographic information systems database were utilized to evaluate for the presence of WSWs within a 1,500-foot radius of the release area, and to evaluate if each property in the search area was connected to the public water supply.

The primary source of water for Mecklenburg County is Mountain Island Lake, an impoundment of the Catawba River. The site is not located within a water supply watershed. No public water supply sources were identified within a 1,500-foot radius of the release source area.

3.2 Water Supply Wells

Field reconnaissance and the Mecklenburg County geographic information systems database were utilized to evaluate for the presence of WSWs within a 1,500-foot radius of the release site, and to evaluate if each property in the search area was connected to the public water supply.

Twenty WSWs have been identified within a 1,500-foot radius of the release site (**Figure 4**), of which eleven have been abandoned since the release occurred. Eleven WSWs, including two inactive wells and one non-potable use well remain within a 1,500-foot radius of the release site. Well abandonment records are provided as **Appendix D**. Well use and owner information is summarized in **Table 2**.

3.3 Surface Water

The release site is located within the Yadkin Pee-Dee River Basin. North Prong Clarke Creek is located approximately 1,800 feet north of the release site and South Prong Clarke Creek is located approximately 2,700 feet south of the release site, both of which are classified as Class C water bodies by the NCDEQ Division of Water Resources. Two groundwater seeps and an ephemeral stream are located approximately 1,200 feet southeast of the release site. The ephemeral stream flows to South Prong Clarke Creek. No surface water sample collected to date has exceeded 15A NCAC 02B Surface Water Quality Standards (2B Surface Water Quality Standards).

3.4 Wellhead Protection Areas

There are currently no wellhead protection areas as defined by 42 USC 300h-7(e) in the vicinity of the Site.

3.5 Subsurface Structures

Line 1 and Line 2 were identified as potential utility pathways for vapor migration. During the line inspection and recoat activities, soil around the lines was excavated north and south of the release area and replaced with clean backfill. Utilities located along Huntersville-Concord Road include a water line, a natural gas line, and a telecommunication line at estimated depths of approximately three feet. Depth to water in proximity to the utility lines is over 30 feet. Results from the soil vapor assessment activities within utility corridors are included in Section 6.3.

4.0 LAND USE SURVEY

The area within a 1,500 foot radius of the Site is a mixture of low density residential properties, agricultural properties and wooded land. The release occurred on the Oehler Nature Preserve. Properties within the survey area are zoned for residential single family and agricultural use.

5.0 GEOLOGY AND HYDROGEOLOGY

5.1 Regional Geology

Mecklenburg County is located within the Charlotte Belt of the Piedmont physiographic province. The Piedmont province is characterized by rolling hills and moderately steep valleys formed by stream erosion of upland areas. Average relief is less than 100 to 150 feet between the upland areas and the stream valleys.

Based on a review of the 1985 Geologic Map of North Carolina (NCDNR), the site is underlain by metamorphosed quartz diorite (PzZq). This unit is described as foliated to massive. Based on a review of the National Resource Conservation Services (NRCS) Soil Survey, the primary mapped soil units are the Cecil sandy clay loam, the Enon sandy loam, and the Wilkes loam. All of these are saprolitic and derived from granites or diorites or metamorphosed varieties (NRCS, 2020). Regionally, this is part of the Piedmont Physiographic Province and the Charlotte Belt. The regional geology is described in the context of several lithotectonic belts of the Piedmont between the Blue Ridge to the west and the Coastal Plain and Triassic Basin to the east. The Charlotte Belt is primarily composed of plutonic rocks with some areas of metavolcanics rocks (Goldsmith, Milton, & Horton Jr., 1988). Rocks within the Belt vary in age and degree of metamorphism. Metasedimentary rocks are uncommon. The rocks of this portion of the Charlotte Belt are part of a granite/diorite complex, in which the diorite country rock is inter-penetrated by the granite (Legrand & Mundorff, 1952). The quartz diorite unit is described as containing quartz diorite and varieties of gneiss (Wilson, 1983). The unit described as quartz diorite may contain areas of tonalite, granodiorite, and granite, due to the origin of the unit with multiple intrusions of various composition and mapping limitations where outcrops are uncommon. The unit may also contain metamorphic rocks such as gneiss and schist, but this is referred to herein as quartz diorite for consistency. The quartz diorite bedrock is covered by a mantle of saprolite.

Saprolite, the product of in-place chemical weathering of crystalline bedrock, is a general term used to describe a thoroughly decomposed crystalline rock and is described in published data (Legrand H. E., 2004; Wilson, 1983) in

this area. Quartz-rich granitic rocks generally weather to a sandy saprolite and more feldspathic plutonic rocks, such as diorite, generally weather to a clayey saprolite. Saprolite often retains some of the original rock fabric, such as foliation and mineral grain differentiation. The mapped soil includes units derived from granite and diorite.

5.2 Regional Hydrogeology

A typical hydrogeologic unit in the Piedmont province is characterized as a single hydrologic system formed by the saprolite overburden (residuum) and the underlying consolidated bedrock. Recharge of the surficial water table occurs through infiltration by rainfall. However, infiltration through fine-grained surficial soil is limited and a large component of rainfall is lost to runoff. The saprolite hydrostratigraphic unit acts as a reservoir to receive and store water that discharges to nearby surface water bodies and recharges the underlying bedrock unit.

Generally, groundwater flow in a fractured crystalline bedrock system with a saprolite overburden is characterized by higher storage and lower conductivity (or higher porosity and lower permeability) in the overburden and higher conductivity and lower storage (or higher permeability and lower porosity) in the fractured bedrock. Thus, groundwater stored in the saprolite is the primary source of recharge of the underlying fractured bedrock aquifer. Legrand (2004) describes two components of groundwater flow into this type of system: (1) flow through the regolith parallel to the bedrock surface and (2) flow into the bedrock via interconnected fractures where they intersect the regolith. Discharge generally occurs at springs or seeps or as basal flow into bodies of water (including perennial and ephemeral streams). This flow along the base of the regolith in the transitional zone of saprolite and weathered rock and has been described as the most permeable part of the groundwater system (Harned & Daniel, III, 1989; Schaeffer, 2018) and the primary lateral transmitter of groundwater and groundwater contaminants (Harned & Daniel, III) in similar Piedmont groundwater systems. This transitional zone is the result of less advanced weathering than the overlying regolith, causing extensive fracturing along the bedrock surface. Porosity within this zone is moderate relative to the overlying saprolite and underlying bedrock, but permeability is relatively higher than both. Thus, there are often three distinct hydrostratigraphic units: the saprolite, the transition zone, and the bedrock.

5.3 Site Geology

A review of soil boring logs for the site coupled with the electrical resistivity tomography (ERT) survey indicates a saprolite overburden throughout the study area with thicknesses varying from 20 feet to over 100 feet. This soil is generally described as clayey near the surface, underlain primarily by a thick sequence of silty clay and silty sand, and with greater amounts of very fine to medium silty sand observed at times with weathered bedrock fragments in the transitional bedrock interface. Soil in the clayey stratum are nearly always red or reddish, transitioning to brown and gray in the silty stratum. Soils are generally micaceous, particularly in the silty stratum, and pyrite was observed more often near the bedrock interface or in the weathered rock. The phaneritic texture of the underlying rock and gneissic banding is apparent in the lower two saprolite strata. There is a general lack of schistosity, but foliation was observed infrequently. The study area is generally undisturbed with the exception of the pipeline and Huntersville-Concord Road. Thus, the bedrock overburden can be described as saprolite entirely and fill is generally not present except as pipeline or other utility or road sub-grade backfill.

Based on approximate depths to bedrock as noted during drilling using sonic and hollow-stem auger methods and ERT survey results (included in **Appendix E**), depths to bedrock indicate that bedrock is at its highest elevation in the immediate area at the release site extending to the south across Huntersville-Concord Road. Bedrock depths roughly descend in all directions from the immediate release site.

5.4 Site Hydrogeology

Groundwater at the release site is estimated to flow in a general northerly and southerly direction. The monitoring well and recovery well gauging data is presented in **Table 3** and **Table 4**, respectively. A groundwater potentiometric surface map for the surficial and bedrock units are provided as **Figure 5A** and **Figure 5B**, respectively. A free product distribution map is provided as **Figure 6**. Hydrographs for monitoring and recovery wells are provided as **Appendix F**.

Depth to groundwater at the site ranges from less than 10 feet below ground surface at the north limit of the study area, where the ground surface lies at lower elevations, to over 50 feet below ground surface in the vicinity of

MW-41 and MW-55, where the bedrock is encountered at greater depths. The water table occurs primarily in the saprolite unit; however, bedrock rises locally above the water table in some areas of the site. The potentiometric map indicates that groundwater elevations are highest proximal to the release site flowing north and south in a radial pattern. The calculated water table gradient to the north, based on the September 23, 2021 gauging event, is approximately 0.022 feet/foot as determined by "three point problem" calculation between MW-53, MW-56, and MW-57. The calculated water table gradient to the south, based on the September 23, 2021 gauging event, is approximately 0.005 feet/foot as determined by "three point problem" calculation between MW-19, MW-80, and MW-81.

In-situ rising head slug tests were performed by AECOM at 16 monitoring wells encompassing the release area. Two replicate in-situ rising head tests were performed at each of the 16 monitoring wells evaluated. The average hydraulic conductivity value for each well was calculated (**Table 5**). A summary of slug test data is provided as **Appendix G**. From the release site to the north, hydraulic conductivities at each well tested ranged from of 0.22 to 1.07 feet per day (ft./day). From the release site to the south, hydraulic conductivities at each well tested ranged from of 0.31 to 2.32 ft./day. Wells located north and south of the release site were grouped to evaluate average hydraulic conductivities in both groundwater flow directions. These data yield an average hydraulic conductivity for the overburden of 0.33 ft./day to the north and 0.52 ft./day to the south. To estimate the average groundwater flow velocity in the surficial aquifer north and south of the release area, a modified Darcian flow equation were used: Velocity (V) = Hydraulic Conductivity (K) * Horizontal Gradient (i) / Estimated Effective Porosity (n_e). Based on an average hydraulic conductivity (K) of 0.33 ft./day, an average hydraulic gradient of 0.022 feet/foot, and an estimated effective porosity (n_e) of 19 percent for saprolite and partially weathered bedrock (average of Core Labs analytical values for Shelby tubes), the average groundwater velocity (v) to the north of the release area is estimated to be 0.04 ft./day or 13.7 feet per year. Based on an average hydraulic conductivity (K) of 0.52 ft./day, an average hydraulic gradient of 0.005 feet/foot, and an estimated effective porosity (n) of 19 percent for saprolite and partially weathered bedrock, the average groundwater velocity (v) to the south of the release area is estimated to be 0.01 ft./day or 5.4 feet per year.

6.0 COMPREHENSIVE SITE ASSESSMENT ACTIVITIES AND RESULTS

6.1 Soil Assessment Activities and Results

Soil sampling was completed subsequent to Line 1 and Line 2 inspection and recoating activities utilizing hand tools as described in Section 2.3. Soil assessment activities were also completed during monitoring well and select recovery well installation activities. Monitoring and recovery well soil borings were advanced with either a Geoprobe® direct-push drill rig, a sonic drill rig, and/or utilizing split spoons. Soil delineation borings were advanced in accordance with the August 31, 2021 Soil and Groundwater Delineation Workplan with a Geoprobe® direct-push drill rig.

Soil cores were retrieved, and samples were collected from target intervals, placed in airtight containers and allowed to equilibrate for approximately 15 minutes before measuring VOC headspace readings with a photoionization detector (PID). The samples exhibiting the highest headspace readings were typically selected for chemical analysis unless free product was present. In cases where there were no significant PID measurements in a boring, the depth interval corresponding to the terminus of the unsaturated zone was typically selected for chemical analysis. Saturated soil samples were also collected at a sub-set of borings for saturated interval characterization and remedial design purposes.

Soil samples were submitted to Pace for laboratory analysis of the following chemical specific parameters in accordance with NCDEQ requirements:

- VOCs by EPA Method 8260D; and
- VPH by the MADEP Method.

Results of the chemical specific laboratory analysis are summarized in **Table 6** and on **Figure 3**. Laboratory analytical reports are provided in **Appendix B**. Boring Logs are provided as **Appendix H**.

Ten locations within the investigation area were selected for undisturbed Shelby tube sample collection for physical testing, including physical parameters and fluid saturations. The locations were selected to provide unconsolidated hydraulic data from laboratory analyses within and across measurable LNAPL. A figure depicting the sample locations is included in **Appendix I**. A total of nineteen depth intervals from the ten locations were selected for laboratory analysis. Depths were selected for testing by considering both coarse and fine grain intervals with a focus on intervals exhibiting the greatest response as indicated by Ultraviolet (UV) light photos. The thin-wall tube (Shelby) sampler was used to obtain undisturbed samples of cohesive soils for the following prescribed testing: Bulk Density, Grain Density, Total Porosity, Air Filled Porosity, Effective Porosity, Moisture Content, Water Saturation, LNAPL Saturation, LNAPL Mobility, LNAPL Density, Air/Water Surface Tension, LNAPL/Water Interfacial Tension, and AIR/LNAPL Surface Tension. The Shelby tubes utilized were 3-inch diameter and 30 inches in length. Immediately after removal from the borehole, both ends of the tube were sealed with a layer of non-shrinking wax followed by placement of a plastic disk to protect the ends of the sample. The tubes were sealed and packaged following the defined analytical laboratory (Core Labs, Inc.) methods. The tubes were then placed in a cooler with dry ice to prevent further fluid loss and prepared for shipping. After receipt at the laboratory, the samples were prepared, and cores were photographed under UV light and analyzed. The sample location map, core UV light photographs, and laboratory testing report are included in **Appendix I**.

During January 2021, CPC began mapping the subsurface geology to aid in establishing the bounds of the measurable LNAPL, in consultation with NCDEQ. Optical Image Profiler OIP was used to produce a three-dimensional (3D) model of the subsurface using ultraviolet light and subsurface probes to detect hydrocarbons in soil. CPC proactively initiated this OIP process to define the limits of the LNAPL within the subsurface. A copy of the report by Columbia Technologies, Inc. describing the findings of the OIP work is provided as **Appendix J**.

The lowest Maximum Soil Contaminant Concentration Levels (MSCCs) prescribed by NCDEQ are the delineation endpoints for the site. Based on the findings of the soil delineation activities, soil delineation activities are complete. Soil cleanup means and methods will be detailed in the Corrective Action Plan for Incident No. 95827.

6.2 Groundwater Assessment Activities and Results

Between August 27, 2020 through October 20, 2021, 117 monitoring wells were installed within and along the presumed outer perimeter of the release area with the objective of completing the horizontal and vertical delineation of petroleum impacted groundwater originating from Incident No. 95827. Monitoring wells were installed utilizing hollow stem auger, air rotary, and sonic drilling methods. Shallow monitoring wells are typically constructed as Type II wells with the well screen bracketing the water table. Deep monitoring wells are constructed with isolation casings extending from ground surface and tremie grouted approximately 10 feet into the consolidated bedrock unit, and an open borehole without casing or screen extends through the isolation casing and into the bedrock unit to allow for geophysical borehole logging. Monitoring wells MW-90DD and MW-91DD are constructed with telescoping isolation casings. Deep monitoring wells are completed with 2" PVC screen and casing as soon as practical after completion of geophysical borehole logging.

Geophysical borehole logging was performed by Marshall Miller and Associates, Inc. The results of the geophysical borehole logging were utilized to identify the primary water bearing zones within the bedrock unit for isolation and sampling. The borehole geophysical information is provided as **Appendix K**. Boring logs are provided as **Appendix H**.

Well development was performed to evacuate potable water and sediment introduced during the well drilling and installation process. Monitoring well development was performed by lowering a decontaminated submersible pump into the screen interval of the well, surging the pump to bring sediment into suspension and pumping multiple well volumes until the purge water was generally free of sediment. Drill cuttings and well development fluids were contained for off-site disposal.

Each available monitoring well present and without measurable free product at the time of the groundwater monitoring event has been sampled on a monthly basis. Monitoring well sampling was performed in accordance with the United States Environmental Protection Agency (U.S. EPA) "Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells". Field water quality measurements were recorded for pH, temperature, conductivity, dissolved oxygen, and oxidation reduction potential using a calibrated water quality meter. Water quality parameters were recorded in accordance with NCDEQ guidelines.

Groundwater samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via chain-of-custody protocol, to Pace. Samples were analyzed for the presence of VOCs by EPA Method 6200, VPH by the MADEP Method, and lead by EPA method 6010D. Groundwater sampling logs are provided in **Appendix L**. Detections of analyzed constituents in monitoring wells are depicted on **Figure 8**. Isoconcentration maps for benzene, diisopropyl ether, methyl-tert butyl ether, naphthalene, toluene, total xylenes, C_5-C_8 Aliphatics, C_9-C_{12} Aliphatics, and C_9-C_{10} Aromatics are provided as **Figure 8A** through **Figure 16B**, respectively. Cross sections are provided as **Figure 17** through **Figure 20**. Analytical results are summarized in **Table 7A** and **7B** and copies of the laboratory reports are provided in **Appendix B**. Detections of lead, bromodichloromethane, chloroform, chloromethane, dibromochloromethane, 1,2-dichloroethane, hexachloro-1,3-butadiene, methylene chloride, styrene, 1,1,1,2-tertachloroethane, tetrachloroethene, trichloroethene, trichlorofluoromethane, and vinyl chloride are not attributed to Incident No. 95827. As shown on **Figure 8A** through **Figure 20**, the horizontal and vertical extent of petroleum impacts is delineated to 2L Groundwater Quality Standards, based on the groundwater sampling results for the above mentioned samples collected between September 16, 2021 and October 11, 2021.

Apex performed a pump test at MW-90D and MW-91D on June 28-29, 2021. These tests were performed to evaluate inter-well fracture flow and the relationship between fracture flow and flow in the saturated overburden. A secondary objective was to evaluate aquifer parameters related to the groundwater and light non-aqueous phase liquid (LNAPL).

The structural interpretation from the downhole geophysical logs and the elevations of the primary water bearing fractures indicates a sub-horizontal fracture between 655 and 658 feet (msl) in the area of the release, correlating to a depth of approximately 75 feet bgs in this area and approximately 50 feet below the top of bedrock and consisting of generally competent rock. The packer-assisted pump test of this zone at MW-90D resulted in a total removal of LNAPL. While the interconnectivity of the fractures was confirmed between MW-90D and -91D, aquifer parameters were not estimated due to the short test duration and simultaneous removal of both LNAPL and groundwater.

A narrative and expanded pump test report is presented in **Appendix M** accompanied by downhole geophysical summaries in **Appendix K**. Well Construction details are provided in **Table 8**.

Weekly WSW sampling was completed by Apex during the reporting period. WSW samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via standard chain-of-custody protocol, to Pace. Samples were analyzed for the presence of VOCs by EPA Method 6200, VPH by the MADEP Method, and lead by EPA method 6010D. WSW sampling results are depicted on **Figure 21** and summarized in **Table 9**. Copies of the laboratory reports are provided in **Appendix B**.

During emergency response actions in August 2020, the NCDEQ initiated sample collection from encapsulant, mixtures, and media in the immediate release area and submitted samples for PFAS analyses. CPC contractors, Environmental Planning Specialists, Inc. (EPS), also collected split samples for duplicate analysis. The PFAS compounds detected in selected samples were assumed to be the result of cross-contamination because CPC mobilized fluorine-free F-500 encapsulant to the site for vapor suppression. A subsequent split sampling event between NCDEQ and CPC was performed for groundwater through sampling of selected site recovery wells and monitoring wells. TRC performed an in-depth data validation and assessment of PFAS data available-for site media. The TRC assessment is provided as **Appendix N**. The TRC assessment of PFAS observations in groundwater was previously provided to NCDEQ and discussed in a call on October 27, 2021. The work contained in **Appendix N** was performed by others and not under the responsible charge of Apex or Apex personnel.

Weekly WSW samples continue to show no petroleum constituents exceeding the 2L Groundwater Quality Standards. In accordance with NCDEQ guidance, and based on current data, CPC will continue sampling residential WSWs within 1,500 feet of the release area.

6.3 Soil Vapor Assessment Activities and Results

This section describes the methods and results of the area-wide soil vapor sampling events and risk evaluations completed at the site. Soil vapor assessment activities have been completed at three focused areas with the following purposes:

- Soil vapor monitoring is performed at a residential structure located at 14130 Huntersville-Concord Road, Huntersville, Mecklenburg County, North Carolina. The residential structure was evaluated as a potential receptor because it is occupied and located within 100 feet of a gasoline free product plume associated with Incident Number 95827. The soil vapor points associated with this monitoring program are identified as SVP-01 through SVP-04.
- Soil vapor monitoring is performed to monitor subsurface vapor conditions in close proximity to the air sparge (AS) and soil vapor extraction (SVE) systems. The soil vapor points associated with this monitoring program are identified as SVP-05 through SVP-15. Soil vapor monitoring points SVP-05 through SVP-15 are further subdivided into exposure units based on location to assess risk at different areas of the soil vapor monitoring network.
- Soil vapor conditions were assessed in utility corridors to confirm that underground utilities and utility conduits and backfill material do not create a preferential pathway for vapor migration in the subsurface. The soil vapor points associated with this monitoring program are identified as SVP-16 through SVP-22. Each utility corridor soil vapor monitoring point is treated as a separate exposure unit.

Soil vapor sampling activities were completed by Apex and residential risk evaluation activities at SV-01 through SV-04 were completed by Skeo. Soil vapor monitoring point construction, sample collection, and sample analysis procedures meet the requirements of the NCDEQ Division of Waste Management Vapor Intrusion Guidance – Version 2 dated March 2018. Soil vapor samples are collected in Summa® canisters and submitted to a North Carolina-certified environmental laboratory for analysis of VOCs by EPA Method TO-15 and for Air Phase Petroleum Hydrocarbons (APH) following the MADEP methodology. Historic soil vapor sampling results are provided in **Table 10**. A map showing all soil vapor sampling locations and risk calculator results for SVP-16 through SVP-22 is provided as **Figure 22**. A map showing the exposure unit groupings and risk calculator results for SVP-01 through SVP-15 is provided as **Figure 23**.

The residential soil vapor sampling program at soil vapor monitoring points SVP-01 through SVP-04 commenced on December 15, 2020. Baseline soil vapor conditions were established at SVP-05 through SVP-15 by performing initial monthly soil gas sampling events prior to AS/SVE system start-up. Utility corridor soil vapor assessment activities were performed at SVP-16 through SVP-21 on September 22, 2021 and at SVP-22 on October 15, 2021.

The primary compounds associated with the gasoline release are gasoline constituents (i.e., benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, toluene, xylene, naphthalene, C5-C8 aliphatics, C9-C12 aliphatics, and C9-C10 aromatics) as well as gasoline oxygenates, such as diisopropyl ether and methyl-tert butyl ether.

It is not unusual for soil vapor sampling to detect compounds that are in household cleaning products and other compounds that are present in the surrounding outdoor air. These compounds, specifically chlorinated organic compounds and acrolein, were observed in some soil vapor samples collected near the residence and are discussed further below.

Chlorinated Compounds

Background or household indoor air contamination often occurs from the use of cleaning products. Many cleaning products contain a number of chlorinated chemicals. For example, typical sources of volatile chlorinated compounds are from the use of carpet spot cleaners and dry-cleaned clothing (tetrachloroethylene), drain cleaners (1,1,1-trichloroethane), and chlorinated drinking water (chloroform, bromodichloromethane, bromoform and dibromochloromethane) (DWM, 2018; USEPA, 2016; USEPA, 2021). Additionally, tetrachloroethene has been detected in MW-11 and nearby monitoring wells on the adjoining property to the west, in the vicinity of two former outbuilding locations. The presence of these chlorinated compounds are not attributed to the Line 1 gasoline release and were not present at concentrations of concern with respect to vapor intrusion.

Acrolein

Acrolein is ubiquitous in the environment and is generated by both natural and anthropogenic processes. Acrolein may also be formed when fats are heated and is found in fried foods, cooking oils, and roasted coffee; it is also formed during the combustion of organic matter such as tobacco and exhaust from engines powered by gasoline or

diesel (ATSDR, 2007).

- Acrolein is present as a combustion product in auto exhaust and, thus, commonly present in outdoor air (ATSDR, 2006).
- Acrolein was detected in an ambient outdoor air sample collected on September 29, 2021 at the release site at the property located at 14108 Huntersville-Concord Road (**Tables 10-11**) at slightly higher concentrations (i.e., estimated value of 3.8 µg/m^3), than observed in multiple soil vapor samples, thereby suggesting outdoor air could be the source of the acrolein detected in the soil vapor samples.
- There is not a consistent pattern of acrolein observations, and such acrolein observations are qualified by the laboratory as estimated concentrations with similar concentrations and not associated with elevated detections of gasoline constituents (i.e., aliphatic hydrocarbons) (**Table 11**).
- Most labs cannot reliably report acrolein at acceptable health-based screening levels in soil gas or ambient air (USEPA, 2012).

Chlorinated compounds and acrolein are likely not directly associated with impacted groundwater from the Line 1 gasoline release and are also evaluated to differentiate potential background contributions to ambient air and soil vapor sampling results (See **Appendix O**, **Table 1**).

6.3.1 Risk Estimates

The maximum soil gas concentrations for petroleum hydrocarbons associated with the gasoline release in each of the three exposure units were entered into the January 2021 NCDEQ Risk Calculator. The Risk Calculator converts the soil gas to an estimated indoor air concentration by multiplying the soil gas concentrations by an attenuation factor of 0.03 for the residential calculation. This is a conservative estimate since this default attenuation factor of 0.03 does not consider any site-specific factors that would further reduce the anticipated indoor air concentration such as the distance to actual receptors, and the soil type and soil thickness between the sampling point screen the structure foundation. The calculator also does not account for the presence of a moisture barrier that would further minimize the indoor air concentration.

The Risk Calculator estimates lifetime incremental cancer risk (LICR) for individual carcinogens and noncancer Hazard Quotients (HQ) for individual non-carcinogens. The Risk Calculator calculates the cumulative carcinogenic and non-carcinogenic risks associated with multiple constituents in soil vapor using the "RESIDENT Soil Vapor to Indoor Air" exposure risk module. The cumulative target cancer risk (TCR) upper limit (i.e., the acceptable risk level) established by NCDEQ is 1E-04, and the cumulative non-cancer risk limit (i.e., the HQ) established by NCDEQ is 1.0.

Since inhalation is the only potentially complete exposure pathway, the LICRs via the inhalation exposure pathway were assumed to equal the TCRs in this evaluation. The pathway is considered potentially complete as the indoor air was not sampled but was indirectly estimated through the application of a conservative default attenuation factor.

The low-level observations of chlorinated compounds in the soil vapor samples do not result in an estimated risk or hazard over acceptable thresholds. For acrolein, the observed concentrations in soil vapor samples are roughly the same as outdoor air, and therefore do not pose an excess incremental risk or hazard over background conditions. The detailed risk results for all detected chemicals in soil vapor for each sampling event are summarized in **Appendix O**. **Appendix O**, **Table 1** differentiates the risk by the presumed source and includes the cumulative risk posed by presumed background contributions, including acrolein. The results of the risk calculator outputs for compounds associated with the gasoline release are depicted on **Figures 22 - 23**.

6.3.2 Additional Information on Acrolein Observations

The AS system was shut down on September 10, 2021 to evaluate potential causes of acrolein detections observed in one of the fifteen soil vapor samples collected on August 25, 2021 (laboratory results received September 9, 2021) as discussed below. During the August 25, 2021 sampling event, one of the 15 primary soil vapor samples collected (SVP-04) contained an estimated acrolein concentration of 3.2 µg/m^3. All other samples (including the duplicate sample of SVP-04, were below detection for this constituent) (See **Tables 10 - 11**). Weekly sampling also detected acrolein in at least one of 15 samples collected on August 25, September 1, September 10, September 15,

September 22, and September 29, 2021 at estimated concentrations ranging from 2.3 to 6.4 µg/m^3. Receipt of final analytical report packages from Pace is pending for soil vapor samples collected at SVP-01 through SVP-15 on October 5, and October 15. There is no pattern on the sample location where estimated acrolein concentrations are being detected and the concentrations were all similar ranging from 2.3J µg/m^3 to 6.4J µg/m^3. In total, there have been 30 acrolein detections out of 177 sample results with estimated concentrations ranging from 2.3J µg/m^3 to 6.4J µg/m^3. A review of the data shows that there is no pattern on where acrolein is detected and it does not trend with the gasoline constituents as represented by the C5-C8 aliphatics or C9-C12 aliphatics (**Table 11**).

According to a 2009 EPA factsheet, average acrolein detections in ambient air range from non-detect to 2.05 µg/m^3 (EPA, 2009). Acrolein may also be formed when fats are heated and is found in fried foods, cooking oils, and roasted coffee; it is also formed during the combustion of organic matter such as tobacco and fuels like gasoline and oil. Additional investigation of possible sources for acrolein detections is underway.

Apex began utilizing individually certified summa cans and flow controllers during the August 22, 2021 sampling event to eliminate any uncertainty associated with use of batch certified sampling equipment provided by the laboratory. For acrolein, the observed concentrations in soil vapor samples are roughly the same as outdoor air, and therefore do not pose an excess incremental risk or hazard over background conditions.

Another complicating factor is that acrolein is an organic compound with double bonds and therefore is one of the most difficult chemicals to measure in air, because it is highly reactive. This means it can react easily with other chemicals to form other compounds that complicate laboratory analysis. According to Dann and Wang (2007) and Shelow et al. (2009), acrolein is highly reactive compound and concentrations of acrolein can increase inside Summa® canisters during the laboratory holding time between sample collection and sample analysis. Acrolein does not typically occur in soil gas and acrolein detections may be attributed to artifacts of the sampling and analytical process.

The results of an EPA 2009 short-term laboratory study raised significant questions about the consistency and reliability of acrolein monitoring results (USEPA, 2012). Based on the results of both the short-term laboratory tests and the past information on variability in acrolein analysis among labs, EPA concluded that additional work was needed to improve the accuracy of acrolein sample collection and acrolein analysis in 2010. The laboratory data consistently shows that the reporting limit for acrolein in soil vapor collected during all ten events is less than < 9.2 µg/m^3, and thus, any detected value is flagged by the lab with a "J" to indicate the value is estimated because it was detected below the laboratory reporting limit. A reporting limit of 0.69 µg/m^3 would be required to provide the necessary accuracy for measurement of the acrolein concentrations without having the uncertainties associated with estimating the concentrations as J-flagged values. Analysis of volatile compounds by EPA Method TO-15 utilizing the selective ion monitoring (SIM) methodology is capable of providing lower reporting limits; however, this method should be avoided for acrolein analysis as acrolein formation can occur as a product of non-methane hydrocarbon secondary ions (EPA, 2009). Additional efforts are underway to reduce analytical processing times, and reporting limits to reduce the uncertainties associated with acrolein analysis in air and soil vapor samples.

6.3.3 Results Summary

The detected compounds at SVP-01 through SVP-04 attributed to the Line 1 gasoline release were evaluated using the NCDEQ Risk Calculator, which conservatively calculates the soil vapor risks using default assumptions of soil vapor transport. The residential soil vapor data show that the estimated incremental cancer risk is below the acceptable level established by NCDEQ of 1E-04 and the estimated total hazard is less than the NCDEQ threshold of 1.0, with the exception of five low level temporal exceedances. Based on this analysis, there are no unacceptable risks identified with compounds associated with the Line 1 gasoline release. For acrolein, the observed concentrations in soil vapor samples are roughly the same as outdoor air, and therefore do not pose an excess incremental risk or hazard over background conditions. CPC continues to investigate the source of acrolein that was detected during the sampling events. Ongoing soil vapor sampling at SVP-01 through SVP-15 is planned on a monthly basis.

6.4 Surface Water Assessment Activities and Results

The release site is located within the Yadkin Pee-Dee River Basin. North Prong Clarke Creek is located approximately 1,800 feet north of the release site and South Prong Clarke Creek is located approximately 2,700 feet south of the release site. Both streams are classified as Class C water bodies by the NCDEQ Division of Water Resources. Two groundwater seeps and an ephemeral stream are located approximately 1,200 feet southeast of the release site. The ephemeral stream flows to South Prong Clarke Creek.

Surface water sampling was conducted by Environmental Planning Specialists, Inc. (EPS) at seven locations (SW-1 through SW-7). Surface water samples were also collected from the two groundwater seep locations (SW-Seep and SW-Seep 2) and the receiving ephemeral stream (SW-Confluence, SW-Confluence 2, and SW-G) on a bi-weekly basis and subsequent to qualifying rain events. Surface water samples were collected in laboratory supplied bottle ware, placed on ice, and transported, via chain-of-custody protocol, to a North Carolina certified laboratory. Samples were analyzed for the presence of benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260D and total petroleum hydrocarbons gasoline range organics by EPA Method 8015C. Surface water samples collected to date have not exceeded North Carolina Title 15A NCAC 02B regulations (2B Surface Water Quality Standards). A surface water sample locations map, surface water sampling results, and general surface water parameter measurements are provided in **Appendix P**.

7.0 INTERIM CORRECTIVE ACTION MEASURES

7.1 Air Sparge and Soil Vapor Extraction System

The objective of AS and SVE system is to decrease the migration of dissolved phase hydrocarbons south of the release site and recovery well network. A total of 22 air sparge wells and 18 soil vapor extraction wells have been installed (**Figure 23**). Vapor recovered from soil vapor extraction wells is routed through a temporary thermal oxidation unit.

The AS and SVE system start-up was initiated on August 23, 2021. The air sparge system was shut down on September 10, 2021 to evaluate soil vapor conditions proximate to the system as described above in Section 6.3. The SVE system continues to operate.

7.2 Free Product Recovery Activities

As of October 23, 2021, a total of 89 vacuum enhanced recovery wells and 56 hydraulic control wells have been installed within the release site (**Figure 24**). Pneumatic recovery pumps are operated in a sub-set of the recovery wells and select hydraulic control wells; vacuum is applied to the wells to enhance recovery. Recovery is limited to skimming LNAPL and PCW from the surface of the water table at present. An individual National Discharge Elimination System (NPDES) Permit application is pending review and approval by NCDEQ. As of October 20, 2021, approximately 1,222,803 gallons of gasoline free product has been recovered from the recovery well network. Total product recovery during the soil excavation activities (2,273 gallons), the emergency response activities (90,930 gallons), soil vapor recovery (5,834 gallons), and from the recovery well network (1,222,803 gallons) is approximately 1,321,840 gallons.

A summary of system one and system two vapor recovery operations information is provided in **Table 12** and **Table 13**, respectively. A summary of wells equipped with recovery pumps and vacuum enhancement is provided in **Table 14**.

Recovered free product has been transported for reprocessing to Midwest Gas Company located in Columbus, Ohio and the CPC Facility located in Greensboro, North Carolina.

8.0 COMMUNITY MONITORING ACTIVITIES

8.1 Air Monitoring

CTEH, LLC (CTEH) conducted air monitoring and sampling in response to the release. CTEH has conducted two multi-day monitoring and sampling efforts: the first occurred immediately following the release, beginning August 15, and concluding August 28, 2020; the second occurred earlier this year, beginning February 1 and concluding February 5, 2021. A report summarizing the results from those two sampling efforts is included as **Appendix Q**.

As described in the CTEH report, air monitoring included an evaluation of VOCs, benzene, toluene, ethylbenzene, xylene, and atmospheric flammability as % lower explosive limit (LEL). Air monitoring occurred in nearby communities. Samples were also collected in the nearby communities and along Huntersville-Concord Road.

Monitoring results from the August 2020 effort showed detections on the evenings of August 16 and 17 primarily along Huntersville-Concord Road and south of the release site. Samples collected in the August 2020 effort were compared to ATSDR's health-protective screening values and no exceedances were identified.

Monitoring results from the February 2021 effort showed no detections of VOCs, benzene, hexane, %LEL, toluene, or xylenes. All analytical samples showed BTEX compounds were well below the ATSDR's health-protective screening levels.

Based on these two monitoring and sampling efforts, CTEH concluded that the potential airborne concentrations of gasoline constituents and CPC's ongoing remediation efforts did not pose a health risk to the public.

Apex performs measurements of benzene concentrations adjacent to frac tanks and in locations on the periphery of site activities. A summary of these measurements are included in **Appendix R**.

AreaRaes are maintained on the site to provide advance detection of potential vapor related and atmospheric safety hazards throughout the site. Specifically, AreaRaes are used for:

- Worker exposure monitoring in accordance with Occupational Safety and Health Administration (OSHA) action levels, short-term exposure levels and permissible exposure levels, and
- Perimeter monitoring near occupied residential areas for comparison with OSHA exposure levels. Area Rae Air monitoring data has been transmitted to Mecklenburg County Air Quality on a periodic basis as requested.

8.2 Noise Monitoring

Apex conducts daily noise monitoring at the site with a Casella CES-63X sound level meter. Readings are collected multiple times during each workday and are compared against Section 3(b) of Mecklenburg County's Noise Ordinance. The monitoring occurs at multiple locations adjacent to site property boundaries.

Since the initiation of noise monitoring, the average noise reading through October 20, 2021 measures 54.1 decibels (db(A)). If measurements exceed 60 db(A), site activities are reviewed to determine if modifications to site activities are necessary.

A summary of this noise monitoring data is also provided in **Appendix R**.

9.0 CONCLUSIONS

A total of 302 wells (117 monitoring wells, 89 recovery wells, 56 hydraulic control wells, and 40 air sparge system wells) were installed at the Site between August 27, 2020 and October 20, 2021. The extent of the free product plume has also been delineated by the monitoring and recovery well network (**Figure 6**). **Figures 8A** through **Figure 20**, depict the horizontal and vertical extent of dissolved phase petroleum impacts, based on the results of groundwater samples collected in 2021. The horizontal and vertical extent of free product and dissolved phase

petroleum impacts to groundwater have been delineated based on the September 16 – October 11, 2021 groundwater sampling results. Detections of lead, bromodichloromethane, chloroform, chloromethane, dibromochloromethane, 1,2-dichloroethane, hexachloro-1,3-butadiene, methylene chloride, styrene, 1,1,1,2-tertachloroethane, tetrachloroethene, trichloroethene, trichlorofluoromethane, vinyl chloride, and acrolein are not attributed to the release associated with Incident No. 95827.

The horizontal and extent of petroleum impacted soil has been delineated (**Figure 3**). Petroleum impacts and concentrations in soil are heterogeneous and anisotropic. Soil impacts typically extend downward vertically to the saturated interval.

Weekly WSW and bi-weekly surface water sampling events continue to show no petroleum constituents exceeding the respective 2L Groundwater and 2B Surface Water Quality Standards.

Soil vapor sampling indicates that petroleum hydrocarbons associated with a subsurface gasoline release (e.g., benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, toluene, xylene, naphthalene, C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, diisopropyl ether, and methyl-tert butyl ether) are not present at concentrations that present unacceptable risk levels established by NCDEQ.

The recommended action for the Site is the preparation of a CAP to address residual petroleum impacts to soil and groundwater associated with Incident No. 95827. Additional recommendations are as follows:

- Free product recovery activities will continue.
- Because there have been no petroleum constituents exceeding the 2L Groundwater Quality Standards to date for the WSW sampling efforts, CPC requests that the sampling frequency be reduced from weekly to monthly. If monthly sampling detects petroleum constituents, the sampling frequency will increase to weekly.
- Additionally, as there have been no petroleum constituents exceeding 2B Surface Water Quality Standards, CPC requests that the scheduled surface water sampling frequency be reduced from bi-weekly to quarterly. CPC will continue to perform surface water sampling subsequent to qualifying rain events (greater than 1-inch of rainfall within a 24-hour period).
- Ongoing soil vapor sampling at SVP-01 through SVP-15 is planned on a monthly basis.
- As per NCDEQ's Notice dated September 25, 2020, groundwater monitoring reports will be submitted to the NCDEQ Mooresville Regional Office on the 30th of each month until that schedule is revised.
- A CAP will be submitted to the NCDEQ within the agreed upon schedule following approval of this CSA.

Copies of Public Notice Letters are provided as **Appendix S**.

10.0 REFERENCES

Dann, T., and D. Wang (2007). Canada's Experience with Acrolein Measurements Using Canisters – Preliminary Results. Presented at NESCAUM Monitoring and Assessment Committee Meeting, Troy, NH. April 24-25, 2007.

Winner, M.D. and R.W. Coble (1996). Hydrogeologic Framework of the North Carolina Coastal Plain.

Goldsmith, R., Milton, D. J., & Horton Jr., J. W. (1988). Geologic Map of the Charlotte Quadrangle, North Carolina and South Carolina. USGS.

Harned, D. A., & Daniel, III, C. C. (1989). The transition zone between bedrock and regolith: Conduit for contamination? Proceedings of a Conference on Ground Water in the Piedmont of the Eastern United States.

Legrand, H. E. (2004). A Master Conceptual Model for Hydrogeological Site Characterization in the Piedmont and Mountain Region of North Carolina. NCDENR.

Legrand, H. E., & Mundorff, M. J. (1952). Geology and Ground Water in Charlotte Area, North Carolina. USGS.

NCDNR. (1985). Geologic Map of North Carolina. North Carolina Department of Natural Resources and Community Development.

NRCS. (2020). Custom Soil Resource Report for Mecklenburg County, North Carolina. USDA.

Schaeffer, M. F. (2018). Carolina Piedmont Groundwater System—Existence of the Transition Zone Between Regolith and Bedrock. IAEG/AEG Annual Meeting Proceedings, San Francisco, California.

Shelow, D., J.Rice, M. Jones, L. Camalier, and J. Swift. Acrolein Measurements. Presentation at 2009 National Ambient Air Monitoring Conference, Nashville, TN. 2009.

USEPA, 2009 Acrolein Factsheet 107-08-8, April 1992/updated September 2009: https://www.epa.gov/sites/default/files/2016-08/documents/acrolein.pdf

Wilson, F. A. (1983). Geophysical and Geologic Studies in Southern Mecklenburg County and Vicinity, Open File Report 83-93. USGS.

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

EXHIBIT
14

October 19, 2021

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
Attn: John Wyatt
4295 Cromwell Road, #311
Chattanooga, Tennessee 37421

Re: Notice of Continuing Violation
N.C. Gen. Stat. § 143-214.1
15A NCAC 02L .0202

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: **95827**
Risk Classification: High

Dear Mr. Wyatt:

On September 25, 2020, the Underground Storage Tank Section (UST Section), Division of Waste Management (DWM), of the Department of Environmental Quality (the Department) sent you a Notice of Violation (NOV) for the discharge of petroleum at the above referenced location. Information provided by Colonial Pipeline to the Department showed petroleum concentrations above the groundwater quality standards established pursuant to N.C. Gen. Stat.§ 143-241.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202.

REQUIRED CORRECTIVE ACTIONS:

Colonial Pipeline must restore groundwater quality to the level of the aforementioned standards, or as closely thereto as is economically and technologically feasible for protection of human health and the environment pursuant to 15A NCAC 02L .0106.

The September 25, 2020 NOV outlined the steps that Colonial Pipeline must take to restore the groundwater quality to the level of the aforementioned standards, to sample and protect water supply wells and surface water, and to determine the horizontal and vertical extent of petroleum contamination through the plume. The UST Section received a Comprehensive Site Assessment (CSA) from you on January 20, 2021. Upon review, the UST Section determined the CSA to be deficient in several areas. On February 24, 2021, the UST Section sent a Notice of Continuing Violation (NOCV) to you. The NOCV outlined the CSA's deficiencies and directed you to submit a revised CSA correcting those deficiencies by April 26, 2021. Colonial Pipeline submitted a portion of the information required by the NOCV on April 26, 2021 and requested an extension for items 6, 14, and 18 until August 31, 2021. On

May 5, 2021, the UST Section sent a NOCV to you outlining the continuing CSA deficiencies and directed you to submit a revised CSA by June 25, 2021. On May 7, 2021, again Colonial Pipeline requested an extension until August 31, 2021. Colonial Pipeline submitted a portion of the information required by the May 5, 2021 NOCV on June 25, 2021 and August 31, 2021 and requested an extension for submittal of the vertical extent of groundwater contamination throughout the plume of contamination. However, Colonial Pipeline did not request an extension for submittal of detailed information regarding predictive calculations for the estimation of product volume released.

Colonial asserted in the May 28, 2021 submittal to DEQ and in subsequent conversations that additional data collection would be needed under non-pumping conditions which would require shutting the product recovery system down. Colonial contended that this approach would delay free product removal if it was utilized and that Colonial's effort to provide NC DEQ with a revised volume estimate would be ongoing. Colonial has informed DEQ that free product recovery volumes now exceed Colonial's estimate of 1.2 million gallons. As required by, among other things, 15A NCAC 2L .0106, please immediately submit updated detailed information regarding predictive calculations for the estimation of the extent of product volume released based on information currently available to Colonial Pipeline. Please also provide to DEQ all currently available information relevant to your product volume estimation. As previously communicated to you by DEQ, the volume of the petroleum release is vital to understanding the magnitude of contaminant impact, improving the accuracy of projected remediation timeframes, and tracking changes in contaminant mass and/or mass discharge over time while also providing important metrics for assessing remediation progress. Finally, please immediately provide the vertical extent of groundwater contamination throughout the plume of contamination as specified in the NOCV dated May 5, 2021 and as required by 15A NCAC 2L .0106.

Colonial Pipeline remains in violation of requirements contained in the September 25, 2020 NOV, the February 24, 2021 NOCV, the April 26, 2021 NOCV, and the May 5, 2021 NOCV. Penalties may be assessed for the violations described within this Notice of Violation. Your prompt attention to the items described herein is required. Failure to comply with the State's rules, in the manner and time specified, may result in the assessment of civil penalties and/or the use of other enforcement mechanisms available to the State. Each day that a violation continues may be considered a separate violation.

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contactme at 919-707-8200.

Sincerely,

Michael E. Scott
Director
Division of Waste Management, NCDEQ

cc: Jeff Morrison, Colonial Pipeline
John Wyatt, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Michael Scott, NCDEQ
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Wayne Randolph, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ

Dan Bowser, NCDEQ
Blair Murray, NCDEQ
Bobby Williams, Town of Huntersville
Shawna Caldwell, LUESA- Mecklenburg County Health Department

North Carolina Department of Environmental Quality | Division of Waste Management
217 West Jones Street | 1646 Mail Service Center | Raleigh, North Carolina 27699-1646
919.707.8200

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

EXHIBIT
15

October 19, 2021

Colonial Pipeline Company
4295 Cromwell Road, #311
Chattanooga, Tennessee 37421
Attn. John Wyatt

Re: Notice of Regulatory Requirements
N.C.G.S. § 143-214.1
15A NCAC 02L .0106 & .0111
15A NCAC 02L .0202

Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC
Incident: **95827**
Risk Classification: High

Mr. Wyatt:

On September 25, 2020, the Underground Storage Tank Section (UST Section), Division of Waste Management (DWM), of the Department of Environmental Quality (the Department) sent you a Notice of Violation (NOV) for the discharge of petroleum at the above-referenced location that caused the exceedance of the groundwater quality standards established pursuant to North Carolina General Statutes § 143-214.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202.

The Department needs updated information on the risks associated with your release which must be performed by a North Carolina Licensed Geologist or Professional Engineer. The Department will use this information to perform risk evaluations and evaluate progress of the assessment and remediation of the release.

Per 15A NCAC 02L .0106 and .0111, please include the following information in groundwater monitoring reports, in accordance with the UST Section Guidelines for Assessment and Remediation, that are required to be submitted to the UST Section in the Mooresville Regional Office by the last day of each month:

1. Detailed information regarding predictive calculations for the estimation of contaminant mass in the soil expressed in gallons of free product.
2. A mass calculation summary table to include untreated captured soil, vapors, petroleum contact water (PCW), recovered light non-aqueous phase liquid (LNAPL), and excavated soil. Those specific calculations must be provided in an appendix. An evaluation of the mass calculations included in the text with supporting figures to show treads and relationships to groundwater elevations, LNAPL thickness and elevations, and other parameters. The mass calculations should also be provided as equivalent gallons of gasoline.
3. Any air sampling analytical results collected from the vapors routed via DR11 HDPE piping to the dual fuel burner oxidation unit. If this sampling is not being conducted, begin sampling monthly to calculate amount

of mass being recovered and disposed of via thermal destruction. Report all data in a table format as described above.

4. There is a discrepancy between gauging and volume of free product reported by the disposal facilities. Please resolve the discrepancy and provide a method to determine the amount of free product in gallons and PCW in gallons leaving the site.
5. Please obtain PCW samples analyzed using EPA Method 6200B on at least a weekly basis and at least one sample analyzed by Method 537.1 modified (expanded list) for Perfluorinated Chemicals (PFAS) including Perfluorooctane sulfonate (PFOS) and Perfluorooctanesulfonic Acid (PFOA) constituents.
6. Include the following information in a PWC summary table:
    a. Dates that PCW has been removed from the site.
    b. The truck ID that can be referenced to a manifest and include all manifests that have not already been submitted.
    c. Volume of PCW reported in gallons.
    d. Also include analytical (including PFAS/PFOS/PFOA sampling) and disposal manifest relating to the table mentioned above as an appendix.
    e. Detailed explanation of the calculation process with the information listed above reporting the percentage of free product per load.
    f. Representative analytical information for each load and receiving disposal facility.
7. A table listing residential addresses connected to Charlotte Water by Colonial Pipeline identified in a table and on figures.
8. A listing of properties acquired and water connection information with the supply well identified in a table and on figures.
9. A summary table of all systems operations including enhanced SVE, product recovery, and hydraulic control including but not limited to flow, vacuum, vapor concentrations per the UST Section Corrective Action GuidelineReportingTables(https://deq.nc.gov/about/divisions/waste-management/ust/guidance-documents).
10. A summary table and figures of daily fluid recovery rates and cumulative totals and a trend evaluation.
11. Outline the area of all excavated soil in the appropriate figure.
12. Measure fluid level rebound immediately following systems shut down and provide the results in an appendix with appropriate tables and figures.

The information stated above to be included in the monthly monitoring reports, in response to this Notice of Regulatory Requirements, is in addition to the required information stated in previous correspondence. Failure to comply with the State's rules in the manner and time specified may result in the assessment of civil penalties and/or the use of other enforcement mechanisms.

If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact me at 919-707-8200

Sincerely,

Michael E. Scott
Director
NC Division of Waste Management, NCDEQ

cc: Jeff Morrison, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Vance Jackson, NCDEQ
Scott Bullock, NCDEQ
Ron Taraban, NCDEQ
Laura Leonard, NCDEQ
Wayne Randolph, NCDEQ
Bobby Williams, Town of Huntersville
Shawna Caldwell, LUESA- Mecklenburg County Health Department

Colonial Pipeline Company

EXHIBIT
16

Sam McEwen
Director, Environmental

October 28, 2021

Via Email Delivery

Michael E. Scott
Director
NC Division of Waste Management, NCDEQ
217 West Jones Street
Raleigh, NC 27603

Re: October 19, 2021 Notice of Continuing Violation

Dear Director Scott:

Colonial Pipeline Company ("Colonial") received the October 19, 2021 Notice of Continuing Violation ("NOCV") letter, seeking: (1) "updated detailed information regarding predictive calculations for the estimation of the extent of product volume released" at the Huntersville site; (2) "all currently available information relevant to" the estimate of volume released; and (3) information related to the "vertical extent" of groundwater contamination throughout the plume of contamination. Colonial anticipates including item (3) in its revised Comprehensive Site Assessment Report (CSA), which Colonial plans to provide to NCDEQ by October 30, 2021.

With respect to item (1), Colonial currently estimates that the release exceeded 1.2 million gallons of product. Using API's LDRM methodology, Colonial provided to NCDEQ the estimate of 1.2 million gallons released. See Comprehensive Site Assessment Report dated January 20, 2021. Colonial notified NCDEQ that this estimate would likely need to be adjusted upward. See letter to Michael Scott dated May 28, 2021. Records provided to NCDEQ on Colonial's ongoing remediation efforts (i.e., the monthly monitoring reports) confirm that the release exceeded 1.2 million gallons. See Monthly Monitoring Report submitted July 30, 2021. As Colonial has previously discussed with NCDEQ staff, it is technically infeasible to provide a reliable calculated estimate of the total release volume without stopping or substantially modifying Colonial's ongoing remediation efforts at the site for a substantial period of time to collect additional data. Colonial respectfully suggests that requiring Colonial to immediately stop or substantially modify remediation activities would run afoul of NCDEQ's overarching mission and the purpose of the 2L Rules —*"Providing science-based environmental stewardship for the health and prosperity of ALL North Carolinians"* – as ceasing or modifying current activities could result in the further expansion and migration of contamination. This would also increase the risk of receptor exposure and prolong cleanup efforts.

Other methods of calculating a revised volume estimate, which have broad margins of error associated with them, are unlikely to produce reliable results. Colonial believes that developing unreliable estimates would be counterproductive, and could misinform others. By contrast, as NCDEQ knows, Colonial's

remediation efforts have been, and continue to be, highly productive currently removing more than a thousand gallons of free product per day.

Additionally, contrary to NCDEQ's statements in the NOCV, an estimate of volume of product released is not needed for successful remediation at the site. Such remediation activities are guided by constituent concentrations and the horizontal and vertical extent of the contamination as delineated through groundwater and soil sampling — information that Colonial continues to gather and continues to provide to NCDEQ. *See, e.g.*, 15 NCAC 2L .0106(g). As a result, the risks created by stopping remediation activities to conduct additional rounds of data collection for yet another volume estimate greatly outweigh any minimal benefit that a revised volume estimate would provide, particularly when such an estimate would be inherently variable, and therefore potentially unreliable. As EPA has explained, "[e]ven where substantial data are available and several estimation methods used, volume estimates with an uncertainty of minus 50 percent to plus 100 percent are the best that can be expected." EPA, How To Effectively Recover Free Product at Leaking Underground Storage Tank Sites at IV-17 (1996). Colonial strongly prefers to continue its ongoing remediation efforts to ensure cleanup proceeds as quickly as possible to continue to protect human health and the environment for all North Carolinians.

If NCDEQ were to issue an order requiring Colonial to stop or substantially modify its ongoing remediation efforts to obtain the data required for refinement of Colonial's current estimate of over 1.2 million gallons, Colonial believes it would take at least four to six months to complete this task. Given the complex geologic and hydrogeologic conditions at the site, at least 3 months would be needed for the site to stabilize following shutdown of the recovery network and collection of sufficient data; additional time would be needed for validation and analysis. Even then, the resulting estimate would not be precise and would have a significant margin of error. Again, Colonial believes that such a lengthy delay of remediation and removal of free product would not be most protective of public health and the environment. Instead, and in order to provide full transparency, Colonial will continue to report the actual volume of product recovered.

With respect to item (2), Colonial believes it has provided NCDEQ with all of the data it has collected and verified concerning the volume of the release and the ongoing recovery. Although the request for "all currently available information relevant to [the] product volume estimation" is vague, Colonial believes it has already satisfied this request through its prior (and continuing) delivery of data to NCDEQ. Colonial will continue to update NCDEQ with available information through its monthly reports and the forthcoming update to the CSA. If NCDEQ still believes it is missing specific records or data, please let me know.

Although the NOCV did not contain a date certain for Colonial to provide the requested information, we understand NCDEQ is interested in resolving these issues as soon as possible. To that end, Colonial requests the opportunity to discuss these issues with you and your staff at your earliest convenience to

see if an agreement on a path forward can be reached. Colonial believes such a meeting would be more productive than a further exchange of letters.[1]

Please feel free to contact me directly at 678-772-8090, or SMcEwen@colpipe.com.

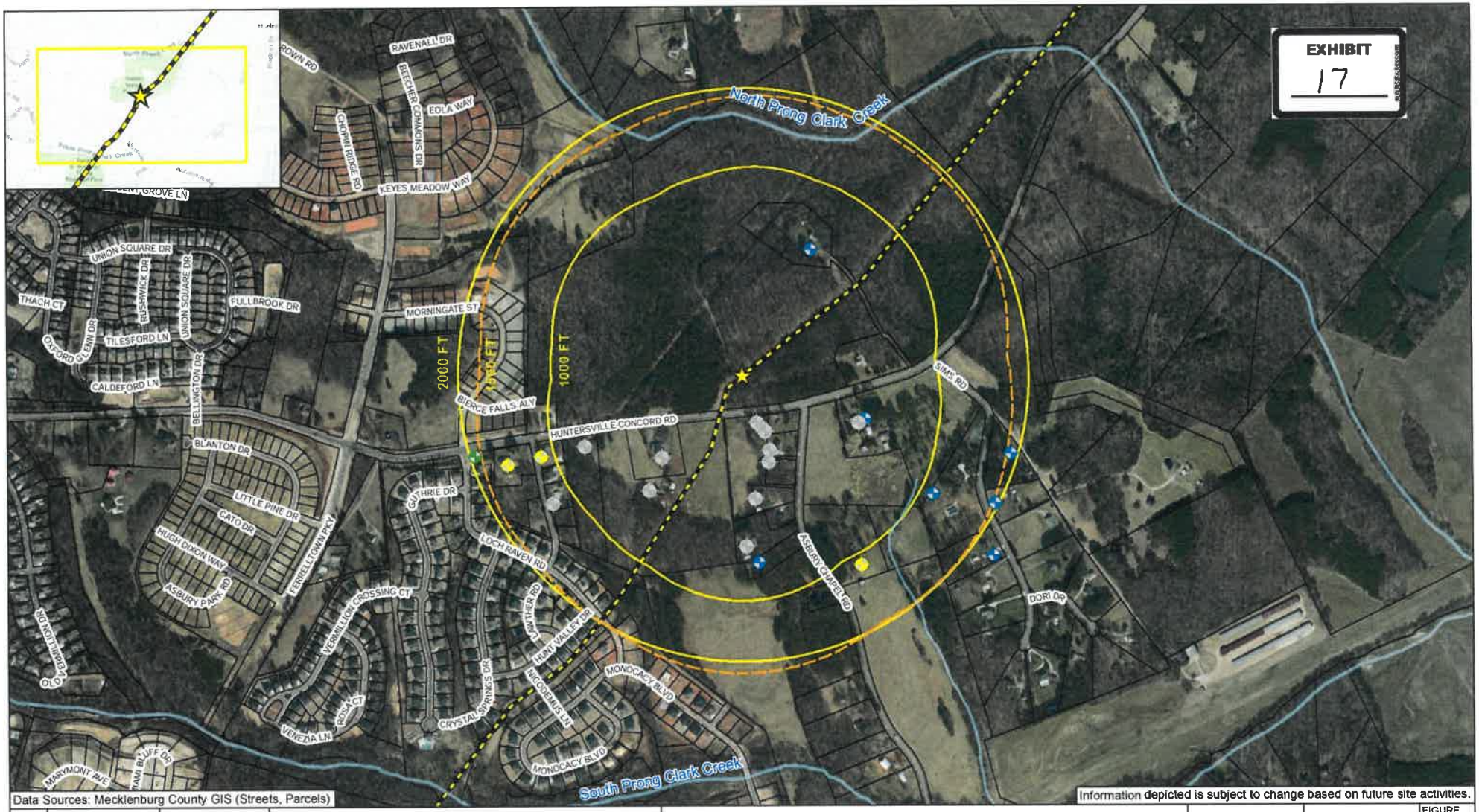
I look forward to hearing from you soon.

Sincerely,

Sam McEwen

[1] Colonial disputes and reserves all rights with respect to NCDEQ's claims that Colonial has been and continues to be in violation of requirements contained in the Notice of Violations dated October 19, 2021; May 5, 2021; February 24, 2021; and September 25, 2020.

EXHIBIT
17



Data Sources: Mecklenburg County GIS (Streets, Parcels)

Information depicted is subject to change based on future site activities.

Checked By:	AS
Created By:	CW
Scale:	1 " = 625 FT
Date/Time:	10/30/2021; 14:22
Project No.:	CPC20126

Potential Receptor Map
Colonial Pipeline Company
2020-L1-SR2448
Huntersville, North Carolina

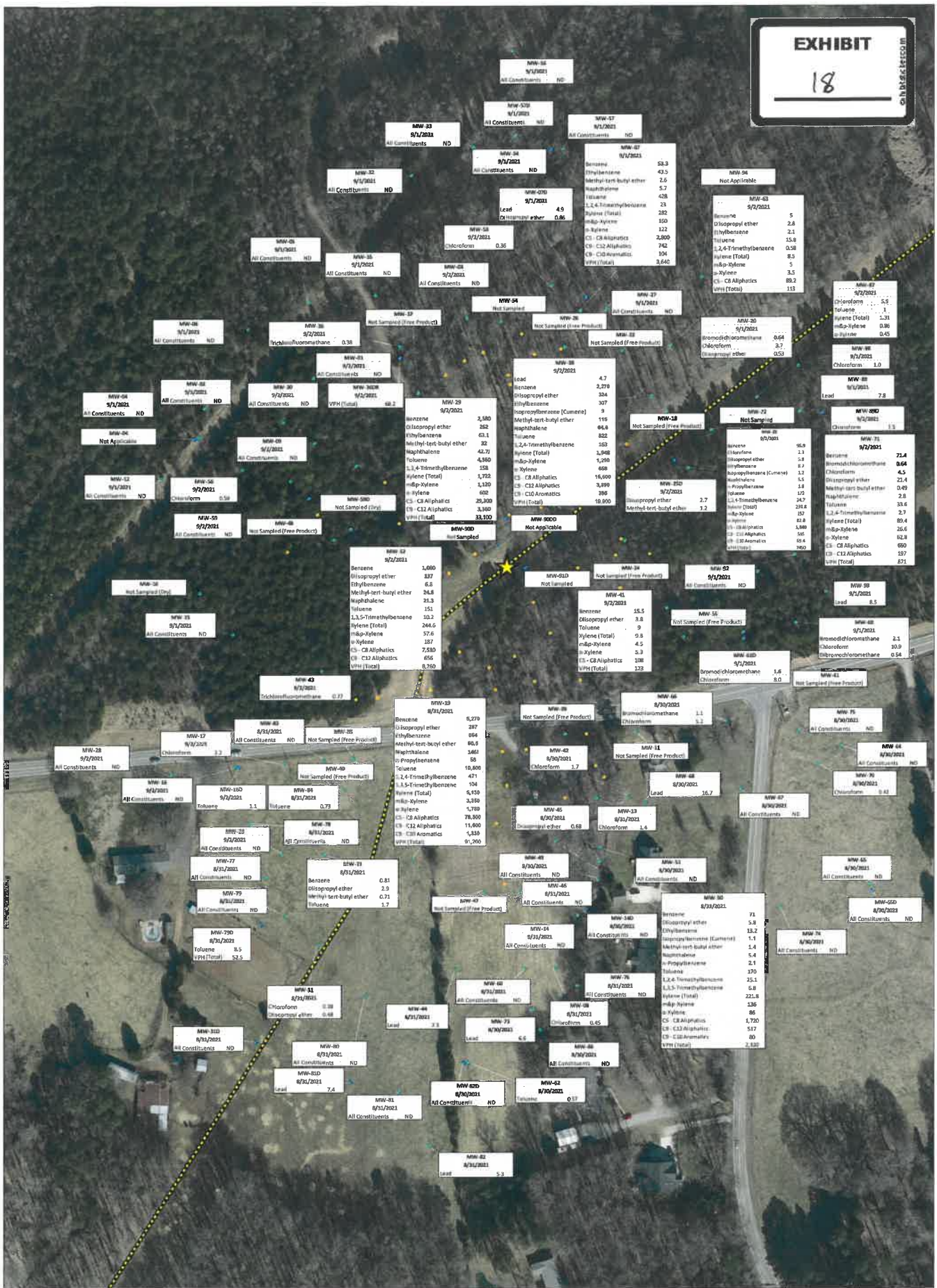
0 600 1,200 1,800 Feet

Release Site
Pipeline
Parcel Boundaries
Water Supply Well (Potable Use)
Water Supply Well (Non-Potable Use)
Water Supply Well (Abandoned)
Water Supply Well (Inactive Use)
1,500-Foot Radius from Edge of October 2021 Free Product Boundary
2,000-Foot Radius from Point of Release

APEX

FIGURE
4

Document Path: E:\Apex\Huntersville\Figures\MXD\October CSA Figures 2021\Figure 4 Potential Receptor Map_CSA.mxd



Checked By:	--
Created By:	CW
Scale:	1 " = 65 FT
Date/Time:	09/21/2021; 12:34
Project No.:	CPC20126

Monitoring Well Sampling Results

Colonial Pipeline Company

2020-L1-SR2448

Huntersville, North Carolina

0 65 130 195 260 Feet

Release Site
Pipeline
Monitoring Well
Monitoring Well (Bedrock)
Recovery Well

Notes:
ND = Non-Detect
NA = Not Applicable
All units reported in µg/L.
µg/L = Micrograms per Liter
Detections in Bold indicate an exceedance of NCAC 2L standard.
Only laboratory detections are shown on this map.
See Table 5 for complete results.

APEX

FIGURE 8

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
S. DANIEL SMITH
Director

NORTH CAROLINA
Environmental Quality

EXHIBIT
19

October 27, 2021

CERTIFIED MAIL 7018 1830 0001 8036 5287
RETURN RECEIPT REQUESTED

Colonial Pipeline Company
4295 Cromwell Road, #311
Chattanooga, Tennessee 37421
Attn. John Wyatt

Re: Notice of Regulatory Requirements
N.C.G.S. § 143-214.1
15A NCAC 02L .0106 & .0111
Colonial Pipeline SR2448
SR 2488/Pipeline ROW
Huntersville, NC

Mr. Wyatt:

On September 25, 2020, the Underground Storage Tank Section (UST Section), Division of Waste Management (DWM), of the Department of Environmental Quality (the Department) sent Colonial Pipeline Company a Notice of Violation (NOV). The Notice addressed the discharge of petroleum at the above-referenced location that caused the exceedance of the groundwater quality standards established pursuant to North Carolina General Statutes§ 143-214.1 and codified in Title 15A of the North Carolina Administrative Code (NCAC), Subchapter 02L .0202.

On October 19, 2021, Michael Scott, the Director of the NC Department of Environmental Quality's Division of Waste Management sent you a Notice of Continuing Violation and a Notice of Regulatory Requirements (NORR) seeking updated information needed to assess risks associated with the release.

In addition to the information requested in the October 19, 2021 NORR, the Division of Water Resources is requiring by copy of this letter for Colonial Pipeline Company to collect surface water data to support the site assessment and protection of receptors, per 15A NCAC 02L .0106. You are hereby required to:

- Sample locations. Obtain surface water samples from the 19 locations approximately shown on the attached Figure each month starting on December 1, 2021.
- Notification/Reporting. Immediately report the presence of any petroleum hydrocarbon sheen or free product to the NCDEQ Division of Water Resources, Mooresville Regional Office by telephone using 704-663-1699 or 1-800-858-0368.
- Analyses. Analyze the monthly surface water samples for pH, conductivity, dissolved oxygen, Volatile Organic Compounds using EPA Method 8260D, and total lead using EPA Method 6010D for each of the 19 locations on the attached Figure starting December 1, 2020.
- PFAS. Analyze surface water samples from locations 3, 4, 5, 8, 9, and 13 for PFAS compounds in January, March, June, and September of 2022 using EPA draft Method 1633, starting January 2021.
- Reporting. Report results of monthly surface water sampling to the NCDEQ Division of Water Resources, Mooresville Regional Office within 15 days of receipt of analytical results. Verbally or electronically report any detections of petroleum hydrocarbons to the Mooresville Regional Office immediately (in no case later than 24 hours upon discovery). Note any surface water sampling location that was dry in the monthly

sampling report

- Annual Summary Report. Submit an annual surface water sampling summary report to the NCDEQ Division of Water Resources, Mooresville Regional Office by February 1, 2023 that summarizes the surface water sampling results from calendar year 2022. This report will contain recommendations for continued surface water sampling and analyses based on the calendar year 2022 surface and groundwater quality data and will include surface water sampling locations, analytical parameters, and collection and reporting frequency.
- Sampling revisions beyond 2022. The NCDEQ Division of Water Resources, Mooresville Regional Office will review the surface water sampling results, recommendations contained in the calendar year 2022 surface water sampling report, and consider revisions to the surface water sampling plan based on the results of the groundwater and surface water sampling results.

The information stated above to be included in the monthly monitoring reports, in response to this Notice of Regulatory Requirements, is in addition to the required information stated in previous DEQ correspondence. Failure to comply with the State's rules in the manner and time specified may result in the assessment of civil penalties and/or the use of other enforcement mechanisms.

Thank you for your attention to this matter. If you have any questions regarding the actions that must be taken or the rules mentioned in this letter, please contact Rick Bolich, Groundwater Resources Section Chief at 919-707-3671 or Danny Smith, Division of Water Resources, Director at 919 707- 9014.

Sincerely,

S. Daniel Smith, Director
NC Division of Water Resources, NCDEQ

Attachment: Surface water sample location map

cc: Jeff Morrison, Colonial Pipeline
Robert Hughes, Colonial Pipeline
Michael Scott, DEQ
Corey Basinger, DEQ
Andrew Pitner, DEQ
Brandy Costner, DEQ
Bobby Williams, Town of Huntersville
Shawna Caldwell, LUESA- Mecklenburg County Health Department

STORM WATER Services

0 325 650 1,300 1,950 Feet

Surface Water Sampling Location Map
Colonial Pipeline
Huntersville, NC

MAP SCALE: 1" = 650'
DRAWN BY: TRB

DATE: February 22, 2021

Figure 1

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

EXHIBIT
20

Activity Summary
August 21, 2020

DEQ STAFF: Brian Polk and Mark Webb

DATE OF ACTIVITY: August 20, 2020

LOCATION: 14108 Huntersville-Concord Road, Huntersville, NC 28078 - Colonial Pipeline Release

Brian Polk and Mark Webb arrived at 14108 Huntersville-Concord Road, Huntersville, NC 28078, at approximately 9:30 am and met with John Culbreath with Colonial Pipeline, and Alex Tester and Lindsay Boone with Montrose Environmental Group based in Atlanta, GA.

All parties discussed safety requirements and sampling protocols related to the site and PFOS sampling. Everyone agreed that efforts would be taken to prevent and minimize cross contamination, but site hazards (i.e., possible flammable atmosphere) dictated that all safety precautions should be maintained including wearing flame-resistant coveralls, which could be a potential source of PFOS contamination.

The group also agreed to survey the sampling areas prior to collecting samples to review sampling protocols and how best to split samples. Four locations were identified to sample, and it was agreed that samples would be split between two bottles for DEQ and two for Montrose for each sample location. Additionally, all samples were collected by alternating the filling of sample bottles between DEQ's and Montrose's bottles.

DEQ staff then donned the additional required personal protective equipment (i.e., flame-resistant coveralls), activated the REA Multi Gas meter to monitor the lower explosive limits, and proceeded to the operation area to survey the sample locations.

Sample Collection

Sample One: The Raw Product (i.e., F500 Encapsulator Lot# 2366 8/23/2016) was sampled first and was collected from a 250-gallon tote using a COLIWASA. There was a distinct odor once the cover was removed from the tote. Great effort was made to

Practice-COVID 19 precautions while sampling, but the sampler's face mask fell while collecting the sample. Because the sampler's gloves were coated in product, the mask could not be adjusted. Sampling continued, and all bottles were filled as required.

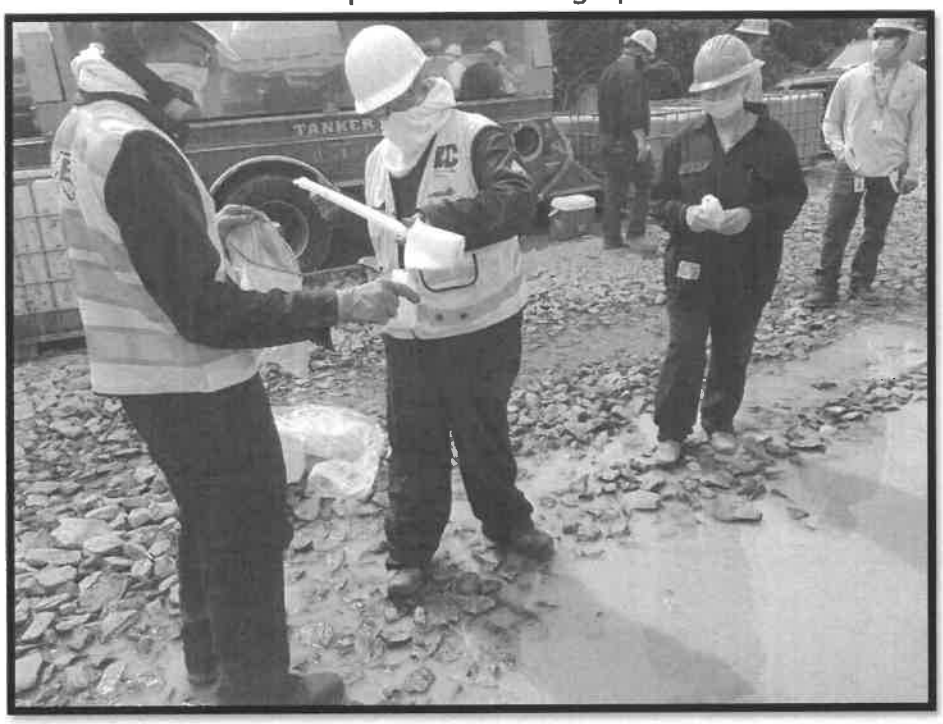
Sample One Photographs:

Sample Two: Sample Two was the Mixed Product, which was the Encapsulator mixed with water from a fire hose/nozzle connected directly to a fire truck. The Huntersville Fire Department adjusted the pump pressure as low as possible and filled the sample bottles directly from the fire hose, which was used to apply the Encapsulator Mixture.

After samples were taken from the first two locations, all bottles were processed and placed on ice at each party's vehicle. The group then reassembled in the operation area to collect the surface water samples.

Sample Three: Surface Water #1 sample was collected from a large puddle in front of the fire truck used to mix the Encapsulator product. The sample was collected using a three-foot dipper. Staff observed sediment in each sample.

Sample Three Photograph:

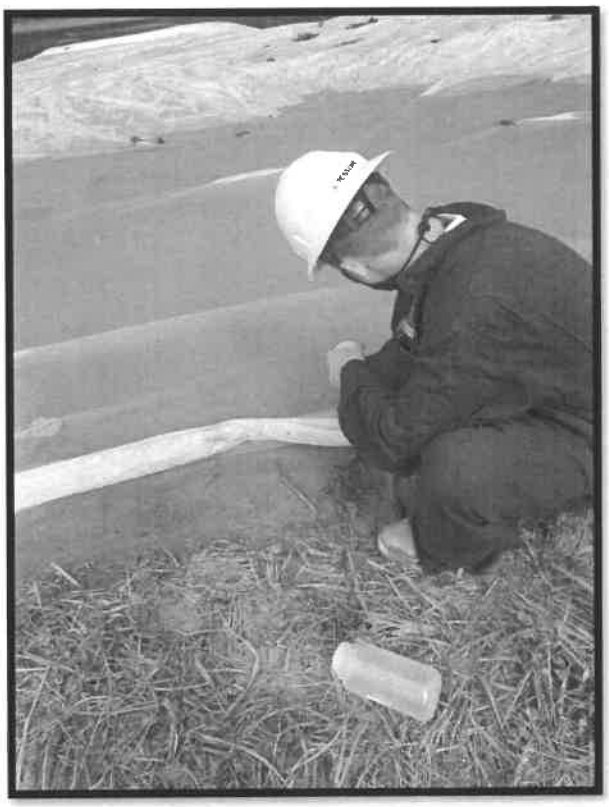


Sample Four: After the group surveyed the area around the open excavation where the pipe was being repaired (cutting and welding), the sample location for Surface Sample #2 was identified. On the west side of the excavation, there was a stormwater collection system lined with plastic, and standing water was observed along the entire system. After speaking with site personnel, it was agreed to collect Sample Four on the south end of the stormwater collection system where transport trucks were loaded. Some sheen and foam were observed on the water's surface.

Montrose's consultant, Alex Testoff, collected the sample by dipping a 1000 mL bottle into the water and filling each of the four sample bottles with 250 mL of surface water.

After the two surface water samples were collected, all bottles were processed and placed on ice at each party's vehicle. Samples were transported by Mark Webb to the NC DEQ- Water Resources Reedy Creek Laboratory. Thomas B. Ascenzo accepted that samples at 3:45 PM.

Sample Four Photographs:



Note: All photographs were taken by Montrose Environmental Group as Colonial Pipeline prohibited other parties from taking photographs due to potential explosive atmosphere.

50 International Dr.
Suite 150
Greenville, SC 29615

T 864.
TRCcor

EXHIBIT
21

Technical Position Paper

To:	Sam McEwen
	Colonial Pipeline Company (CPC)
From:	Karen C. Saucier and Chelsea Wenhardt
	TRC Environmental Corporation
Subject:	PFAS Position Paper for Huntersville Gasoline Release Site
Date:	October 12, 2021
CC:	Carol Sims, CPC
Project No.:	429385.0001

On August 14, 2020, Colonial Pipeline Company (CPC) and local emergency response agencies were notified of a suspected gasoline release in the CPC right of way (ROW) within the Oehler Nature Preserve near Huntersville, North Carolina. The release site is situated on a parcel owned by the Mecklenburg County Parks Department. The initial emergency response involving line repair, free product capture, and soil excavation/management included application of approximately 1,100 gallons of fluorine-free F-500 encapsulant for vapor control during these activities. During initial emergency response, the North Carolina Department of Environmental Quality (NCDEQ), Division of Waste Management (DWM) initiated sample collection from encapsulant, along with mixtures and media directly in contact with the encapsulant and submitted samples to GEL Laboratory for per- and polyfluoroalkyl substances (PFAS) analyses by modified EPA Method 537. CPC's contractor, Environmental Planning Specialists, Inc. (EPS), collected split samples for duplicate analysis by Enthalpy Laboratory. PFAS compounds were detected intermittently in mixture samples. Given that fluorine-free F-500 encapsulant was specifically sourced and applied during the initial emergency response, the detection of PFAS compounds is believed to potentially be associated with cross-contaminated encapsulant. Shallow soils in the release area which may have been influenced by the release and/or the encapsulant were removed immediately following pipeline repairs.

In October 2020, approximately two months following the initial emergency response activities, EPS acting on behalf of CPC, collected groundwater samples from 15 monitoring wells[1] and four recovery wells[2] for PFAS analysis. Groundwater samples from these 19 wells were split with NCDEQ for duplicate analysis of PFAS compounds.

This position paper presents: (1) information on valid observations of PFAS compounds in site groundwater samples; (2) a summary of the conceptual site model (CSM) with attention to PFAS

[1] Monitoring Wells sampled: MW 11, MW 13, MW 15, MW 18, MW 19, MW 22, MW 24, MW 25, MW 29, MW 36, MW 37, MW 38, MW 39, MW 40, and MW 42.

[2] Recovery Wells sampled: RW-07, RW-13, RW-14, and RW-20.

observations; and (3) discussion of the appropriateness of available criteria currently used by federal and other state agencies to evaluate potential risk to PFAS compounds detected in groundwater.

Observation of PFAS Compounds in Groundwater

The groundwater sample data collected in October 2020 by both CPC and NCDEQ were validated using standard industry practices. The purpose of the validation was to develop a consensus list of observed PFAS compounds for discussion and potential future considerations.

In a June 2021 conference call attended by representatives of NCDEQ and CPC, NCDEQ suggested that the practical quantitation limit (PQL) for PFAS compounds is 10 ng/L. As such, the 10 ng/L PQL suggested by NCDEQ is used as a threshold for discussion of detected PFAS compounds from the joint analytical results.

As noted, groundwater samples were collected from 15 monitoring wells and four recovery wells installed around the release site. CPC and NCDEQ split the collected samples for analyses. Groundwater data from samples collected on CPC's behalf were analyzed by Enthalpy Laboratory and validated by Environmental Standards, Inc. (ESI); and the data collected on NCDEQ's behalf were analyzed by GEL and validated by TRC for inclusion in this technical position paper. Please see **Attachment 1** for validation reports for both CPC and NCDEQ PFAS groundwater data sets.

Attachment 2 includes a tabular summary of the PFAS observations, with concentrations above the 10 ng/L PQL highlighted in the validated analytical results. The validated observations of PFAS compounds above 10 ng/L include:

- Perfluorobutanoic acid (PFBA) – observed at estimated (J-qualified) value in four samples - 2 of 4 recovery wells and 2 of 15 monitoring wells;
- Perfluoro-3-methoxypropanoic acid (PFMOPrA) – observed at estimated (J-qualified) value in two samples – no recovery wells and 2 of 15 monitoring wells; and
- 6:2 Fluorotelomer sulfonate (6:2 FTS) – observed at estimated (J-qualified) value in one sample - 1 recovery well and no monitoring wells.

It is of note that no individual validated values greater than 10 ng/L are replicated in a corresponding split sample.

Summary of Conceptual Site Model

A detailed CSM has been initiated for this site in support of the Comprehensive Site Assessment ([CSA] Apex Companies, LLC, January 2021). By design, the CSM is "evergreen" in that it continues to be refined as more chemical and physical data are collected and evaluated and site understanding is improved. The CSM also informs the characterization of PFAS observations at the site. PFAS observations greater than 10 ng/L, along with other key site observations and pertinent features, are

presented on Figure 1. Key points of the CSM, that in turn relate to PFAS observations in groundwater, are as follows:

- The gasoline release occurred near a topographic bedrock high, and groundwater flow is north and south in a radial pattern from the point of release.
- The source of light non-aqueous phase liquid (LNAPL) present in the subsurface is the gasoline release.
- The emergency response included measures to ensure the encapsulant mobilized for vapor suppression was fluorine-free and was managed appropriately until applied. PFAS observed in product, mixtures, and ponded water samples collected in the staging and emergency response area are thought to potentially be associated with cross-contaminated encapsulant applied during the initial emergency response.
- In-place soils that received the encapsulant during emergency response were removed within a matter of hours, allowing very little opportunity for percolation and migration into groundwater from the area.
- The site has an active groundwater interim remedial measure consisting of LNAPL and groundwater recovery focused in the area of the release. This interim remedial measure is designed to address the petroleum release but does not discriminate compounds recovered in the dissolved phase; it will capture dissolved constituents present in groundwater, including those unrelated to the petroleum release.
- There were a limited number of PFAS compounds (PFBA, PFMOPrA, and 6:2 FTS) observed in groundwater above the PQL of 10 ng/L. No individual validated PFAS values greater than 10 ng/L are replicated in a corresponding split sample.
- It is important to note that designation of 6:2 FTS and PFMOPrA as valid detections represents a conservative position as there were potential issues noted with these detections during validation (see Attachment 1).
- Significant thickness of LNAPL was present in five of the 19 wells sampled for PFAS in October 2020, including all four recovery wells and one monitoring well (MW 39). As clearly stated in North Carolina Sampling Guidance[3] for collection of groundwater samples, (NCDEQ) "does not recommend the sampling of wells with floating non-aqueous phase liquid for trace contaminants" as these wells are compromised and "cannot provide useful information regarding the level of contamination."
- PFBA was observed above the PQL in two recovery well samples (RW-07 and RW-14) and two monitoring well samples (MW 18 and MW 24). Results are likely biased as, recovery wells RW-07 and RW-14 had approximately 13 feet and 10 feet of LNAPL, respectively, and monitoring well

[3] From NCDEQ Sampling Guidance Appendix F Collecting Groundwater Samples – Section "F.3. Sampling Wells with Floating Non-Aqueous Phase Liquid: NCDENR does not recommend the sampling of wells with floating non-aqueous phase liquid for trace contaminants. This concerns primarily petroleum related sites, but includes any chemical product (e.g., solvent) that floats on the water table. ***Sample data from such wells cannot provide useful information regarding the level of contamination. Furthermore, these wells may never provide legitimate data as they may have become permanently chemically damaged by the product being in contact with the well casing for an extended period of time.*** NCDENR does reserve the right to require sampling of these wells - ***not for levels of trace contaminants*** - but for confirmation of an appropriate remediation technique." *Bold added for emphasis.*

MW 24 had approximately 14 feet of LNAPL present in the well at time of PFAS sampling in October 2020.

- 6:2 FTS was observed above the PQL in one recovery well (RW-20) sample but in no other samples. Results are likely biased as, recovery well RW-20 had approximately 2.5 feet of LNAPL present in the well at time of PFAS sampling in October 2020.
- PFMOPrA was observed in two monitoring well samples (MW 19 and MW 42) but not in any recovery well samples near the release site. Further, these monitoring wells are two of the four monitoring locations which contained observations of other dissolved volatile organic compounds (VOCs) in October 2020 unrelated to the petroleum release.
- A concentration gradient of PFAS compounds is not observed from the petroleum release site.
- Perfluorooctane sulfonamide (PFOSA) was typically the most prevalent PFAS compound in mixture samples collected at the time of the emergency response. There were no validated detections of PFOSA in recovery well or monitoring well samples collected in October 2020.
- The distribution pattern of PFAS compounds values greater than 10 ng/L is intermittent and concentrations above the PQL do not support that PFAS compounds in groundwater are sourced from or associated with the release or the initial emergency response.
- Recent and on-going data collection across the United States demonstrates that PFAS are ubiquitous in the environment[4] and therefore, may be present in environmental media (including groundwater) at trace levels.
- In the Final Report[5] to the North Carolina General Assembly, the North Carolina PFAS Testing Network documents the occurrence of 48 targeted PFAS in 376 North Carolina drinking water supplies. The most frequently detected PFAS in NC drinking water were the perfluoroalkyl acids including PFBA ranging up to ~35 ng/L.
- PFAS constituents detected in groundwater samples below 10 ng/L and reported at estimated values below the reporting limit, were generally not replicated in split samples, or were reported in monitoring wells unaffected by the petroleum release. These extremely low detections of PFAS are reasonably attributable to "background" or other potential sources such as residential septic systems.

Relevant and Appropriate Groundwater Criteria

It is noteworthy that the groundwater affected by the gasoline release is not a current source of drinking water. Specifically, the recovery wells with PFAS observations (PFBA and 6:2 FTS) greater than 10 ng/L also contain significant LNAPL impacts which prevents use of this groundwater as a potable source.

NCDEQ currently has no specific guidance for evaluating emerging contaminants in groundwater and has not formally promulgated groundwater standards for total PFAS or individual PFAS compounds. NCDEQ

[4] Per- and polyfluoroalkyl Substances fact sheet, NC Department of Health and Human Services, Division of Public Health, November 2019; PFAS in Your Environment (USEPA) https://www.epa.gov/pfas;

[5] NC-PFAST-Network-Final-Report_revised_30Apr2021.pdf (ncpfastnetwork.com).

has proposed a 15A NCAC 02L .0202 Groundwater Quality Standard (2L Standard) of 70 ng/L for the sum of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) which is undergoing rule making. NCDEQ has maintained an Interim Maximum Allowable Concentration (IMAC) of 2,000 ng/L for PFOA since December 2006. NCDEQ has suggested applying the PQL as the compliance concentration for PFAS: *"...substances which are not naturally occurring and for which no standard is specified shall not be permitted in concentrations at or above the practical quantitation limit in Class GA or Class GSA groundwaters."*[6] In a June 2021 meeting with CPC, NCDEQ suggested that the PQL for PFAS compounds is 10 ng/L.

TRC agrees that 10 ng/L is an appropriate PQL for PFAS compounds given the current state of analytical methods for environmental media. However, TRC does not agree that the PQL is appropriate for a groundwater quality standard or for use as a comparison value for compliance. This is in part based on the North Carolina 2L rule (15A NCAC 02L .0202) and experience with groundwater comparison values for a wide variety of compounds without 2L Standards on other regulated sites in North Carolina.

As noted below, the 2L Standard rules do not contemplate the use of PQLs as the basis for groundwater quality standards for substances in Class GA and GSA groundwater

> *"(d) Except as provided in Paragraph (f) of this Rule, groundwater quality standards for substances in Class GA and Class GSA groundwaters are established as the least of:*
>
> *(1) Systemic threshold concentration calculated as follows: [Reference Dose (mg/kg/day) x 70 kg (adult body weight) x Relative Source Contribution (.10 for inorganics; .20 for organics)] / [2 liters/day (avg. water consumption)];*
>
> *(2) Concentration which corresponds to an incremental lifetime cancer risk of 1x10-6;*
>
> *(3) Taste threshold limit value;*
>
> *(4) Odor threshold limit value;*
>
> *(5) Maximum contaminant level; or*
>
> *(6) National secondary drinking water standard."*

Further, the 2L Standard does allow for the use relevant and appropriate health-based data derived and relied upon by others for use in establishing comparison values.

> *"(e) The following references, in order of preference, shall be used in establishing concentrations of substances which correspond to levels described in Paragraph (d) of this Rule.*
>
> *(1) Integrated Risk Information System (U.S. EPA).*
>
> *(2) Health Advisories (U.S. EPA Office of Drinking Water).*
>
> *(3) Other health risk assessment data published by the U.S. EPA.*

[6] 15A NCAC 02L .0202(c)

> ***(4) Other relevant, published health risk assessment data, and scientifically valid peer-reviewed published toxicological data."***

The NCDEQ DWM efforts are currently focused on establishing the presence of PFAS in drinking water systems (including groundwater sources), and technologies for treating PFAS in wastewater treatment plants or point of use systems. The NCDEQ DWM PFAS strategy states "*...division staff continue to work with permitted facilities to identify and provide technical solutions when such compounds are found based on relevant science and research.*"[7] The DWM strategy also states "*The final element of DWM's PFAS strategy includes continued and expansion of staff knowledge base to make informed decisions on PFAS. By sending division staff to local and national conferences on PFAS-related issues, staff will expand their knowledge base.*"[8]

The United States Environmental Protection Agency (EPA) has issued Health Advisory Levels (HALs) for PFOA and PFOS and Regional Screening Levels[9] for PFOA, PFOS, and perfluorobutane sulfonic acid (PFBS). In the absence of federal standards to regulate other PFAS, many states have developed their own drinking water and groundwater standards and/or guidelines. In some states, enforceable regulatory standards such as the Maximum Contaminant Level (MCL) have been established for select PFAS compounds that represent the legal threshold limit allowed in drinking water. However, other states have recommended guideline values that provide information to local officials, community water supply operators and the public on PFAS compounds based on potential human health effects from drinking water. These latter guideline values are not enforceable (unlike MCLs) but may be used in evaluating potential risk posed by PFAS compounds present in completed groundwater exposure pathways where no promulgated groundwater standards exist.

Table 1 is a compilation of current available regulatory standards, HALs, and guidelines from various US states and Canada compiled for PFAS compounds observed above 10 ng/L at the site. The Interstate Technology & Regulatory Council (ITRC) publishes an updated table with state PFAS standards and risk-based screening values for groundwater with the most recent update in August 2021. The ITRC PFAS Regulation Table was used as the main reference for **Table 1**, but additional recommended state regulations (*i.e.*, Wisconsin) were also included, although not yet final.

---

[7] https://deq.nc.gov/news/key-issues/emerging-compounds/waste-management-work-emerging-compounds#sharing-experiences-and-learning-from-others'-work

[8] Ibid.

[9] https://www.epa.gov/risk/regional-screening-levels-rsls

Table 1
PFAS Groundwater Guidelines and Standards

STANDARD/GUIDELINE	YEAR LAST UPDATE	PROMULGATED?	PFBA	6:2 FTS	PFMOPrA
US STATES					
Groundwater/ Drinking Water					
USEPA Health Advisory	2016				
USEPA RSL	2021				
Hawaii Environmental Action Level	2021		7,600		
North Carolina IMAC	2006				
Minnesota Health Risk Limit (chronic)	2018	Y	7,000		
Texas Protection Concentration Level	2021	Y	71,000		
Wisconsin Recommended GW Enforcement Standards	2020	N	10,000		
INTERNATIONAL					
Groundwater/ Drinking Water					
Canada MAC	2018				
Canada Drinking Water Screening Value	2016		30,000		
Canada Drinking Water Screening Value	2019			200	

Lowest available screening value from the United States and Canada

The standards, criteria and/or advisory levels presented in **Table 1** are applicable (if published by North Carolina and USEPA) or relevant and appropriate requirements (if published by other states). The toxicological studies and references used by other states varies, though the common goal is to issue guidelines for potable water to protect public health. In the absence of NCDEQ guidance for addressing some PFAS compounds, these values are valid for use as protective screening levels for groundwater in North Carolina. For two of the three PFAS compounds detected above the PQL of 10 ng/L, the following screening levels are proposed in lieu of the PQL:

- PFBA: 7,000 ng/L
- 6:2 FTS: 200 ng/L
- No screening value available for PFMOPrA

The NCDEQ has a precedent of using ITRC guidance to develop NC-specific environmental guidance. ITRC guidance is the basis for the Vapor Intrusion Guidance. Also, in August 2021 the NCDEQ Secretary's Science Advisory Board viewed a collection of toxicological information and viewed other states regulation and guidance information that was compiled by ITRC and other peer-reviewed sources. The stated purpose of reviewing this information is to *"...support an analysis of regulatory strategies most*

appropriate for North Carolina". The Secretary's Science Advisory Board was chartered by the Governor and supports the NCDEQ and Department of Health and Human Services (NCDHHS) by examining new and emerging chemicals and providing guidance on how to manage the compounds to better protect public health and the environment. The Board helps evaluate the human health impacts of exposure to contaminants and provides input to NCDEQ and NCDHHS for establishing health goals for emerging contaminants.

The values compiled by ITRC, and future updates based on scientific studies, are the best available criteria to assess protection of human health and will be used to compare against groundwater concentrations until values are established by the North Carolina agencies and/or research provides more information on health effects and related health advisories. These values have been established based on drinking water, providing conservative criteria for site groundwater that is not used for potable purposes and that has trace levels of contaminants unrelated to, and presumably present before, the gasoline release.

Conclusions

A summary of validated PFAS observations over 10 ng/L in the October 2020 groundwater data set along with supplemental additional information is presented in **Attachment 3**.

- There were a limited number of PFAS compounds (PFBA, PFMOPrA, and 6:2 FTS) observed in groundwater above the PQL of 10 ng/L.
- No individual validated PFAS values greater than 10 ng/L are replicated in a corresponding split sample.
- Observed PFAS compounds in groundwater samples are well below available risk-based screening values for PFBA and 6:2 FTS.
- PFBA and 6:2 FTS observed above the PQL in recovery wells should be discounted consistent with NCDEQ guidance on the presence of significant LNAPL.
- Published risk-based screening values are not available for PFMOPrA.
- PFMOPrA was not detected in recovery wells near the release site and only detected in monitoring wells located on residential parcels where other non-petroleum related dissolved VOCs were also detected at low levels.
- The distribution pattern of PFAS compound values greater than 10 ng/L is intermittent and concentrations above the PQL do not support that PFAS compounds in groundwater are sourced from or associated with the release or the initial emergency response.

The compiled data sets for PFAS in groundwater support that the limited PFAS observations are not related to the gasoline release or the resulting emergency response. Further, the limited observed concentrations are well below concentrations published by others deemed to be protective of potable groundwater use. TRC believes that the absence of PFAS concentrations of interest along with the lack

of any pattern of distribution in the intermittent detections corroborates that PFAS compounds are not sourced from or associated with the Huntersville release and do not warrant additional investigation.