DNREC EXHIBITS

Public Hearing for the Proposed Plan of Remedial Action

General Motors Corp – Wilmington Assembly Plant (DE-1149)

Operable-Unit 5 (OU-5)

March 13, 2019

1) **July 17, 2015 -** Remedial Investigation Report (Appendices A-H links below)

2) **June 30, 2017** - OU-5 Focused Feasibility Study Report

3) **October 9, 2018 -** Monitoring Well Abandonment and Installation Work Plan

4) **November 15, 2018 -** OU-5 Groundwater Monitoring results Report

5) **December 20, 2018 -** VI Evaluation for OU-5 Memo

6) **January 2, 2019 -** Legal Notice for Proposed Plan of Remedial Action and Public Workshop for **OU-5**

7) **January 2, 2019 -** Proposed Plan of Remedial Action for OU-5

8) **February 17, 2019 -** Legal Notice for Public Hearing regarding the Proposed Plan of Remedial Action-OU-5, General Motors Corp-Wilmington Assembly Plant

9) **March 13, 2019 -** Public Hearing Presentation regarding the Proposed Plan of Remedial Action-OU-5, General Motors Corp-Wilmington Assembly Plant

Appendices A-H links to the July 17, 2015 Remedial Investigation Report:
Appendix A:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb0c94cf34761
Appendix B:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb0e055d64952
Appendix C:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb0e610e849c5
Appendix D:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb0ecb1764abb
Appendix E:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054f20c8b9014f2890dcee5005
Appendix F:
https://onlinedocs.dnrec.delaware.gov/docfinity/servlet/repository/;jsessionid=D61FD356B3281AB0BD8058BBFB8DEB33?flex=true&id=6744d73fd212a86f0jt5o41da0010000&pdf=true
Appendix G:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb1b48e467c64
Appendix H:
https://apps.dnrec.state.de.us/dochandler/handler.ashx?docid=2c9ff3054e93433c014eb1bacb787db1

Exhibit 1

CONESTOGA-ROVERS
& ASSOCIATES

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Remedial Investigation Report

Former GM Wilmington Assembly Plant
Wilmington, Delaware

Prepared for: RACER Trust

Conestoga-Rovers & Associates
2055 Niagara Falls Boulevard, Suite 3
Niagara Falls, New York 14304

July 2015 • 017338 • Report No. 20

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Remedial Investigation Report

Former GM Wilmington Assembly Plant
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Disclaimer – Please note, Conestoga-Rovers & Associates (CRA) changed its name to GHD Services Inc. on July 1, 2015. This document was originally submitted under the CRA name prior to this date. However, in the interest of continuity, the CRA name will remain on this document after July 1, 2015.

Conestoga-Rovers & Associates
2055 Niagara Falls Boulevard
Niagara Falls, New York/14304

July 2015 • 017338 • Report No. 20

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List of Acronyms and Short Forms

AMSL	Above Mean Sea Level
AOI	Area of Interest
AST	Aboveground Storage Tank
BCOC	Bioaccumulative Constituent of Concern
bgs	below ground surface
BTEX	Benzene, toluene, ethyl benzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COPC	Chemical of Potential Concern
COPEC	Constituent of Potential Ecological Concern
CRA	Conestoga-Rovers & Associates
CSM	Conceptual Site Model
CSF	Cancer Slope Factor
DNREC	Department of Natural Resources and Environmental Control
EBI	Environmental Baseline Investigation
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
ESV	Ecological Screening Value
Fisker	Fisker Automotive, Inc.
FS	Feasibility Study
GM Corporation	General Motors Corporation
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMW	High Molecular Weight
LMW	Low Molecular Weight
MLC	Motors Liquidation Company
Mod	Modular
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
OU	Operational Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RACER	Revitalizing Auto Communities Environmental Response Trust
RB	Refinement Benchmark
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RI	Remedial Investigation
SIRB	Site Investigation and Restoration Branch
SQB	Sediment Quality Benchmark
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List

List of Acronyms and Short Forms

TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit
URS	Uniform Risk-Based Standard
UST	Underground Storage Tank
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WWTP	Waste Water Treatment Plant

Section 1.0 Introduction

1.1 Purpose of Report

Conestoga-Rovers & Associates (CRA), on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER Trust), has prepared this Remedial Investigation (RI) Report to document the RI activities at the former General Motors (GM) Corporation Wilmington Assembly Plant located in Wilmington, Delaware [United States Environmental Protection Agency (USEPA) ID DED 002369205] (Facility or Site).

CRA prepared a RI Work Plan dated August 2011 (CRA, 2011a)and an Addendum to the RI Work Plan dated September 7, 2011 (CRA, 2011b). The Delaware Department of Natural Resources and Environmental Control (DNREC) approved the work plan and addendum in a letter to RACER dated October 20, 2011 (DNREC, 2011). Field activities began in the fall of 2011. Based on the results from the Fall 2011 activities, CRA prepared a Supplemental RI Work Plan dated July 27, 2012 (CRA, 2012). The supplemental RI work was completed in the Fall of 2012. During the supplemental RI activities off-Site impacts were identified along the eastern portion of the Facility boundary. BrightFields, Inc. (BrightFields) was retained by RACER to investigate and delineate the off-Site impacts. BrightFields conducted investigation activities from the Winter of 2012 through Spring of 2014. At the request of DNREC CRA prepared a Supplemental RI Work Plan for OU-6 dated September 29, 2014 (CRA, 2014a) to guide additional RI activities at the wooded area at the northeast corner of the Site. The activities were completed in the fall of 2014.

The primary objectives of the RI were to:

- Characterize the Facility and the actual or potential risk to human health and the environment
- Identify sources of contamination and evaluate the nature and extent of hazardous waste and/or hazardous waste constituents in environmental media at the Site
- Provide sufficient data to develop a conceptual site model (CSM) and complete a Risk Assessment
- Determine the need for further action to mitigate current and future unacceptable risk, if any, to human health and the environment

The activities documented herein were completed based on the approved work plans to assess the nature and extent of impacts associated with the Site as a result of GM Corporation's historical operations by investigating Areas of Interest (AOIs) as described further in Section 1.3 and Section 3.0.

1.2 Facility Background

1.2.1 Facility Description and History

The Facility consists of the property located at 801 Boxwood Road, New Castle County, Wilmington, Delaware. The Facility currently consists of approximately 142 acres of land, including the approximately 3.2 million square foot Main Assembly Building, and several outlying buildings and structures [e.g., Waste Water Treatment Plant (WWTP), Pump Houses, and Powerhouse]. The Facility was developed in 1945 by GM Corporation for the purpose of automobile assembly. GM Corporation commenced operations at the Facility in 1946 and continued automobile assembly operations until July 2009 when the plant was idled. The Facility location is presented on Figure 1.1. The Facility layout is presented on Figure 1.2.

As a result of GM Corporation's 2009 bankruptcy, certain operating assets of GM Corporation were sold on July 10, 2009 to a newly formed company now known as General Motors LLC. Existing non-continuing assets, including the Site, remained the property of GM Corporation which was known as Motors Liquidation Company (MLC), in its capacity as debtor-in-possession in the bankruptcy case. The Site was sold by MLC to Fisker Automotive, Inc. (Fisker) in July 2010. However, MLC retained liability for the remediation of the Site. In October of 2010, the United States Government announced that MLC had agreed to resolve its liabilities at 89 sites relating to liabilities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and the Clean Air Act through an environmental response trust fund. On March 31, 2011, the Revitalizing Auto Communities Environmental Response Trust (RACER Trust) became effective and is conducting, managing, and funding cleanup at the 89 sites formerly owned by MLC, including the former Wilmington Assembly Plant.

Between July 2009 and April 2014, the plant remained idle with limited activities present at the Site while Fisker evaluated opportunities to revive the assembly plant. The Site was purchased by Wanxiang Delaware in April 2014 as part of a purchase by Wanxiang Group of Fisker's assets. At this time, the Site remains idle while Wanxiang evaluates opportunities for the Site under Fisker Automotive and Technology LLC.

1.2.2 Previous Investigations

Previously documented Site investigations have been conducted since at least 1990. Investigations included, but were not limited to, the bulk product tank areas [i.e., Operable Unit 1 (OU-1) and Operable Unit 2 (OU-2)], aboveground storage tank (AST) and underground storage tank (UST)closures and documented spills/releases.

Table 1.1 presents a chronological summary of previous major environmental investigations conducted at the Facility.

Table 1.2 presents a chronological summary of previous and ongoing remedial actions conducted at the Facility.

1.3 Areas of Interest

AOIs investigated as part of this RI include Recognized Environmental Conditions (RECs) identified by CRA during a Phase I Environmental Site Assessment (ESA) conducted in 2009 (CRA, 2011c) and other areas targeted for investigation by the DNREC as a result of their review of historical Site information and the results of BrightFields Environmental Baseline Investigation (EBI).

A total of 26 AOIs and three additional investigation areas have were identified at the Site as summarized in Table 1.3. The approximate locations of the AOIs and additional investigation areas are presented on Figure 1.3. For purposes of the human health risk assessment (HHRA), the AOIs were divided into several exposure areas or Operable Units (OUs) to evaluate the RI soil data while the Site groundwater was evaluated on a Site-wide basis. The AOIs and boundaries of the OUs are shown on Figure 1.3.

1.4 Report Organization

The RI Report is organized in the following sections:

1.0 Introduction

This section presents an introduction, Facility background information, and report organization.

2.0 Site Physical Characteristics

This section summarizes general conditions at the Site, including the Site location, operational history, geology, hydrogeology, surface water hydrology, meteorology, demography and land use, and ecology.

3.0 AOIs and Investigation Activities

This section provides background information on the AOIs, a summary of activities and results at each AOI, and a discussion of impacts to environmental media at the Site.

4.0 Nature and Extent of Contamination

This section describes the nature and extent of the environmental impacts of the Site relative to soil, groundwater and surface water.

5.0 Conceptual Site Model

This section discusses potential routes of migration, contaminant persistence, and contaminant migration.

6.0 Baseline Risk Assessment

This section provides the human evaluation and ecological assessment.

7.0 Summary and Conclusions

This section summarizes the results of the investigation and human health assessment and ecological assessment, identifies data limitations and presents recommendations for future work.

8.0 References

This section provides a list of documents referenced in the preparation of this Work Plan.

Section 2.0 Site Physical Characteristics

2.1 Operational History

GM Corporation was the sole owner and operator at the Site from the time the former Wilmington facility was built in 1945 until GM Corporation's bankruptcy in 2009 when GM Corporation became known as MLC. The plant was idled in July of 2009. The Site was sold to Fisker in July of 2010 and was then purchased by Wanxiang Delaware in April 2014. The Site has remained idle throughout the ownership by Fisker and Wanxiang. All manufacturing operations conducted at the Site have been associated with automotive assembly.

Detailed information on historical operations and waste management practices that could impact environmental media at the Site was provided in the approved RI Work Plan and included:

- Raw material usage and storage
- ELPO Areas (painting)
- Phosphate tanks

- Anchor Building and associated fueling and vehicle maintenance operations
- Above ground storage tanks
- Underground storage tanks
- Hazardous waste
- Solid and special waste
- Wastewater and sewers
- Stormwater
- Polychlorinated biphenyls
- Air emissions
- Spill and releases

2.2 Geology

Cross sections of geology across the Site were generated based on the soil stratigraphic log data from the 2011-2012 RI investigation activities. Figure 2.1 is a plan view showing the locations of the cross sections. Cross sections A-A' through D-D' are depicted on Figure 2.2 through Figure 2.5.

A review of soil borings advanced during the investigation shows the soils at the Site to be fill-underlain by unconsolidated sediments consisting primarily of silty sands and clays, from below the paved surface to a depth of approximately 8 to 10 feet below ground surface (bgs). Gravel lenses are seen ranging in thickness from 1 to 10 feet at varying depths across the Site. A review of historical soil boring logs from previous investigations indicates that there appears to be a continuous sand layer ranging from 16 to 30 feet in thickness with starting depths ranging from approximately 7.8 feet bgs to 11.5 feet bgs and extending to depths ranging from approximately 23.8 feet bgs to 40 feet bgs. The historical logs also indicate that the sand layer is underlain by reddish-brown clay of an undetermined thickness.

The natural soils present in this area are associated with the Cretaceous Age [65-136 million years (MY)] Potomac Formation. The Potomac Formation is principally variegated silt and/or clay with interbedded quartzitic sands. The Potomac Formation consists of deltaic fluvial deposits that rest uncomfortably upon Precambrian-Age (> 570 MY) basement rock, which is considered to be the Wilmington Complex gneiss in the vicinity of the Site. The thickness of the Potomac Formation on-Site is unknown; however published literature indicates that the Potomac Formation can be relatively thin (less than 50 feet) in areas near the Fall Line, as is the case with this Site. The Fall Line represents a lineament (fault) separating the igneous and metamorphic rocks of the Piedmont Province from the unconsolidated, flat-lying sediments of the Atlantic Coastal Plain.

2.3 Hydrogeology

On-Site, groundwater was observed at an average depth of approximately 12 feet bgs during the 2011 to 2013 RI. Groundwater elevations recorded between September/November 2012 through September 2013 are provided in Table 2.1. Groundwater contours from the most recent and complete hydraulic monitoring event (i.e., June 2013) are provided on Figure 2.6. The plant appears to create a groundwater divide at the site with groundwater on the east side flowing to the east toward Little Mill Creek and groundwater on the west side flowing to the west towards Red Clay Creek.

According to Facility personnel interviewed during the 2009 Phase I ESA, there was no historical use of Facility groundwater for potable or non-potable purposes. At the time of Facility inspections conducted in 2009, there was no visual evidence suggesting that potable water, production, or irrigation wells were located at the Facility. There are two groundwater sumps, one on the east side and one on the north side of the modular (Mod) Paint Building that dewater the area in the vicinity of the Mod Paint Building. According to Facility personnel, the sumps are approximately 30 to 40 feet deep. Groundwater in the sumps is pumped and discharged to the storm sewer discharge system located on northeastern side of the Facility. The sumps are operated manually as needed.

A review of the DNREC Technology Enabled Permitting Process (TEPP), well completion reports, and well abandonment reports, indicates that there are potentially 14 water well locations within a 2-mile radius of the Facility as shown on Figure 2.7. It should be noted that the locations of two of the water wells could not be identified through the TEPP data but, based on the information that is available; it is believed that these wells are located at least 1 mile from the Facility. Details from the relevant well completion reports are provided in Table 2.2 including details on the well use, desired capacity, screen depth, address, casing diameter, completion date, well location, and approximate distance to the Facility. Water well information accessed through the DNREC TEPP is provided in Appendix A.

As part of the vapor intrusion and groundwater delineation investigation at AOI-16, BrightFields conducted an assessment to identify the residential and commercial addresses within proximity of the former UST area and to determine whether public water service or private wells were used. The evaluation focused on the properties located within a two-block area east of the Site (AOI-16). BrightFields contacted Artesian Resources Corporation (Artesian), the local water supplier, and based on the information provided to BrightFields, there were no private wells reported to currently be in use in the assessment area. There was a record of one historical well at 19 Read Ave. that was sealed approximately 30 years ago.

2.4 Surface Water Hydrology

Surface water flow across the Facility is directed to the Facility storm sewer system, which discharges to Little Mill Creek at Outfall 001 under a National Pollutant Discharge Elimination System (NPDES) Permit No. DE0000523. The NPDES Permit, which is held by the current property owner, requires continuous flow monitoring, weekly pH monitoring, monthly monitoring for biochemical oxygen demand (BOD), total lead, hardness as calcium carbonate, and oil & grease. Enterococcus is monitored twice per month. Total zinc is monitored quarterly and biomonitoring is conducted semiannually. The discharge must also be free from floating solids, sludge deposits, debris, oil, and scum. Outfall 001 is the only point of discharged covered by the permit.

According to a University of Delaware study (University of Delaware, 2001), with the exception of Little Mill Creek, there are no surface water bodies or waterways (streams, rivers, lakes, etc.), including associated wetlands, floodplains, and riparian zones present on-Facility or immediately adjacent to the Facility.

Little Mill Creek is located in the wooded area along the eastern property boundary. Approximately 1,000 feet of this creek is located within the Facility boundary. Little Mill Creek discharges to the Christiana River approximately 1 mile downstream. Red Clay Creek is located approximately 1.1 miles west of the Facility and also discharges to the Christiana River. The Christiana River is the major river draining this portion of New Castle County. There are no lakes or significant ponds within one mile of the Facility.

2.5 Meteorology

The average total precipitation in Wilmington, Delaware is approximately 49.43 inches with a peak of 5.36 inches in July. The average temperature in Wilmington, Delaware is 62.7 degrees Fahrenheit (^{O}F) with an average low of 25 ^{O}F in January and an average high of 85 ^{O}F in July.

The average wind speed is 7.5 knots from the west.

2.6 Demography and Land Use

According to the 2010 census, there are 70,851 people and 29,293 households residing in Wilmington, Delaware. The population density is 6,497.7 per square mile.

The Facility is located at an elevation of between approximately 75 and 80 feet above mean sea level (AMSL). The Facility is relatively flat with a gradual decrease in elevation towards the north and east.

The Facility is zoned as heavy industrial on New Castle County's Official Zoning Map No. 36 and was operated as an automobile assembly plant until July of 2009. The plant is currently under the ownership and operational control of Wanxiang. Key Facility features include the Main Assembly Building, ancillary buildings, WWTP rail spur, bulk product tank farms, and employee parking. A wooded parcel is located at the north-eastern portion of the Facility.

The Facility is located in a mixed commercial and residential area of Wilmington, Delaware with a railroad switching yard located to the north of the Facility, a multi-lane divided highway to the west of the Facility, and residential land use to the south and east of the Facility as further discussed below.

The Facility is bounded to the north by a Baltimore & Ohio Railroad switching yard. A rail spur enters the Facility from the north towards the east of the Facility, just east of the Tire Building, for the delivery of various automobile parts.

The Facility is bounded to south by Boxwood Road. South of Boxwood Road is a residential area that includes two parcels of land originally purchased by GM Corporation for expansion of the Facility south of Boxwood Road. These parcels were sold by GM Corporation in 1995 and are under development for residential purposes.

The Facility is bounded to the east by a residential area along the southern portion of the eastern Facility boundary. The remaining eastern property boundary is bounded by a forested area and swim club facility.

The Facility is bounded to the west by Centerville Road. West of Centerville Road are commercial properties including an automobile repair shop (Hicks Auto), safety material supplier store (DP Fire and Safety), a building material supplier (Delaware Brick Co.), and a garden supply store (J&J System). To the west of the commercial properties is a multi-lane divided highway (State Route 141).

2.7 Ecology

The vast majority of the Site assessment area is covered with buildings, pavement, and other man-made surfaces. A few areas of maintained lawn are adjacent to some of the buildings and parking fields. A few mature trees are present in the lawn area of the main entrance on Boxwood Road. These areas of lawn and trees small and isolated and provide minimal habitat for ecological receptors.

A large area of mature forest, 15.3 acres in size, is present east of the northeastern portion of the Site. Little Mill Creek enters the north central portion of the forested area and flows in a southeasterly direction and enters into a residential area. Little Mill Creek eventually flows into the Christiana River. The forested area and Little Mill Creek likely provide habitat for a diversity of wildlife species.

An ecological risk assessment (ERA), consisting of Steps 1, 2, and 3a of the USEPA process for conducting ecological risk assessment (USEPA 1997), was conducted for the Site. The details are provided in Section 6.

Section 3.0 AOIs and Investigative Activities

3.1 Areas of Interest (AOIs)

AOIs are those areas identified as RECs during the 2009 Phase I ESA conducted by CRA (CRA, 2010a) or areas identified by DNREC as requiring further investigation by Fisker as part of their EBI and/or by MLC in accordance with DNREC's Investigation and Remediation Cost Estimate dated April 2010.

A total of 26 AOIs were identified at the Site by RACER. Three additional investigation areas were added at the request of Fisker as documented in the Addendum to the Work Plan dated September 7, 2011 and approved by DNREC. The additional areas are the parking lot, USTs D, F, G, and H, and the Outfall 001 Swale. The AOIs and three additional areas were fully described including discussion of previous investigations and/or action and recommended/proposed actions to be conducted under the RI in Section 4 of the RI Work Plan and the Addendum to the RI Work Plan. The AOIs are listed on Table 1.3 and shown on Figure 1.3.

Based on the review of the issues, previous investigations, and actions at each AOI in the approved RI Work Plan, it was determined that further action was not warranted at the following eight AOIs:

- AOI 2 – No. 6 Fuel Oil aboveground storage tank (AST G)
- AOI 3 – Waste Solvent ASTs (ASTs P – Q)
- AOI 8 – WWTP Sump
- AOI 11 – New Hazardous Waste Accumulation Area
- AOI 15 – Grit Separator Building
- AOI 22 – Oil Stained Gravel
- AOI 24 – Solvent ASTs
- AOI 25 – Former Open Ditch

These AOIs were not investigated as part of the RI and are not discussed further in this report. The remaining 18 AOIs and 3 additional areas listed below were investigated as detailed in the RI Work Plan and addendum.

- AOI 1 – No. 6 Fuel Oil (AST F)
- AOI 4 – Kolene AST
- AOI 5 – Diesel Oil UST by Power House
- AOI 6 – Modular Paint Pits and Mixing Sumps / East of Mod Building
- AOI 7 – Acetylene Sludge Pits
- AOI 9 – Hydraulic Lift
- AOI 10 – Old Hazardous Waste Accumulation Area (Former Tank Storage Area)
- AOI 12 – Test Track Waste Storage Area
- AOI 13 – ELPO Areas
- AOI 14 – Phosphate Area
- AOI 16 – Petroleum Dispensing Area
- AOI 17 – Former Petroleum Dispensing Area
- AOI 18 – OU-2 Area
- AOI 19 – Lift Stations (to WWTP)
- AOI 20 – PCB Containing equipment/Oil Stained Areas
- AOI 21 – Railroad Tracks
- AOI 23 – Group 3 UST
- AOI 26 – Outfall 001
- Additional Area – Parking Lot
- Additional Area – USTs D, F, G, and H
- Additional Area – Outfall 001 Swale

Based on the findings of the 2011 activities supplemental investigation activities were conducted as detailed in the July 2012 Supplemental RI Work Plan at the following AOIs:

- AOI 6 – Modular Paint Pits and Mixing Sumps / East of Mod Building
- AOI 10 – Old Hazardous Waste Accumulation Area (Former Tank Storage Area)
- AOI 12 – Test Track Waste Storage Area
- AOI 16 – Petroleum Dispensing Area
- AOI 18 – OU-2 Area
- AOI 23 – Group 3 UST
- AOI 26 – Outfall 001

Additionally, two wells were installed on the south side of the site to assist in defining groundwater flow across the Site.

In 2014, the Wooded Area at the north east corner of the Site was added to AOI-26. Additional investigation activities were conducted in October and November 2014 at AOI 26, including the Wooded Area under the Supplemental Remedial Investigation Work Plan for OU-6 dated September 29, 2014 (CRA, 2014a).

3.2 Remedial Investigation Activities

RI activities were conducted in accordance with the RI Work Plan, the September 7, 2011 Addendum to the RI Work Plan, and the July 27, 2012 Supplemental RI Work Plan. Additional work was conducted in 2014 under the Supplemental Remedial Investigation Work Plan for OU-6 dated September 29, 2014. The sediment and surface water sampling portion of the 2014 work was completed specifically to support the ERA process and is not included in the HHRA. All work was done with DNREC concurrence.

The initial RI investigation activities were conducted in the fall of 2011 and included:

- Installation of 67 soil borings
- Collection and screening (conducted by DNREC) of 145 soil samples for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals (total and dissolved), polychlorinated biphenyls (PCBs) and Pesticides
- Confirmatory laboratory analysis of 39 soil samples (27 percent)
- Installation of 11 groundwater monitoring wells
- Collection and analysis of 18 groundwater samples
- Collection and analysis of 7 sediment samples
- Visual inspections of lift stations and in-ground conveyor systems to determine risk of release

Based on the results of the initial RI, the supplemental RI activities were conducted in the fall of 2012 and included:

- Installation of 57 soil borings
- Collection and field screening of 86 soil samples for metals only using an X-ray fluorescence (XRF) analyzer (54 were retained for potential laboratory analysis)
- Confirmatory analysis of 17 (20 percent) of the screened soil samples
- Installation of 4 groundwater monitoring wells
- Installation of two hydraulic monitoring wells
- Collection of 18 groundwater samples

- Installation of 10 vertical aquifer sample (VAS) locations
- Collection of 40 VAS groundwater samples
- Collection of 5 sediment and 5 surface water samples
- Installation of 5 temporary soil gas probes
- Collection of 5 soil gas and 1 ambient air sample

Based on the findings of the supplemental RI BrightFields conducted RI activities at off-Site locations in the vicinity of Dodson Avenue. BrightFields' report: Vapor Intrusion and Groundwater Delineation Investigation, dated July 2014, detailing the work completed and the results is provided as Appendix B.

The additional work completed in 2014 included:

- Collection of 15 surface (0 to 2 feet bgs) soil samples from the Wooded Area
- Collection of 6 sediment and 7 surface water samples from Outfall-001 and Little Mill Creek
- Installation of monitoring well MW-48
- Collection of 5 groundwater samples

The data generated by the 2014 activities is discussed and evaluated in the ERA. The surface soil data was also evaluated for OU-6 in the HHRA.

The investigative activities conducted at each AOI are summarized in Table 3.1. Site-wide RI sample locations are shown on Figure 3.1. BrightFields sample locations are shown on Figure 3.1 for reference only. Table 3.2 provides a sample summary for each media (i.e., soil, groundwater, sediment, surface water, and soil gas) sampled for each AOI and includes sample IDs, sample dates, sample depth, screening and analytical parameters. Soil boring and monitoring well construction logs are provided as Appendix C.

All soil samples selected for confirmatory laboratory analysis were submitted to TestAmerica Laboratories, Inc. (TestAmerica) located in Edison, New Jersey. Data tables summarizing the analytical results from the RI are provided in Appendix D.

Data quality assurance/quality control (QA/QC) was collected on the samples as required in Section 6.6 of the RI Work Plan. This included the collection of field duplicate samples (1 per 20 or fewer samples), matrix spike/matrix spike duplicate (MS/MSD) samples (1 per 20 or fewer samples), and trip blanks (1 per cooler containing water samples for VOC analysis). Field equipment blanks were not required as dedicated/disposable sampling equipment was used.

The laboratory analytical data was reviewed by a CRA chemist to determine the quality and validity of the data resulting from the collection and analysis of the samples. The laboratory analytical data is presented in Appendix E. Summary memoranda regarding the data validation is presented in Appendix F.

The data validation was performed in accordance with the requirements of Section 6.7 of the RI Work Plan as approved by DNREC. Data precision and accuracy meets accepted standards and the data contained within this report is appropriate for use and without significant anomalies, with the qualifications noted, for the purposes of this investigation. As part of the data validation, a small portion of analytical results were rejected. The compounds acetone and methyl ethyl ketone (MEK) were rejected. These compounds are known to be "poor responders", and as such require elevated rejection criteria. The *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (U.S. EPA, February 1994) guidelines state that all VOCs (even poor performers) must have a response factor greater than or equal to 0.05. If they do not, positive results are qualified as estimated "J" and non-detect results are rejected. The validation was based on these guidelines which are noted in the approved RI Work Plan.

3.3 Remedial Investigation Supplemental Information

The results of samples collected for laboratory analysis are discussed and presented in Section 4.0, Nature and Extent of Contamination. The following sections provide supplemental information related to RI activities which did not include data collection or which are addressed outside the scope of the RI.

3.3.1 AOI- 16 Petroleum Dispensing Area Extension

AOI-16 (Petroleum Dispensing Area) initially consisted of a petroleum dispensing station located on the northern wall of the southern half of the Anchor Building. Based in the findings of the initial RI, the AOI was expanded to include the area where historical USTs (D, F, and G) were located near the eastern property boundary along Dodson Avenue. The AOI was expanded again based on the results of supplemental RI activities to include privately owned commercial and residential properties east of the Site. The expanded area of AOI-16 is shown on Figure 3.2. Off-Site investigation activities were completed by BrightFields and are presented in BrightFields' Investigation Report provided in Appendix B.

3.3.2 AOI-19 and AOI-20

Visual inspections were conducted of the Lift Stations throughout the Site (AOI-19) and at the in-ground conveyors in the Main Assembly and Mod Paint buildings (AOI-20). The purpose of the inspections was to determine the condition and assess the potential for an environmental release. The observations from the inspections are presented in Table 3.3.

Section 4.0 Nature and Extent of Contamination

The overall objective of the RI was to define the nature, degree and extent of impact, if any, in the shallow and subsurface soils, groundwater, sediment, surface water, and air, and to assess the potential risks to human health and to the environment. A HHRA and an ERA were completed for the Site. The complete HHRA and ERA reports are provided as Appendices G and H to this report, respectively.

For purposes of the HHRA, the AOIs were divided into several exposure areas or Operable Units (OUs) to evaluate the RI soil data. Groundwater was evaluated on a Site-wide basis. The AOIs and boundaries of the OUs are shown on Figure 1.3. The OUs for soil evaluation are presented below.

OU	*Description*	*AOI Included*
OU-3	Main Assembly Plant Area (excluding OU-1 and OU-2)	AOI-1, 4, 5, 6, 7, 9, 10, 13, 14, 19, 20, 21, and Parking Lot Area
OU-4	Former Petroleum Dispensing and UST Area	AOI-16 17, USTs D, F, G, and H
OU-5	Former Test Track Area	AOI-12 and 23
OU-6	Little Mill Creek/Wooded Area	AOI-26 and Outfall 001

OU-6 includes AOI-26-Outfall-001 Little Mill Creek/Wooded Area. Sediments, surface water, and surface soil were evaluated for OU-6 for the purposes of supporting the ERA.

In 2004, DNREC issued a No Further Action (NFA) for OU-1 and therefore, further evaluation of OU-1 in the HHRA was not required. Investigation activities in the OU-2 Area resulted in approval of the document entitled "Report of Findings for OU-2 Bulk Product Area Tanks Soil Investigation", which requested written concurrence from DNREC that NFA is appropriate with regards to the soil in the OU-2 Area (CRA, 2006a). Based on subsequent discussions with DNREC Site Investigation and Restoration Branch (SIRB), a NFA letter for the OU-2 Area soil will be issued once groundwater conditions within the OU-2 Area are addressed. For the purposes of the HHRA and at the recommendation provided by DNREC in response to the HHRA Work Plan, CRA evaluated the combined groundwater data from the entire Site (Site-Wide

Groundwater), as indicated below. Therefore, separate evaluation of OU-2 in the HHRA was not required. The OU-2 groundwater is discussed in Section 6.0.

As part of the HHRA data collected during the RI was screened against the DNREC SIRS Screening Level Table issued in January 1, 2013 and updated October 2014 (screening criteria or screening levels) (DNREC, 2014) to develop a list of chemicals of potential concern (COPCs) for each OU. Table 4.1 provides the list of COPCs for each OU. The details of the COPC screening are discussed in the HHRA provided as Appendix G.

It is important to note that, as discussed in Section 3.2, some non-detect data was rejected during the data validation process consistent with the validation guidelines. COPC screening was completed against all detected values and the two constituents which had rejected data (i.e., acetone and MEK) were not detected in the data set and were not carried forward as COPCs as discussed in the following subsections. Therefore, the rejected data has not impact on the COPC screening or HHRA outcome.

4.1 OU-3 COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for OU-3.

Surface Soil (0 to 2 feet bgs)

SVOCs

- benzo(a)pyrene

Metals

- antimony
- arsenic
- cobalt
- lead
- manganese
- mercury
- nickel

Subsurface Soil (2 to 10 feet bgs)

Metals

- antimony
- arsenic

- cobalt
- manganese

OU-3 soil sample results for non-metal and metal COPC parameters exceeding screening criteria are presented on Figures 4.1 and 4.2 respectively.

4.2 OU-4 COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for OU-4.

Surface Soil (0 to 2 feet bgs)

Metals

- cobalt
- manganese

Subsurface Soil (2 to 10 feet bgs)

SVOCs

- 2-methylnaphthalene

OU-4 soil sample results for non-metal and metal COPC parameters exceeding screening criteria are presented on Figures 4.3 and 4.4 respectively.

4.3 OU-5 COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for OU-5.

Surface Soil (0 to 2 feet bgs)

VOCs

- 1,4-dichlorobenzene
- Ethylbenzene
- xylenes (total)

SVOCs

- 2-methylnaphthalene
- benzo(a)pyrene
- naphthalene

Metals

- antimony
- arsenic
- barium
- cadmium
- chromium
- cobalt
- copper
- iron
- lead
- manganese
- mercury
- nickel
- selenium
- thallium
- vanadium
- zinc

Thallium was only detected in the soil samples analyzed using XRF screening. Since only laboratory analyzed data were used for calculating human health risks and thallium was not detected in the laboratory analyzed data, thallium was not carried through the HHRA as a COPC for OU-5 surface soil.

Subsurface Soil (2 to 10 feet bgs)

Metals

- antimony
- arsenic
- barium
- cadmium
- cobalt
- copper
- iron
- lead
- manganese
- mercury
- vanadium

OU-5 soil sample results for non-metal COPC parameters exceeding screening criteria are presented on Figure 4.5. Included on this figure are the results for 2- methylnaphthalene, naphthalene, ethylbenzene and xylenes (total) at the 17 to 19 foot bgs depth interval; these compounds exceed the HSCA screening levels, however have been left off of the non-metal COPC list due to the depth interval at which they were sampled at. The 17-19 feet bgs depth is not considered as "subsurface" as it is deeper than the 0 to 10 foot bgs interval. It should also be noted that the 17 to 19 feet bgs depth interval is below the water table. The potential impact of constituents present in soil on groundwater quality at the Site is evaluated as part of the Site-wide groundwater evaluation and the mass loading evaluation of Site groundwater to Little Mill Creek included in the ERA. The sample results for OU-5 metal COPCs were divided into 3 figures. Sample results for metal COPCs from 0 to 2 feet bgs are presented on Figure 4.6a. Sample results for metal COPCs from 2 to 10 feet bgs are presented on Figure 4.6b and soil results for depths greater than 10 feet bgs are presented on Figure 4.6c.

4.4 OU-6 COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for OU-6.

Surface Soil (0 to 2 feet bgs)

SVOCs
- benzo(a)pyrene

Metals
- antimony
- lead

OU-6 soil sample results for non-metal and metal COPC parameters exceeding screening criteria are presented on Figures 4.7 and 4.8 respectively.

Sediment

SVOCs
- 2-methylnaphthalene
- benzo(a)anthracene
- benzo(a)pyrene
- benzo(b)fluoranthene
- benzo(g,h,i)perylene
- benzo(k)fluoranthene
- dibenz(a,h)anthracene
- indeno(1,2,3-cd)pyrene

Metals
- antimony

- copper
- lead
- zinc

Total petroleum hydrocarbon C10-C28 diesel range organics [total petroleum hydrocarbons (TPH) [C10-C28] diesel range organics (DRO)] were also detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs.

OU-6 sediment sample results for non-metal and metal COPC parameters exceeding screening criteria are presented on Figures 4.9 and 4.10 respectively.

Surface Water

Metals

- manganese

OU-6 surface water sample results for metal COPC parameters exceeding screening criteria are presented on Figure 4.11.

4.5 Site-Wide Groundwater COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for Site-wide groundwater. Both dissolved and total metals were used for COPC screening.

VOCs

- 1,1-dichloroethane
- 1,2,4-trimethylbenzene
- 1,2-dichloroethane
- 1,4-dichlorobenzene
- 2-hexanone, benzene
- carbon tetrachloride
- chloroform
- cis-1,2-dichloroethene
- ethylbenzene
- isopropyl benzene
- tetrachloroethene
- toluene
- trichloroethene
- xylenes (total)

SVOCs
- 2-methylnaphthalene
- biphenyl
- dibenzofuran
- naphthalene

Metals
- aluminum
- arsenic
- barium
- cobalt
- iron
- lead
- manganese
- selenium
- vanadium

PCBs
- aroclor-1260 (PCB-1260)

Although the groundwater data was not evaluated by individual OUs, the Site-wide groundwater results for COPC parameters exceeding screening criteria are presented separate figures by OU for ease of review. The following figures present the groundwater results for COPC parameters exceeding screening criteria:

- 4.12 – OU-3 non-metal COPCs
- 4.13 – OU-3 metal COPCs
- 4.14 – OU-4 non-metal COPCs
- 4.15 – OU-4 metal COPCs
- 4.16 – OU-5 non-metal COPCs
- 4.17 – OU-5 metal COPCs

4.6 Off-Site Groundwater COPCs

The following parameters were detected at maximum concentrations greater than the screening criteria, and therefore were identified as COPCs for Off-Site Groundwater.

VOCs
- 1,2,4-trimethylbenzene
- Benzene
- Chloroform
- Ethylbenzene
- isopropyl benzene
- methyl tert butyl ether
- toluene
- xylenes (total)

SVOCs
- 2-methylnaphthalene
- naphthalene

Off-Site groundwater sample results for non-metal COPC parameters exceeding screening criteria are presented on Figure 4.18.

4.7 Air

The potential for groundwater constituents to affect outdoor and indoor air is addressed in the HHRA in Appendix G

4.8 Biota

The potential for constituents of potential ecological concern (COPECs) to affect biota is addressed in the ERA in Appendix H.

Section 5.0 Conceptual Site Model

5.1 General Contaminant Fate and Transport

Many factors control the partitioning of a chemical in the environment. An understanding of the general fate and transport characteristics of the constituents identified in media is important when predicting future theoretical exposure, linking sources with currently contaminated media, and identifying potentially complete pathways to Site media. Based on the historical analytical data collected for the environmental media of concern at the Site, comparison of the results to DNREC SIRS screening criteria, and current and anticipated future Site conditions, the following potential contaminant transport mechanisms at the Site are:

- Movement with wind
- Movement with surface water
- Movement during future Site re use construction disturbance
- Movement of constituents leached from soil
- Movement with groundwater
- Movement of VOCs (from soil and groundwater) within subsurface gas

The exposure of soil at the surface may result in the transport of dust and VOCs by wind. Cover material, such as buildings and asphalt parking areas, is present throughout most of the Site, but is limited in some areas. The existing cover likely does not totally prevent upward migration of chemicals within vapors. The existing cover has also been found to contain detectable concentrations of chemicals. The presence of chemicals within the existing cover may contribute to chemical migration of VOCs or fugitive dust. VOCs in the air will be subject to dispersion by the wind and photolysis due to exposure to sunlight, thereby limiting their concentrations.

The exposure of soil at the surface may also result in the transport of dissolved or suspended contaminants along surface water drainage pathways. The potential for this to occur is limited because of the topography of the Site. Organic chemicals dissolved in surface water may be subject to adsorption, hydrolysis, or photolysis. VOCs may also volatilize during transport in surface water.

Construction activities may also result in disturbance of contaminants in the various media. Contaminants attached to soil particulates may become suspended in the air column and transported by wind. Additionally, contaminants may be moved from the subsurface to the ground surface during excavation and/or earthwork.

Movement of leached constituents is another potential contaminant transport mechanism. Leached constituents can be produced through infiltration of precipitation into impacted surface soils. Once leached constituents have been produced, the following migration pathways are possible:

1. Leached constituents can be transferred to subsurface soil through percolation away from the surface soils. This transfer may occur through the process of mechanical filtration, precipitation, and/or sorption.
2. Leached constituents can percolate through the underlying soil and impact the underlying aquifer(s).

3. VOCs in leached material can migrate through the vadose zone via diffusion to ambient and/or indoor air.

Movement with groundwater is a potential transport mechanism. Once the chemicals have entered the groundwater, the following migration pathways are possible:

1. Lateral groundwater migration toward Little Mill Creek.
2. Impacted groundwater can migrate vertically to deeper aquifers.
3. VOCs in groundwater can migrate through the vadose zone via diffusion to ambient and/or indoor air.

During groundwater transport, the contaminants released to the groundwater will be subject to dispersion, adsorption, volatilization, and biotic and abiotic degradation.

5.2 Potential Routes of Migration

5.2.1 Mass Loading to Little Mill Creek

Due to the proximity of Little Mill Creek to the Site, mass loading of contaminants to the creek was considered for monitoring wells within 500 feet of the creek. The only monitoring well within 500 feet of the creek was MW-109. This well was installed and sampled by BrightFields during the EBI in 2010. No VOCs, SVOCs, PCBs or pesticides were detected in the sample collected from the well. Barium, calcium, iron, magnesium, manganese, sodium, and zinc were detected in the sample collected from MW-109. The concentrations were compared to the DNREC Uniform Risk Based Standard (URS) for protection of human health in a Non-Critical water resource area (the applicable standard at that time). Iron was the only metal detected that exceeded the URS. Based on the results of the sample collected during the EBI, the well was not included in the original RI work plan. In order to further evaluate what the potential impact of inorganic parameters in Site groundwater may be having on the metals concentration in Little Mill Creek, one new monitoring well (MW-48) was installed in October 2014 and groundwater samples were collected from MW-27, MW-28, MW-35, MW-48, and MW-109. The groundwater sampling event was paired with a corresponding surface water sampling event to evaluate the potential mass loading to Little Mill Creek. The samples were analyzed for total and dissolved metals and the results are presented in the ERA in Appendix H.

Data from 2014 suggest that iron and manganese are the only metals in groundwater that are potentially loading into Little Mill Creek. For both metals, the detected concentrations are well below concentrations that are expected to impact the aquatic life of Little Mill Creek. Details of the ERA are provided in Section 6.2.

5.3 Potential Pathways of Exposure

This section provides potential exposure scenarios for the Site. The discussion focuses on the receptors, possible transport mechanisms and the routes of exposure.

5.3.1 Direct Contact

At present, the Site is secured by fencing and the facility is currently being used for staging and warehousing of equipment. However, it is anticipated that the future use of the property will involve uses similar in nature to the historical property use and may involve some modifications to the Site. Hence, potential direct exposures are likely to be limited to workers involved in the Site operations or modifications to the Site. Potential receptors and routes of exposure include:

- Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site. These exposures are expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the site. In addition, occupational health practices that allow for the safe handling of the material would be implemented.
- Direct contact with a trespasser. Although it is possible for trespassers to make their way on Site, this is highly unlikely since the Site is a fenced facility with controlled entrance gates that are locked and considered a secured location.
- Direct contact by ecological receptors including mammals, birds and burrowing animals. The Site is a former industrial property and the anticipated future land use will be consistent with the historical operations. Direct exposures to wildlife are, thus, expected to be minimal.

5.3.2 Exposure to Air/Wind Dispersed Material

VOCs were only detected at concentrations exceeding screening criteria at one location at the Site. The location is covered by asphalt and is not near any buildings to present an indoor air pathway for exposure. However, COPCs can become airborne from areas of the Site which are not covered via wind-blown dust. These areas are however minimal as the majority of the Site is covered with surfaces such as asphalt or concrete. Potential exposures include:

- Inhalation by workers. These exposures are addressed by occupational health practices (e.g., dust monitoring and control during ground intrusive activities) in place at the site and are not likely to be significant.
- Direct contact by humans and ecological species with windblown materials deposited in the surface water and sediments. Bioaccumulation by ecological species and ingestion of

contaminated aquatic organisms is also possible. These exposures are addressed subsequently under surface water/sediment scenarios.

5.3.3 Groundwater Exposure

Organic and inorganic COPCs are present in the groundwater at the Site. Groundwater at the Site is not used for potable or non-potable purposes and the Site and surrounding area are supplied water through a municipal drinking water supply. There is the potential for vapors from volatile constituents in the groundwater to migrate toward potential receptors. Potential exposures include:

- Inhalation of groundwater vapors. Site workers and individuals living or working in adjacent properties may be exposed to vapors resulting from volatile constituents in groundwater which have migrated off-Site and could potentially enter off-Site buildings. These exposures were being evaluated as part of BrightFields off-Site investigation Report in Appendix B.
- Direct contact by workers. Workers conducting Site related subsurface activities have the potential to come in contact with impacted groundwater. Although this potential is limited as the depth to groundwater is generally deeper than most utilities, occupational health practices that allow for the safe handling of the groundwater will be evaluated as part of the Feasibility Study process.

5.4 Modeling Methods and Results

The extent of groundwater impacts has been delineated. As such, modeling is not necessary to establish the area of groundwater impact.

Section 6.0 Baseline Risk Assessment

6.1 Human Health Risk Assessment

The HHRA was conducted in accordance with the methodology presented in the DNREC-approved *Proposed Risk Assessment Approach for Remedial Investigation (RI) – Revised* dated October 1, 2014 (CRA, 2014b) (HHRA Work Plan). The HHRA is presented in Appendix G. The following section provides a summary of the results of the HHRA with details on the specific assumptions, exposure assessments and calculations provided in Appendix G.

The purpose of the HHRA was to determine whether releases of chemicals to environmental media pose unacceptable risks to human health under specific exposure conditions. The HHRA also provides information to support risk management decisions concerning the need for further evaluation of remedial action based upon current and reasonably anticipated future land use.

COPCs were identified in the various media through a comparison to the Delaware screening criteria. Surface soil, soil (including surface and subsurface soil), groundwater, sediment, and surface water were quantitatively evaluated within the HHRA as follows (Note: although total and dissolved metals were used for COPC screening, total metals were used for the risk assessment):

Medium	***Receptor***
Surface soil	• Resident (direct contact) • Trespasser (direct contact) • Outdoor Worker (direct contact)
Soil (surface and subsurface soil)	• Resident (inhalation of indoor air) • Indoor Worker (inhalation of indoor air) • Utility Worker (direct contact) • Construction Worker (direct contact)
Groundwater	• Resident (potable) • Resident (inhalation of indoor air) • Indoor Worker (inhalation of indoor air) • Utility Worker (direct contact) • Construction Worker (direct contact)
Sediment	• Trespasser (direct contact)
Surface Water	• Trespasser (direct contact)

Cancer risks and non-carcinogenic hazards were calculated using the Risk Assessment Information System (RAIS) Calculator (RAIS, 2014) and compared to the target cancer risk level (Risk) of 1×10^{-5} and target hazard index (HI) of 1.0. For scenarios where RAIS could not be used to calculate the human health risks and hazards, the methodology and assumptions used are outlined for the exposure scenario in Section 5.0 of the HHRA. The tables below provide a summary of the results.

OU-3

Medium	***Receptor***	***Route***	***Risk > 10^{-5}?***	***HI > 1?***
Surface Soil	Resident	Direct Contact	**Yes**	No
	Trespasser	Direct Contact	No	No
	Outdoor Worker	Direct Contact	No	No
Surface and Subsurface Soil	Resident	Inhalation of Indoor Air	Not Calculated(1)	No
	Indoor Worker	Inhalation of Indoor Air	Not Calculated(1)	No
	Utility Worker	Direct Contact	No	No
	Construction Worker	Direct Contact	No	No

(1) – Mercury was the only volatile COPC identified for OU-3 soil, and since mercury is not carcinogenic, a cancer risk as not calculated.

OU-4

Medium	***Receptor***	***Route***	***Risk > 10^{-5}?***	***HI > 1?***
Surface Soil	Resident	Direct Contact	No	No
	Trespasser	Direct Contact	No	No
	Outdoor Worker	Direct Contact	No	No
Surface and Subsurface Soil	Resident	Inhalation of Indoor Air	No	No
	Indoor Worker	Inhalation of Indoor Air	No	No
	Utility Worker	Direct Contact	No	No
	Construction Worker	Direct Contact	No	No

OU-5

Medium	***Receptor***	***Route***	***Risk > 10^{-5}?***	***HI > 1?***
Surface Soil	Resident	Direct Contact	**Yes**	**Yes**
	Trespasser	Direct Contact	No	No
	Outdoor Worker	Direct Contact	**Yes**	**Yes**
Surface and Subsurface Soil	Resident	Inhalation of Indoor Air	**Yes**	**Yes**
	Indoor Worker	Inhalation of Indoor Air	**Yes**	**Yes**
	Utility Worker	Direct Contact	**Yes**	No
	Construction Worker	Direct Contact	No	No

OU-6

Medium	***Receptor***	***Route***	***Cancer Risk***	***Risk > 10^{-5}?***	***Non-Cancer Hazard***	***HI > 1?***	***Appendix D Table Reference***
Surface Soil	Resident	Ingestion Dermal Inhalation	5.7E-06	No	1.8E-01	No	Table D.7
Surface Soil	Trespasser	Ingestion Dermal Inhalation	1.0E-07	No	2.8E-03	No	Table D.8

Medium	**Receptor**	**Route**	**Cancer Risk**	**Risk > 10^{-5}?**	**Non-Cancer Hazard**	**HI > 1?**	**Appendix D Table Reference**
Surface Soil	Outdoor Worker	Ingestion Dermal Inhalation	7.5E-07	No	1.1E-02	No	Table D.9
Surface Soil	Utility Worker	Ingestion Dermal Inhalation	2.2E-07	No	3.2E-03	No	Table D.10
Surface Soil	Construction Worker	Ingestion Dermal Inhalation	8.7E-09	No	3.2E-03	No	Table D.11
Sediment	Trespasser	Dermal	**1.9E-05**	**Yes**	2.1E-05	No	Table D.12
Surface Water	Trespasser	Ingestion Dermal	- (1)	- (1)	1.2E-02	No	Table D.13

Notes:
(1) Manganese was the only COPC identified for surface water, and since manganese is not carcinogenic, a cancer risk was not calculated.

Site-Wide Groundwater

Medium	**Receptor**	**Route**	**Risk > 10^{-5}?**	**HI > 1?**
Groundwater	Resident	Potable Exposure	**Yes**	**Yes**
	Resident	Inhalation of Indoor Air	**Yes**	**Yes**
	Indoor Worker	Inhalation of Indoor Air	**Yes**	**Yes**
	Utility Worker	Direct Contact	**Yes**	No
	Construction Worker	Direct Contact	No	No

Off-Site Groundwater

Medium	**Receptor**	**Route**	**Risk > 10^{-5}?**	**HI > 1?**
Groundwater	Resident	Potable Exposure	**Yes**	**Yes**

6.1.2 Summary and Results

6.1.2.1 Surface and Subsurface Soil

OU-3

OU-3 includes the main manufacturing building and areas of the facility. Based on the results of the HHRA, there were no risks above acceptable levels other than for surface soil for resident receptor.

The major contributors to the risk for the resident direct contact with soil were arsenic (7.7E-06) and benzo(a)pyrene (6.4E-05). The resident risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required for arsenic and benzo(a)pyrene in OU-3 soil.

Furthermore, it should be noted that the arsenic exposure point concentration (EPC) applied in the RAIS Calculator was 3.26 mg/kg, which is less than the Delaware soil screening level of 11 mg/kg (DNREC, 2014). The Delaware soil screening level is based on the Delaware background soil concentration, which is greater than the risk-based screening level (i.e., USEPA residential RSL of 0.67 mg/kg) (USEPA, 2015). Since the EPC of arsenic in OU-3 soil is less than the Delaware background soil concentration, no further action would be required for arsenic in OU-3 soil.

OU-4

All calculated health risks were below acceptable levels for OU-4. Therefore, no further action would be required for OU-4 soil.

OU-5

Resident Direct Contact with Soil

The major contributors to the risk for the resident direct contact with soil were arsenic (1.1E-04), ethylbenzene (1.9E-05), lead (1.2E-04), and naphthalene (1.2E-05). The major contributors to the calculated hazard index (20) for the resident direct contact with soil were antimony (7.3), arsenic (2.1), cadmium (5.9), and iron (1.4).

As stated earlier, the resident risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required for OU-5 relative to resident direct contact with soil.

Resident Inhalation of Indoor Air (from Soil)

The major contributors to the calculated cancer risk (1.3E-02) for the resident inhalation of indoor air (from soil) were 1,4-dichlorobenzene (1.3E-03), ethylbenzene (1.1E-02), and naphthalene (9.6E-04). The major contributors to the calculated hazard index (116) for the resident inhalation of indoor air (from soil) were ethylbenzene (12), mercury (2.1), naphthalene (25), and xylenes (76).

As stated earlier, the residential risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required to address indoor air at OU-5 relative to resident inhalation of indoor air. Furthermore, as discussed in the HHRA there are significant uncertainties associated with the soil to indoor air pathway and some regulatory jurisdictions do not recommend evaluating this pathway.

Indoor Worker Inhalation of Indoor Air (from Soil)

The major contributors to the calculated cancer risk (4.6E-03) for the indoor worker inhalation of indoor air (from soil) were 1,4-dichlorobenzene (4.3E-04), ethylbenzene (3.8E-03), and naphthalene (3.3E-04). The major contributors to the calculated hazard index (41) for the indoor worker inhalation of indoor air (from soil) were ethylbenzene (4.3), naphthalene (9.1), and xylenes (27).

OU-5 is a paved parking lot and there are currently no buildings or structures present. Therefore, the indoor worker scenario is not currently applicable. The future anticipated use of the Site would be similar to the historical and current use of the Site. Therefore, no further action to address indoor worker inhalation is warranted at OU-5. Furthermore, as discussed in the HHRA there are significant uncertainties associated with the soil to indoor air pathway and some regulatory jurisdictions do not recommend evaluating this pathway.

Outdoor Worker Direct Contact with Soil

The major contributors to the calculated cancer risk (5.2E-05) for the outdoor worker direct contact with soil were arsenic (2.1E-05) and lead (2.3E-05). The major contributors to the calculated hazard index (1.3) for the outdoor worker direct contact with soil were antimony (0.44), arsenic (0.13), and cadmium (0.38). There were no individual COPCs with calculated hazard indices greater than the acceptable hazard index level of 1.0.

Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material would be implemented.

Utility Worker Direct Contact with Soil

The major contributors to the calculated cancer risk (1.2E-05) for the utility worker direct contact with soil were arsenic (4.6E-06) and lead (6.7E-06).

Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material would be implemented.

OU-6

Health risks above acceptable levels were calculated for the trespasser direct contact exposure to OU-6 sediment. The major contributor to the calculated cancer risk (1.9E-05) for the trespasser direct contact exposure to sediment was benzo(a)pyrene (1.5E-05), present in the on-Site sediment samples collected from Outfall 001 prior to the discharge weir.

The trespasser direct contact exposure to sediment for only benzo(a)pyrene does not warrant further action with regard to the HHRA, The sediment and surface water down stream of the Outfall and the mass loading to Little Mill Creek are also being evaluated in the ERA.

6.1.2.2 Site-Wide Groundwater

Resident Inhalation of Indoor Air (from groundwater)

The major contributors to the calculated risk for the resident inhalation exposure to indoor air (from groundwater) were benzene (6.1E-05) and ethylbenzene (3.1E-05). The major contributors to the calculated hazard index (6) for the resident inhalation exposure to indoor air (from groundwater) were 1,2,4-trimethylbenzene (3.8) and xylenes (1.2).

The resident risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required to address residential risks.

Indoor Worker Inhalation of Indoor Air (from groundwater)

The major contributors to the calculated risk (1.8E-05) for the indoor worker inhalation exposure to indoor air (from groundwater) were benzene (1.2E-05) and ethylbenzene (5.8E-06). The major contributors to the calculated hazard index (1.1) for the indoor worker inhalation exposure to indoor air (from groundwater) were 1,2,4-trimethylbenzene (0.7) and xylenes (0.24). As indicated above, there were no individual COPCs with calculated hazard indices greater than the acceptable hazard index level of 1.0. Additionally, these contaminants are specifically associated with OU-4/AOI-16 located on the east side of the Site. Groundwater associated with AOI-16 is being evaluated with the off-Site groundwater and vapor impacts by BrightFields through the Focused Feasibility Study Former Wilmington Assembly Plant – Dodson Ave. Interim vapor Phase Remediation dated May 2014.

Resident Potable Groundwater Exposure

The major contributors to the calculated risk (1.5E-03) for the resident potable groundwater exposure were aroclor-1260 (3.1E-05), arsenic (1.0E-04), benzene (6.3E-04), chloroform (1.1E-05), 1,2-dichloroethane (2.1E-05), ethylbenzene (2.7E-04), and naphthalene (4.2E-04).

The major contributors to the calculated hazard index (129) for the resident potable groundwater exposure were benzene (8.6), 1,1-biphenyl (11), cobalt (9.5), iron (3), manganese (32), naphthalene (11), 1,2,4-trimethylbenzene (38), and xylene (11).

The resident risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Moreover, residents in the impacted area are serviced by the public water supply system. Therefore, no further action would be required to address residential risks.

Utility Worker Direct Contact with Groundwater

The major contributor to the calculated risk (7.5E-05) for the utility worker direct contact exposure to groundwater was aroclor-1260 (6.5E-05).

Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material during utility work would be implemented. No further action to address direct contact with groundwater is required.

6.1.2.3 OU-2 Groundwater

As discussed in Section 4.0 a Groundwater Remedial Investigation and Feasibility Study (RI/FS) report was prepared and submitted to DNREC to evaluate the groundwater conditions in OU-2 in January 2009 (CRA, 2009b). The OU-2 Groundwater RI/FS included an HHRA that concluded that the concentrations of constituents in groundwater within OU-2 do not pose a significant risk either under current use conditions or if future operations at OU-2 where to entail a much higher degree of worker presence and were not to be regulated by OHSA.

Subsequently, a Limited Action remedy consisting of routine groundwater sampling was conducted in the vicinity of the OU-2 Area from August 2008 through May 2010. The groundwater analytical data generated throughout the duration of the Limited Action remedy demonstrated that the extent of groundwater contamination had not migrated beyond OU-2, and that with the exception of chlorobenzene at MW-7, the relevant concentrations of groundwater contaminants had not increased significantly over the monitoring period. As such, impacts to groundwater were consistent with the conditions evaluated in the OU-2 Groundwater HHRA.

However, as noted in the RI Work Plan, there were sample results during the Limited Action remedy that exceeded the previously detected maximum concentrations contemplated by the OU-2 HHRA. These include the following parameters:

- Chlorobenzene
- 1,4-dichlorobenzene
- Ethylbenzene
- Vinyl chloride
- Xylenes
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- Antimony
- Arsenic
- Iron
- Manganese

Therefore, as part of the risk evaluation for the Site, the parameters that exceeded the previously detected maximum concentrations contemplated by the OU-2 Area HHRA were further evaluated to determine if the conclusions of the OU-2 Groundwater HHRA remain valid and determine if further evaluation of these parameters in the Site-wide HHRA is warranted.

To determine if the conclusions of the OU-2 Groundwater HHRA remain valid, several approaches, or lines of evidence, were used to look at the data to ensure that a comprehensive analysis has been completed. The first approach was to compare the concentrations used in the OU-2 Groundwater HHRA risk calculations to the maximum detected concentrations and 95 percent upper confidence limit (UCL) concentrations from the entire 2008 to 2010 groundwater monitoring program as summarized below. In addition to treating the entire dataset as a whole, as a second level of evaluation the data was reviewed in more detail for the wells which are located in groundwater area exhibiting the highest levels of impact (i.e., MW-3, MW-11 and MW-12) since this area represents the highest risk to potential receptors.

In the OU-2 Groundwater HHRA, the maximum detected concentrations were used in the risk calculations, generally due to the sample size, with the exception of acetone, benzene, chromium (total), ethylbenzene, 2-methylnaphthalene, naphthalene, toluene, vanadium, and xylenes (total). For these parameters the 95 percent UCL was calculated and used in the risk calculations. However, the OU-2 Groundwater HHRA also looked at the associated risk if the maximum detected concentration had been used for all parameters (i.e., the OU-2 Groundwater HHRA look at both the risk associated with using the 95 percent UCL for select parameter and the risk associated with using the maximum detected for all parameters).

			2008 to 2010 Groundwater Data		
Parameter	***Units***	***Concentration Used in OU-2 HHRA***	***Max Detected Concentration***	***Date/Location of Max Detected***	***95 Percent UCL***
	Volatile Organic Compounds				
1,4-Dichlorobenzene	µg/L	14	120	MW-15 – 03/10	13.6
Chlorobenzene	µg/L	76	1,300	MW-7 – 03/10	220
Ethylbenzene	µg/L	18,000	19,000	MW-3 – 03/10	2,400
Vinyl chloride	µg/L	--	2.5	MW-12 – 02/08	0.70
Xylenes (total)	µg/L	8,460	32,000	MW-3 – 03/10	4,100
	Semi-volatile Organic Compounds				
Dibenz(a,h)anthracene	µg/L	--	3.7	MW-13 – 08/08	-- (1)
Indeno(1,2,3-cd)pyrene	µg/L	--	3.7	MW-13 – 08/08	-- (1)
Naphthalene	µg/L	608	3,200	MW-13 – 02/09	490
	Metals				
Antimony	µg/L	--	6.7	MW-9 – 11/08	6.2
Arsenic	µg/L	47.4	47.8	MW-11 – 08/08	12
Iron	µg/L	--	285,000	MW-3 – 02/09	64,000
Manganese	µg/L	21,300	25,800	MW-3 – 02/09	4,700

Notes:

- Not detected in the OU-2 dataset

(1) Only one detection, therefore, UCL cannot be determined

Comparison of the concentrations used in the OU-2 HHRA to the maximum detected concentrations from the 2008 to 2010 groundwater monitoring data show that the maximum detected concentrations exceed the concentration used in the OU-2 HHRA for each of the parameters listed above. However, given the number of data points from the 2008 to 2010 groundwater monitoring event, there is sufficient data to calculate the 95 percent UCL concentrations for these parameters which would be a more appropriate concentration to use in the risk assessment. For 1,4-dichorobenzene, ethylbenezene, xylenes (total), naphthalene, arsenic, and manganese, the 95 percent UCL concentration is below the concentration used in the OU-2 HHRA, therefore, on the basis of the 95 percent UCL concentration the 2008 to 2010 dataset does not change the conclusions of the OU-2 HHRA for these parameters.

Further analysis of these six parameters relative to the mostly highly impacted area of groundwater in OU-2 (i.e., MW-3, MW-11 and MW-12) indicates that the maximum detected concentration for 1,4-dichlorobenze and naphthalene were not observed in this area (i.e., they were observed at MW-15 and MW-13, respectively). This finding is consistent with a lack of a specific contaminant plume for these constituents, and therefore, the use of a 95 percent UCL across OU-2 is considered appropriate for this evaluation. It should also be noted that the maximum detected concentration of 1,4-dichlrobenze of 120 µg/L, which was detected at MW-15 in February 2009 appears to be anomalous. The following sample collected from MW-15 in March 2010 contained a concentration of 1,4 –dichlorobenzene of 0.27 J µg/L and the next highest concentration of 1,4-dichlorobenzene collected during the 2008 to 2010 dataset is 9 µg/L (MW-7 in February 2009).

The maximum detected concentration for ethylbenzene, xylenes (total), arsenic, and manganese did occur at either MW-3 or MW-11. As noted in the Groundwater Monitoring Report OU-2 Bulk Product Tank Area (March, 2011) the maximum detected concentrations of ethylbenzene and xylenes (total) during the Interim Remedial Action show no increasing trend and are less than 5 percent higher than the maximum detected concentration contemplated in the OU-2 Groundwater HHRA. This pattern is consent with the normal variability of data over time and therefore not considered likely to impact the results of the HHRA.

The maximum detected concentration for arsenic and manganese was also observed in this area (MW-11 and MW-3, respectively). Consistent with the site-wide data and the data from the OU-2 groundwater monitoring, a specific contaminant plume related to metals in groundwater does not exist for the Site. The data as presented in the Groundwater Monitoring Report OU-2 Bulk Product Tank Area (March, 2011) is either isolated to a select number of monitoring wells (as in the case of arsenic) or fairly widespread throughout OU-2 (as in the case of manganese). Therefore, as noted above, the use of the 95 percent UCL concentration is the most appropriate approach for evaluating the potential risk when sufficient data exists.

Vinyl chloride, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and antimony were not detected in the dataset used in the OU-2 HHRA. During the 2008 to 2010 groundwater monitoring events, these parameters were detected infrequently and therefore would have been screened out of the site wide HHRA due to low detection frequency. Dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were each detected in one sample result (from MW-13 in August 2009) of 48 samples analyzed for these parameters during the monitoring program. Vinyl chloride and antimony were each detected in two samples of the 83 samples analyzed for these parameters during the monitoring event. Moreover, the maximum detected concentrations, which are the basis for the further analysis conducted herein, were detected during the February or August 2008 sampling events. More recent data from 2009 and 2010 collected as part of the Limited Action remedy showed these constituents to be non-detect or below screening criteria. Therefore, no further evaluation of these parameters within the risk assessments is warranted.

Iron was not included in the OU-2 HHRA as it does not pose a significant risk for the exposure pathways evaluated in the OU -2 HHRA (i.e., volatilization to indoor air and direct contact with groundwater). Therefore, the concentrations of iron in the 2008 to 2010 dataset does not change the conclusions of the OU-2 HHRA for iron.

The concentrations of chlorobenzene observed in the 2008 to 2010 groundwater dataset are sufficiently higher than the concentrations used in the OU-2 HHRA that further evaluation of this parameters would be warranted (i.e., 95 percent UCL from 2008 to 2010 dataset is 220 µg/L compared to the maximum detected concentration used in the OU-2 HHRA of 76 µg/L). However, upon further review of the risk calculations from the OU-2 HHRA it is clear that chlorobenzene is not a significant contributor to the risk associated with OU-2 groundwater. The U.S. EPA cancer classification for chlorobenzene is Group D, not classifiable as to human carcinogenicity and therefore it does not contribute to the carcinogenic risk calculation in the OU-2 HHRA. The largest contributors to the HI's calculated in the OU-2 HHRA were toluene, vanadium, naphthalene, ethylbenzene, and xylenes(total). Moreover, since the HI's calculated in the OU 2 HHRA are less than one and the HI related to chlorobenzene is more than an order of magnitude lower than HI's for the largest contributors, the change in the concentration of chlorobenzene from the OU 2 HHRA dataset to the 2008 to 2010 dataset does not change the conclusions of the OU-2 HHRA.

Lastly, in accordance with the RI Work Plan samples were collected to confirm detections of lead at MW-15 and toluene at MW-11 in 2010. The 2010 results indicated concentrations exceeding the applicable criteria at the time. The concentrations of these parameters at these wells had been below the applicable criteria prior to the 2010 sampling event. The results of the sampling conducted under the RI are presented in Table 6.1. Using a direct comparison, the results for lead, dissolved lead, and toluene were below the screening criteria used for the RI. Therefore, no further action is warranted to address the May 2010 detections of lead at MW-15 and toluene at MW-11 in May 2010.

6.1.2.4 Off-Site -Groundwater

The major contributors to the calculated risk (3.2E-04) for the off-Site resident potable groundwater exposure were ethylbenzene (9.7E-05) and naphthalene (2.2E-04) and associated with OU-4. The major contributors to the calculated hazard index (20) for the off-Site resident potable groundwater exposure were naphthalene (5.9), 1,2,4-trimethylbenzene (12), and xylene (1.5).

Off-Site impacts are currently being addressed by BrightFields through the Focused Feasibility Study Former Wilmington Assembly Plant – Dodson Ave. Interim Vapor Phase Remediation dated May 2014.

6.2 Ecological Risk Assessment

An ERA consisting of Steps 1, 2, and 3a of the USEPA process for conducting ecological risk assessment is presented in Appendix H. Media evaluated were soil collected from the main manufacturing area and an area of mature forest east of the Site (wooded area) and surface water and sediment of Little Mill Creek, which is located in the wooded area. Sediment collected from a stormwater ditch in the northeastern portion of the Site was also evaluated.

The screening process (Steps 1 and 2) identified COPECs by comparing maximum concentrations to ecological screening values (ESVs). In Step 3a, the COPECs identified in the screening process were refined by considering complete exposure pathways, exposure concentrations based on 95 percent UCL concentrations, background concentrations, and alternative ecological benchmarks. Food chain models were used to assess the potential for risk to avian and mammalian wildlife.

6.2.1 Main Manufacturing Area

Based on maximum detected concentrations detected in soil of the main manufacturing area, the screening process identified four VOCs (cyclohexane, cis 1,2 dichloroethene, isopropylbenzene, and methylcyclohexane), three BTEX constituents (benzene, ethylbenzene, and total xylenes), two SVOCs (bis(2 ethylhexyl)phthalate and butylbenzylphthalate), high molecular weight (HMW) polycyclic aromatic hydrocarbons (PAHs), total PCBs, three pesticides (4,4' DDT, endrin aldehyde, and endrin ketone), and 17 metals (aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, titanium, vanadium, and zinc) as COPECs.

The Step 3a refinement process eliminated all COPECs for soil in the main manufacturing area. All samples in the dataset were collected from areas covered by pavement or other man made surfaces. Due to the cover, ecological receptors are not exposed to the COPECs in soil.

6.2.2 Wooded Area

Screening of surface soil collected from the wooded area identified two VOCs (isopropylbenzene and methylcyclohexane), one SVOC (butylbenzylphthalate), and 12 metals (aluminum, antimony, cadmium, chromium, copper, iron, lead, manganese mercury, selenium, vanadium, and zinc) as COPECs. Isopropylbenzene and methylcylcohexane were retained as COPECs due the lack of ESVs. Aluminum was retained because pH of the soil, which is the basis of the ESV, is uncertain. The maximum concentration of cadmium was below its ESV. However, cadmium was retained as a COPEC because it is a bioaccumulative chemical of concern (BCOC) and could potentially pose risk to upper trophic level wildlife.

The 15 constituents retained as COPECs for the wooded area were refined by evaluating the potential for risk to soil invertebrates, terrestrial plants, avian wildlife, and mammalian wildlife. Selection of refinement benchmarks (RBs) for the four receptor groups considered background concentrations in New Castle County. Due to the absence of RBs and background concentrations, potential risk to soil invertebrates and terrestrial plants could not be evaluated for isopropylbenzene, methylcyclohexane, and butylbenzylphthalate. However, based on several lines of evidence, including the absence of indicators of stressed vegetation in the wooded area, these three organic compounds are not expected to pose a significant potential for risk to soil invertebrates or terrestrial plants. None of the 12 metals carried forward for refinement were identified as posing risk to soil invertebrates and terrestrial plants.

The refinement for avian and mammalian wildlife identified isopropylbenzene, methylcylcohexane, butylbenzylphthalate, antimony, cadmium, lead, mercury, and selenium as potentially posing risk. These eight constituents were further evaluated using food chain models. Food chain models did not identify a potential for risk to avian and mammalian wildlife for any of the eight constituents.

6.2.3 Surface Water of Little Mill Creek

The screening of data collected in 2012 identified aluminum, barium, and zinc as COPECs for the surface water of Little Mill Creek. The refinement process eliminated all three of these metals as COPECs. For the supplemental data collected in 2014, concentrations of barium in surface water collected from Outfall 001 and the stormwater outfall and manganese in the surface water from the stormwater outfall exceed the DNREC surface water screening levels. These two areas provide limited habitat for aquatic life. Consequently, the potential for risk to aquatic life at Outfall 001 and stormwater outfall is limited due to an incomplete exposure pathway.

Concentrations of barium in all samples collected from Little Mill Creek and lead in one sample exceed their DNREC screening levels. Concentrations of barium are very similar for all samples, which suggests that concentrations above the screening level are due to natural sources. The screening level for barium is a Tier II value, which includes safety factors. All concentrations in Little Mill Creek are below the ecological screening level (ESL) identified by USEPA Region 5. Consequently, it can reasonably be concluded that concentrations of barium in Little Mill Creek do not pose risk to aquatic life above the threshold for concern.

The single detected concentration of lead in Little Mill Creek is below numerous ecological benchmarks for aquatic life. Furthermore, the absence of detected concentrations of lead in either outfall or perimeter groundwater wells suggests lead may be attributable to sources other the Site.

6.2.4 Sediment

The screening process for sediment collected in 2011 and 2012 identified bis(2 ethylhexyl)phthalate, butylbenzylphthalate, carbazole, and dibenzofuran, low molecular weight (LMW) PAHs, HMW PAHs, TPH, and 12 metals (antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, vanadium, and zinc) as COPECs for sediment. The refinement process identified a potential for risk to benthic invertebrates exposed to organic compounds (toluene and SVOCs), PAHs, chromium, copper, lead, and zinc in the sediment. Food chain models identified a potential for risk to avian and mammalian wildlife exposed to HMW PAHs (avian piscivores), TPH (mammalian insectivores), mercury (avian piscivores), vanadium (avian piscivores), and zinc (avian piscivores).

As a result of the initial screening, supplemental data for sediment were collected in 2014 and analyzed for PAHs and metals. Concentrations of total PAHs in bulk sediment exceed both the lower tier no effect and upper tier lowest effect sediment quality benchmarks (SQBs) in the stormwater ditch and one station in Little Mill Creek (SED 100 02). Consideration of ESBs, which take into account bioavailability and relative toxicity of the individual PAHs, also identified a potential for risk to benthic invertebrates for the stormwater ditch and all stations in Little Mill Creek, with the highest potential at SED 100 02.

PAHs are ubiquitous in the environment due to the large number and diversity of sources that potentially release PAHs into the environment (Boehm, 2006; Neff et al., 2005). Several lines of evidence suggest that the elevated concentrations of PAHs in the stormwater ditch and Little Mill Creek are due to sources other than the Site. The Norfolk Southern rail yard, which forms the northern boundary of the Site, is potentially a significant source of PAHs. Sources of PAHs in the rail yard include diesel fuel, lubricating oils, creosote in ties, and incomplete combustion products from burning of diesel fuel. Another potential source of PAHs is the urban watershed of Little Mill Creek upstream of the Site. Sources of PAHs in the urban watershed include oil and incomplete combustion products from car and truck traffic.

If Site-related sources upstream of the stormwater ditch are the primary source of PAHs in the sediment of Little Mill Creek, then the relative composition of PAHs is be expected to be different upstream of the Site and adjacent and downstream of the Site. This is not the case. Analysis of the relative concentrations of the six predominate parent PAHs in sediment identified a consistent pattern for samples collected from the stormwater ditch, upstream of surface inputs from the Site (i.e., outfalls), and adjacent to the Site. This consistency strongly suggests that PAHs are most likely attributable to sources other than Site-related activities. Groundwater provides another line of evidence for determining if the Site is a source of PAHs in Little Mill Creek. If PAHs are migrating from the Site, then the PAHs detected in Little Mill Creek at elevated concentrations would also be expected to be present in groundwater. The absence of detected concentrations of any of the PAHs in all perimeter wells provides an additional line of evidence for non-Site sources of PAHs.

Concentrations of PAHs and metals in the sediment of Little Mill Creek were lower for the 2014 samples than those collected in 2011 and 2012, which are less representative of EPCs for current conditions in Little Mill Creek. The food chain model for belted kingfisher was reevaluated for HMW PAHs and zinc. Based on EPCs for the 2014 data, the potential for risk to belted kingfisher exposed to HMW PAHs and zinc is below the threshold for concern.

Semi volatile organic compounds, TPH, mercury, and vanadium were retained as COPECs for sediment based on data collected in 2011 and 2012. For this dataset, all detected concentrations of TPH and mercury were in samples collected from the stormwater ditch, which provides limited habitat for aquatic receptors. The absence of detected concentrations of mercury in Little Mill Creek was confirmed with the supplemental data collected in 2014. The only sample with concentrations of SVOCs with a potential for risk to benthic invertebrates was collected in the stormwater ditch. Vanadium was detected in both the stormwater ditch and Little Mill Creek, with the samples with the highest concentrations collected from the stormwater ditch. Based on these data, it can reasonably be concluded that SVOCs, TPH, mercury, and vanadium do not pose a potential for risk to the aquatic life of Little Mill Creek.

6.2.5 Mass Loading

Comparison of concentrations of dissolved metals in groundwater in the perimeter wells and surface water of Little Mill Creek identified iron and manganese as potential indicators of loading to Little Mill Creek. However, concentrations of both iron and manganese in Little Mill Creek are substantially below their DNREC screening levels, suggesting no impact to aquatic life.

Section 7.0 Summary and Conclusions

7.1 Summary

A RI was conducted at the Site between September 2011 and November 2014. This included the evaluation of off-Site impacts in the area east of the Site near Dodson Avenue by BrightFields as reported in Appendix B. A total of 18 AOIs were investigated as part of the RI activities in accordance with the RI Work Plan, the September 7, 2011 Addendum to the RI Work Plan, the July 27, 2012 Supplemental RI Work Plan, and the Supplemental Investigation Work Plan for OU-6 dated September 29, 2014. All work was done with DNREC concurrence.

The scope of the on-Site RI activities conducted by CRA included the evaluation of surface soil (i.e., 0-2 feet bgs), soil (i.e., 2-10 feet bgs), groundwater, soil gas, sediment and surface water. The on-site portion of the RI included the following activities:

- Installation of 124 soil borings and the collection of 231 soil samples (this number includes all of the soils from AOI-12 that were field screened for metals in 2012 but not retained for potential confirmatory analysis)
- Installation of 17 new monitoring wells and the collection of 76 groundwater samples (this number includes the 40 groundwater samples collected from the vertical aquifer sample locations)
- The collection of 18 sediment and 12 surface water samples
- Collection of 5 soil gas samples

In addition to the above, an evaluation of groundwater, soil gas and indoor air was conducted in the eastern portion of the facility (in the vicinity of AOI-16) and off-Site in the neighborhood of Dodson Avenue. This work is summarized in a report prepared by BrightFields and provided in Appendix B.

7.1.1 Nature and Extent of Contamination

The results of the RI sampling activities were compared to the DNREC SIRS Screening Levels to determine a list of COPCs for each AOI. The initial screening was completed by comparing the maximum detected concentration in each AOI to the corresponding Screening Level. Any parameters in each AOI where the maximum detected concentration was below the SIRS Screening Level were eliminated from further evaluation.

Following the initial screening, benzo(a)pyrene (OU-3, OU-5, and OU-6), 2-methylnaphthalene (OU-5), and naphthalene (OU-5) were the only organic compounds that were identified as a COPCs in surface soil (i.e., 0 to 2 feet bgs).

The only organic compound identified as a COPC in soil (i.e., 2 to 10 feet bgs) was 2-methylnaphthalene at OU-4. in addition, the following inorganic compounds were determined to be COPCs for surface soil and soil:

- Surface Soil OU-3 – antimony, arsenic, cobalt, lead, manganese, mercury, nickel
- Soil OU-3 – antimony, arsenic, cobalt, manganese

- Surface Soil OU-5 – antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, zinc
- Surface Soil OU-5 – antimony, arsenic, barium, cadmium, cobalt, copper, iron, lead, manganese, mercury, vanadium
- Surface Soil OU-6 – antimony, lead

An initial screening also identified a number VOCs, SVOCs, and metals present in Site groundwater above the Screening levels, including the following:

- VOCs detected in groundwater included 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, 2-hexanone, benzene, carbon tetrachloride, chloroform (trichloromethane), cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, trichloroethene, xylenes (total).
- SVOCs detected in groundwater included 2-methylnaphthalene, biphenyl (1,1-biphenyl), dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-cd)pyrene, naphthalene.
- Metals detected in groundwater included aluminum, arsenic, barium, cobalt, iron, lead, manganese, selenium and vanadium.

SVOCs and metals were the only parameters detected in the sediments samples collected from the outfall areas during the RI. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)oyrelen, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3 cd)pyrene , and 2-methylnaphthalene, antimony, copper, lead, and zinc were each detected in the sediment samples.

Manganese was the only parameter detected in surface water at concentrations exceeding the Screening Level. Manganese was detected in each of the five surface water samples at concentrations ranging from 41.3 µg/L to 76.7 µg/L which are above the Screening Level of 32 µg/L.

The results of the off-Site groundwater and soil gas investigation confirmed the presence of residual contamination from an historical petroleum release at the former UST area adjacent to the Anchor Motor Freight Building (OU-4/AOI-16). A dissolved VOC impacted groundwater plume has migrated from the source area near the eastern property boundary to the north-north east. The concentrations of VOCs decline as the plume moves east with the highest observed concentrations being at MW-36 and MW-36D on Site and off-Site well MW-42. The BrightFields report notes that "Groundwater concentrations decline significantly as they move away from the historical source area and do not appear to be reaching an end point receptor."

The BrightFields report also concludes that the VOCs in soil gas that is encroaching on townhome parcels directly adjacent to the property along Dodson Avenue, currently does not appear to be affecting end point receptors.

The results of the indoor air sampling at the townhomes east of the Site indicated that the concentrations of VOCs in the samples were not Site related, but rather, likely from new construction materials. In addition, it was determined that there was not a complete vapor intrusion pathway at the Reybold Self-Storage buildings since they are unoccupied and the rental office is off-Site.

7.1.2 Human Health Risk Assessment

An HHRA was conducted to determine whether releases of chemicals to environmental media pose unacceptable risks to human health under specific exposure conditions and to provide information to support risk management decisions concerning the need for remedial action based upon current and reasonably anticipated future land use.

As a baseline, the following resident exposure scenarios were evaluated in the HHRA.

Surface Soil – direct contact
Soil (Surface and subsurface soil) – inhalation of indoor air
Groundwater – potable and inhalation of indoor air

Risks associated with the resident risk analysis are not applicable to the Site based on current and future anticipated use of the Site, and therefore, no further action would be required to address residential risks.

The following additional trespasser worker scenarios were also evaluated in the HHRA.

Surface soil	Trespasser (direct contact) Outdoor Worker (direct contact)
Soil (surface and subsurface soil)	Indoor Worker (inhalation of indoor air) Utility Worker (direct contact) Construction Worker (direct contact)
Groundwater	Indoor Worker (inhalation of indoor air) Utility Worker (direct contact) Construction Worker (direct contact)
Sediment	Trespasser (direct contact)

Surface Water	Trespasser (direct contact)

Calculated risks to human health for the above scenarios required further action for the following scenarios:

- Outdoor Worker and Utility Worker for direct contact with soil associated with arsenic and lead in OU-5 (i.e., OU-5/AOI 12 – Test Track Waste Storage Area)
- Off-Site Groundwater, which is being addressed under a separate feasibility study process

7.1.3 Ecological Risk assessment

An ERA, consisting of Steps 1, 2, and 3a of the USEPA process for conducting ecological risk assessment (USEPA 1997), was conducted for Site. Media evaluated were soil and surface water and sediment of Little Mill Creek, which is located in an area of mature forest east of the Site.

The screening process (Steps 1 and 2) identified constituents of COPECs by comparing maximum concentrations to ESVs. In Step 3a, the COPECs identified in the screening process were refined by considering complete exposure pathways, exposure concentrations based on 95 percent UCL concentrations, background concentrations, and alternative ecological benchmarks. Food chain models were used to assess the potential for risk avian and mammalian wildlife.

The ERA process for soil collected from the main manufacturing area eliminated all COPECs for soil in the main manufacturing area. All soil samples in the main manufacturing area dataset were collected for areas covered by pavement or other man made surfaces. Due to the cover, ecological receptors are not exposed to the COPECs in soil.

The ERA process for soil collected for the wooded area in OU-6 did not identify a potential for risk to any ecological receptors exposed to any of the chemical constituents detected in the wooded area above the threshold for concern.

The ERA process for surface water collected from Little Mill Creek in 2011 concluded that the potential for risk due to aluminum, barium, and zinc is below the threshold for concern. The single detected concentration of lead in the 2014 dataset is most likely from sources other than the Site.

The ERA process for sediment collected from Little Mill Creek and stormwater ditch in 2011 and 2012 retained SVOCs, PAHs, and five metals as COPECs. The only detected concentrations of petroleum hydrocarbons and mercury were in samples collected from the stormwater ditch, which provides limited habitat for ecological receptors.

Due to uncertainty regarding the potential source of constituents in the sediment, a supplemental dataset was collected from Little Mill Creek in 2014. The supplement sampling provided additional data for PAHs and metals. The subsequent risk characterization for sediment for the supplemental dataset did not identify a potential for risk for benthic invertebrates exposed to metals or avian piscivores exposed to metals and PAHs above the threshold for concern. The risk characterization did, however, identify a potential for risk to benthic invertebrates exposed to PAHs in the stormwater ditch and Little Mill Creek.

Several lines of evidence suggest that the elevated concentrations of PAHs in the sediment of Little Mill Creek are not from sources migrating from the Site. One line of evidence is the presence of numerous sources of PAHs in the watershed of Little Mill Creek, including the urban land use upstream of the Site (oil, incomplete combustion products from car and truck traffic) and the Norfolk Southern rail yard (diesel fuel, lubricating oils, creosote, and incomplete combustion products). A second line of evidence is the consistency in the composition of the predominant PAHs in samples collected in the stormwater ditch, upstream, and adjacent to the Site. A third line of evidence is the absence of detected concentrations of PAHs in perimeter wells on the Site.

The evaluation of potential loading to Little Mill Creek from groundwater identified iron and manganese as potentially migrating from the Site to Little Mill Creek. The low concentrations of both iron and manganese at all sampling locations in Little Mill Creek document that, although loading may be occurring, aquatic life is not impacted by migration of metals from the Site. Therefore no further investigation or remedial actions are required for these chemicals.

7.2 Conclusions

A comprehensive review and evaluation of potential release to the environment has been completed for the Site through the RI process. The investigation and sampling has confirmed that impacts to soil, groundwater, sediment and surface water are present throughout the Site above the DNREC SIRS Screening Levels.

The evaluation of the Site-wide groundwater identified that although the calculated risks for indoor worker inhalation of indoor air were above the threshold, there were no individual COPCs with calculated hazard indices greater than the acceptable hazard index level of 1.0. Additionally, these contaminants are specifically associated with OU-4/AOI-16 located on the east side of the Site. The groundwater associated with OU-4/AOI-16 is being addressed with the off-Site groundwater and vapor impacts by BrightFields through the Focused Feasibility Study Former Wilmington Assembly Plant – Dodson Ave. Interim vapor Phase Remediation dated May 2014.

Utility worker exposure via direct contact (i.e., incidental ingestion, and dermal contact) with on-Site groundwater by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material during utility work would be implemented. No further action to address direct contact with groundwater is required, however, due to the groundwater impacts present, a remedy will need to be further evaluated in the Feasibility Study

Metals are present in Site surface soils and soils. The majority of soil impacts are located in the surface soil (i.e., 0 to 2 feet bgs) and are consistent with the historical operation of the facility for automotive manufacturing. Through the risk assessment process, only arsenic and lead are present in Site soils OU-5/AOI-12 at levels that pose a threat to human health and will require remedial action.

Section 8.0 References

BrightFields, 2010. Environmental Baseline Investigation Report, Former General Motors Corporation – Wilmington Assembly Plan (Fisker Automotive), October 2010.

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CRA, 2011b. Addendum to Remedial Investigation Work Plan, Former GM Wilmington Assembly Plant, Conestoga-Rovers & Associates, March 2011.

CRA, 2011c. Groundwater Monitoring Report, OU-2 Bulk Product Tank Area, Former GM Corporation Wilmington Assembly Plant, Conestoga-Rovers & Associate, March 2011.

CRA, 2012. Memo to R. Galloway, DNREC from G. Carli and C. Barton, CRA, Supplemental Remedial Investigation Work Plan, Former Wilmington Assembly Plant, Conestoga-Rovers & Associates, July 2012.

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CRA, 2014b. Memo to R. Galloway, DNREC from C. Barton and V. Nero, CRA, Proposed Risk Assessment Approach for Remedial Investigation, Former Wilmington Assembly Plant, Wilmington, Delaware, Conestoga-Rovers & Associates, October 2014.

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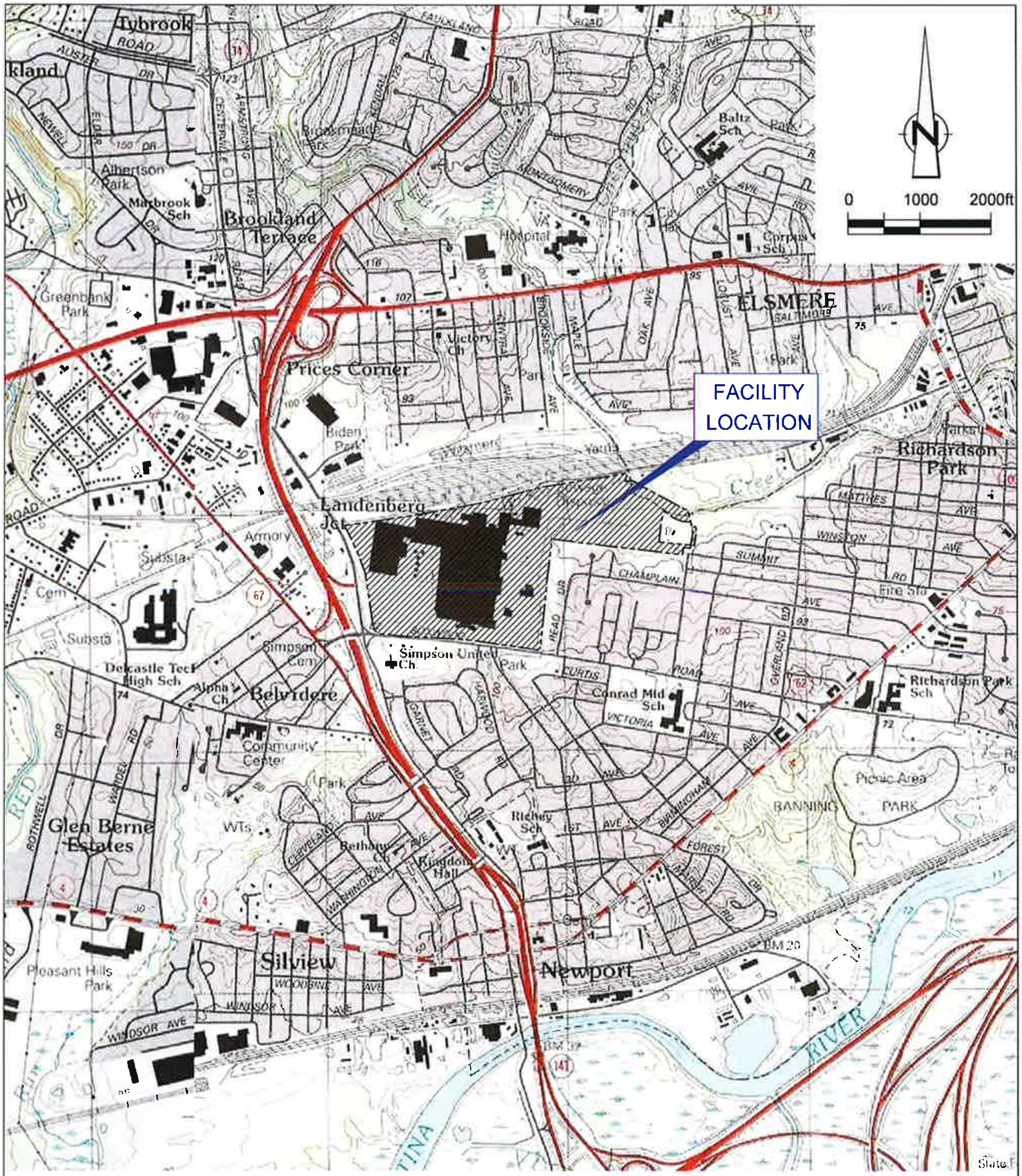
DNREC, 2014, Screening Level Table – Department of Natural Resources and Environmental Control, Division of Waste and Hazardous Substances, Site Investigation & Restoration Section, Delaware DNREC, October 2014.

RAIS, 2014. The Risk Assessment Information System Models

USEPA 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment, USEPA/540/R-97/006, June 1997.

USEPA, 2015. Regional Screening Level (RSL) Summary Table (TR=1E-6, HQ=0.1), January 2015

Figures



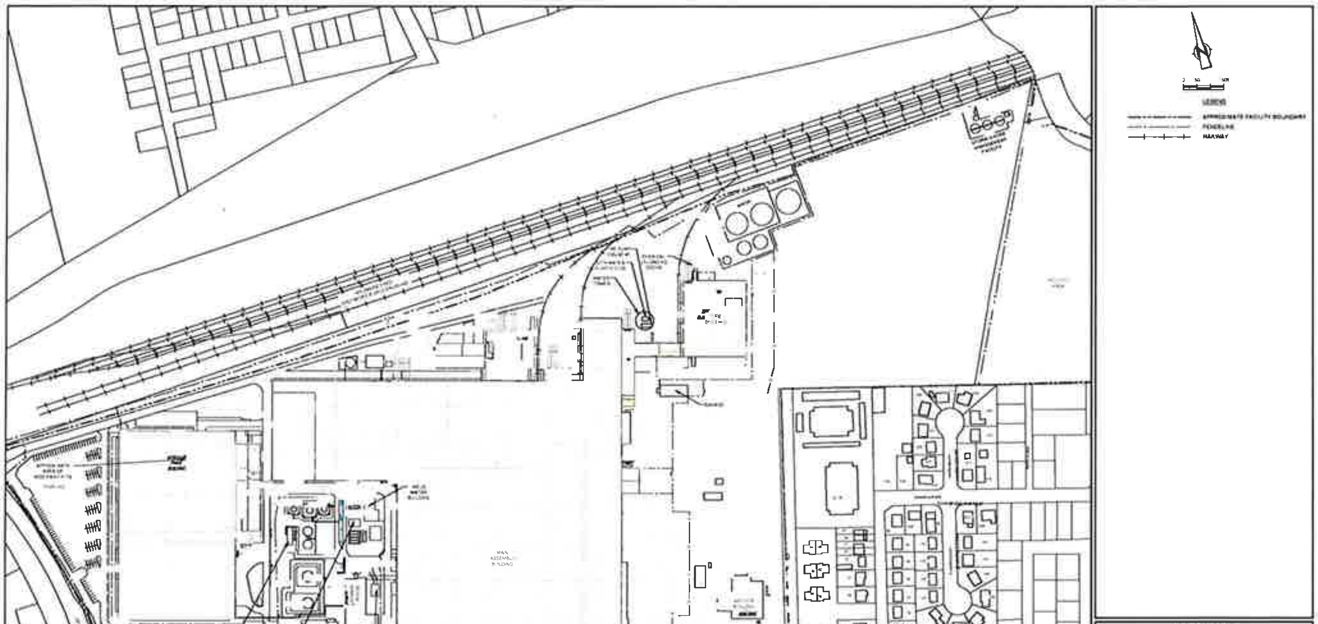
LEGEND

▨ APPROXIMATE FACILITY BOUNDARY

figure 1.1

FACILITY LOCATION
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

REFERENCE:
USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5
MINUTES SERIES 1997 SCALE: 1:24,000



SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

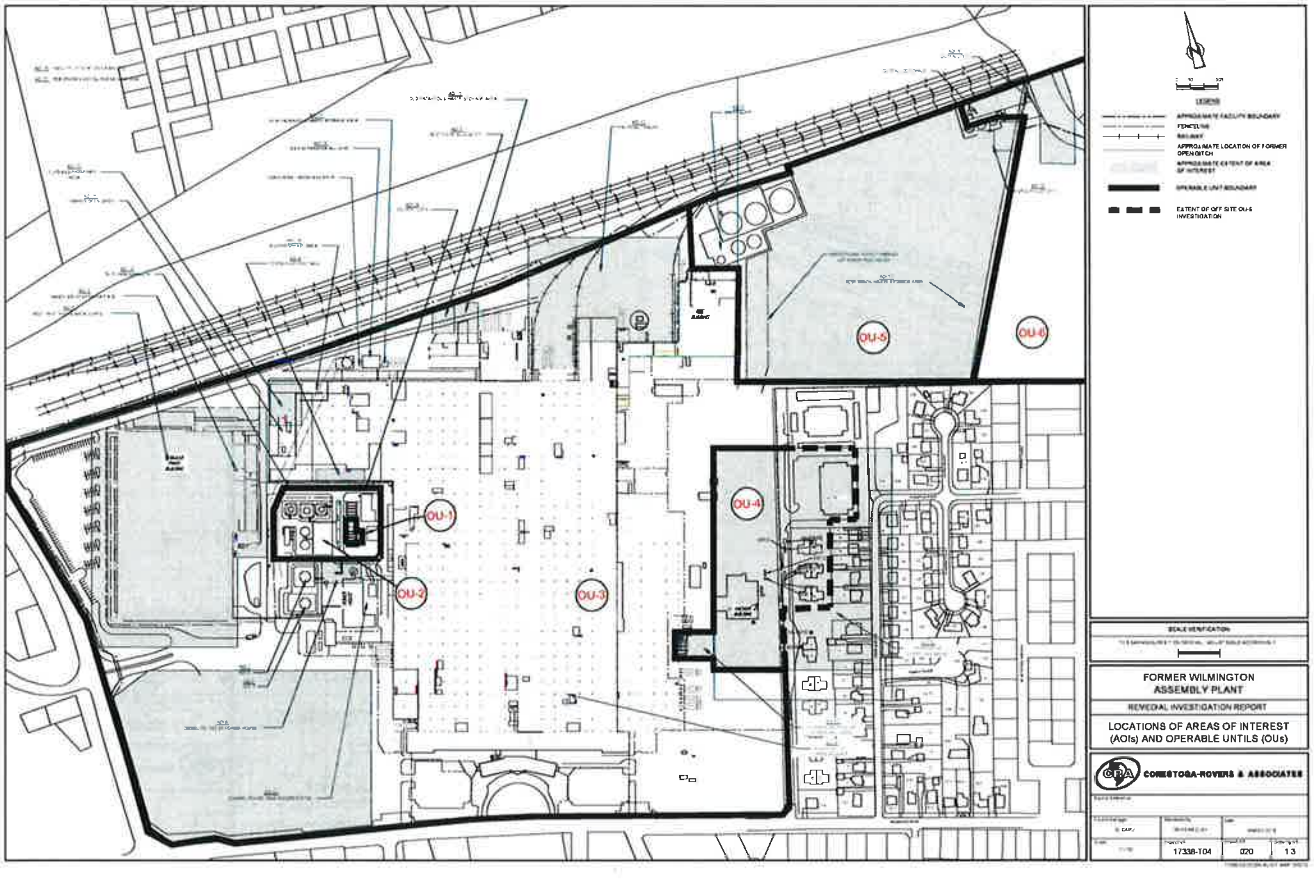
FACILITY LAYOUT

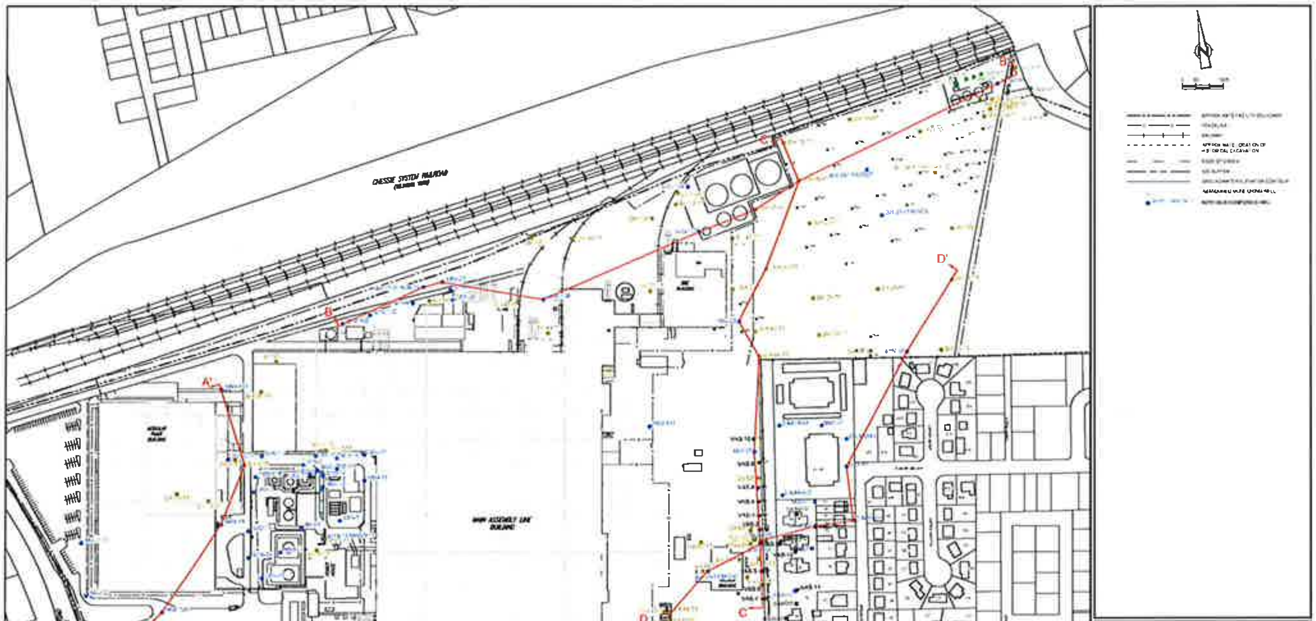
COMESTOGA-ROVERS & ASSOCIATES

17338 T04

020

1 2


OU-1
OU-2
OU-3
OU-4
OU-5
OU-6
LEGEND
APPROXIMATE FACILITY BOUNDARY
FENCELINE
RAILWAY
APPROXIMATE LOCATION OF FORMER OPEN DITCH
APPROXIMATE EXTENT OF AREA OF INTEREST
OPERABLE UNIT BOUNDARY
EXTENT OF OFF SITE OU-6 INVESTIGATION
SCALE VERIFICATION
FORMER WILMINGTON ASSEMBLY PLANT
REMEDIAL INVESTIGATION REPORT
LOCATIONS OF AREAS OF INTEREST (AOIs) AND OPERABLE UNTILS (OUs)
CRA CONESTOGA-ROVERS & ASSOCIATES
17338-T04
020
13



SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

CROSS SECTION
PLAN VIEW

CONESTOGA-ROVERS & ASSOCIATES

G. CARLI

17338-T04

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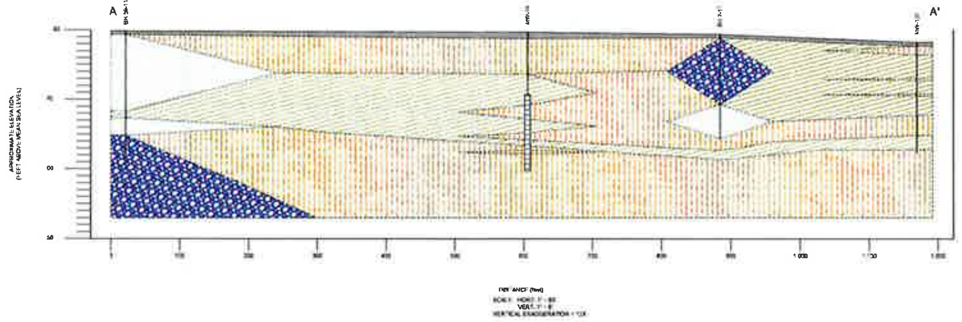
21



SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

CROSS SECTION A-A'

CONESTOGA-ROVERS & ASSOCIATES

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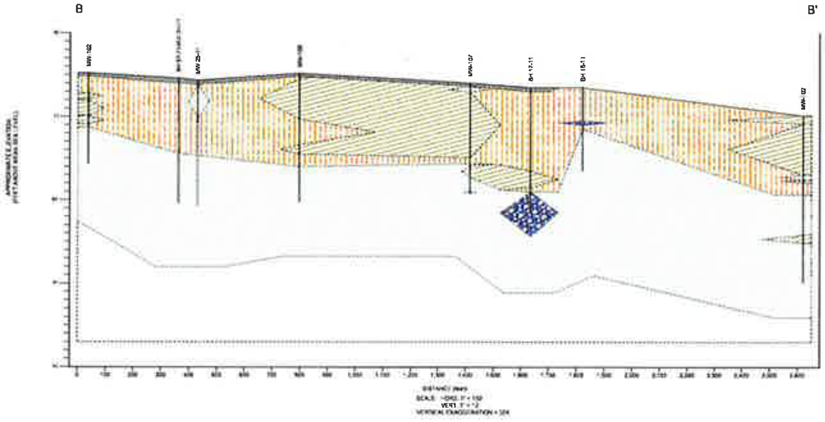


LEGEND

- WELL DESIGNATION
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- SCREENED INTERVAL
- BOTTOM OF BORING

▦ CONCRETE

▩ GRAVEL

▨ CLAY

☐ SAND

▥ SILT

☐ FILL

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

CROSS SECTION B-B'

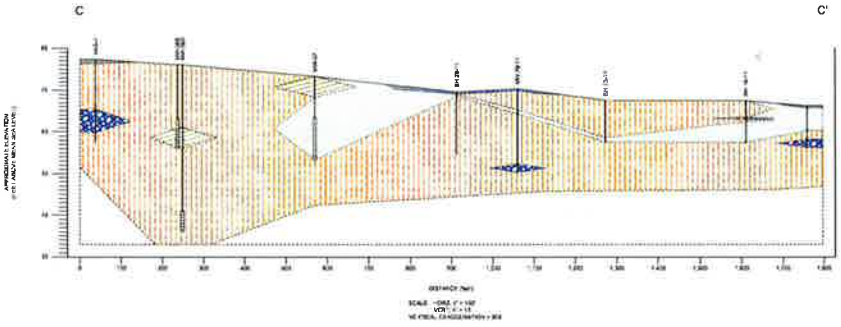
CONESTOGA-ROVERS & ASSOCIATES

D. CARLI

17338-T04

020

23



LEGEND

▨	CONCRETE
▨	GRAVEL
▨	CLAY
☐	SAND
▥	SILT
☐	FILL

SCALE VERIFICATION

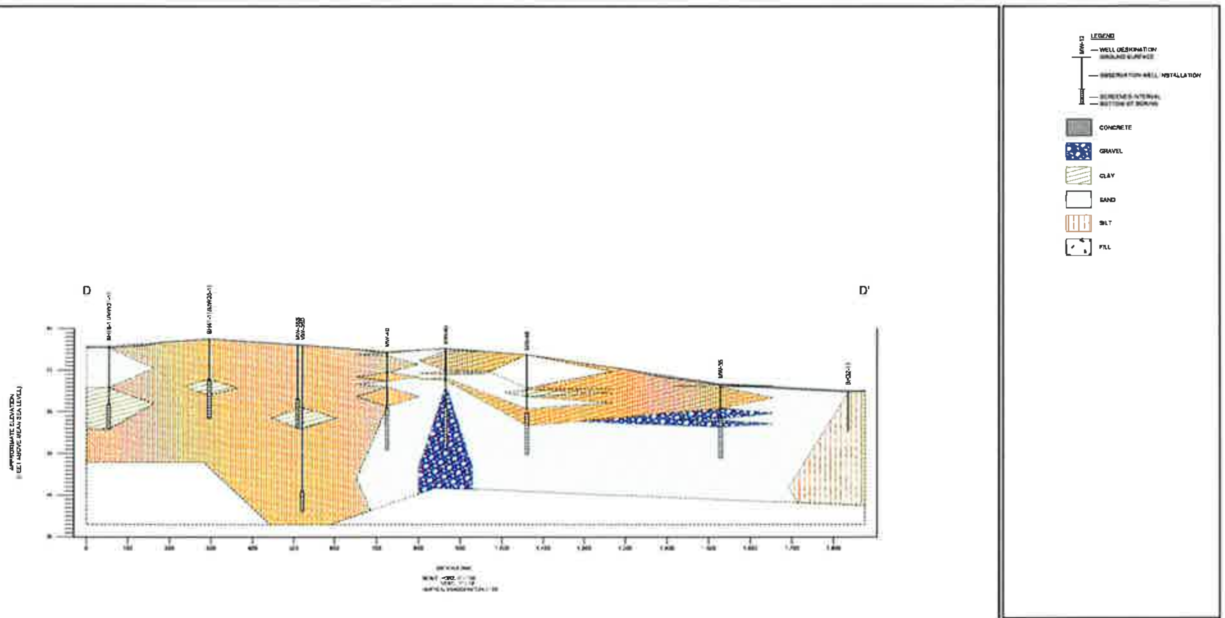
FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

CROSS SECTION C-C'

CONESTOGA-ROVERS & ASSOCIATES

C. CARL	REVIEWED BY		
	17338-T04	020	2.4



SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

CROSS SECTION D-D'

CONESTOGA-ROVERS & ASSOCIATES

D. CARL			
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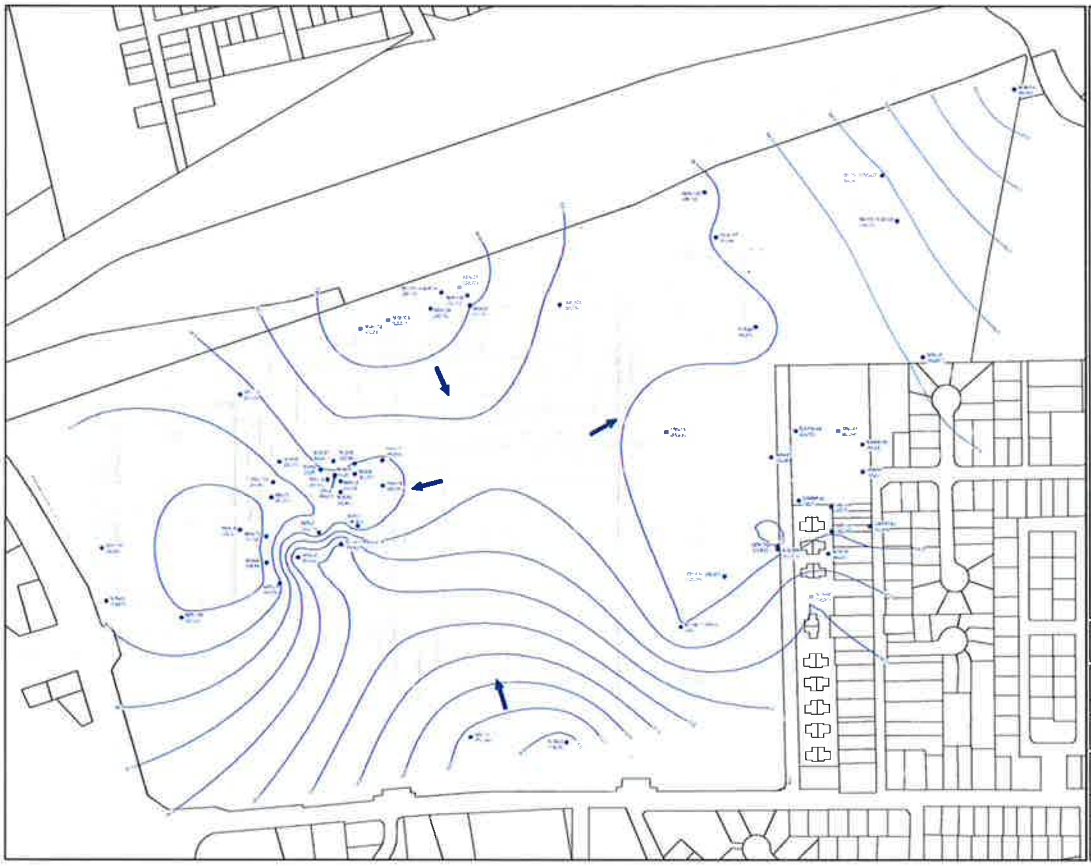

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

GROUNDWATER ELEVATION
CONTOURS JUNE 2013

CONESTOGA-ROVERS & ASSOCIATES

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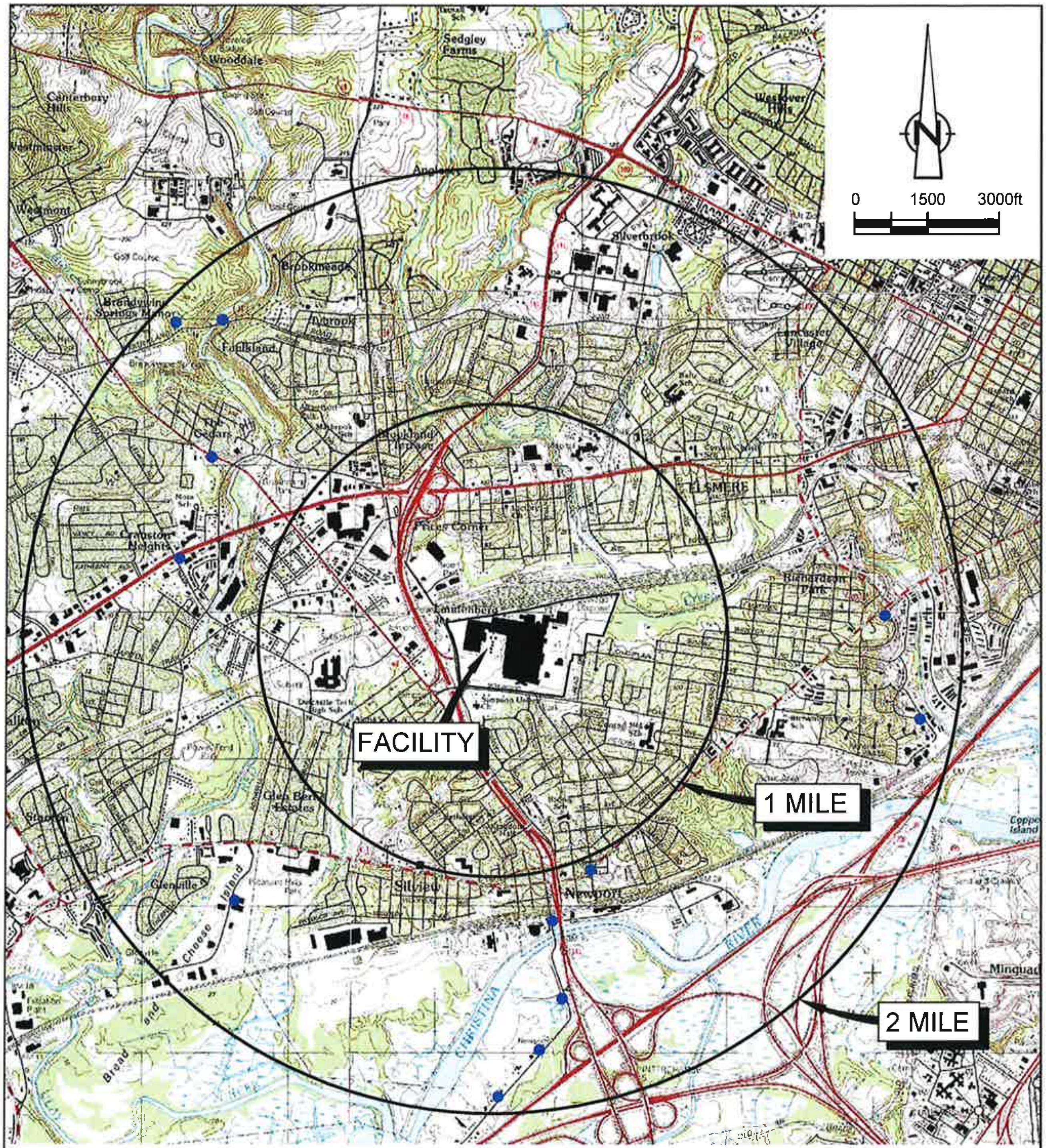


LEGEND

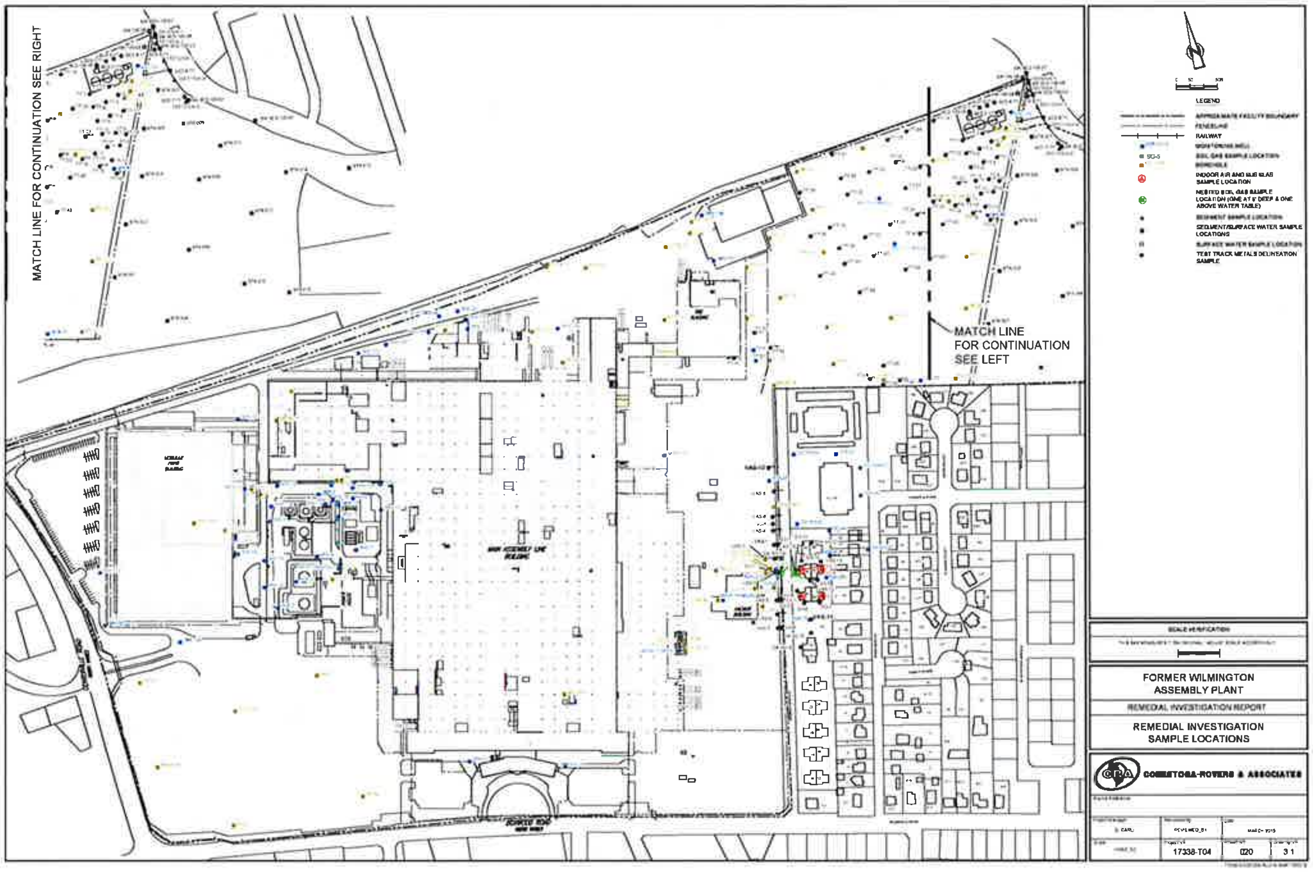
APPROXIMATE FACILITY BOUNDARY
1 MILE RADIUS FROM FACILITY
2 MILE RADIUS FROM FACILITY
● WATER WELL

figure 2.7

NEARBY WATER WELL LOCATIONS (DECEMBER 2009)
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

CRA

SOURCE:
USGS 1:24,000 DIGITAL RASTER QUADS 1997 WILMINGTON NORTH,
WILMINGTON SOUTH,NEWARK EAST, KENNETT SQUARE



FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

REMEDIAL INVESTIGATION
SAMPLE LOCATIONS

CONESTOGA-ROVERS & ASSOCIATES

MARCH 2015

17338-T04 | 020 | 31


VAS-10
VAS-8
VAS-6
SG-5
VAS-4
VAS-1
VAS-2
VAS-3
VAS-5
VAS-7
VAS-11
SG-11
SG-9
ANCHOR BUILDING
8
LEGEND
PROPERTY LINE
FENCELINE
RAILWAY
FUTURE BUILDING
MONITORING WELL
SG-5
SOIL GAS SAMPLE LOCATION
BOREHOLE
KEY PLAN
SCALE VERIFICATION
FORMER WILMINGTON ASSEMBLY PLANT
REMEDIAL INVESTIGATION REPORT
EXPANDED AREA OF AOI-16 SAMPLE LOCATIONS
CRA
CONESTOGA-ROVERS & ASSOCIATES
17338-T04
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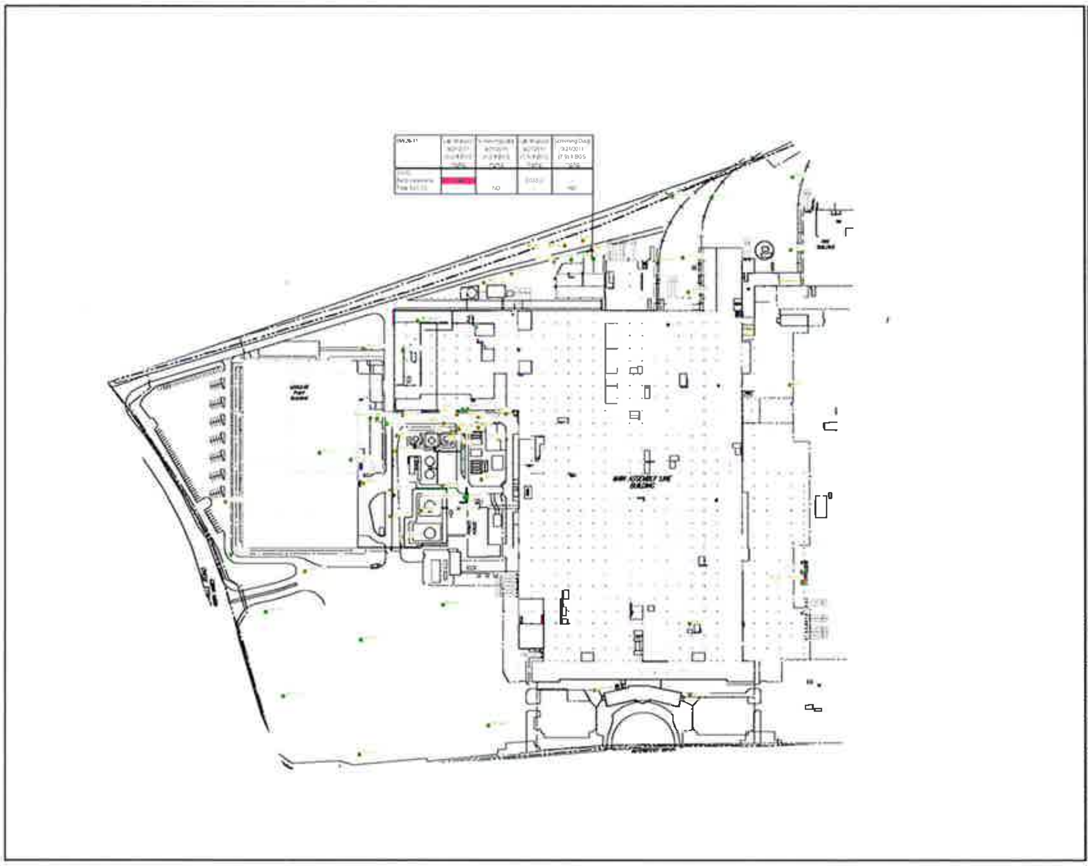
3.2



LEGEND

APPROXIMATE FACILITY BOUNDARY

FENCELINE

RAILWAY

MONITORING WELL

BOREHOLE

LOCATION SAMPLED FOR COPC PARAMETER LIST/SCREENING OR LAB ANALYSIS; NO EXCEEDANCE

🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Benzo(a)pyrene	0.09

SCALE VERIFICATION

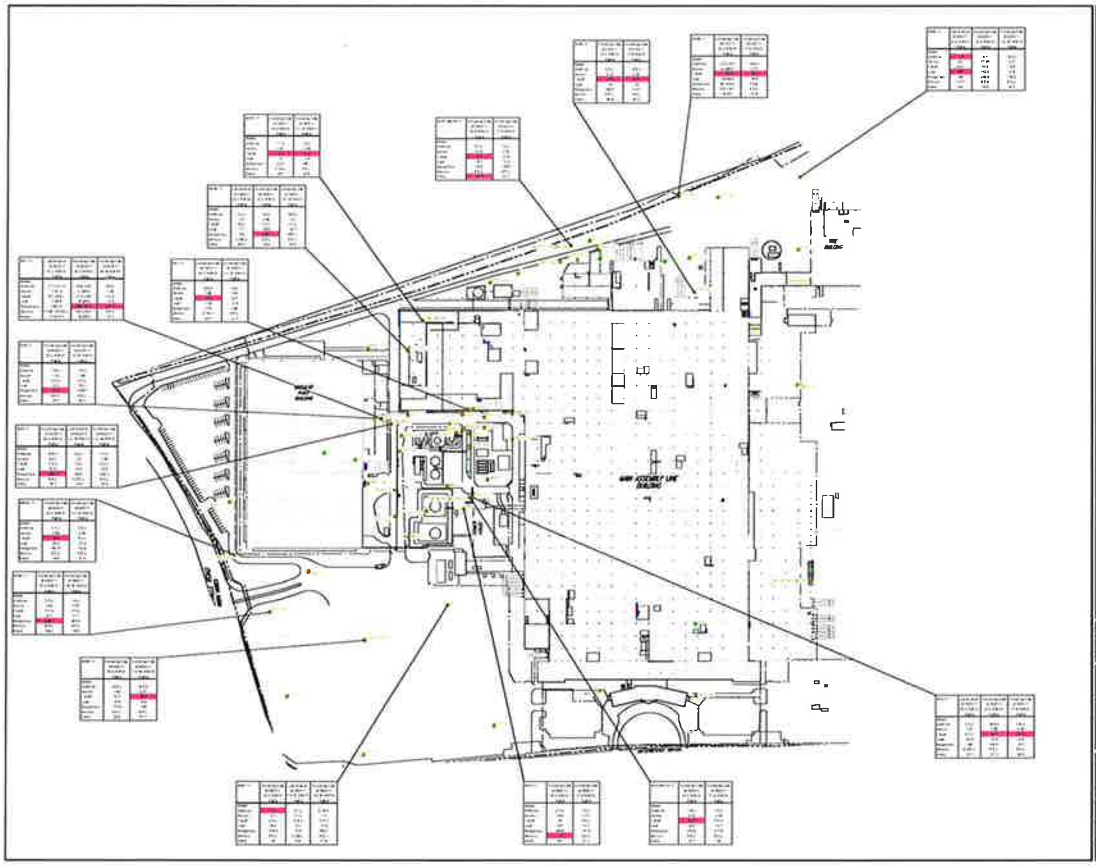
FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-3 SOIL NON-METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

G. CARLI			
	17338-T04	020	4.1



LEGEND

APPROXIMATE FACILITY BOUNDARY

FENCELINE

RAILWAY/SOIL SAMPLE LOCATION

MONITORING WELL

BOREHOLE

LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS); NO EXCEEDANCE

DUPLICATE SAMPLE RESULTS

🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (mg/kg)*
Antimony	3.1
Arsenic	11
Cobalt	34
Lead	400
Manganese	2100
Mercury	1
Nickel	150

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-3 SOIL METAL COPCS
EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

17338-T04

020

4.2

BH13-11	Lab Analysis 0-004520110926 (4-5) ft BGS mg/kg	Lab Analysis 0-013020110926 (13-15) ft BGS mg/kg
SVOC		
2-Methylnaphthalene	1.1	0.37 U

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
2-Methylnaphthalene	1

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-4 SOIL NON-METAL COPCS
EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

CAR			
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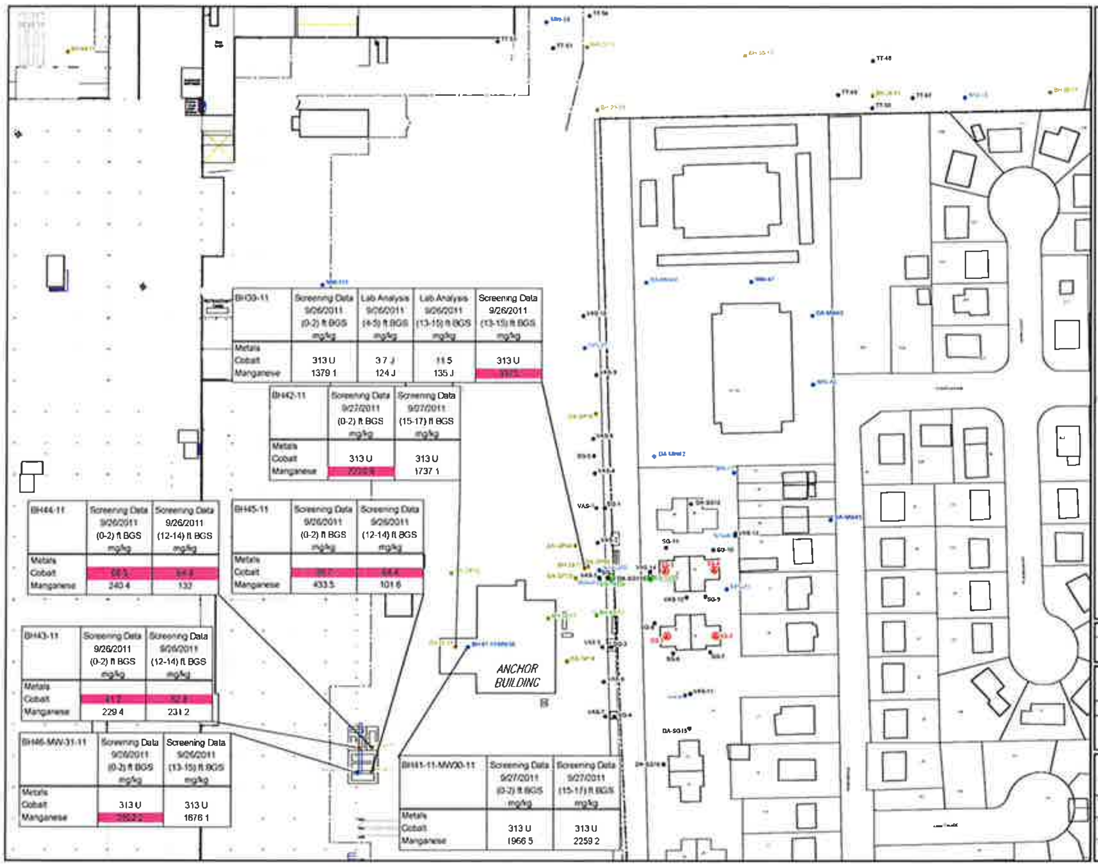

BH33-11	Screening Data 9/26/2011 (0-2) ft BGS mg/kg	Lab Analysis 9/26/2011 (4-5) ft BGS mg/kg	Lab Analysis 9/26/2011 (13-15) ft BGS mg/kg	Screening Data 9/26/2011 (13-15) ft BGS mg/kg
Metals				
Cobalt	313 U	3 7 J	11 5	313 U
Manganese	1379 1	124 J	135 J	[illegible]

BH42-11	Screening Data 9/27/2011 (0-2) ft BGS mg/kg	Screening Data 9/27/2011 (15-17) ft BGS mg/kg
Metals		
Cobalt	313 U	313 U
Manganese	[illegible]	1737 1

BH44-11	Screening Data 9/26/2011 (0-2) ft BGS mg/kg	Screening Data 9/26/2011 (12-14) ft BGS mg/kg
Metals		
Cobalt	55 1	64 8
Manganese	240 4	132

BH45-11	Screening Data 9/26/2011 (0-2) ft BGS mg/kg	Screening Data 9/26/2011 (12-14) ft BGS mg/kg
Metals		
Cobalt	38 7	64 4
Manganese	433 5	101 6

BH43-11	Screening Data 9/26/2011 (0-2) ft BGS mg/kg	Screening Data 9/26/2011 (12-14) ft BGS mg/kg
Metals		
Cobalt	41 2	32 8
Manganese	229 4	231 2

BH46-MW-31-11	Screening Data 9/26/2011 (0-2) ft BGS mg/kg	Screening Data 9/26/2011 (13-15) ft BGS mg/kg
Metals		
Cobalt	313 U	313 U
Manganese	[illegible]	1676 1

BH41-11-MW30-11	Screening Data 9/27/2011 (0-2) ft BGS mg/kg	Screening Data 9/27/2011 (15-17) ft BGS mg/kg
Metals		
Cobalt	313 U	313 U
Manganese	1966 5	2259 2

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- FUTURE BUILDING
- MONITORING WELL
- SG-5 SOIL GAS SAMPLE LOCATION
- BOREHOLE
- INDOOR AIR AND SUB SLAB SAMPLE LOCATION
- NESTED SOIL GAS SAMPLE LOCATION (ONE AT 5' DEEP & ONE ABOVE WATER TABLE)
- TEST TRACK METALS DELINEATION SAMPLE
- VERTICAL AQUIFER SAMPLE LOCATION
- LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS) NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (mg/kg)*
Cobalt	24
Manganese	[illegible]

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-4 SOIL METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

D. CARL	REVIEWED_BY	MARCH 2015	
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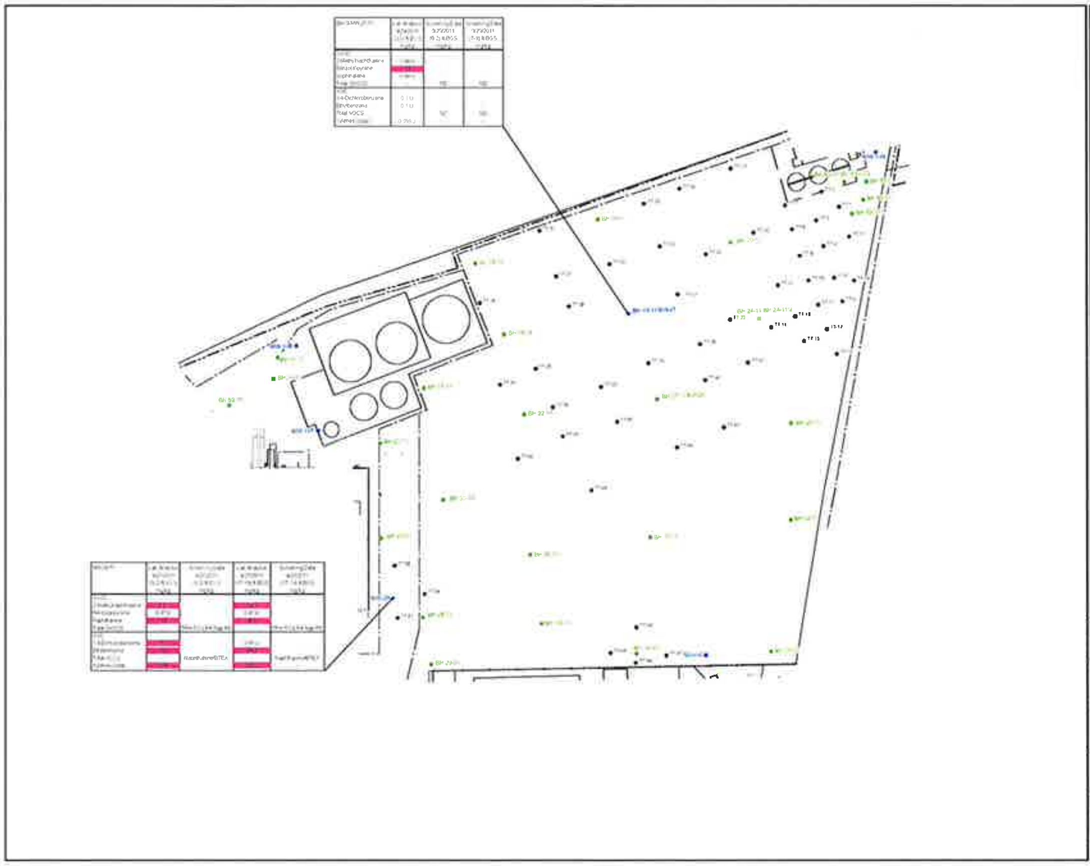

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
2-Methylnaphthalene	1
Benzo(a)pyrene	0.09
Naphthalene	5
1,4-Dichlorobenzene	2.4
Ethylbenzene	5.4
Xylenes (total)	63

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 SOIL NON-METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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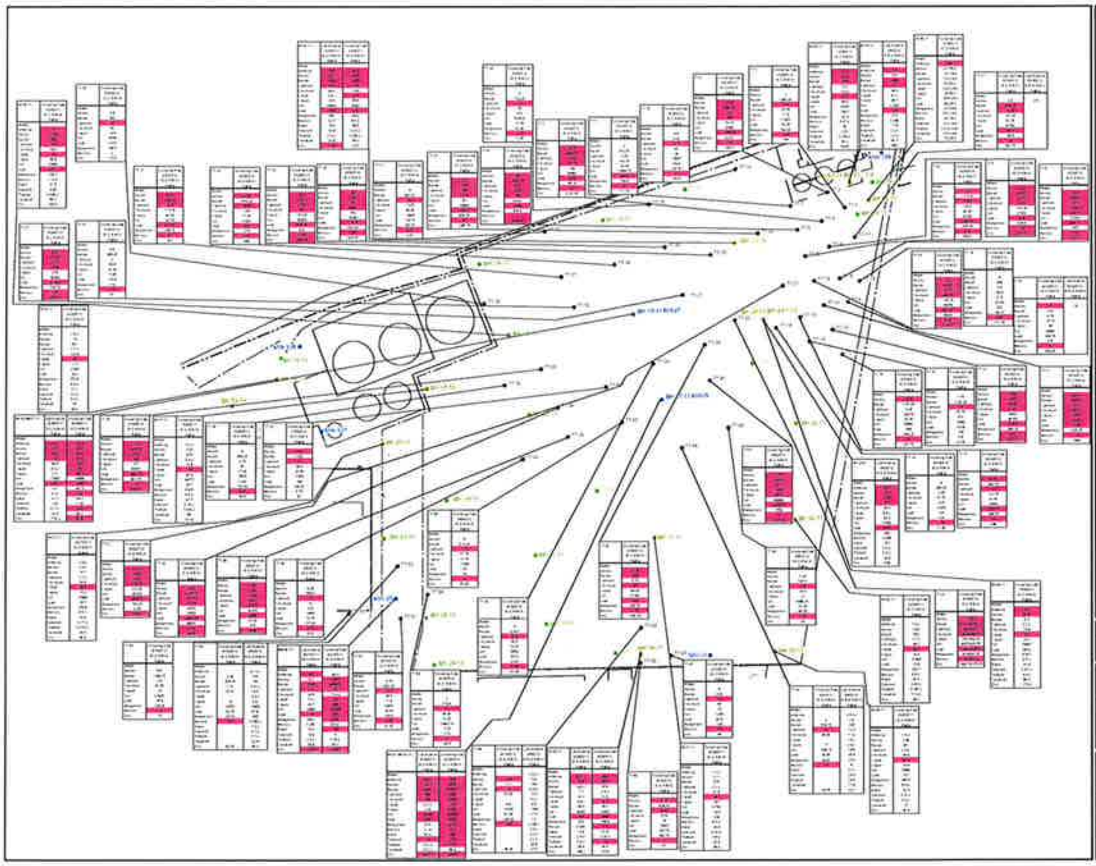

0 40 80

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- MONITORING WELL
- BOREHOLE
- TEST TRACK METALS DELINEATION SAMPLE
- LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS) - NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	214
Cobalt	34
Copper	310
Iron	74797
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 SOIL 0'-2' METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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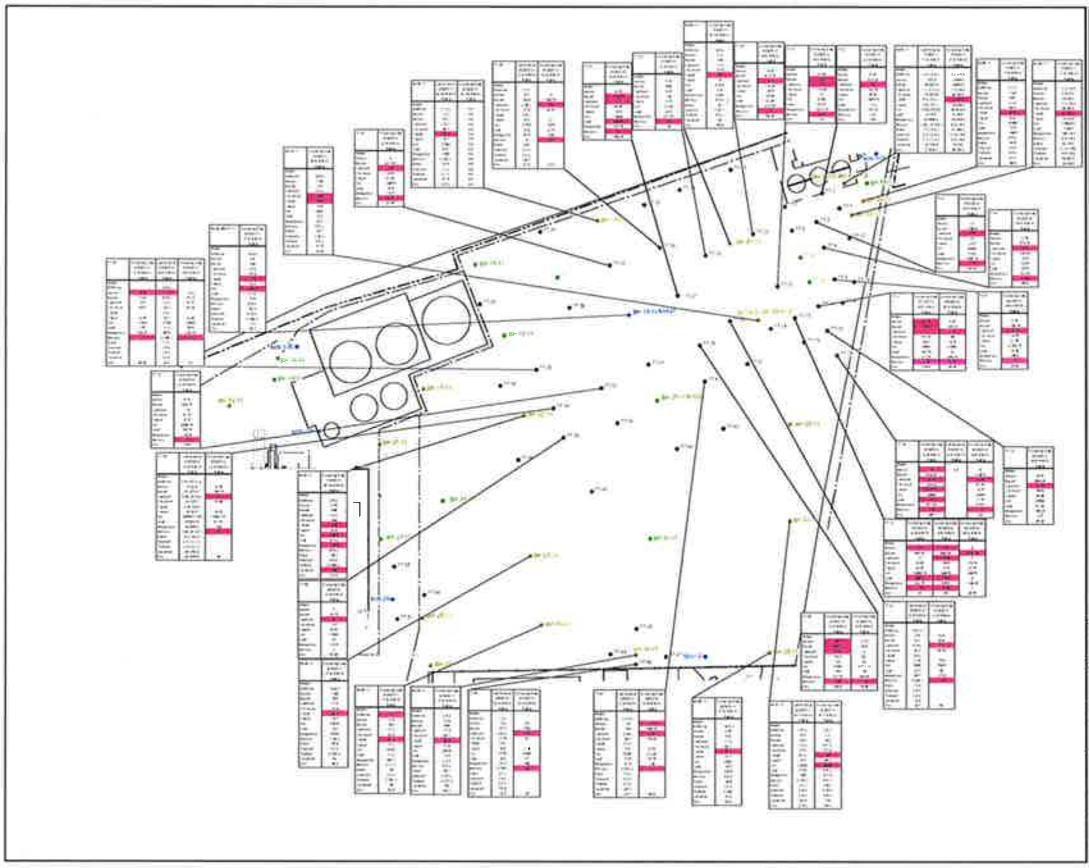

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- MONITORING WELL
- BOREHOLE
- TEST TRACK METALS DELINEATION SAMPLE
- LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	214
Cobalt	34
Copper	310
Iron	14757
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 SOIL 2'-10' METAL COPCS
EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

G. CARLI		MARCH [illegible]	
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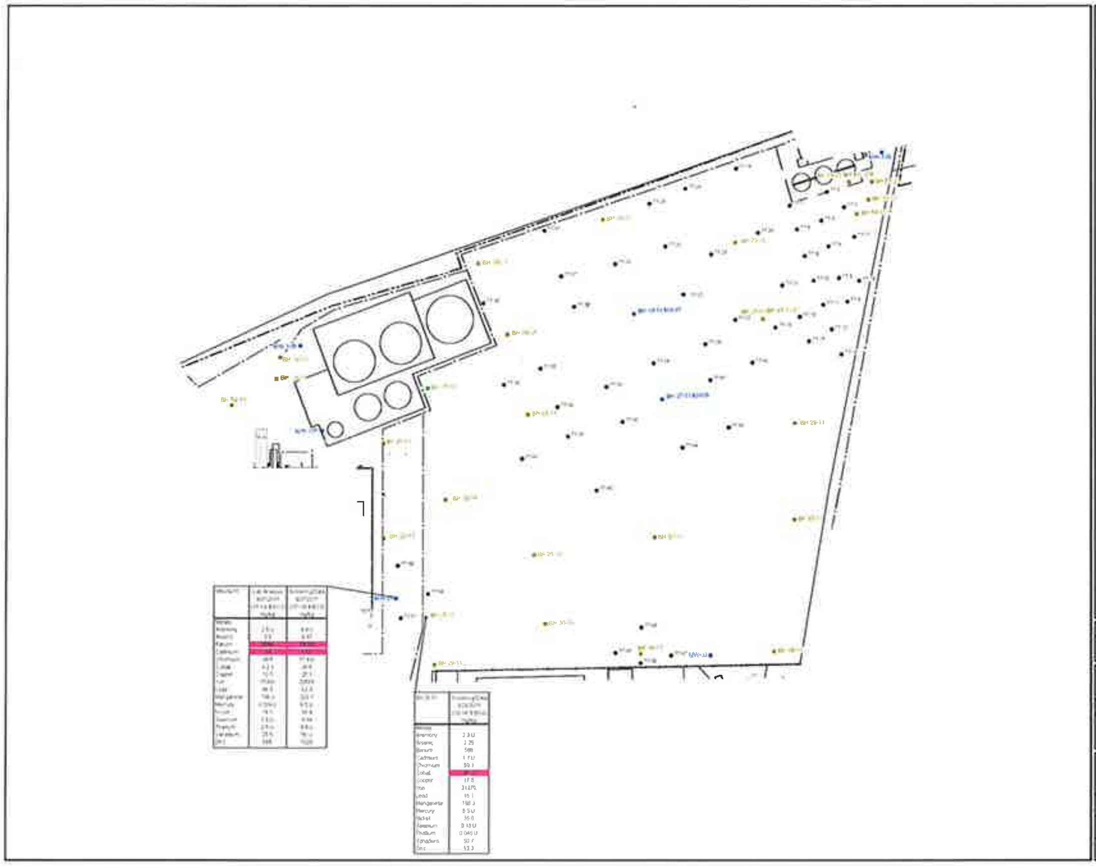


LEGEND

APPROXIMATE FACILITY BOUNDARY

FENCELINE

RAILWAY

MONITORING WELL

BOREHOLE

TEST TRACK METALS DELINEATION SAMPLE

LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS) - NO EXCEEDANCE

🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (mg/kg)*
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	214
Cobalt	34
Copper	310
Iron	54757
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

SCALE VERIFICATION

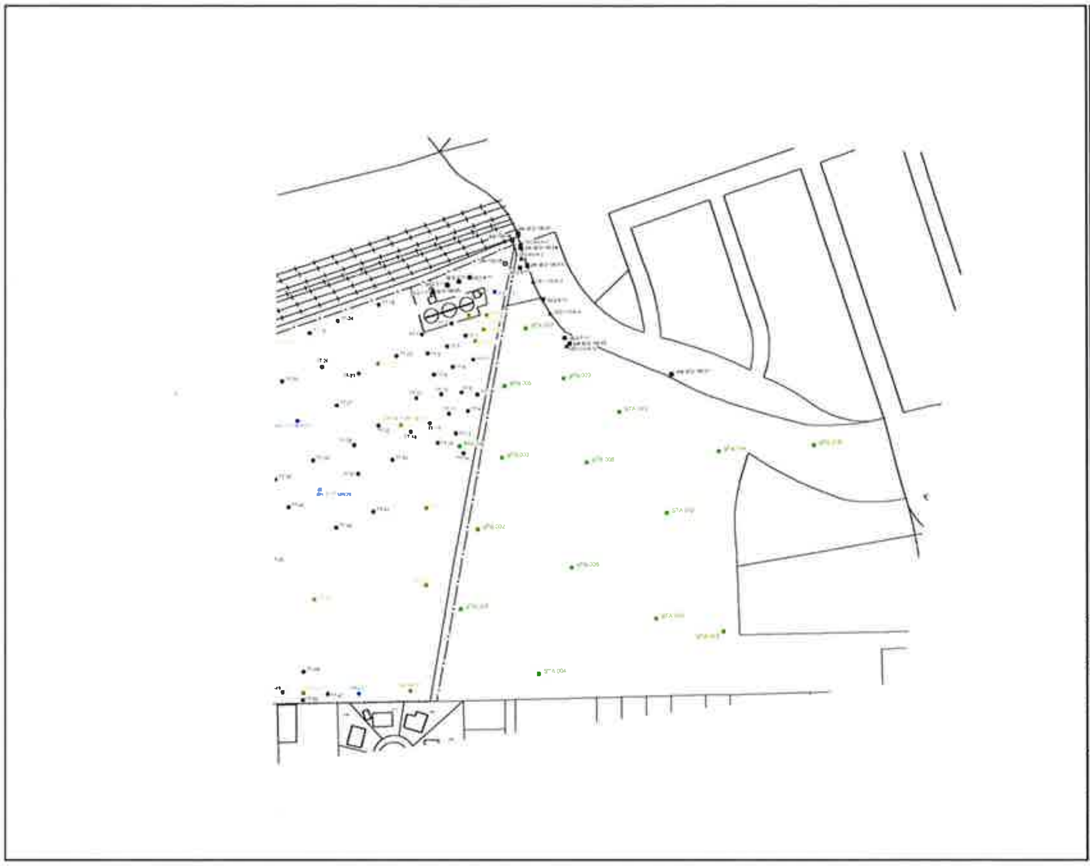
FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 SOIL >10' METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

D. CARLI	REVIEWED_BY	MARCH
	17336-T04	020 | 4.5C



LEGEND

APPROXIMATE FACILITY BOUNDARY

FENCELINE

RAILWAY/SOIL SAMPLE LOCATION

GROUNDWATER CONTOUR

● MONITORING WELL

■ BO-5 SOIL GAS SAMPLE LOCATION

■ BOREHOLE

▲ SEDIMENT SAMPLE LOCATION

■ SEDIMENT/SURFACE WATER SAMPLE LOCATIONS

□ SURFACE WATER SAMPLE LOCATION

● TEST TRACK METALS DELINEATION SAMPLE

🟩 LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS): NO EXCEEDANCE

🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Benzo(a)pyrene	0.09

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-6 SOIL NON-METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

C. CARL	REVIEWED BY	MARCH 2015	
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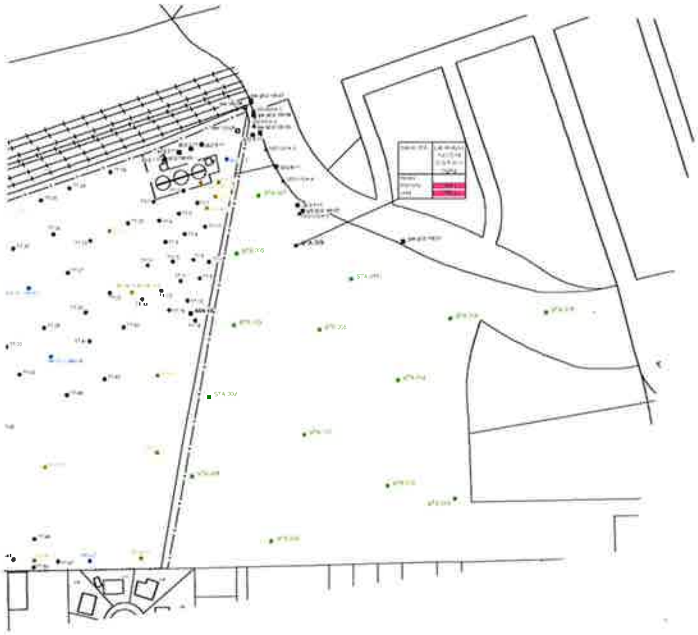

LEGEND

APPROXIMATE FACILITY BOUNDARY
FENCELINE
RAILWAY/SOIL SAMPLE LOCATION
GROUNDWATER CONTOUR
MONITORING WELL
● SG-5 SOIL GAS SAMPLE LOCATION
■ BOREHOLE
SEDIMENT SAMPLE LOCATION
SEDIMENT/SURFACE WATER SAMPLE LOCATIONS
SURFACE WATER SAMPLE LOCATION
TEST TRACE METALS DELINEATION SAMPLE
LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSES)- NO EXCEEDANCE
🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Antimony	3.1
Lead	400

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-8 SOIL METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

REVIEWED BY
MARCH 2015
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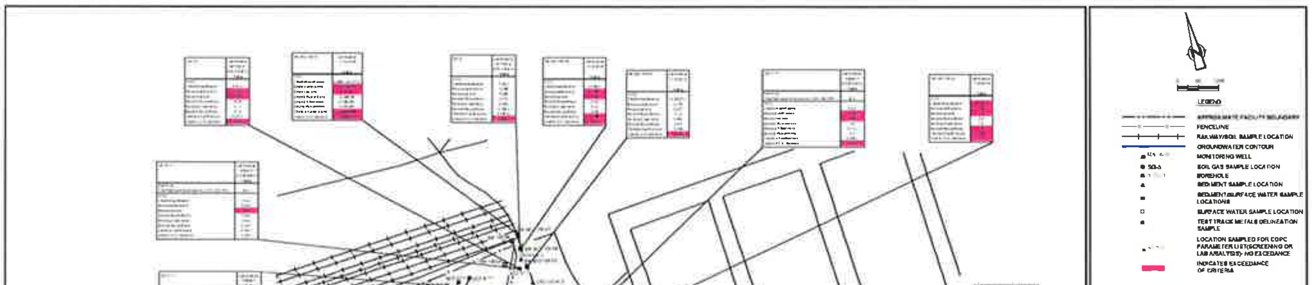


PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
2-Methylnaphthalene	0.0202
Benzo(a)anthracene	0.108
Benzo(a)pyrene	0.15
Benzo(b)fluoranthene	NC
Benzo(g,h,i)perylene	NC
Benzo(k)fluoranthene	0.24
Dibenz(a,h)anthracene	0.033
Indeno(1,2,3-cd)pyrene	0.017

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

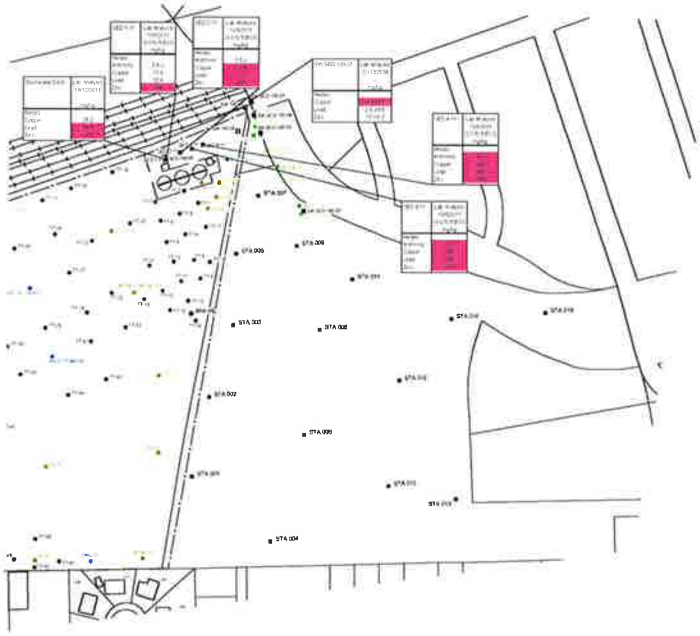
FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-6 SEDIMENT NON-METAL COPCS
EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

D. CARLI	[illegible]	[illegible]	
[illegible]	17338 T04	020	4.9



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY/SOIL SAMPLE LOCATION
- GROUNDWATER CONTOUR
- MONITORING WELL
- ● SG-5 SOIL GAS SAMPLE LOCATION
- ● BOREHOLE
- ● SEDIMENT SAMPLE LOCATION
- ● SEDIMENT/SURFACE WATER SAMPLE LOCATIONS
- ● SURFACE WATER SAMPLE LOCATION
- ● TEST TRACK METALS DELINEATION SAMPLE
- ● LOCATION SAMPLED FOR COPC PARAMETER LIST (SCREENING OR LAB ANALYSIS) - NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (mg/kg)*
Antimony	2
Copper	31.6
Lead	35.8
Zinc	121

SCALE VERIFICATION

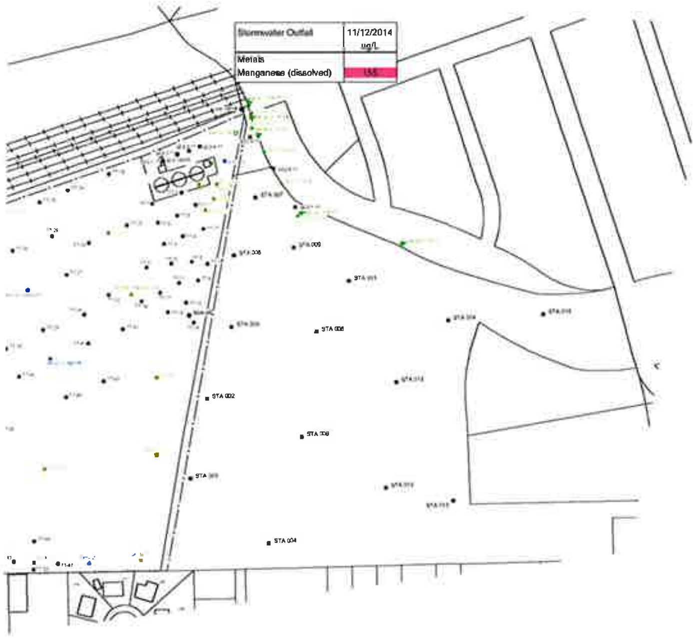
FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-6 SEDIMENT METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

D. CARL		MARCH 2016	
	17338-T04	020	4.10



LEGEND

APPROXIMATE FACILITY BOUNDARY
FENCELINE
RAILWAY/SOIL SAMPLE LOCATION
GROUNDWATER CONTOUR
MONITORING WELL
SOIL GAS SAMPLE LOCATION
BOREHOLE
SEDIMENT SAMPLE LOCATION
SEDIMENT/SURFACE WATER SAMPLE LOCATIONS
SURFACE WATER SAMPLE LOCATION
TEST TRACK METALS DELINEATION SAMPLE
LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
Manganese	120
Manganese (dissolved)	120

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-6 SURFACE WATER METAL
COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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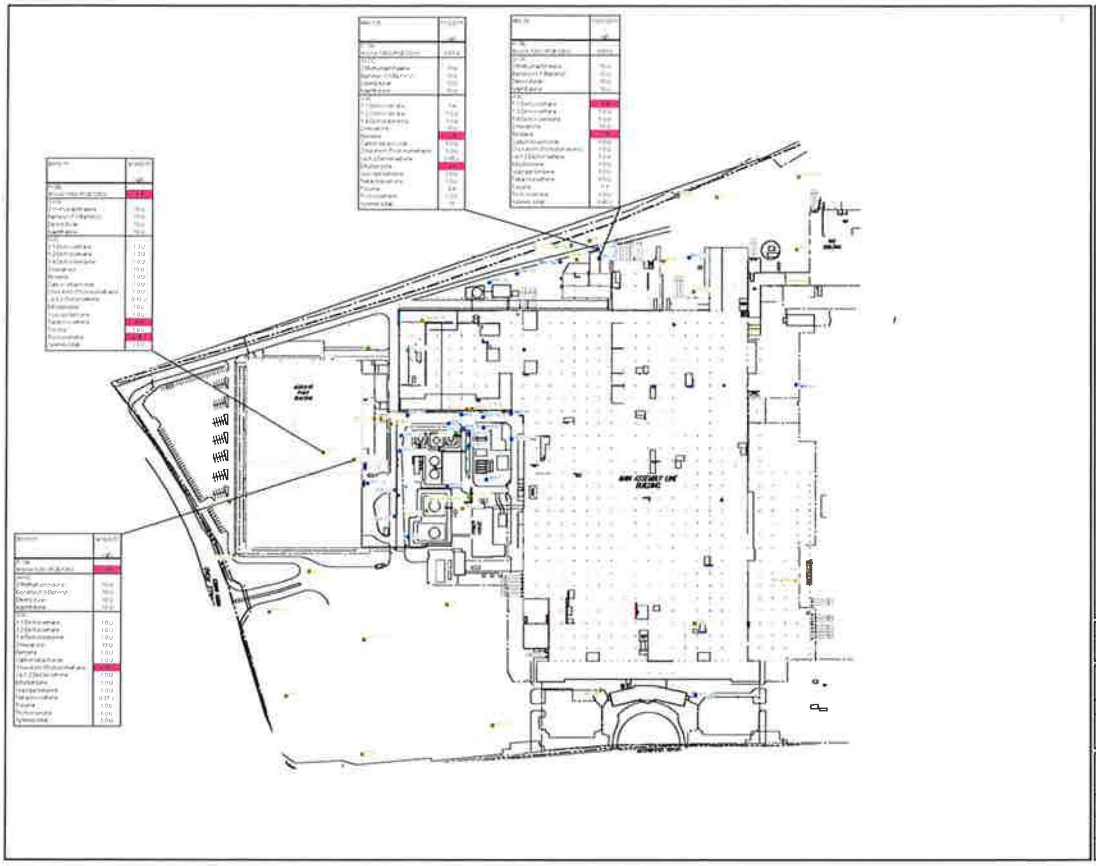

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY/ROW SAMPLE LOCATION
- MONITORING WELL
- BOREHOLE
- LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (ug/L)*
Aroclor 1260 (PCB-1260)	0.034
1,4-Dichlorobenzene	0.42
2-Methylnaphthalene	2.7
Biphenyl (1,1-Biphenyl)	0.083
Dibenzofuran	0.58
Naphthalene	0.14
1,1-Dichloroethane	2.4
1,2,4-Trimethylbenzene	1.5
1,2-Dichloroethane	0.15
1,4-Dichlorobenzene	0.42
2-Hexanone	3.4
Benzene	0.39
Carbon tetrachloride	0.39
Chloroform (Trichloromethane)	0.19
cis-1,2-Dichloroethene	3.6
Ethylbenzene	1.5
Isopropylbenzene	39
Naphthalene	0.14
Tetrachloroethene	1
Toluene	86
Trichloroethene	0.28
Xylenes (total)	19

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-3 GROUNDWATER NON-METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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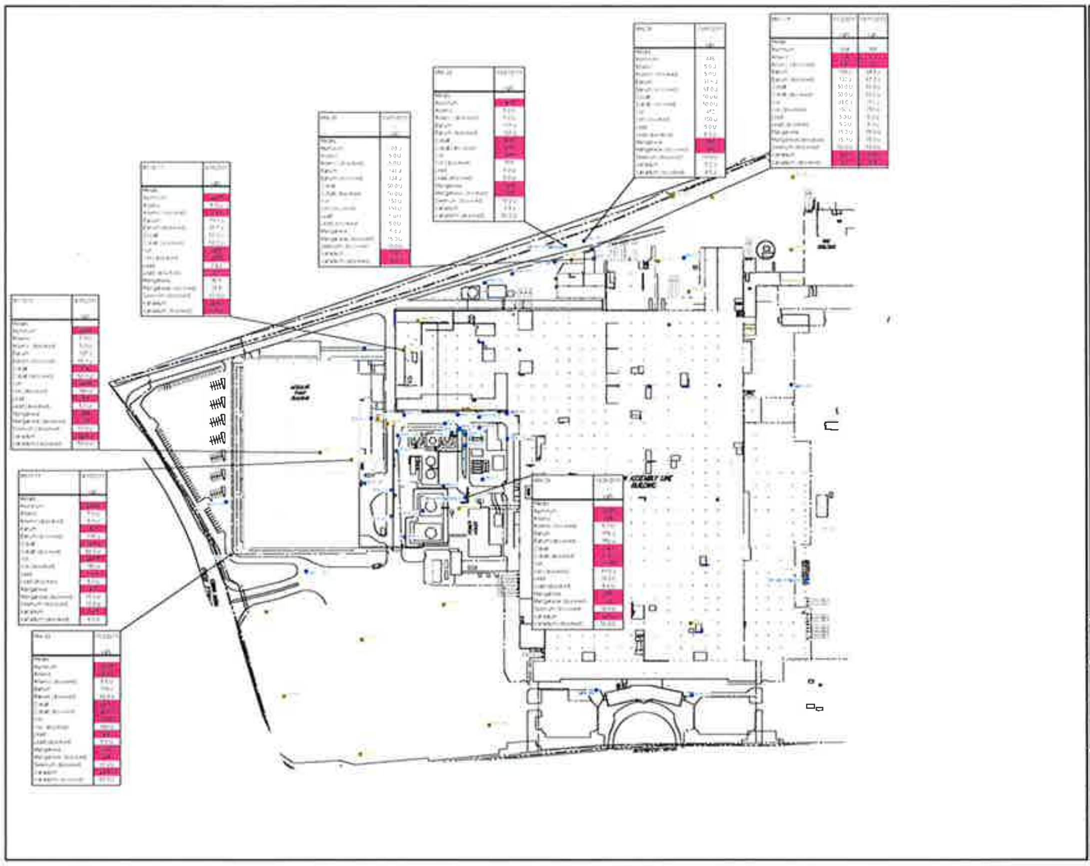

PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
Aluminum	1800
Arsenic	0.045
Arsenic (dissolved)	0.045
Barium	290
Barium (dissolved)	290
Cobalt	0.47
Cobalt (dissolved)	0.47
Iron	1100
Iron (dissolved)	1100
Lead	5
Lead (dissolved)	5
Manganese	32
Manganese (dissolved)	32
Selenium (dissolved)	7.8
Vanadium	6.3
Vanadium (dissolved)	6.3

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-3 GROUNDWATER METAL
COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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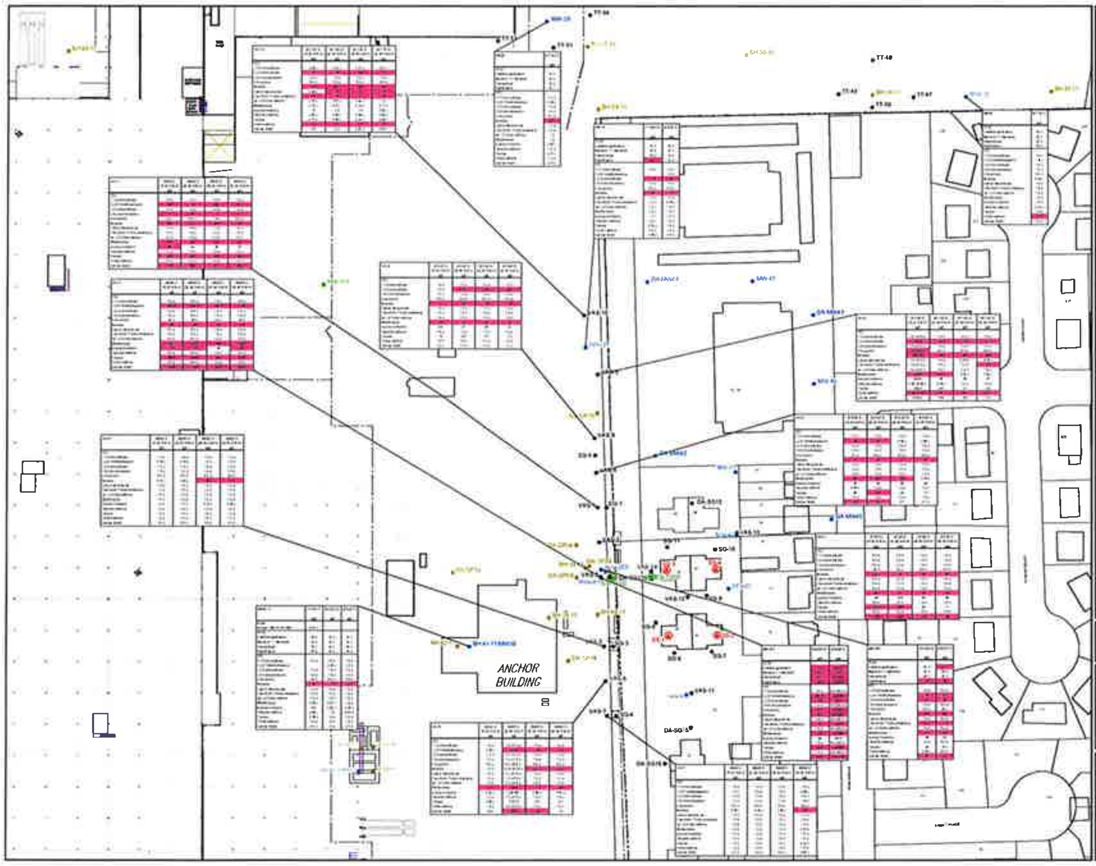
	17338-T04	020	4 13



PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
Aroclor-1260 (PCB-1260)	0.034
1,4-Dichlorobenzene	0.42
2-Methylnaphthalene	2.7
Biphenyl (1,1-Biphenyl)	0.083
Dibenzofuran	0.58
Naphthalene	0.14
1,1-Dichloroethane	2.4
1,2,4-Trimethylbenzene	1.5
1,2-Dichloroethane	0.15
1,4-Dichlorobenzene	0.42
2-Hexanone	3.4
Benzene	0.39
Carbon tetrachloride	0.39
Chloroform (Trichloromethane)	0.19
cis-1,2-Dichloroethene	2.8
Ethylbenzene	1.3
Isopropyl benzene	39
Naphthalene	0.14
Tetrachloroethene	1
Toluene	88
Trichloroethene	0.26
Xylenes (total)	19

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-4 GROUNDWATER NON-METAL
COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

G. CARLI			
	17338-T04	020	4.14

PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
Aluminum	1600
Arsenic	0.045
Arsenic (dissolved)	0.045
Barium	290
Barium (dissolved)	290
Cobalt	0.47
Cobalt (dissolved)	0.47
Iron	1100
Iron (dissolved)	1100
Lead	5
Lead (dissolved)	5
Manganese	32
Manganese (dissolved)	32
Selenium (dissolved)	7.8
Vanadium	6.3
Vanadium (dissolved)	6.3

SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-4 GROUNDWATER METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

G. CARL

17308-T04

020

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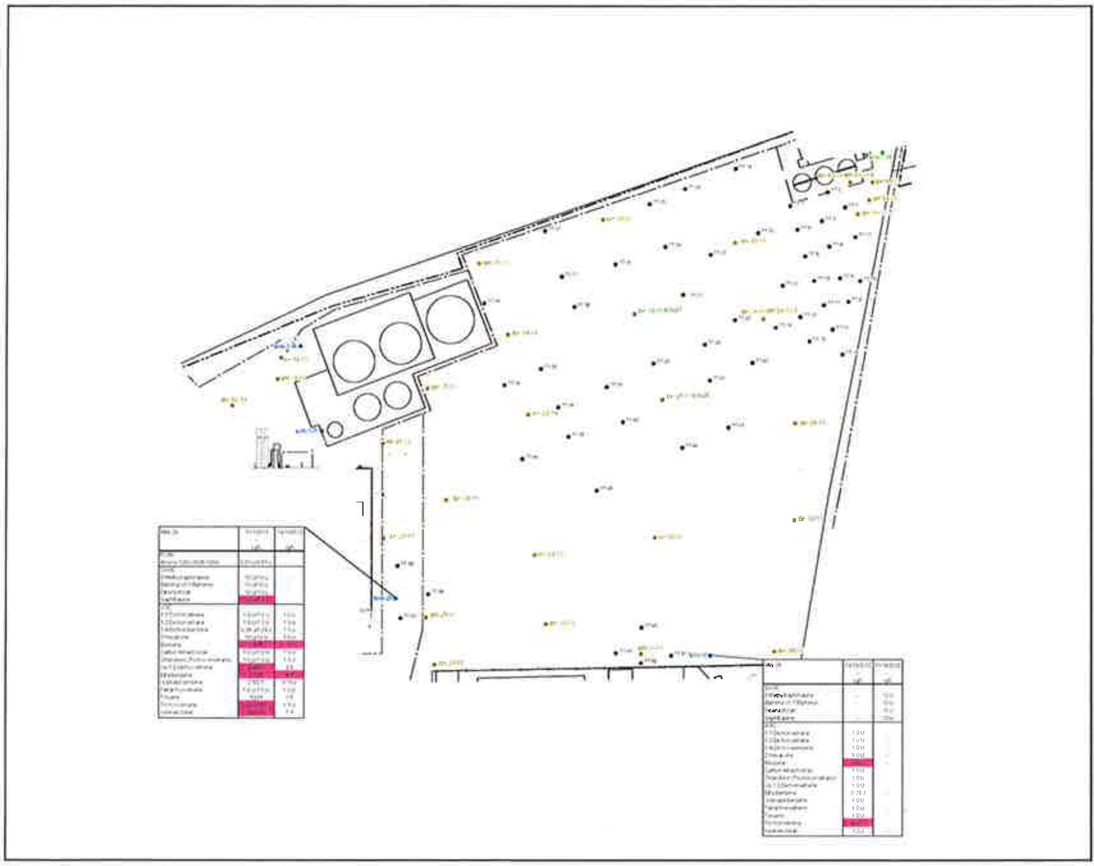

LEGEND

APPROXIMATE FACILITY BOUNDARY
FENCELINE
RAILWAY
● MONITORING WELL
● BOREHOLE
● TEST TRACK METALS DELINEATION SAMPLE
● LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS) - NO EXCEEDANCE
1.0U/1.0U DUPLICATE SAMPLE RESULTS
🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
Aroclor-1260 (PCB-1260)	0.024
2-Methylnaphthalene	2.7
Biphenyl (1,1-Biphenyl)	0.083
Dibenzofuran	0.38
Naphthalene	0.17
1,1-Dichloroethane	2.4
1,2-Dichloroethane	0.15
1,4-Dichlorobenzene	0.42
2-Hexanone	3.4
Benzene	0.39
Carbon tetrachloride	0.38
Chloroform (Trichloromethane)	0.19
cis-1,2-Dichloroethene	3.6
Ethylbenzene	1.3
Isopropyl benzene	39
Tetrachloroethene	1
Toluene	86
Trichloroethene	0.28
Xylenes (total)	19

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 GROUNDWATER NON-METAL
COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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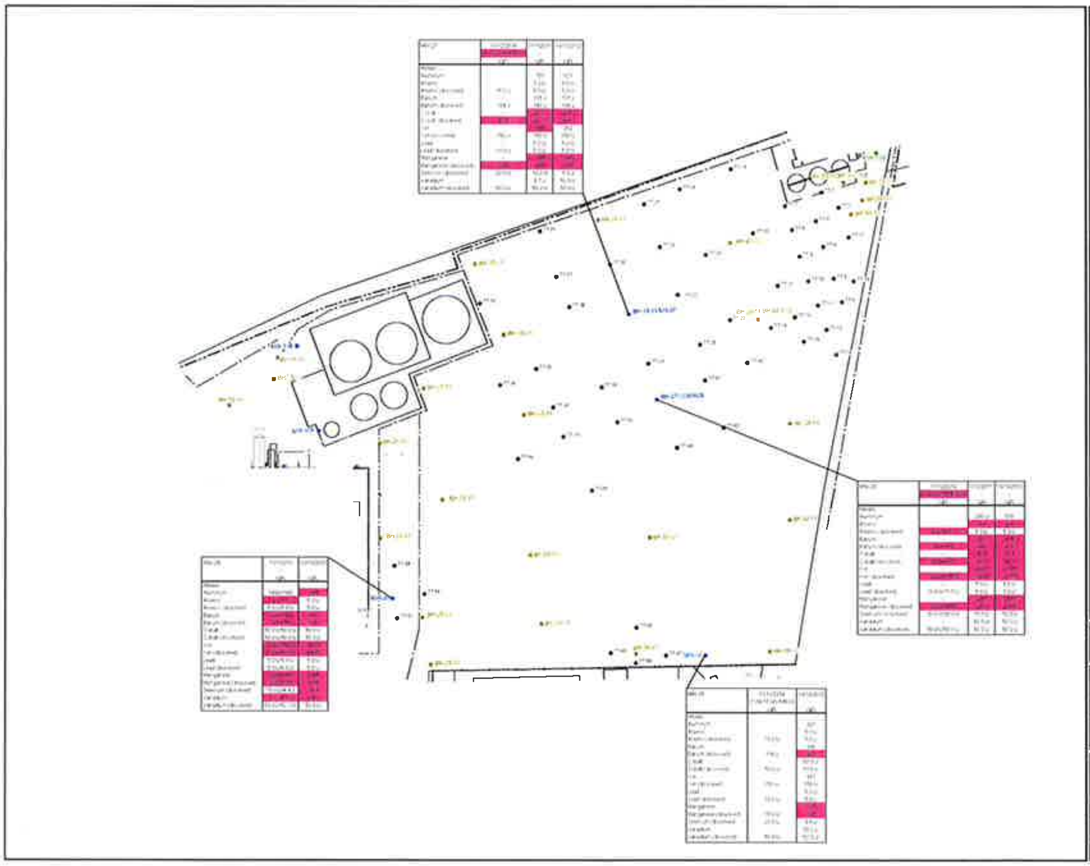

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- MONITORING WELL
- BOREHOLE
- TEST TRACE METALS DELINEATION SAMPLE
- LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEDANCE
- DUPLICATE SAMPLE RESULTS
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level *(2014)* *(ug/L)*
Aluminum	1600
Arsenic	0.045
Arsenic (dissolved)	0.045
Barium	290
Barium (dissolved)	290
Cobalt	0.47
Cobalt (dissolved)	0.47
Iron	1100
Iron (dissolved)	1100
Lead	5
Lead (dissolved)	5
Manganese	32
Manganese (dissolved)	32
Selenium (dissolved)	7.8
Vanadium	6.3
Vanadium (dissolved)	6.3

SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OU-5 GROUNDWATER METAL
COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

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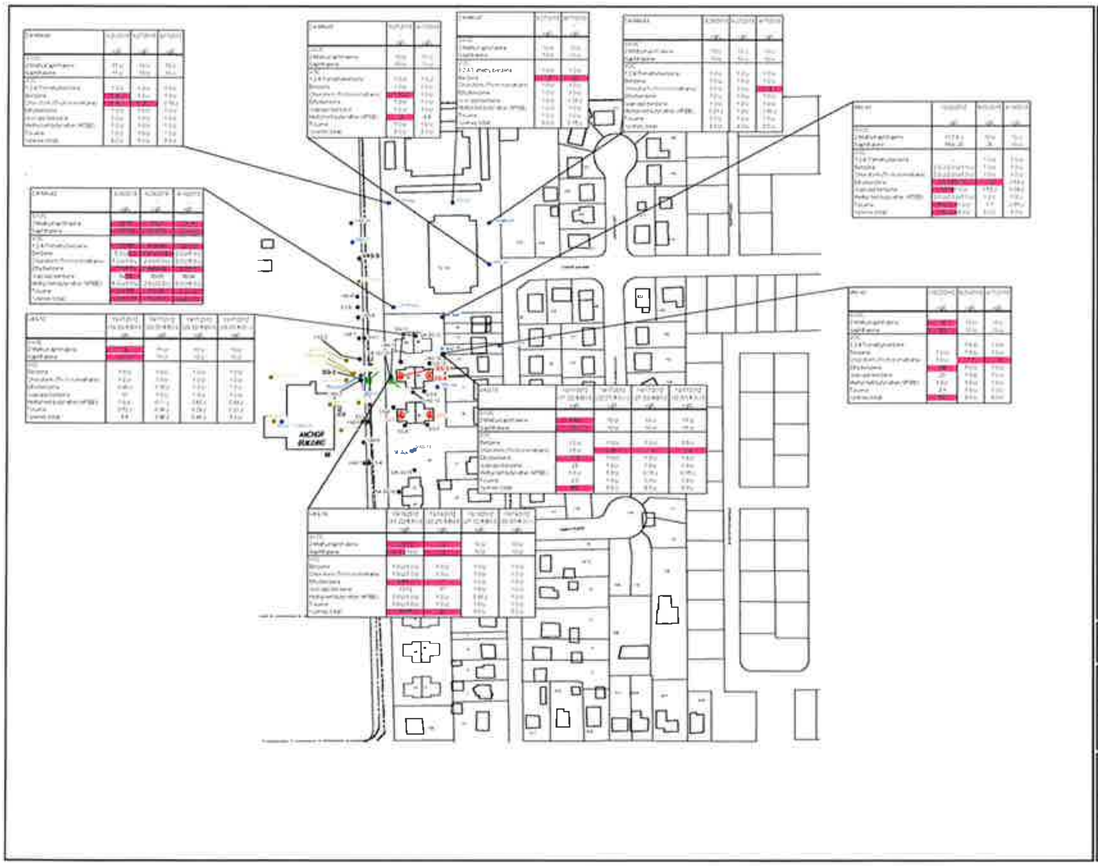

PARAMETER	DNREC SIRS Screening Level (2014) (ug/L)
2-Methylnaphthalene	27
Naphthalene	0.14
1,2,4-Trimethylbenzene	15
Benzene	0.39
Chloroform (Trichloromethane)	0.19
Ethylbenzene	1.5
Isopropyl benzene	39
Methyl tert butyl ether (MTBE)	10
Toluene	86
Xylenes (total)	19

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

FORMER WILMINGTON ASSEMBLY PLANT

REMEDIAL INVESTIGATION REPORT

OFF-SITE GROUNDWATER NON-METAL COPCS EXCEEDING SCREENING CRITERIA

CONESTOGA-ROVERS & ASSOCIATES

Project Manager	Reviewed By	Date
O. CARLI	[illegible]	MARCH 2015

Scale	Project No.	Report No.	Drawing No.
[illegible]	17338-T04	020	4.18

Tables

TABLE 1.1

CHRONOLOGY OF MAJOR ENVIRONMENTAL INVESTIGATIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Environmental Investigation*	*Conducted by*	*Source*
1990	Anchor Building UST closures (AOI-9)	I.D. Griffith	Letter from – W Kryak of GM to Mr. J. Barndt of DNREC
1990	Group 3 UST (GMI) closure activities (AOI-2)	I.D. Griffith	November 28, 1990 letter from DNREC to GM for UST GM1
1990	Group 5 UST (WI) closure activities (AOI-2)	I.D. Griffith	November 28, 1990 letter from DNREC to GM for UST GM1
July, 1990	ELPO waste transfer line release investigation (AOI-12)	Facility Personnel	September 19, 1990 Spill Report
1992	Focused dye tracer test of Facility's sanitary and storm sewer networks (AOI-13)	Clean Tech	Clean Tech, 1992
1994	Wastewater pipeline investigation at the Grit Separator Building (AOI-8)	Facility Personnel	Letter from Mr. Jeffery Holmes of GM to Mr. Berlin of DNREC
1996	Wastewater pipeline investigation at the phosphate area (AOI-7)	Facility Personnel	Letter from Mr. Jeffery Holmes of GM to Mr. Norris of DNREC
1997	Soil investigation in the area of Hydraulic List Station (column N4) (AOI-12)	Clean Tech	Limited Site Investigation of the Hydraulic Lift Station in the Area of Column N4 (November 1997)

TABLE 1.1

CHRONOLOGY OF MAJOR ENVIRONMENTAL INVESTIGATIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Environmental Investigation*	*Conducted by*	*Source*
1997	Soil investigation in the vicinity of Basic Paint Department (AOI-11)	Clean Tech	Limited Site Investigation of the Petroleum Impacted Soil Adjacent to the Basic Paint Department
1998	Soil and groundwater investigation at bulk product tank farm (AOI-1)	Enecotech Midwest	Environmental Assessment Report – Large AST Area (October, 1998)
1998	Soil and groundwater investigation at AST containment/ truck unloading area (AOI-1)	Enecotech Midwest	AST Containment/Truck Unloading Rack (October, 1998)
2002	Focused soil investigations related to Tank L (AOI-1)	CRA	Report of Findings – Soil Sampling Program at Tank L Product Release Area, (March 2002)
2002	Soil investigation related to convault area (AOI-1)	CRA	Report of Findings - OU-1 Soils Bulk Product Tank Areas (January 2004)
2003	Soil investigation following a diesel fuel release at the Pump House (AOI-1)	CRA	Report of Findings - OU-1 Soils Bulk Product Tank Areas (January 2004)
2005	Soil and groundwater confirmation investigation at bulk product tank farm (AOI-1/AOI-10)	CRA	Report of Findings OU-2 Bulk Product Tank Area Soil Investigation (February 2006)

TABLE 1.1

CHRONOLOGY OF MAJOR ENVIRONMENTAL INVESTIGATIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Environmental Investigation*	*Conducted by*	*Source*	
2006	Groundwater investigation downgradient of bulk product tank farm (AOI-10)	CRA	Groundwater Remedial Investigation and Feasibility Study Report - OU-2 Bulk Product Tank Area (January 2009)	
2008-2010	Focused groundwater investigation at bulk product tank farm (AOI-10)	CRA	Groundwater Remedial Investigation and Feasibility Study Report - OU-2 Bulk Product Tank Area (January 2009)	
2009	Soil and groundwater investigation for tank closure (Tanks A, B, C, and F) (AOI-1)	CRA	AST Closure Document, Four Aboveground Storage Tanks (August 2009)	
2010	Tank F Investigation (AOI-1)	CRA	Tank F Investigation Report, Former GM Wilmington Assembly Plant (CRA, 2010)	
2010	Environmental Baseline Investigation (Site Wide)	Brightfields, Inc.	Environmental Baseline Investigation Report, Former General Motors Corporation, Wilmington Assembly Plant (Fisker Automotive) (Brightfields, 2010)	Multiple

Notes:

CRA- Conestoga--Rovers and Associates
GM – General Motors Corporation
AST – Aboveground Storage Tank
UST – Underground Storage Tank
AOI – Area of Interest

TABLE 1.2

CHRONOLOGY OF ENVIRONMENTAL ACTIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Remedial Action*	*Conducted by*	*Source*
1950s- 1960s	Remediation of the former open waste storage area east of current Tire Building	Unknown	Former Facility personnel
1975	In-place closure of diesel oil UST by the Power House	Facility Personnel	GM, 1995. Liability Assessment Report - LAD Division, GM Wilmington Assembly Plant
December 1980	Applied for RCRA Hazardous Waste Permit Part A	Facility Personnel	Letter from Mr. E. Bosetti to DNREC Mr. P. Retallick dated March 8, 1991
September 1982	Applied for RCRA Hazardous Waste Permit Part B	Facility Personnel	Letter from Mr. E. Bosetti to DNREC Mr. P. Retallick dated March 8, 1991
April, 1989	Filed permit application withdrawal of Part A and B under the protective filing status of Federal Register Section 3005(e)(2) of RCRA	Facility Personnel	Letter from Mr. E. Bosetti to DNREC Mr. P. Retallick dated March 8, 1991
October 1992	RCRA Facility Assessment Terminated	Facility Personnel	Letter from DNREC Ms. N. Marker to GM Mr. S. Meager dated October 9, 1992
1989-1990	Anchor Building UST Removals	I.D. Griffith Inc.	Underground Storage Tank Removal Project (November, 1989)
March 1990	Group 3 and 5 USTs Removals	I.D. Griffith Inc.	Underground Storage Tank Removal Project (November, 1989)
1997	Anchor Building AST Removal	Continental Vanguard	Continental Vanguard former personnel (Mr. Tawn Franz)
July 1990	July 23, 1990 wastewater release	Clean Tech	September 19, 1990 Spill Report

TABLE 1.2

CHRONOLOGY OF ENVIRONMENTAL ACTIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Remedial Action*	*Conducted by*	*Source*
July 1991	July 1, 1991, sanitary effluent release	Clean Tech	Letter from Ms. Buniski of Clean Tech to Mr. G. McKee of GM dated July 9, 2009
March 16, 1993	Diesel fuel release	Clean Tech	Clean Tech, 1992
March 19, 1993	Sulfuric acid spill from Sulfuric Acid Tank (AST V)	Facility Personnel	Letter from Mr. J. Holmes of GM to Mr. C. Cleaver of DNREC dated March 24, 1993
July 13, 1994	Wastewater release to lift station at DD28	Facility Personnel	Spill/release form dated July 13, 1994
December 4, 1994	Grit Separator Building wastewater release	Facility Personnel	Letter from Mr. J. Holmes of GM to Mr. C. Berlin of DNREC dated December 14, 1994
April 19, 1996	Wastewater pipeline release at the phosphate area	Facility Personnel	Letter from Mr. J. Holmes of GM to Mr. R. Norris of DNREC dated April 24, 1994
June 30, 1996	Diesel oil AST release in vicinity of Pump House No. 2	Facility Personnel	Letter from Mr. J. Holmes of GM to Mr. J. Mulrooney of DNREC dated July 5, 1996
1997	Hydraulic lift station investigation	Clean Tech	Limited Site investigation of the Hydraulic Lift Station in the Area of Column N4 (November 1997)
October 1998	East Lot waste investigation	Facility Personnel	Discovery of Previously Undisclosed Material in East Lot Memorandum October 28, 1998

TABLE 1.2

CHRONOLOGY OF ENVIRONMENTAL ACTIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Remedial Action*	*Conducted by*	*Source*
March 30, 2001	Fire fighting foam release to storm sewer	Facility Personnel	Letter from Mr. J. Holmes of GM to Mr. J. Mulrooney of DNREC dated April 3, 2001
January 11, 2002	Power steering fluid release from Tank L	CRA	Report of Findings - OU-1 Soils Bulk Product Tank Areas (January 2004)
July 15, 2003	Diesel fuel release	Facility Personnel/Talley Brothers, Inc.	GM Environmental Spill/Release Tracking Form dated July 15, 2003
2003	Remediation of impacted soils due to 2002 power steering release in the vicinity of Tank L at OU-1 Area	CRA/Talley Brothers, Inc.	Report of Findings OU-1 Soils Bulk Product Tank Areas, GM Wilmington Assembly Plant (January, 2004)
February 7, 2006	Purge solvent release at Modular Paint Building	Facility Personnel	GM Environmental Spill/Release Tracking Form dated July 2, 2006
February 12, 2007	VOCs release to atmosphere	Facility Personnel	Release ID 12484, dated February 12, 2007
July 23, 2007	VOCs release to atmosphere	Facility Personnel	Release ID 12728, dated July 23, 2007
March 20, 2008	Diesel fuel release in the freight parking lot	Facility Personnel	Letter from Mr. J. Holmes of GM to DNREC/DAWM Central Respiratory dated March 20, 2008
June 2008	VOC release to atmosphere	Facility Personnel	Release ID 13130, dated June 10, 2008

TABLE 1.2

CHRONOLOGY OF ENVIRONMENTAL ACTIONS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Date	*Remedial Action*	*Conducted by*	*Source*
June 2008	Refrigerant gas release to atmosphere	Facility Personnel	Release ID 13128, dated June 10, 2008
June 25, 2008	Oil release into catch basin in vicinity of Weld Water Building	Facility Personnel	GM Environmental Spill/Release Tracking Form dated June 25, 2008
2008	AST closure investigation (ASTs A, B, and received closure	CRA	AST Closure Document, Four Aboveground Storage Tanks (August 2009)
January 2008	VOCs release to atmosphere due to problems with a damper timer	Facility Personnel	Release ID 12951, dated January 28, 2008
Unknown	In-place closure of OU-2 USTs	Unknown	Facility personnel
Unknown	In-place closure of Kolene Tank	Unknown	Facility personnel
Unknown	Closure and removal of Solvent-Borne dip tank	Unknown	Facility personnel

Notes:

CRA- Conestoga-Rovers and Associates
GM – General Motors Corporation
AST – Aboveground Storage Tank
UST – Underground Storage Tank
DNREC – Delaware department of Natural Resource and Environmental Control

TABLE 1.3

LIST OF AREAS OF INTEREST (AOIs)
REMEDIAL INVESTIGATION WORK PLAN
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

AOI Number	*Investigated During RI*	*Operable Unit (OU)*	*Investigation Area Description* [1]
AOI 18	Yes	OU2	OU-2 Area
AOI 1	Yes	OU3	No. 6 Fuel Oil (AST F)
AOI 2	No	OU3	No. 6 Fuel Oil (AST G)
AOI 3	No	OU3	Waste Solvent ASTs (ASTs P-Q)
AOI 4	Yes	OU3	Kolene AST
AOI 5	Yes	OU3	Diesel Oil UST by Powerhouse
AOI 6	Yes (2)	OU3	Modular Paint Pits and Mixirng Area Sumps/ East of Mod Paint Building
AOI 7	Yes	OU3	Acetylene Sludge Pits
AOI 8	No	OU3	WWTP Sump
AOI 9	Yes	OU3	Hydraulic Lift
AOI 10	Yes (2)	OU3	Old Hazardous Waste Accumulation Area (Former Tank Storage Area)
AOI 11	No	OU3	New Hazardous Waste Accumulation Area
AOI 13	Yes	OU3	ELPO Areas
AOI 14	Yes	OU3	Phosphate Area
AOI 15	No	OU3	Grit Separator Building
AOI 19	Yes	OU3	Lift Stations (to WWTP)
AOI 20	Yes	OU3	PCB Containing Equipment/Oil Stained Surfaces
AOI 21	Yes	OU3	Railroad Tracks
AOI 22	No	OU3	Oil Stained Gravel
AOI 24	No	OU3	Solvent ASTs
AOI 25	No	OU3	Former Open Ditch
Additional Area	Yes	OU3	Parking Lot Area
Additional Area	Yes	OU3	USTs D, F, G, and H
AOI 16	Yes (2)	OU4	Petroleum Dispensing Area
AOI 17	Yes	OU4	Former Petroleum Dispensing Area
AOI 12	Yes (2)	OU5	Test Track Waste Storage Area
AOI 23	Yes (2)	OU5	Group 3 UST
AOI 26	Yes (2)	OU6 (3)	Outfall 001
Additional Area	Yes	OU6 (3)	Outfall 001 Swale

(1) "Areas of Interest (AOIs)" have been identified as those areas being investigated by Fisker as part of their Baseline Investigation and/or areas requiring investigation in accordance with DNREC's Investigation and Remediation Cost Estimate dated April 2010, and/or areas identified as REC's in the February 2010 Phase I ESA prepared by CRA.

(2) AOIs included in Supplemental RI invesitgation activities.

(3) OU6 includes wooded area west of the main former manufacturing plant property

TABLE 2.1

GROUNDWATER ELEVATIONS
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

		Sept 26/ Nov 16 2012		*May 2013*		*June 2013*		*September 20, 2013*		*September 26, 2013*	
Monitoring Well ID	***Ref Point Elevation (AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***
MW-2	77.2	11.7	65.6	11.8	65.4	11.4	65.8	11.4	65.8	11.7	65.6
MW-3	77.53	NM	--	11.7	65.8	11.3	66.3	NM	--	NM	--
MW-3D	77.68	12.2	65.5	12.4	65.3	12.1	65.6	12.2	65.5	12.2	65.5
MW-4	(1)	--	--	--	--	--	--	--	--	--	--
MW-5	(1)	--	--	--	--	--	--	--	--	--	--
MW-6	77.89	12.3	65.6	12.6	65.3	12.1	65.8	12.2	65.7	12.3	65.6
MW-7	78.07	13.0	65.1	13.3	64.7	12.8	65.2	12.7	65.4	13.0	65.1
MW-8	77.53	12.7	64.9	12.9	64.6	12.4	65.1	12.6	65.0	12.7	64.9
MW-9	74.9	10.7	64.2	10.8	64.1	10.7	64.3	10.3	64.6	10.7	64.2
MW-10	78.31	11.7	66.7	11.9	66.5	11.4	66.9	11.5	66.8	11.7	66.7
MW-11	77.77	12.3	65.5	12.6	65.2	12.2	65.6	12.2	65.5	12.3	65.5
MW-11R	77.3	12.6	64.8	12.6	64.7	12.5	64.8	12.6	64.7	12.6	64.8
MW-12	76.91	12.1	64.8	12.4	64.5	12.0	65.0	11.8	65.1	12.1	64.8
MW-13	77.89	12.7	65.2	12.9	65.0	12.4	65.5	12.5	65.4	12.7	65.2
MW-14	79.35	15.9	63.4	15.9	63.4	16.1	63.3	15.9	63.5	15.9	63.4
MW-15	78.45	13.5	65.0	13.5	65.0	13.2	65.2	13.4	65.1	13.5	65.0
MW-16	77.6	11.9	65.7	12.1	65.5	11.7	65.9	11.8	65.8	11.9	65.7
MW-17	78.45	12.7	65.7	13.0	65.5	12.6	65.9	12.7	65.8	12.7	65.7
MW-18	78.58	13.2	65.4	13.5	65.1	13.0	65.6	13.1	65.5	13.2	65.4
MW-19	78.45	14.3	64.1	14.5	63.9	14.3	64.2	14.4	64.1	14.3	64.1
MW-20	78.37	14.4	64.0	14.5	63.8	14.2	64.1	14.3	64.1	14.4	64.0
MW-21	78.67	14.3	64.4	14.7	64.0	14.2	64.5	14.2	64.5	14.3	64.4
MW-22	78.19	13.8	64.4	9.8	68.4	8.8	69.4	13.2	65.0	13.3	64.9
MW-23	77.94	9.9	68.0	10.6	67.4	8.3	69.6	10.6	67.4	10.6	67.3
MW-24	74.35	6.0	68.4	6.1	68.3	6.0	68.4	6.0	68.4	5.8	68.6
MW-25	74.02	5.8	68.2	5.7	68.3	5.3	68.7	5.5	68.6	5.6	68.4
MW-26	74.9	6.9	68.0	7.0	67.9	6.9	68.0	6.4	68.5	6.6	68.3
MW-27	70.98	7.2	63.8	7.0	64.0	6.9	64.1	7.0	64.0	7.2	63.8
MW-28	72.07	8.6	63.5	8.2	63.9	7.8	64.3	8.6	63.5	8.6	63.4
MW-29	75.12	10.0	65.2	9.5	65.6	8.9	66.2	10.4	64.8	9.9	65.2
MW-30	82.14	17.8	64.4	17.2	65.0	16.6	65.6	17.4	64.7	17.4	64.7
MW-31	80.61	15.5	65.2	15.0	65.6	14.6	66.0	15.2	65.4	15.2	65.4
MW-32	82.67	18.9	63.8	18.7	64.0	17.8	64.9	19.5	63.2	18.7	63.9
MW-33	83.196	11.7	71.5	11.0	72.2	10.0	73.2	15.2	68.0	15.2	68.0
MW-34	83.96	12.5	71.5	12.1	71.9	9.5	74.4	13.8	70.2	13.8	70.2
MW-35	71.631	8.2	63.5	7.6	64.0	6.8	64.9	8.3	63.3	8.4	63.2
MW-36D	80.752	17.4	63.4	16.8	63.9	16.1	64.7	17.3	63.5	17.3	63.4
MW-36S	80.823	16.5	64.3	15.9	64.9	15.0	65.9	16.3	64.5	16.4	64.4

TABLE 2.1

GROUNDWATER ELEVATIONS
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

		Sept 26/ Nov 16 2012		*May 2013*		*June 2013*		*September 20, 2013*		*September 26, 2013*	
Monitoring Well ID	***Ref Point Elevation (AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***	***Measured Depth (feet)****	***Groundwater Elevation (feet AMSL)***
MW-37	78.03	13.9	64.1	13.3	64.8	12.4	65.7	NM	--	NM	--
MW-38 (off-Site)	82.47	16.3	66.2	16.1	66.4	14.5	68.0	NM	--	NM	--
MW-39 (off-Site)	81.97	17.5	64.5	16.9	65.1	15.5	66.5	NM	--	NM	--
MW-40 (off-Site)	79.46	15.3	64.2	14.7	64.8	13.5	66.0	NM	--	NM	--
MW-41 (off-Site)	78.24	14.2	64.0	13.6	64.6	12.5	65.7	NM	--	NM	--
MW-42 (off-Site)	79.51	Not Installed	Not Installed	14.8	64.7	13.8	65.7	NM	--	NM	--
MW-43 (off-Site)	78.34	Not Installed	Not Installed	13.9	64.4	12.9	65.5	NM	--	NM	--
MW-44 (off-Site)	77.59	Not Installed	Not Installed	13.0	64.6	12.0	65.6	NM	--	NM	--
MW-45R (off-Site)	79.57	Not Installed	Not Installed	15.3	64.3	14.1	65.5	NM	--	NM	--
MW-46	78.5	Not Installed	Not Installed	Not Installed	Not Installed	13.0	65.5	NM	--	NM	--
MW-47	78.38	Not Installed	Not Installed	Not Installed	Not Installed	12.8	65.5	NM	--	NM	--
MW-100	79.56	16.3	63.2	16.2	63.4	15.5	64.1	NM	--	16.0	63.5
MW-101	78.02	12.7	65.3	12.5	65.5	12.3	65.7	NM	--	12.5	65.5
MW-102	74.89	6.9	68.0	6.6	68.3	6.2	68.7	NM	--	6.9	68.0
MW-103	74.99	7.0	68.0	6.9	68.1	6.4	68.6	NM	--	6.8	68.2
MW-104	74.37	6.2	68.2	6.1	68.3	5.6	68.8	NM	--	6.0	68.4
MW-105	74.35	6.1	68.3	6.2	68.1	6.0	68.3	NM	--	5.1	69.3
MW-106	74.99	9.0	66.0	8.8	66.2	8.2	66.8	NM	--	8.7	66.3
MW-107	73.84	8.8	65.0	8.4	65.5	7.9	65.9	NM	--	8.6	65.3
MW-108	71.61	6.1	65.5	5.9	65.7	5.4	66.2	NM	--	NM	--
MW-109	70.04	10.3	59.8	10.3	59.8	9.9	60.1	NM	--	10.1	59.9
MW-110	81.98	17.7	64.3	17.5	64.4	17.2	64.8	NM	--	17.6	64.4
MW-111	78.99	14.5	64.5	14.0	65.0	13.4	65.6	NM	--	14.2	64.8

Notes:

MW-100 through MW-111 are on-Site brightfields wells. MW-38 through MW-47 are Brightfields off-Site wells.
(1) - Monitoring Well can not be located on site.
NM - Not Measured
* - Feet below reference point elevation
AMSL - Above Mean Seal Level

TABLE 2.2

NEARBY WATER WATER WELL DETAILS
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Modified Grid No.	*Permit Number*	*Well Use*	*Local ID*	*Desired Capacity*	*Screen Bottom*	*Screen Top*	*Address*	*City*	*Casing Diameter (inches)*	*Daily Use*	*Date Completed*	*Site Location Comments*
084-356	194922	1	ORC-1*ORC-10	-	-	-	Blue Ball & Post Rd	Marcus Hook	-	-	-	3701 Kirkwood Hwy.
084-356	194923	1	ORC-11*ORC-16	-	-	-	Blue Ball & Post Rd	Marcus Hook	-	-	-	3701 Kirkwood Hwy.
086-356	50788	D	-	-	-	-	c/o Walton Corp	Newark	6	-	19820503	
086-358	99902	A	-	10	-	-	2311 Newport Gap Pike	Wilmington	6.2	1	19940614	
086-360	38893	D	Faulkland Rd	5	-	-	214 Waverley Rd	Wilmington	-	1	19770914	Faulkland Rd, Rd 270
086-360	40000	D	Rt 48	10	-	-	15 Hillside Rd	Wilmington	6	1	19771121	E of Cr 282 on the S side of Lancaster Rd (Rt 48)
086-360	182710	D	Fells	6	-	-	2325 Fells Lane	Wilmington	6	1	20020115	W/ Fells Ln. N/RT 34
092-350	180049	3	WP 101	25	15	5	Barley Mill Plaza Bldg 27	Wilmington	6	0.3	20010821	Corners of James and Water Sts, E of 141
092-350	180211	3	EW-102	25	15	5	Barley Mill Plaza Bldg 27	Wilmington	6	-	20010822	Corners of James and Water Sts, E of 141
092-350	180212	3	WP-103	25	15	5	Barley Mill Plaza Bldg 27	Wilmington	6	-	20010821	Corners of James and Water Sts, E of 141
092-350	180213	3	EW-104	25	15	5	Barley Mill Plaza Bldg 27	Wilmington	6	-	20010822	Corners of James and Water Sts, E of 141
092-350	180214	3	WP-105	25	15	5	Barley Mill Plaza Bldg 27	Wilmington	6	-	20010822	Corners of James and Water Sts, E of 141
098-352	197622	3	RW-2	1	18	3	403 Meco Drive	Wilmington	6	1.4	20040122	403-408 Meco Dr., Wayman Site
098-352	198070	3	RW-4		20	5	406 Meco Drive	Wilmington	6	-	20040120	406 Meco Dr
098-352	198150	3	RW-3	1	18	3	403 Meco Drive	Wilmington	6	1.4	20040122	403-408 Meco Dr., Wayman Site
098-352	198187	3	RW-5		19	4	406 Meco Drive	Wilmington	6	-	20040120	406 Meco Dr
098-352	198188	3	RW-6	1	18	3	404 Meco Drive	Wilmington	6	1	20040121	404 Meco Dr, Wilmington

NOTES:

Well Use:	A - Agriculture
	C - Miscellaneous Public
	D - Domestic
	P - Public
	S - SB 126 - Agricultural in CPCN

- information not recorded in TEPP
CPCN - Certification of Convenience and Necessity
TEPP - Technology Enabled Permitting Process

TABLE 3.1

SUMMARY OF REMEDIAL INVESTIGATION ACTIVITIES
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

AOI Number	*Investigation Area Description* [illegible]	*Rationale*	*No. of Boreholes*	*No. of Surface/Shallow Soil Samples*	*No. of Deep Subsurface Soil Samples*	*Soil Sample Locations*	*No. of New Monitoring Wells*	*No. of Groundwater Samples*	*Groundwater Sample Locations*	*No. of Soil Gas Samples*	*Soil Gas Sample Locations*	*No. of Sediment Samples*	*No. of Surface Water Samples*	*Sediment/Surface Water Sample Locations*	*Comments*	*Previous Investigation*
AOI 1	No. 6 Fuel Oil (AST F)	Installation of one monitoring well to confirm presence of SVOCs above URS at GP 32	0	0	0	-	1	1	MW22-11	0	-	0	0	-		Yes. Facility assessment for the closure of four ASTs (i.e., AST A, B, C, and F).
AOI 2	No. 6 Fuel Oil (AST G)	No evidence to suggest a release based on results of Fisher Environmental Baseline Investigation (EBI)	0	0	0	-	0	0	-	0	-	0	0	-		No
AOI 3	Waste Solvent ASTs (ASTs P [illegible])	Confirm and delineate the metals exceedances identified by EBI at GP-103 installed to investigate this AOI. The presence of metals is likely not related to the solvent ASTs and will be investigated by CRA as part of AOI 6 the Mod Paint Pits and Sumps	0	0	0		0	0	-	0	-	0	0	-		EBI
AOI 4	[illegible] AST	Investigate possible impacts to subsurface due to former operation of and/or in place closure of the tank	2	2	2	BH1-11 and BH2-11	0	0	-	0	-	0	0	-		No
AOI 5	Diesel Oil UST by Powerhouse	Evaluate impacts from historical release	3	3	3	BH3-11 through BH5-11	1	1	MW23-11	0	-	0	0	-		No
AOI 6	Modular Paint Pits and Mixing Area Sumps/ East of Mod Paint Building	Groundwater infiltration was observed through joints in pits. Determine if there has been a release to soil and/or groundwater. Also to confirm and delineate the metals exceedances identified by Fisher Investigation at GP-103 installed to investigate AOI 3	6	4	6	BH6-11 through BH8-11 and BH10-11 through BH11-11 and MW 32	1	3	BH10-11, BH11-11, and MW-32	0	-	0	0	-	BH6-11 through BH8-11 are associated with GP-103	GP-103 was part of EBI
AOI 6	Supplemental RI - Modular Paint Pits and Mixing Area Sumps/ East of Mod Paint Building	PCBs and PCE were detected in GW grab samples beneath Mod Paint Building	0	0	0	-	0	5	MW-14, MW32-11, MW-100, MW-101, MW-110	0	-	0	0	-	Sampled existing wells MW-14, MW32-11, MW-100, MW-101, and MW-110 for VOCs and PCBs	No
AOI 7	Acetylene Sludge Pits	No information on construction and/or closure. Investigate possible impacts to subsurface due to former operation of pit.	2	2	2	BH57-11 and BH58-11	1	1	MW24-11	0	-	0	0	-		EBI
AOI 8	WWTP Sump	No evidence to suggest a release based on results of EBI	0	0	0	-	0	0	-	0	-	0	0	-		No (inspection only)
AOI 9	Hydraulic Lift	Delineate known residual TPH impacts	1	1	1	BH12-11	0	0	-	0	-	0	0	-		1996 Limited Soil Investigation
AOI 10	Old Hazardous Waste Accumulation Area (Former Tank Storage Area)	No evidence to suggest a release based on results of EBI	2	2	2	MW25-11 and MW26-11	2	3	MW25-11, MW26-11 and MW-105	0	-	0	0	-	One well installed up gradient of MW 105 and one well installed down gradient of MW 105.	EBI
AOI 10	Supplemental RI - Old Hazardous Waste Accumulation Area (Former Tank Storage Area)	Confirm aluminum results and pH at MW-105	0	0	0	-	0	1	MW-105	0	-	0	0	-	MW-105 was re-sampled for metals to confirm results.	
AOI 11	New Hazardous Waste Accumulation Area	No evidence to suggest a release based on results of EBI	0	0	0	-	0	0	-	0	-	0	0	-		No (inspection only)
AOI 12	Test Track Waste Storage Area	Investigate possible impacts resulting from reported historical waste burning activities and presence of sludge in fence post holes that was hazardous for lead	24	24	24	BH13-11 through BH32-11 and MW29-11	3	3	MW27-11 through MW29-11	0	-	0	0	-		No
AOI 12	Supplemental RI - Test Track Waste Storage Area	Delineate metals in soils and VOCs and metals from MW29-11	56	56	0	BH18/2-11, BH24/2-12 and TT-1 through TT-54	1	4	MW27-11, MW28-11, MW29-11, and MW-35	0	-	0	0	-	Resampled BH18-11(BH18-11/2) and BH24-11 (BH24-11/2) for metals and Conducted grid sampling to delineate metals. Field screened with XRF to guide process. Installed MW-35 near BH34-11 as a down/cross gradient well to MW29-11 to sample for VOCs and total and dissolved Metals. No soil samples will be collected during well installation.	No
AOI 13	LPG Areas	Investigate possible impacts to subsurface based on observance of degraded concrete within plant and at large tank.	1	1	1	BH36-11	0	1	BH36-11	0	-	0	0	-		
AOI 14	Phosphate Area	Investigate possible impacts to subsurface based on observance of degraded concrete	1	1	1	BH37-11	0	0	-	0	-	0	0	-	Well installed under AOI 13 applies to this AOI as well. Well and Sample accounted for in AOI 13.	
AOI 15	Grit Separator Building	No evidence to suggest a release based on results of EBI.	0	0	0	-	0	0	-	0	-	0	0	-		No (inspection only)
AOI 16	Petroleum Dispensing Area	Determine if petroleum impacts are present due to moderate staining observed	5	5	5	BH38-11 through BH42-11	1	1	MW33-11	0	-	0	0	-		No

TABLE 3.1

SUMMARY OF REMEDIAL INVESTIGATION ACTIVITIES
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

AOI Number	Investigation Area Description [1]	Rationale	No. of Boreholes	No. of Surface/Shallow Soil Samples	No. of Deep Subsurface Soil Samples	Soil Sample Locations	No. of New Monitoring Wells	No. of Groundwater Samples	Groundwater Sample Locations	No. of Soil Gas Samples	Soil Gas Sample Locations	No. of Sediment Samples	No. of Surface Water Samples	Sediment/Surface Water Sample Locations	Comments	Previous Investigation
AOI 16	Supplemental RI - Petroleum Dispensing Area	Evaluate groundwater and soil gas/vapor quality along property line.	0	0	0	0	3	44	4 water samples from each VAS boring (40), MW-10, MW-36S, MW-36D, and MW-37	5	SG 1 through SG 5	0	0	-	Installed 10 borings and conduct vertical aquifer sampling (no soil samples were collected) to determine where to install MW 36S, MW 36D, and MW 37. Collect GW samples from MW10-11, MW 36S, MW 36D, and MW 37. Completed screening level soil gas sampling at 5 locations	No (inspection only)
AOI 17	Former Petroleum Dispensing Area	Determine if petroleum impacts are present.	4	4	4	BH43-11 through BH46-11	1	1	MW31-11	0	-	0	0	-		No (inspection only)
AOI 18	OU 2 Area	Evaluate Concentrations of toluene and lead detected during OU 2 Investigation	0	0	0	-	0	3	MW-11, MW-15, and MW-10	0	-	0	0	-	1 sample at MW-11 for toluene; 1 sample at MW 15 for lead, and 1 sample at MW 10 for lead.	OU 2 Investigation
AOI 18	Supplemental RI - OU 2 Area	Complete the second round of sampling at MW-11, MW-15, and MW-10 for Toluene and Lead	0	0	0	-	0	3	MW-11, MW-15, and MW-10	0	-	0	0	-	1 sample at MW-11 for toluene; 1 sample at MW 15 for lead, and 1 sample at MW 10 for lead.	OU 2 Investigation
AOI 19	Lift Stations (to WWTP)	Conduct visual inspection to evaluate integrity and potential for release.	0	0	0	-	0	0	-	0	-	0	0	-	See Table 3.3	No
AOI 20	PCB Containing Equipment/Oil Stained Surfaces	Conduct visual inspection to evaluate the integrity of the concrete beneath in ground conveyors to assess the potential for a release to the environment	0	0	0	-	0	0	-	0	-	0	0	-	See Table 3.3	No
AOI 21	Railroad Tracks	DNREC requested this AOI be investigated. Install soil borings (2 per spur) to investigate presence of impacts at the three rail road spurs on the north side of the Main Assembly Plant	6	6	6	BH47-11 through BH42-11	0	0	-	0	-	0	0	-		No
AOI 22	Oil Stained Gravel	No evidence to suggest a release based on results of EBI.	0	0	0	-	0	0	-	0	-	0	0	-		No
AOI 23	Group 3 UST	Evaluate the horizontal and vertical extent of impacted soil in the vicinity of GP-130	4	4	4	BH53-11 through BH56-11	0	0	-	0	-	0	0	-		No
AOI 23	Supplemental RI - Group 3 UST	Confirm results of shallow soil metals results	1	1	0	BH53/2-11	0	0	-	0	-	0	0	-		No
AOI 24	Solvent ASTs	No evidence to suggest a release based on results of EBI.	0	0	0	-	0	0	-	0	-	0	0	-		
AOI 25	Former Open Ditch	No evidence to suggest a release based on results of EBI.	0	0	0	-	0	0	-	0	-	0	0	-		
AOI 26	Outfall 001	Determine if impacts are present in creek sediments. Fisker requested swale samples	0	0	0	-	0	0	-	0	-	7	0	Sed-1 through Sed-7	Four sediment samples collected in the swale. Three sediment samples collected from Outfall and Little Mill Creek.	Sampling following release
AOI 26	Supplemental RI - Outfall 001	Confirm SVOC impacts in creek sediments, determine surface water is impacted, collect upstream/background sediment and surface water samples to evaluate impacts. Evaluate potential of impacts in shallow soils in Wooded Area as part of the ERA. Additional groundwater sampling specifically for evaluation of metals impacts from Site groundwater to Little Mill Creek.	0	15	0	-	1	5	MW-27, MW-28, MW-33, MW-48, MW-100	0	-	11	11	Sed 8 through Sed 12 and SW 1 through SW 5 and SW SED 100-01 through SW SED 100-08	Five sediment samples collected (SED-8 through SED 9) - 1 upstream background, 1 immediately upstream of Outfall 001, 1 at Outfall 001, and two downstream of Outfall 001. Corresponding surface water samples (SW-1 through SW 5) collected at each location. Corresponding surface water and sediment samples at SW SED 100-01 through SW SED 100-04 and SW SED 100-07. Surface water only at SW SED 100-06 and SW SED 100-08, and Sediment only at SW SED 100-05.	
NA	Parking Lot	Evaluate presence of impacts from Fill	6	6	6	BH59-11 through BH64-11	0	0	-	0	-	0	2	-		No
NA	Supplemental RI - Site Wide Groundwater	To better define groundwater flow direction and to measure pH.	0	0	0	-	2	0	-	0	-	0	0	-	The purpose of the two new wells MW 33 and MW-34 is to measure groundwater levels only. No soil or groundwater samples will be collected	NA
		TOTALS	124	137	67		18	81		5		18	13			

Notes:

[1] "Areas of Interest (AOIs)" have been identified as those areas being investigated by Fisker as part of their Baseline Investigation and/or areas requiring investigation in accordance with DNREC's Investigation and Remediation Cost Estimate dated April 2010, and/or areas identified as REC's in the February 2010 Phase I ESA prepared by CRA

TABLE 3.2

SAMPLING SUMMARY
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit / AOI	Sample ID	Location ID	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parent Sample ID (Sample ID of original sample (for duplicates, etc.)	Laboratory / Confirmatory Analysis	TCL VOCs	TCL SVOCs	TAL Metals	PCB	Pesticides	Dissolved TAL Metals	TOTAL LEAD	DISSOLVED LEAD	TOLUENE	DRO	GRO	Grain Size	Total Organic Carbon/Black Carbon	Acid Volatile Sulfides	Simultaneously Extracted Metals	PAH (34 Homologues)
	SOIL																						
Operable Unit 3																							
AOI 4 - Xylene AST	SO 17338-091311 MM-01	BH1-11	9/13/2011	0	2			S	S	S	S	S											
	SO-17338-091311 MM-02	BH1-11	9/13/2011	12	14			S	S	S	S	S											
	SO 17338-091311 MM-03	BH2 11	9/13/2011	0	2			S	S	S	S	S											
	SO 17338-091311 MM-04	BH2 11	9/13/2011	13	15			S	S	S	S	S											
AOI 5 - Diesel Oil UST by Power House	SO-17338-091511 MM-011	BH3 11	9/15/2011	0	2			S	S	S	S	S											
	SO-17338-091511 MM-012	BH3 11	9/15/2011	7	9			S	S	S	S	S											
	SO 17338-091511 MM-013	BH4-11/MW-23	9/15/2011	0	2			S	S	S	S	S											
	SO 17338-091511-MM-014	BH4-11/MW-23	9/15/2011	7	9			S	S	S	S	S											
	SO-17338-091511 MM-015	BH5-11	9/15/2011	0	2		Yes	S	S/X	S/X	S/X	S/X											
	SO 17338-091511 MM-016	BH5 11	9/15/2011	7	9			S	S	S	S	S											
AOI 6 - Modular Paint Pits and Mixing Area Sumps / East of Mod Paint Building	SO-17338 101011 MM 149	BH6 11	10/10/2011	0	2		Yes	S/X	S/X	S	S	S											
	SO-17338-101011-MM-150	BH6-11	10/10/2011	13	15			S	S	S	S	S											
	SO-17338-101011-MM-151	BH7 11	10/10/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-101011-MM-152	BH7-11	10/10/2011	0	2	SO-17338-101011-MM-151	Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-101011-MM-153	BH7 11	10/10/2011	8	10			S	S	S	S	S											
	SO-17338-101011-MM-154	BH8 11	10/10/2011	0	2			S	S	S	S	S											
	SO-17338-101011-MM-155	BH8-11	10/10/2011	12	14		Yes	S/X	S	S/X	S	S											
	SO-17338-091511-MM-017	BH10-11	9/15/2011	4	5		Yes	S/X	S	S/X	S	S											
	SO-17338-091511-MM-018	BH11-11	9/15/2011	4	5			S	S	S	S	S											
	SO-17338-092011-MM-033	MW-32	9/20/2011	0	2			S	S	S	S	S											
	SO-17338-092011-MM-034	MW-32	9/20/2011	11	13			S	S	S	S	S											
AOI 7 - Acetylene Sludge Pits	SO-17338-092011-MM-035	BH57-11/MW-24	9/20/2011	0	2			S	S	S	S	S											
	SO-17338-092011 MM-036	BH57 11/MW-24	9/20/2011	7	9			S	S	S	S	S											
	SO 17338-092011 MM-037	BH58-11	9/20/2011	0	2			S	S	S	S	S											
	SO 17338-092011 MM-038	BH58-11	9/20/2011	5	7		Yes	S/X	S/X	S/X	S/X	S/X											
AOI 9 - Hydraulic Lift	SO-17338-091411-MM-09	BH12-11	9/14/2011	0	2		Yes	S	S	S	S/X	S/X											
	SO-17338-091411-MM-010	BH12-11	9/14/2011	16	18		Yes	S/X	S/X	S/X	S	S											
AOI 10 - Old Hazardous Waste Accumulation Areas	SO-17338-092111-MM-039	MW-25	9/21/2011	0	2			S	S	S	S	S											
	SO-17338-092111-MM-040	MW-25	9/21/2011	0	2	SO-17338-092111-MM-039		S	S	S	S	S											
	SO-17338-092111-MM-041	MW-25	9/21/2011	7	9			S	S	S	S	S											
	SO-17338-092111-MM-042	MW-26	9/21/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092111-MM-043	MW 26	9/21/2011	7	9		Yes	S/X	S/X	S/X	S/X	S/X											
AOI 13 - ELPO Area	SO-17338-091411 MM-07	BH36-11	9/14/2011	0	2		Yes	S/X	S	S/X	S	S											
	SO 17338-091411 MM-08	BH36-11	9/14/2011	12	14			S	S	S	S	S											
A1OI 13 - ELPO Area and AOI 14 - Phosphate Area	SO-17338-091311-MM-05	BH37-11	9/13/2011	0	2			S	S	S	S	S											
	SO 17338-091311-MM-06	BH37-11	9/13/2011	11	13			S	S	S	S	S											
AOI 21 - Railroad Tracks	SO-17338-092111-MM-044	BH47-11	9/21/2011	0	2			S	S	S	S	S											
	SO-17338-092111-MM-045	BH47-11	9/21/2011	4	6			S	S	S	S	S											
	SO-17338-092111-MM-048	BH48-11	9/21/2011	0	2			S	S	S	S	S											
	SO-17338-092111-MM-049	BH48-11	9/21/2011	0	2	SO 17338-092111 MM-048		S	S	S	S	S											
	SO-17338-092111-MM-050	BH48-11	9/21/2011	7	9			S	S	S	S	S											
	SO-17338-092111-MM-046	BH49-11	9/21/2011	0	2			S	S	S	S	S											
	SO-17338-092111-MM-047	BH49-11	9/21/2011	7	9			S	S	S	S	S											

TABLE 3 2

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Operable Unit / AOI	Sample ID	Location ID	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parent Sample ID (Sample ID of original sample for duplicates, etc.)	Laboratory / Confirmatory Analysis	TCL VOCs	TCL SVOCs	TAL Metals	PCB	Pesticides	Dissolved TAL Metals	TOTAL LEAD	DISSOLVED LEAD	TOLUENE	DRO	GRO	Grain Size	Total Organic Carbon/Black Carbon	Acid Volatile Sulfides	Simultaneously Extracted Metals	PAH (34 Homologues)
AOI 21 - Railroad Tracks Cont.	SO-17338-092211-MM-051	BH50-11	9/22/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092211-MM-052	BH50-11	9/22/2011	7	9			S	S	S	S	S											
	SO-17338-092211-MM-053	BH51-11	9/22/2011	0	2			S	S	S	S	S											
	SO-17338-092211-MM-054	BH51-11	9/22/2011	9	11		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092211-MM-055	BH52-11	9/22/2011	0	2		Yes	S	S	S/X	S/X	S/X											
	SO-17338-092211-MM-056	BH52-11	9/22/2011	13	15			S	S	S	S	S											
Parking Lot	SO-17338-091911-MM-020	BH59-11	9/19/2011	0	2			S	S	S	S	S											
	SO-17338-091911-MM-021	BH59-11	9/19/2011	16	18			S	S	S	S	S											
	SO-17338-092011-MM-031	BH60-11	9/20/2011	0	2			S	S	S	S	S											
	SO-17338-092011-MM-032	BH60-11	9/20/2011	13	15			S	S	S	S	S											
	SO-17338-091911-MM-029	BH61-11	9/19/2011	0	2			S	S	S	S	S											
	SO-17338-091911-MM-030	BH61-11	9/19/2011	13	15		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-091911-MM-022	BH62-11	9/19/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-091911-MM-023	BH62-11	9/19/2011	0	2	SO-17338-091911-MM-022	Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-091911-MM-024	BH62-11	9/19/2011	15	17			S	S	S	S	S											
	SO-17338-091911-MM-025	BH63-11	9/19/2011	0	2			S	S	S	S	S											
	SO-17338-091911-MM-026	BH63-11	9/19/2011	14	16			S	S	S	S	S											
	SO-17338-091911-MM-027	BH64-11	9/19/2011	0	2			S	S	S	S	S											
	SO-17338-091911-MM-028	BH64-11	9/19/2011	13	15			S	S	S	S	S											
Operable Unit 4																							
AOI 16 - Petroleum Dispensing Area and Historical USTs	SO-17338-092611-MM-070	BH38-11	9/26/2011	0	2		Yes	S/X	S/X	S	S/X	S/X											
	SO-17338-092611-MM-071	BH38-11	9/26/2011	9	10		Yes	S/X	S/X	S	S/X	S/X											
	SO-17338-092611-MM-072	BH38-11	9/26/2011	9	10	SO-17338-092611-MM-071	Yes	S/X	S/X	S	S/X	S/X											
	SO-17338-092611-MM-075	BH39-11	9/26/2011	4	5		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092611-MM-076	BH39-11	9/26/2011	13	15		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092611-MM-073	BH40-11	9/26/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092611-MM-074	BH40-11	9/26/2011	9	10		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092711-MM-077	BH41-11	9/27/2011	3	4			S	S	S	S	S											
	SO-17338-092711-MM-078	BH41-11	9/27/2011	15	17			S	S	S	S	S											
	SO-17338-092711-MM-079	BH42-11	9/27/2011	0	2			S	S	S	S	S											
	SO-17338-092711-MM-080	BH42-11	9/27/2011	15	17			S	S	S	S	S											
AOI 17 - Former Petroleum Dispensing Area	SO-17338-092611-MM-066	BH43-11	9/26/2011	0	2			S	S	S	S	S											
	SO-17338-092611-MM-067	BH43-11	9/26/2011	12	14			S	S	S	S	S											
	SO-17338-092611-MM-064	BH44-11	9/26/2011	0	2			S	S	S	S	S											
	SO-17338-092611-MM-065	BH44-11	9/26/2011	12	14			S	S	S	S	S											
	SO-17338-092611-MM-062	BH45-11	9/26/2011	0	2			S	S	S	S	S											
	SO-17338-092611-MM-063	BH45-11	9/26/2011	12	14			S	S	S	S	S											
	SO-17338-092611-MM-068	BH46-11/MW-31	9/26/2011	0	2			S	S	S	S	S											
	SO-17338-092611-MM-069	BH46-11/MW-31	9/26/2011	13	15			S	S	S	S	S											
Operable Unit 5																							
AOI 12 - Test Track Area	SO-17338-092211-MM-057	BH13-11	9/22/2011	0	2			S	S	S	S	S											
	SO-17338-092211-MM-058	BH13-11	9/22/2011	8	10			S	S	S	S	S											
	SO-17338-092611-MM-060	BH14-11	9/26/2011	0	2		Yes	S/X	S/X	S	S/X	S/X											
	SO-17338-092611-MM-061	BH14-11	9/26/2011	5	5.5			S	S	S	S	S											
	SO-17338-100311-MM-118	BH15-11	10/3/2011	0	2			S	S	S	S	S											
	SO-17338-100311-MM-119	BH15-11	10/3/2011	6	8			S	S	S	S	S											
	SO-17338-092911-MM-112	BH16-11	9/29/2011	0	2			S	S	S	S	S											
	SO-17338-092911-MM-113	BH16-11	9/29/2011	8	10		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-100311-MM-114	BH17-11	10/3/2011	0	2			S	S	S	S	S											
	SO-17338-100311-MM-115	BH17-11	10/3/2011	11	13			S	S	S	S	S											

TABLE 3.2

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Operable Unit / AOI	*Sample ID*	*Location ID*	*Sample Date*	*Start Depth (ft bgs)*	*End Depth (ft bgs)*	*Parent Sample ID (Sample ID of original sample for duplicates, etc.)*	*Laboratory / Confirmatory Analysis*	*TCL VOCs*	*TCL SVOCs*	*TAL Metals*	*PCB*	*Pesticides*	*Dissolved TAL Metals*	*TOTAL LEAD*	*DISSOLVED LEAD*	*TOLUENE*	*DRO*	*GRO*	*Grain Size*	*Total Organic Carbon/Black Carbon*	*Acid Volatile Sulfides*	*Simultaneously Extracted Metals*	*PAHs (34 Homologues)*
AOI 12 - Test Track Area Core	SO-17338-100311-MM-120	BH18-11	10/3/2011	0	2			S	S	S	S	S											
	SO 17338 100311 MM 121	BH18-11	10/3/2011	7	9			S	S	S	S	S											
	SO-17338-092911-MM-110	BH19 11/MW 27	9/29/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092911-MM-111	BH19 11/MW 27	9/29/2011	7	9			S	S	S	S	S											
	SO-17338-100311-MM-122	BH20-11	10/3/2011	0	2		Yes	S	S	S/X	S	S											
	SO-17338-100311-MM-123	BH20-11	10/3/2011	8	10			S	S	S	S	S											
	SO-17338-092711-MM-083	BH21-11	9/27/2011	0	2			S	S	S	S	S											
	SO-17338-092711-MM-084	BH21-11	9/27/2011	12	14			S	S	S	S	S											
	SO-17338-100311-MM-116	BH22 11	10/3/2011	0	2			S	S	S	S	S											
	SO-17338-100311-MM-117	BH22 11	10/3/2011	8	10			S	S	S	S	S											
	SO-17338-092711-MM-081	BH23-11	9/27/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092711-MM-082	BH23-11	9/27/2011	8	10			S	S	S	S	S											
	SO-17338-100311-MM-124	BH24-11	10/3/2011	0	2			S	S	S	S	S											
	SO-17338-100311-MM-125	BH24 11	10/3/2011	6	8			S	S	S	S	S											
	SO-17338-092811-MM-089	BH25-11	9/28/2011	0	2			S	S	S	S	S											
	SO-17338-092811-MM-090	BH25-11	9/28/2011	13	14			S	S	S	S	S											
	SO-17338-092811-MM-093	BH26-11	9/28/2011	0	2			S	S	S	S	S											
	SO-17338-092811-MM-094	BH26-11	9/28/2011	7	9			S	S	S	S	S											
	SO-17338-092911-MM-104	BH27 11/MW 28	9/29/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092911-MM-105	BH27-11/MW 28	9/29/2011	7	9		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092911-MM-101	BH28-11	9/29/2011	0	2			S	S	S	S	S											
	SO-17338-092911-MM-102	BH28-11	9/29/2011	0	2	SO-17338-092911-MM-101		S	S	S	S	S											
	SO-17338-092911-MM-103	BH28-11	9/29/2011	3	5			S	S	S	S	S											
	SO-17338-092811-MM-087	BH29-11	9/28/2011	0	2			S	S	S	S	S											
	SO-17338-092811-MM-088	BH29 11	9/28/2011	12	14			S	S	S	S	S											
	SO-17338-092811-MM-095	BH30-11	9/28/2011	0	2			S	S	S	S	S											
	SO-17338-092811-MM-096	BH30-11	9/28/2011	7	9			S	S	S	S	S											
	SO-17338-092911-MM-106	BH31-11	9/29/2011	0	2			S	S	S	S	S											
	SO-17338-092911-MM-107	BH31-11	9/29/2011	6	8			S	S	S	S	S											
	SO-17338-092911-MM-099	BH32 11	9/29/2011	0	2			S	S	S	S	S											
	SO-17338-092911-MM-100	BH32 11	9/29/2011	5	7		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-092811-MM-091	BH33-11	9/28/2011	0	2		Yes	S	S	S/X	S/X	S/X											
	SO-17338-092811-MM-092	BH33 11	9/28/2011	7	9			S	S	S	S	S											
	SO-17338-092911-MM-108	BH34-11	9/29/2011	0	2		Yes	S	S/X	S/X	S	S											
	SO-17338-092911-MM-109	BH34-11	9/29/2011	7	9			S	S	S	S	S											
	SO-17338-092811-MM-097	BH35 11	9/28/2011	0	2			S	S	S	S	S											
	SO 17338 092811 MM 098	BH35 11	9/28/2011	7	9			S	S	S	S	S											
	SO-17338-092711-MM-085	MW-29	9/27/2011	0	2		Yes	S/X	S/X	S/X	S/X	S/X											
	SO 17338-092711 MM-086	MW 29	9/27/2011	17	19		Yes	S/X	S/X	S/X	S/X	S/X											
	SO-17338-080612-MM-201	BH 18/2	8/6/2012	0.6	2		Yes			S/X													
	SO-17338-080612-MM-202	BH 24/2	8/6/2012	0.6	2		Yes			S/X													
	SO-17338-082212-MM-203	TT-1	8/22/2012	0.6	2					S													
	SO-17338-082212-MM-204	TT-2	8/22/2012	2	4					S													
	SO-17338-082212-MM-205	TT-3	8/22/2012	4	6					S													
	SO-17338-082212-MM-206	TT-4	8/22/2012	4	6					S													
	SO-17338-082212-MM-207	TT-5	8/22/2012	4	6					S													
	SO-17338-082212-MM-208	TT 6	8/22/2012	0.6	2		Yes			S/X													
	SO-17338-082312-MM-209	TT-7	8/23/2012	0.6	2					S													
		TT 8	8/23/2012	0.6	2					S													
	SO-17338-082312-MM-210	TT-9	8/23/2012	2	4		Yes			S/X													
	SO-17338-082312-MM-211	TT-10	8/23/2012	2	4					S													
	SO-17338-082312-MM-212	TT-11	8/23/2012	6	8					S													
	SO-17338-082312-MM-213	TT-12	8/23/2012	4	6					S													
	SO-17338-082312-MM-214	TT 13	8/23/2012	6	8					S													
	SO-17338-082312-MM-215	TT 14	8/23/2012	0 6	2					S													
	SO-17338-082312-MM-216	TT 15	8/23/2012	0 6	2					S													

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AOI 12 - Test Track Area Cont	SO-17338-082312-MM-217	TT-16	8/23/2012	4	6		Yes			S/X													
	SO 17338-082312 MM 218	TT 17	8/23/2012	0.6	2		Yes			S/X													
	SO-17338-082312 MM 219	TT 18	8/23/2012	0.6	2					S													
	SO-17338-082912 MM 220	TT-19	8/29/2012	0.6	2					S													
	SO 17338-082912-MM 221	TT 20	8/29/2012	4	6					S													
	SO 17338-082912 MM 222	TT 21	8/29/2012	4	6					S													
	SO 17338-082912 MM-223	TT-22	8/29/2012	2	4		Yes			S/X													
	SO 17338-082912 MM 224	TT-23	8/29/2012	2	4					S													
	SO 17338-082912-MM 225	TT 24	8/29/2012	0.6	2		Yes			S/X													
	SO 17338-082912-MM 226	TT-25	8/29/2012	0.6	2					S													
	SO 17338-082912-MM 227	TT 26	8/29/2012	2	4		Yes			S/X													
	SO 17338-082912 MM 228	TT 27	8/29/2012	4	6					S													
	SO 17338-082912-MM 229	TT 28	8/29/2012	4	6					S													
	SO 17338-082912 MM 230	TT 29	8/29/2012	0.6	2					S													
	SO 17338-082912 MM 231	TT 30	8/29/2012	2	4					S													
	SO 17338-083012 MM 232	TT 31	8/30/2012	0.6	2					S													
	SO-17338-083012 MM 233	TT 32	8/30/2012	0.6	2					S													
	SO-17338-083012 MM 234	TT 33	8/30/2012	2	4					S													
	SO-17338-083012 MM 235	TT-34	8/30/2012	2	4		Yes			S/X													
	SO 17338-0830212-MM-236	TT-34	8/30/2012	2	4	SO-17338-0830212-MM-235	Yes			S/X													
	SO-17338-083012-MM-237	TT 35	8/30/2012	4	6		Yes			S/X													
	SO 17338-083012-MM 238	TT 36	8/30/2012	0.6	2					S													
	SO 17338-083012-MM-239	TT-37	8/30/2012	2	4					S													
	SO 17338-083012 MM 240	TT-38	8/30/2012	0.6	2					S													
	SO 17338-090612-MM-241	TT-39	9/6/2012	2	4					S													
	SO 17338-090612 MM 242	TT-40	9/6/2012	0.6	2					S													
	SO 17338-090612-MM-243	TT 41	9/6/2012	2	4		Yes			S/X													
	SO 17338-090612-MM 244	TT 42	9/6/2012	0.6	2					S													
	SO 17338-090612-MM 245	TT 43	9/6/2012	0.6	2					S													
	SO 17338-090612 MM 246	TT 43	9/6/2012	0.6	2	SO-17338-090612-MM-245				S													
	SO 17338-090612-MM 247	TT-44	9/6/2012	0.6	2		Yes			S/X													
	SO 17338-090612 MM 248	TT-45	9/6/2012	0.6	2					S													
	SO 17338-090612 MM 249	TT 46	9/6/2012	0.6	2					S													
	SO-17338-091012 MM 250	TT 47	9/10/2012	0.6	2					S													
	SO 17338-091012 MM 251	TT 48	9/10/2012	0.6	2		Yes			S/X													
	SO 17338-091012 MM 252	TT 49	9/10/2012	0.6	2					S													
	SO-17338-091012 MM 253	TT 50	9/10/2012	2	4		Yes			S/X													
	SO 17338-091012-MM 254	TT 51	9/10/2012	0.6	2					S													
	SO 17338-091012 MM 255	TT 52	9/10/2012	0.6	2		Yes			S/X													
	SO 17338-091012-MM 256	TT-53	9/10/2012	0.6	2					S													
	SO 17338-091212 MM 257	TT-54	9/12/2012	0.6	2					S													
AOI 22 - Group 3 UST	SO 17338 100411 MM 130	BH53 11	10/4/2011	0	2			S	S	S	S	S											
	SO 17338-100411 MM-131	BH53 11	10/4/2011	7	9		Yes	S/X	S/X	S/X	S/X	S/X											
	SO 17338 100411 MM 132	BH53 11	10/4/2011	7	9	SO 17338 100411 MM 131	Yes	S/X	S/X	S/X	S/X	S/X											
	SO 17338-100411 MM 126	BH54-11	10/4/2011	0	2			S	S	S	S	S											
	SO 17338-100411 MM 127	BH54-11	10/4/2011	0	2	SO-17338 100411-MM 126		S	S	S	S	S											
	SO 17338 100411-MM 128	BH54-11	10/4/2011	7	8			S	S	S	S	S											
	SO 17338-100411 MM 129	BH54-11	10/4/2011	7	9	SO 17338 100411-MM 128		S	S	S	S	S											
	SO 17338-100411 MM 136	BH55-11	10/4/2011	0	2			S	S	S	S	S											
	SO 17338 100411 MM 137	BH55-11	10/4/2011	7	8			S	S	S	S	S											
	SO-17338 100411 MM 133	BH56-11	10/4/2011	0	2			S	S	S	S	S											
	SO 17338 100411 MM 134	BH56 11	10/4/2011	0	2	SO 17338 100411 MM 133		S	S	S	S	S											
	SO 17338 100411 MM 135	BH56 11	10/4/2011	7	8			S	S	S	S	S											
	SO-17338-080612 MM 200	BH 53/2	8/6/2012	0.6	2		Yes			S/X													

TABLE 3.2

SAMPLING SUMMARY
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit / AOI	Sample ID	Location ID	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parent Sample ID (Sample ID of original sample for duplicates, etc.)	Laboratory / Conformatory Analysis	TCL VOCs	TCL SVOCs	TAL Metals	PCB	Pesticides	Dissolved TAL Metals	TOTAL LEAD	DISSOLVED LEAD	TOLUENE	DRO	GRO	Grain Size	Total Organic Carbon/Black Carbon	Acid Volatile Sulfides	Simultaneously Extracted Metals	PAH (34 Homologues)
Operable Unit 6																							
Wooded Area	SO-17338-100214-SEB-001	STA-001	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-002	STA-001	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-003	STA-002	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-004	STA-003	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-005	STA-005	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-006	STA-007	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-007	STA-009	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-008	STA-011	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-009	STA-014	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-010	STA-015	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-011	STA-012	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-012	STA-008	10/2/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-013	STA-013	10/3/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-014	STA-010	10/3/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-015	STA-006	10/3/2014	0	2		Yes	X	X	X	X	X											
	SO-17338-100214-SEB-016	STA-004	10/3/2014	0	2		Yes	X	X	X	X	X											
	GROUNDWATER																						
Operable Unit 3																							
AOI 1 - No. 6 Fuel Oil AST	GW-17338-110111-MW22-10	MW-22	11/1/2011	NA	NA		Yes		X														
AOI 5 - Diesel Oil UST by Power House	GW-17338-102611-MW23-01	MW-23	10/26/2011	NA	NA		Yes	X	X	X	X	X	X										
AOI 6 - Modular Paint Pits and Mixing Area Sumps / East of Mod Paint Building	GW-17338-091611-MW-03	Bn10-11	9/16/2011	NA	NA		Yes	X	X	X	X		X										
	GW-17338-091611-MW-02	Bn11-11	9/16/2011	NA	NA		Yes	X	X	X	X		X										
	GW-17338-110211-MW32-15	MW-32	11/2/2011	NA	NA		Yes$^{(1)}$	X		X			X										
	GW-17338-110711-MW32-19	MW-32	11/7/2011	NA	NA		Yes$^{(1)}$		X		X	X											
	WG-17338-100112-MW32-MM-248	MW-32	10/1/2012	NA	NA		Yes	X			X												
	WG-17338-100112-MW110-MM-249	MW-110	10/1/2012	NA	NA		Yes	X			X												
	WG-17338-100212-MW100-MM-250	MW-100	10/2/2012	NA	NA		Yes	X			X												
	WG-17338-100512-MW14-MM-251	MW-14	10/5/2012	NA	NA		Yes	X			X												
	WG-17338-100512-MW101-MM-252	MW-101	10/5/2012	NA	NA		Yes	X			X												
AOI 7 - Acetylene Sludge Pits	GW-17338-103111-MW24-02	MW-24	10/31/2011	NA	NA		Yes	X	X	X	X	X	X										
AOI 10 - Old Hazardous Waste Accumulation Area	GW-17338-103111-MW25-03	MW-25	10/31/2011	NA	NA		Yes	X	X	X	X	X	X										
	GW-17338-103111-MW26-04	MW 26	10/31/2011	NA	NA		Yes	X	X	X	X	X	X										
	GW-17338-110211-MW105-14	MW-105	11/2/2011	NA	NA		Yes	X	X	X	X	X	X										
	WG-17338-101112-MW105-MM-257	MW-105	10/11/2012	NA	NA		Yes			X			X										
AOI 13 - ELPO Area and AOI 14 - Phosphate Area	GW-17338-091611-MW-01	Bn36-11	9/16/2011	NA	NA		Yes	X	X	X	X	X											
AOI 18 - OU-2 Area	GW 17338 110711 MW11 18	MW-11	11/7/2011	NA	NA		Yes									X							
	GW 17338-110311-MW110-16	MW-110	11/3/2011	NA	NA		Yes							X	X								
	GW 17338-110311 MW15 17	MW-15	11/3/2011	NA	NA		Yes							X	X								
	WG-17338-101112-MW11 MM 254	MW-11	10/11/2012	NA	NA		Yes									X							
	WG 17338-101112 MW10 MM 255	MW-10	10/11/2012	NA	NA		Yes							X	X								
	WG 17338-101112-MW15 MM 256	MW-15	10/11/2012	NA	NA		Yes							X	X								
Operable Unit 4																							
AOI 16 - Petroleum Dispensing Area and Historical USTs	GW-17338-110111-MW10-06	MW-10	11/1/2011	NA	NA		Yes	X	X	X	X	X	X										
	WG-17338-080812-VAS1-MM-208	VAS-1	8/8/2012	30	35		Yes	X															

TABLE 5.2

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FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit / AOI	*Sample ID*	*Location ID*	*Sample Date*	*Start Depth (ft bgs)*	*End Depth (ft bgs)*	*Parent Sample ID (Sample ID of original sample for duplicates, etc.)*	*Laboratory / Confirmatory Analysis*	TCL VOCs	TCL SVOCs	TAL Metals	PCB	Pesticides	Dissolved TAL Metals	TOTAL LEAD	DISSOLVED LEAD	TOLUENE	DRO	GRO	Grain Size	Total Organic Carbon/Black Carbon	*Acid Volatile Sulfides*	Simultaneously Extracted Metals	*PAH (34 Homologues)*
AOI 16 - Petroleum Dispensing Area and Historical USTs Cont	WG-17338-080812-VAS1-MM-205	VAS-1	8/8/2012	25	30		Yes	X															
	WG-17338-080812-VAS1-MM-206	VAS 1	8/8/2012	30	35		Yes	X															
	WG-17338-080812-VAS1-MM-207	VAS-1	8/8/2012	15	20		Yes	X															
	WG-17338-080712-VAS2-MM-200	VAS 2	8/7/2012	15	20		Yes	X															
	WG-17338-080712-VAS2-MM-201	VAS 2	8/7/2012	30	35		Yes	X															
	WG-17338-080712-VAS2-MM-202	VAS 2	8/7/2012	25	30		Yes	X															
	WG-17338-080712-VAS2-MM-203	VAS-2	8/7/2012	20	25		Yes	X															
	WG-17338-080812-VAS3-MM-208	VAS-3	8/8/2012	30	35		Yes	X															
	WG-17338-080812-VAS3-MM-209	VAS-3	8/8/2012	25	30		Yes	X															
	WG-17338-080812-VAS3-MM-210	VAS-3	8/8/2012	20	25		Yes	X															
	WG-17338-080812-VAS3-MM-211	VAS-3	8/8/2012	15	20		Yes	X															
	WG-17338-081012 VAS4-MM-227	VAS-4	8/10/2012	30	35		Yes	X															
	WG-17338-081012-VAS4-MM-228	VAS 4	8/10/2012	25	30		Yes	X															
	WG-17338-081012-VAS4-MM-229	VAS-4	8/10/2012	20	25		Yes	X															
	WG-17338-081012-VAS4-MM-230	VAS 4	8/10/2012	15	20		Yes	X															
	WG-17338-080912-VAS5-MM-222	VAS-5	8/9/2012	30	35		Yes	X															
	WG-17338-080912-VAS5-MM-223	VAS 5	8/9/2012	25	30		Yes	X															
	WG-17338-080912-VAS5-MM-224	VAS-5	8/9/2012	20	25		Yes	X															
	WG-17338-080912-VAS5-MM-225	VAS-5	8/9/2012	15	20		Yes	X															
	WG-17338-080912-VAS6-MM-213	VAS-6	8/9/2012	30	35		Yes	X															
	WG-17338-080912-VAS6-MM-214	VAS-6	8/9/2012	25	30		Yes	X															
	WG-17338-080912-VAS6-MM-215	VAS 6	8/9/2012	20	25		Yes	X															
	WG-17338-080912-VAS6-MM-216	VAS-6	8/9/2012	20	25	WG-17338-080912-VAS6 MM 215	Yes	X															
	WG-17338-080912-VAS6-MM-217	VAS-6	8/9/2012	15	20		Yes	X															
	WG-17338-080912-VAS7-MM-218	VAS-7	8/9/2012	30	35		Yes	X															
	WG-17338-080912-VAS7-MM-219	VAS-7	8/9/2012	25	30		Yes	X															
	WG-17338-080912-VAS7-MM-220	VAS 7	8/9/2012	20	25		Yes	X															
	WG-17338-080912-VAS7-MM-221	VAS-7	8/9/2012	15	20		Yes	X															
	WG-17338-081312-VAS8-MM-232	VAS-8	8/13/2012	30	35		Yes	X															
	WG-17338-081312-VAS8-MM-233	VAS 8	8/13/2012	25	30		Yes	X															
	WG-17338-081312-VAS8-MM-234	VAS-8	8/13/2012	20	25		Yes	X															
	WG-17338-081312-VAS8-MM-235	VAS 8	8/13/2012	15	20		Yes	X															
	WG-17338-091112-VAS9-MM-238	VAS-9	9/10/2012	30	35		Yes	X															
	WG-17338-091112-VAS9-MM-239	VAS-9	9/10/2012	25	30		Yes	X															
	WG-17338-091112-VAS9-MM-240	VAS-9	9/10/2012	20	25		Yes	X															
	WG-17338-091112-VAS9-MM-241	VAS-9	9/10/2012	15	20		Yes	X															
	WG-17338-091112-VAS9-MM-242	VAS-9	9/10/2012	15	20	WG-17338-091112-VAS9-MM-242	Yes	X															
	WG-17338-091112-VAS10-MM-243	VAS-10	9/10/2012	30	35		Yes	X															
	WG-17338-091112-VAS10-MM-244	VAS-10	9/10/2012	25	30		Yes	X															
	WG-17338-091112 VAS10-MM 245	VAS-10	9/10/2012	20	25		Yes	X															
	WG-17338-091112-VAS10-MM-246	VAS-10	9/10/2012	15	20		Yes	X															
	WG-17338-102212-MW30-MM-264	MW 30	10/22/2012	NA	NA		Yes	X	X	X			X										
	WG-17338-102212-MW365-MM-265	MW-365	10/22/2012	NA	NA		Yes	X	X	X			X										
	WG-17338-102312-MW360-MM-266	MW-360	10/23/2012	NA	NA		Yes	X	X	X			X										
	WG-17338-111612-MW37-CT-268	MW-37	11/16/2012	NA	NA		Yes	X	X	X			X										
AOI 17 - Former Petroleum Dispensing Area	GW-17338-103111-MW31-05	MW-31	10/31/2011	NA	NA		Yes	X	X	X	X	X	X										
Operable Unit 5																							
AOI 12 - Test Track Area	GW-17338-110111-MW27-09	MW 27	11/1/2011	NA	NA		Yes	X	X	X	X	X	X										
	GW-17338-110211-MW28-12	MW-28	11/2/2011	NA	NA		Yes	X	X	X	X	X	X										
	GW-17338-110111-MW29-07	MW 29	11/1/2011	NA	NA		Yes	X	X	X	X	X	X										
	GW-17338-110111-DUP-08	MW 29	11/1/2011	NA	NA	GW-17338-110111-MW29-07	Yes	X	X	X	X	X	X										
	WG-17338-101812-MW29-MM-259	MW 29	10/18/2012	NA	NA		Yes	X		X			X										
	WG-17338-101812-MW28-MM-260	MW 28	10/18/2012	NA	NA		Yes	X		X			X										
	WG-17338-101812-MW35-MM-261	MW-35	10/18/2012	NA	NA		Yes	X		X			X										
	WG-17338-101812-MW27-MM-262	MW 27	10/18/2012	NA	NA		Yes	X		X			X										

TABLE 3 2

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AOI 12 - Test Track Area Cont.	WG-17338-111612-MW35-CC-268	MW-35	11/16/2012	NA	NA		Yes		X														
Operable Unit 6																							
AOI 26 - Outfall 001 and Wooded Area	WG-17338-111214-RR-001	MW-36	11/12/2015	NA	NA		Yes						X										
	WG-17338-111214-RR-002	MW-35	11/12/2015	NA	NA		Yes						X										
	WG-17338-111214-RR-003	MW-28	11/12/2015	NA	NA		Yes						X										
	WG-17338-111214-RR-005	MW-27	11/12/2015	NA	NA		Yes						X										
	WG-17338-111214-RR-006	MW-108	11/12/2015	NA	NA		Yes						X										
Operable Unit 6	*SEDIMENT*																						
AOI 26 - Outfall 001	SD-17338-100511-MM-146	SED 1	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-145	SED 2	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-144	SED 3	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-143	SED 4	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-142	SED 5	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-141	SED 6	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-100511-MM-140	SED 7	10/5/2011	0	0.5		Yes	X	X	X	X	X					X	X					
	SD-17338-091712-SED8-MM204	SED 8	9/17/2012	0	0.5		Yes		X	X													
	SD-17338-091712-SED9-MM203	SED 9	9/17/2012	0	0.5		Yes		X	X													
	SD-17338-091712-SED10-MM202	SED 10	9/17/2012	0	0.5		Yes		X	X													
	SD-17338-091712-SED11-MM201	SED 11	9/17/2012	0	0.5		Yes		X	X													
	SD-17338-091712-SED12-MM200	SED 12	9/17/2012	0	0.5		Yes		X	X													
	SED-17338-111214-SMJ-100-01	SW/SED 100-01	11/12/2014	0	0.5		Yes												X	X	X	X	X
	SED-17338-111214-SMJ-100-02	SW/SED 100-02	11/12/2014	0	0.5		Yes												X	X	X	X	X
	SED-17338-111214 SMJ 100-03	SW/SED 100-03	11/12/2014	0	0.5		Yes												X	X	X	X	X
	SED-17338-111214-SMJ-100-04	SW/SED 100-04	11/12/2014	0	0.5		Yes												X	X	X	X	X
	SED-17338-111214-SMJ-100-05	SED 100-05 (Ditch)	11/12/2014	0	0.5		Yes												X	X	X	X	X
	SED-17338-111214-SMJ-100-07	SW/SED 100-07	11/12/2014	0	0.5		Yes												X	X	X	X	X
Operable Unit 6	*SURFACE WATER*																						
AOI 26 - Outfall 001	SW-17338-091712-SW1-MM-204	SW 1	9/17/2012	-	-				X	X			X										
	SW-17338-091712-SW2-MM-203	SW 2	9/17/2012	-	-				X	X			X										
	SW-17338-091712-SW3-MM-202	SW 3	9/17/2012	-	-				X	X			X										
	SW -17338 -091712-SW4-MM 201	SW 4	9/17/2012	-	-				X	X			X										
	SW-17338-091712-SW5-MM-200	SW 5	9/17/2012	-	-				X	X			X										
	SW-17338-111214-SMJ-100-01	SW/SED 100-01	11/12/2014	-	-								X										
	SW-17338-111214-SMJ-100-02	SW/SED 100-02	11/12/2014	-	-								X										
	SW-17338-111214-SMJ-100-03	SW/SED 100-03	11/12/2014	-	-								X										
	SW-17338-111214-SMJ-100-04	SW/SED 100-04	11/12/2014	-	-								X										
	SW-17338-111214-SMJ-100-06	SW 100-06	11/12/2014										X										
	SW-17338-111214-SMJ-100-07	SW/SED 100-07	11/12/2014	-	-								X										
	SW-17338-111214-SMJ-100-08	SW 100-08 (Outfall)	11/12/2014	-	-								X										
Operable Unit 4	*SOIL GAS*																						
AOI 16 - Petroleum Dispensing Area and Historical USTs	SGA-17338-081712-MM-01	Ambient	8/17/2012	-	-		Yes	X															
	SG4-17338-081712-MM-02	SG4/VAS7	8/17/2012	-	-		Yes	X															
	SG3-17338-081712-MM-03	SG3/VAS5	8/17/2012	-	-		Yes	X															
	SG2-17338-081712-MM-04	SG2/VAS3	8/17/2012	-	-		Yes	X															
	SG7-17338-081712-MM-05	SG2/VAS3	8/17/2012	-	-	SG2-17338-081712-MM-04	Yes	X															
	SG1-17338-081712-MM-06	SG1/VAS1	8/17/2012	-	-		Yes	X															
	SG5-17338-081712-MM-07	SG5/VAS5	8/17/2012	-	-		Yes	X															

TABLE 3.2

SAMPLING SUMMARY
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit / AOI	Sample ID	Location ID	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parent Sample ID (Sample ID of original sample for duplicates, etc.)	Laboratory / Confirmatory Analysis	TCL VOCs	TCL SVOCs	TAL Metals	PCB	Pesticides	Dissolved TAL Metals	TOTAL LEAD	DISSOLVED LEAD	TOLUENE	DRO	ORO	Grain Size	Total Organic Carbon/Black Carbon	Acid Volatile Sulfides	Simultaneously Extracted Metals	PAH (34 Homologues)

Notes

Only samples collected by CRA are included on this table

S - Sample was screened but not submitted for laboratory analysis

S/X - sample was screened and submitted for laboratory analysis

X - Sample was submitted for laboratory analysis

Location BH9-11 was omitted from the sample program due to the fire line repair project

Horizontal Coordinate System = UTM_NAD83

Horizontal Coordinate Datum = DESPC NAD83

Vertical Coordinate Datum = NAVD88

ft amsl = Feet Above Mean Sea Level

ft bgs = Feet Below Ground Surface

NS = Sample was not screened

(1) = There was insufficient volume to collect all parameters on 11/2/11. The well was sampled for VOCs, and TAL total and dissolved metals on 11/2/11. The well was sampled on 11/7/11 for SVOCs, PCBs, and Pesticides

🟦 = Wrong well was sampled This well was sampled inadvertently - MW-10 was supposed to be sampled as part of AOI-18

TABLE 3.3

SUMMARY OF VISUAL OBSERVATIONS AND AOI-19 AND AOI-20
REMDIAL INVESTIGATION
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

AOI Number	*Investigation Area Description (1)*	*RACER's Rationale for Further Action*	*Date of Inspection*	*Location/Bay*	*Observation*
AOI 19	Lift Stations (to WWTP)	Conduct visual inspection to evaluate integrity and potential for release.	9/30/2011	DD-28	Concrete berm around station stained, but in good shape
			9/30/2011	S-18	Immediate concrete around station is in good shape. Some staining. Some cracks in surrounding area.
			9/30/2011	S-7	No access due to construction
			9/30/2011	ELPO Area JJ-28	Some staining on south of pad. Some cracking around location.
			9/30/2011	ELPO Area KK-28	Concrete in good shape. Some staining around pumps.
			9/30/2011	Phosphate Area JJ-30	Concrete in good shape. Water staining.
			9/30/2011	Phosphate Area FF-30	Concrete in good shape. No staining.
			9/30/2011	Basement	Lift station in basement consists of an approximately three foot diameter sump with submersible pumps that tranfer water to outside lift station. Pumps in basement are leaking. Some staining present . Equipment is scheduled to be removed and replaced.
			9/30/2011	Weldwater Building	Concrete in good shape. No staining
			9/30/2011	Modular Paint Building QQ-24	Concrete in good shape. Some staining with white edge.
			9/30/2011	Tire Building	Concrete is in good shape. Drain was dry. Water was present in sump.
AOI 20	PCB Containing Equipment/Oil Stained Surfaces	Conduct visual inspection to evaluate the integrity of the concrete beneath in-ground converyors to assess the potential for a release to the environment.	10/12/2011	Modular Paint Building Southwest corner/west side	Concrete in good shape. Staining near VV-18. Conveyors have catch basins at turn around points with absorbent pads (VV-15). VV-13 full of liquid.
			10/12/2011	South End of Mod Paint Building WW-17 and XX-17	Concrete is in good shape and holding liquid. Some staining and sorbent pads on floor surface near by.
			10/12/2011	Modular Clean Room	In-ground conveyors no issues.
			10/12/2011	Main Assembly Area J-28 and G-29	Elevated conveyor system.

TABLE 4.1

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN (COPCs)
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit	*Medium*	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency*	*Range of Detection Limits*	*Concentration Used for Screening*	*Screening Toxicity Value (2)*		*Table Reference*
OU-3	Surface Soil (0-2')	Benzo(a)pyrene	0.012	J	0.43		mg/kg	AOI 10: MW26-11, 0-2 ftbgs (09/21/11)	2/6	0.036 - 0.041	0.43	0.09	C	A.1
		Antimony	3.3		12.8		mg/kg	AOI 21: BH52-11, 0-2 ftbgs (09/22/11)	2/28	0.5 - 19.8	12.8	3.1	N	
		Arsenic	0.81		17.04		mg/kg	AOI 21: BH52-11, 0-2 ftbgs (09/22/11)	28/28	0.99	17.04	11	C	
		Cobalt	1.4	J	71.9		mg/kg	AOI 21: BH48-11, 0-2 ftbgs (09/21/11)	20/28	1.2 - 313	71.9	34	N	
		Lead	4.2		467		mg/kg	AOI 21: BH52-11, 0-2 ftbgs (09/22/11)	28/28	--	467	400	C	
		Manganese	44.1	J	2808.5		mg/kg	AOI 6: BH7-11, 0-2 ftbgs (10/10/11)	28/28	--	2808.5	2100	N	
		Mercury	0.057		7.63		mg/kg	AOI 5: BH3-11, 0-2 ftbgs (09/15/11)	3/28	0.032 - 6.5	7.63	0.94	N	
		Nickel	2.3	J	167.3		mg/kg	AOI 7: BH57-11, 0-2 ftbgs (09/20/11)	28/28	--	167.3	150	N	
OU-3	Subsurface Soil (2-10')	Antimony	19.8		19.8		mg/kg	AOI 7: BH58-11, 5-7 ftbgs (09/20/11)	1/15	0.7 - 19.8	19.8	3.1	N	A.2
		Arsenic	0.91		34.63		mg/kg	AOI 7: BH58-11, 5-7 ftbgs (09/20/11)	15/15	1.1	34.63	11	C	
		Cobalt	1.3	J	62.3		mg/kg	AOI 21: BH49-11, 7-9 ftbgs (09/21/11)	9/15	0.3 - 313	62.3	34	N	
		Manganese	20		2271.1		mg/kg	AOI 6: BH7-11, 8-10 ftbgs (10/10/11)	15/15	--	2271.1	2100	N	
OU-4	Surface Soil (0-2')	Cobalt	36.7		68.3		mg/kg	AOI 17: BH44-11, 0-2 ftbgs (09/26/11)	3/9	313	68.3	34	N	B.1
		Manganese	229.4		2552.2		mg/kg	AOI 17: BH46-11, 0-2 ftbgs (09/26/11)	9/9	--	2552.2	2100	N	
	Subsurface Soil (2-10')	2-Methylnaphthalene	0.15	J	1.7		mg/kg	AOI 16: BH39-11, 4-5 ftbgs (09/26/11)	2/3	0.36	1.7	1	N	B.2
OU-5	Surface Soil (0-2')	1,4-Dichlorobenzene	5.1		5.1		mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	1/5	0.082 - 0.12	5.1	2.6	C	C.1
		Ethylbenzene	0.26		22		mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	2/5	0.082 - 0.1	22	5.8	C	
		Xylenes (total)	0.059		100		mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	3/5	0.25 - 0.26	100	58	N	
		2-Methylnaphthalene	4.2	J	4.2	J	mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	1/6	0.35 - 0.44	4.2	1	N	
		Benzo(a)pyrene	0.019	J	0.2		mg/kg	AOI 12: BH19-11, 0-2 ftbgs (09/29/11)	4/6	0.035 - 0.87	0.2	0.09	C	
		Naphthalene	22		22		mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	1/6	0.35 - 0.44	22	5	C	
		Antimony	1.7	J	1896		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	14/35	0.1 - 94	1896	3.1	N	
		Arsenic	0.68		3578		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	3578	11	C	
		Barium	54.9		688400		mg/kg	AOI 12: MW29-11, 0-2 ftbgs (09/27/11)	85/85	--	688400	1500	N	
		Cadmium	0.24	J	2946		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	63/82	0.2 - 2.5	2946	7	N	
		Chromium	11.2		25200		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	17.4 - 18	25200	12000	N	
		Cobalt	1.5	J	778		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	29/35	7.1 - 313	778	34	N	
		Copper	2		3200		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	3200	310	N	
		Iron	1.8935		264440		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	264440	74767	N	
		Lead	5.9		35480		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	35480	400	C	
		Manganese	23.6		3130		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	3130	2100	N	
		Mercury	0.045		52.5		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	61/82	0.31 - 6.5	52.5	0.94	N	
		Nickel	3.1	J	468		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	35/35	--	468	150	N	
		Selenium	0.48		177.9		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	8/35	0.05 - 39	177.9	39	N	
		Thallium	0.91		19.1		mg/kg	AOI 12: BH23-11, 0-2 ftbgs (09/27/11)	4/35	0.002 - 13.3	19.1	0.078	N	
		Vanadium	17		383		mg/kg	AOI 12: BH34-11, 0-2 ftbgs (09/29/11)	26/35	0.6 - 56	383	134	N	
		Zinc	11.3		105200		mg/kg	AOI 12: BH27-11, 0-2 ftbgs (09/29/11)	85/85	--	105200	2300	N	
	Subsurface Soil (2-10')	Antimony	1.5	J	13.9		mg/kg	AOI 12: BH18-11, 7-9 ftbgs (10/03/11)	4/30	0.2 - 19.8	13.9	3.1	N	C.2
		Arsenic	1.12		37		mg/kg	AOI 12: TT-13, 4-6 ftbgs (08/23/12)	54/54	1.2	37	11	C	
		Barium	44.6	J	2443.75		mg/kg	AOI 12: TT-28, 2-4 ftbgs (08/29/12)	54/54	--	2443.75	1500	N	
		Cadmium	0.24	J	22.75		mg/kg	AOI 12: TT-16, 2-4 ftbgs (08/23/12)	31/53	0 - 3.3	22.75	7	N	
		Cobalt	1.3	J	519		mg/kg	AOI 12: BH22-11, 8-10 ftbgs (10/03/11)	27/30	9.6 - 313	519	34	N	
		Copper	4.4	J	311.75		mg/kg	AOI 12: TT-16, 2-4 ftbgs (08/23/12)	54/54	--	311.75	310	N	
		Iron	5210		123620		mg/kg	AOI 12: BH22-11, 8-10 ftbgs (10/03/11)	54/54	--	123620	74767	N	
		Lead	4.4		808.75		mg/kg	AOI 12: TT-27, 4-6 ftbgs (08/29/12)	52/54	2.7 - 6.6	808.75	400	C	
		Manganese	27.3		11074		mg/kg	AOI 12: BH22-11, 8-10 ftbgs (10/03/11)	54/54	--	11074	2100	N	

TABLE 4.1

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN (COPCs)
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit	*Medium*	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency*	*Range of Detection Limits*	*Concentration Used for Screening*	*Screening Toxicity Value (2)*		*Table Reference*
OU-5	Subsurface Soil (2-10')	Mercury	0.027	J	6.5		mg/kg	AOI 12: TT-34, 2-4 ftbgs (08/30/12)	30/53	0.036 - 6.5	6.5	0.94	N	
	(continued)	Vanadium	15.5		198		mg/kg	AOI 12: BH22-11, 8-10 ftbgs (10/03/11)	29/30	56	198	134	N	
OU-6	Surface Soil	Benzo(a)pyrene	0.005	J	0.1		mg/kg	Station-001, 0-2 ftbgs (10/02/14)	12/16	0.038 - 0.047	0.1	0.09	C	D.1
		Antimony	1.9	J	14	J	mg/kg	Station-009, 0-2 ftbgs (10/02/14)	6/10	2.1 - 2.4	14	3.1	N	
		Lead	20.3	J	709	J	mg/kg	Station-009, 0-2 ftbgs (10/02/14)	16/16	--	709	400	C	
	Sediment	2-Methylnaphthalene	0.59	J	1.5	J	mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	3/12	0.39 - 0.49	1.5	1	N	D.2
		Benzo(a)anthracene	0.046		47		mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	10/12	0.04 - 0.041	47	0.9	C	
		Benzo(a)pyrene	0.042	J	39		mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	11/12	0.041	39	0.09	C	
		Benzo(b)fluoranthene	0.071		50		mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	10/12	0.04 - 0.041	50	0.9	C	
		Benzo(g,h,i)perylene	0.032	J	29	J	mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	9/12	0.4 - 0.47	29	1 (5)	N	
		Benzo(k)fluoranthene	0.025	J	26		mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	9/12	0.039 - 0.041	26	9	C	
		Dibenz(a,h)anthracene	0.012	J	4.8		mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	8/12	0.039 - 0.047	4.8	0.09	C	
		Indeno(1,2,3-cd)pyrene	0.023	J	33	J	mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	10/12	0.04 - 0.041	33	0.9	C	
		Antimony	1.5	J	10.5		mg/kg	SED 3, 0-0.5 ftbgs (10/05/11)	3/12	2.2 - 2.7	10.5	3.1	N	
		Copper	3.6	J	394		mg/kg	SED 3, 0-0.5 ftbgs (10/05/11)	8/12	5.4 - 7.1	394	310	N	
		Lead	2.2		526		mg/kg	SED 3, 0-0.5 ftbgs (10/05/11)	12/12	--	526	400	C	
		Zinc	11.1		2370		mg/kg	SED 3, 0-0.5 ftbgs (10/05/11)	12/12	--	2370	2300	N	
		TPH (C10-C28) DRO	310		7400	J	mg/kg	SED 4, 0-0.5 ftbgs (10/05/11)	4/7	33 - 42	7400	1000	N	
	Surface Water	Manganese	41.3		76.7		µg/L	SW1 (09/17/12)	5/5	--	76.7	43	N	D.3
		Manganese	31.7		80.1		µg/L	SW4 (09/17/12)	5/5	--	80.1	43	N	
Site Wide	Groundwater	1,1-Dichloroethane	0.21	J	7.8		µg/L	MW-26 (10/31/11)	6/78	1 - 5	7.8	2.7	C	E.1
		1,2,4-Trimethylbenzene	0.14	J	2800	E	µg/L	VAS-3 (08/08/12)	25/38	1	2800	1.5	N	
		1,2-Dichloroethane	0.3	J	31		µg/L	MW-36D (10/23/12)	17/78	1 - 5	31	0.17	C	
		1,4-Dichlorobenzene	0.26	J	1.2		µg/L	VAS-1 (08/08/12)	5/78	1 - 5	1.2	0.48	C	
		2-Hexanone	1.4	J	19	J	µg/L	MW36S (09/18/13)	7/78	5 - 25	19	3.8	N	
		Benzene	0.12	J	860		µg/L	MW36S (09/18/13)	56/78	1	860	0.45	C	
		Carbon tetrachloride	0.074	J	13		µg/L	VAS-10 (09/11/12)	6/78	1 - 5	13	0.45	C	
		Chloroform (Trichloromethane)	0.15	J	24		µg/L	VAS-10 (09/11/12)	11/78	1 - 5	24	0.22	C	
		cis-1,2-Dichloroethene	0.32	J	9.2		µg/L	MW-29 (11/01/11)	9/78	1 - 5	9.2	3.6	N	
		Ethylbenzene	0.11	J	2400		µg/L	VAS-3 (08/08/12)	46/78	1	2400	1.5	C	
		Isopropyl benzene	0.097	J	130		µg/L	VAS-3 (08/08/12)	46/78	1	130	45	N	
		Tetrachloroethene	0.13	J	8.9		µg/L	BH10-11 (09/16/11)	16/78	1 - 5	8.9	1	N	
		Toluene	0.17	J	6100		µg/L	VAS-3 (08/08/12)	47/78	1	6100	110	N	
		Trichloroethene	0.16	J	9.5		µg/L	VAS-10 (09/11/12)	14/78	1 - 5	9.5	0.28	C	
		Xylenes (total)	0.48	J	13000		µg/L	VAS-3 (08/08/12)	47/78	3	13000	19	N	
		2-Methylnaphthalene	3.6	J	180		µg/L	MW36S (09/18/13)	3/30	10 - 12	180	3.6	N	
		Biphenyl (1,1-Biphenyl)	8.6	J	11		µg/L	MW36S (09/18/13)	2/30	10 - 12	11	0.083	N	
		Dibenzofuran	3	J	3.8	J	µg/L	MW36S (09/18/13)	2/30	10 - 12	3.8	0.79	N	
		Naphthalene	4.8	J	270		µg/L	MW-36S (10/22/12)	6/30	10 - 12	270	0.17	C	
		Aluminum	103	J	35300		µg/L	BH11-11 (09/16/11)	22/23	200	35300	2000	N	
		Arsenic	3.9	J	7.9		µg/L	MW-28 (11/02/11)	9/23	5	7.9	0.052	C	
		Barium	70.1	J	1390		µg/L	MW-29 (11/01/11)	23/23	--	1390	380	N	
		Cobalt	3.1	J	139		µg/L	MW-36S (10/22/12)	15/23	50	139	0.6	N	
		Iron	83	J	78400		µg/L	MW-29 (11/01/11)	21/23	150	78400	1400	N	
		Lead	2.9	J	14.3		µg/L	BH11-11 (09/16/11)	5/24	5 - 12.2	14.3	5	C	
		Manganese	5.8	J	30400		µg/L	MW-30 (11/01/11)	21/23	15	30400	43	N	
		Vanadium	2.2	J	53.5		µg/L	BH11-11 (09/16/11)	17/23	50	53.5	8.6	N	
		Arsenic (dissolved)	3.9	J	5.7		µg/L	MW-105 (10/11/12)	4/23	5	5.7	0.052	C	
		Barium (dissolved)	48.7	J	1030		µg/L	MW-29 (11/01/11)	23/23	--	1030	380	N	

TABLE 4.1

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN (COPCs)
FORMER GM WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Operable Unit	*Medium*	*Chemical*	*Minimum Concentration (1,2)*	*Minimum Qualifier*	*Maximum Concentration (1,2)*	*Maximum Qualifier*	*Units*	*Location of Maximum Concentration*	*Detection Frequency*	*Range of Detection Limits*	*Concentration Used for Screening*	*Screening Toxicity Value (2)*		*Table Reference*
Site Wide	Groundwater (continued)	Cobalt (dissolved)	5.7	J	124		µg/L	MW-36S (10/22/12)	12/23	50	124	0.6	N	
		Iron (dissolved)	61.5	J	47500		µg/L	MW-29 (11/01/11)	12/23	150	47500	1400	N	
		Lead (dissolved)	4.1	J	5.7		µg/L	BH36-11 (09/16/11)	2/24	5	5.7	5	C	
		Manganese (dissolved)	23.5		29100		µg/L	MW-36S (10/22/12)	19/23	15	29100	43	N	
		Selenium (dissolved)	4.9	J	13.1		µg/L	MW-29 (10/18/12)	5/23	10 - 30	13.1	10	N	
		Vanadium (dissolved)	4.5	J	13.3	J	µg/L	MW-10S (11/02/12)	6/23	50	13.3	8.6	N	
		Aroclor-1260 (PCB-1260)	2.4		3.5		µg/L	BH11-11 (09/16/11)	2/19	0.51 - 0.67	3.5	0.039	C	
Off-Site	Groundwater	1,2,4-Trimethylbenzene	480		790		µg/L	DA-MW42 (09/18/13)	3/24	1	790	1.5	N	F.1
		Benzene	0.79	J	6.4		µg/L	DA-MW47 (09/17/13)	5/44	1 - 5	6.4	0.45	C	
		Chloroform (Trichloromethane)	0.097	J	2.7		µg/L	DA-MW40 (06/28/13)	11/44	1 - 5	2.7	0.22	C	
		Ethylbenzene	0.11	J	750		µg/L	DA-MW42 (03/26/13)	14/44	1	750	1.5	C	
		Isopropyl benzene	0.23	J	54		µg/L	DA-MW42 (03/26/13)	12/44	1	54	45	N	
		Methyl tert butyl ether (MTBE)	0.14	J	12		µg/L	DA-MW46 (06/27/13)	13/44	1 - 5	12	10	C	
		Toluene	0.2	J	330		µg/L	DA-MW42 (03/26/13)	14/44	1	330	110	N	
		Xylenes (total)	0.15	J	1300		µg/L	DA-MW41 (03/26/13, 09/18/13)	13/44	3	1300	19	N	
		2-Methylnaphthalene	7.6	J	29		µg/L	DA-MW42 (09/18/13)	9/44	10 - 11	29	3.6	N	
		Naphthalene	3	J	220		µg/L	DA-MW42 (09/18/13)	10/44	10 - 11	220	0.17	C	

Notes:

C	Carcinogenic; analyte considered to be a carcinogen
N	Non-Carcinogenic; analyte considered to be a non-carcinogen
–	Not Available
J	Result is an estimated value
(1)	Minimum/maximum detected concentration
(2)	DNREC-SIRS Screening Level Table - Soil, Department of Natural Resources and Environmental Control, Division of Waste and Hazardous Substance, Site Investigation & Restoration Section, Delaware DNREC, October 2014
DRO	Diesel Range Organics
TPH	Total Petroleum Hydrocarbons

TABLE 6.1

AOI-18 GROUNDWATER SAMPLE RESULTS
REMEDIAL INVESTIGATION REPORT
FORMER WILMINGTON ASSEMBLY PLANT
WILMINGTON, DELAWARE

Sample Location:			*MW-10*	*MW-15*	*MW-15*	*MW-11*	*MW-11*
AOI Location			*AOI_18*	*AOI_18*	*AOI_18*	*AOI_18*	*AOI_18*
			On-site	*On-site*	*On-site*	*On-site*	*On-site*
Sample ID:			*WG-17338-101112-MW10-MM-255*	*GW-17338-110311-MW15-17*	*WG-17338-101112-MW15-MM-256*	*GW-17338-110711-MW11-18*	*WG-17338-101112-MW11-MM-254*
Sample Date:			*10/11/2012*	*11/3/2011*	*10/11/2012*	*11/7/2011*	*10/11/2012*
Parameters	***Units***	***WG Criteria***					
Metals							
Lead	µg/L	5	5.0 U	5.0 U	5.0 U	-	-
Lead (dissolved)	µg/L	5	5.0 U	3.2 J	5.0 U	-	-
Toluene	µg/L	86	-	-	-	4.4	37

Notes:

Criteria - DNREC SIRS Screening Table Updated January 2014
J - Estimated concentration
U - Not detected at the associated reporting limit
- Not analyzed

Exhibit 2

OU-5 Focused Feasibility Study Report

Former GM Wilmington Assembly Plant
Wilmington, Delaware

Prepared for: RACER Trust

GHD | 2055 Niagara Falls Boulevard Niagara Falls New York 14303
017338 | T05 Report No 23 | June 2017

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Appendix Index

1. Introduction

1.1 Purpose of the Report

GHD Services Inc. (GHD), on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER Trust), has prepared this Focused Feasibility Study (FFS) Report to assess potential remedial approaches for Operable Unit 5 (OU-5) of the former General Motors (GM) Corporation Wilmington Assembly Plant located in Wilmington, Delaware [United States Environmental Protection Agency (USEPA) ID DED 002369205] (Facility or Site).

GHD prepared a Remedial Investigation (RI) Report dated July 2015 (CRA, 2015) which presented the results of RI activities that were conducted at the Site between September 2011 and November 2014. The RI activities included the evaluation of a total of 18 Areas of Interest (AOIs) in accordance with the RI Work Plan, the September 2011 Addendum to the RI Work Plan, the July 2012 Supplemental RI Work Plan, and the Supplemental Investigation Work Plan for OU-6 dated September 2014. All work was done with Delaware Department of Natural Resources and Environmental Control (DNREC) concurrence. The RI Report was approved by DNREC on August 7, 2015.

This FFS Report presents an assessment and evaluation of potential remedial approaches to address the risks to human health that were identified in the RI Report at OU-5. The purpose of the FFS Report is to analyze and present the relevant information needed to allow decision makers to select a site remedy that will protect human health and the environment. The FFS Report has been prepared consistent with the anticipated future use of the Site, as evaluated in the Human Health Risk Assessment (HHRA) presented in the RI.

1.2 Facility Description and History

The Facility consists of the property located at 801 Boxwood Road, New Castle County, Wilmington, Delaware. The Facility currently consists of approximately 142 acres of land located on two tax parcels (07 042.10 055 and 07 042.20 010), including the approximately 3.2 million square foot Main Assembly Building, and several outlying buildings and structures (e.g., Waste Water Treatment Plant, Pump Houses, and Powerhouse). The Facility was developed in 1945 by GM Corporation for the purpose of automobile assembly. GM Corporation commenced operations at the Facility in 1946 and continued automobile assembly operations until July 2009 when the plant was idled. The Facility location is presented on Figure 1.1. The Facility layout is presented on Figure 1.2.

As a result of GM Corporation's 2009 bankruptcy, certain operating assets of GM Corporation were sold on July 10, 2009 to a newly formed company now known as General Motors LLC. Existing non-continuing assets, including the Site, remained the property of GM Corporation which was known as Motors Liquidation Company (MLC), in its capacity as debtor in possession in the bankruptcy case. The Site was sold by MLC to Fisker Automotive, Inc. (Fisker) in July 2010. However, MLC retained liability for the remediation of the Site. In October of 2010, the United States Government announced that MLC had agreed to resolve its liabilities at 89 sites relating to liabilities under the Comprehensive Environmental Response, Compensation and

Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and the Clean Air Act through an environmental response trust fund. On March 31, 2011, the RACER Trust became effective and is conducting, managing, and funding cleanup at the 89 sites formerly owned by MLC, including the former Wilmington Assembly Plant.

Between July 2009 and April 2014, the plant remained idle with limited activities present at the Site while Fisker evaluated opportunities to revive the assembly plant. Fisker filed for bankruptcy in November 2013 and the Site was purchased by Wanxiang Delaware Real Estate Holdings (Wanxiang) in April 2014 as part of a purchase by Wanxiang of Fisker's assets out of the bankruptcy. At this time, the Site remains idle while Wanxiang evaluates potential redevelopment opportunities for the Site.

1.3 Remedial Investigation Summary and Conclusions

A comprehensive review and evaluation of potential release to the environment has been completed for the Site through the RI process. The investigation and sampling has confirmed that impacts to soil, groundwater, sediment, and surface water are present throughout the Site above the DNREC Site Investigation and Restoration Section (SIRS) Screening Levels.

To facilitate the timely evaluation and remediation of the Site, the Site has been divided into several operable units. The locations of the OUs are presented on Figure 1.3.

Operable Units	Description
OU-1	The pump house and aboveground storage tanks (AST) L through Tank O in the AST containment area. Covers soil and groundwater
OU-2	Large AST Area/Truck Unloading Rack and surrounding areas. Cover soil and groundwater.
OU-3	Main Assembly Plant Area soil and groundwater not included in other OUs.
OU-4	Former Petroleum Dispensing and UST Area soil plus groundwater under OU-4
OU-5	Former Test Track Area. Covers soil and groundwater.
OU-6	Wooded Area adjacent to Little Mill Creek. Covers soil and groundwater.

The scope of the on Site RI activities conducted by GHD (formerly Conestoga Rovers & Associates) included the evaluation of surface soil (i.e., 0-2 feet below ground surface (bgs), soil (i.e., 2-10 feet bgs), groundwater, soil gas, sediment, and surface water. The on-site portion of the RI included the following activities:

- Installation of 124 soil borings and the collection of 231 soil samples (this number includes all of the soils from AOI-12 that were field screened for metals in 2012, but not retained for potential confirmatory analysis)
- Installation of 17 new monitoring wells and the collection of 76 groundwater samples (this number includes 40 groundwater samples collected from the vertical aquifer sample locations)
- The collection of 18 sediment and 12 surface water samples
- Collection of 5 soil gas samples

In addition to the above, an evaluation of groundwater, soil gas, and indoor air was conducted in the Eastern portion of the facility (in the vicinity of AOI-16) and off-Site in the neighborhood of Dodson Avenue. This work is summarized in a report prepared by BrightFields and provided as an appendix to the RI report.

The evaluation of the Site wide groundwater identified that although the calculated risks for indoor worker inhalation of indoor air were above the threshold, there were no individual contaminants of potential concern (COPCs) with calculated hazard indices greater than the acceptable hazard index level of 1.0. Additionally, these contaminants are specifically associated with OU-4/AOI-16 located on the east side of the Site. The groundwater associated with OU-4/AOI-16 is being addressed with the off Site groundwater and vapor impacts by BrightFields through the Focused Feasibility Study Former Wilmington Assembly Plant – Dodson Ave. Interim Vapor Phase Remediation dated May 2014.

Utility worker exposure via direct contact (i.e., incidental ingestion, and dermal contact) with on Site groundwater by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material during utility work would be implemented. No further action to address direct contact with groundwater is required; however, due to the groundwater impacts present in OU-4 and OU-5, as previously reported in the RI report, monitoring requirements to address impacted groundwater and soil will be evaluated once remedial actions at OU-4 and OU-5 are complete.

Metals are present in Site surface soils and subsurface soils. The majority of soil impacts are located in the surface soil (i.e., 0 to 2 feet bgs) and are consistent with the historical operation of the facility for automotive manufacturing. Through the risk assessment process, only constituents that are present in Site soils OU-5/AOI-12 at levels that pose a threat to human health will require remedial action. One of the impacted areas of OU-5 is located in the Former Test Track Area that contains an asphalt parking lot covering the impacted soil. The condition of the asphalt is shown in Appendix A. There are major and minor cracks in the asphalt, which have resulted in plant growth and, in limited areas, partially exposed soil. Based on its current condition, the asphalt cover in OU-5 will not serve as a sufficient cover for the metal impacted soils to be protective of human health.

1.4 Summary of Risk Associated with OU-5

The HHRA was conducted in accordance with the methodology presented in the DNREC approved Proposed Risk Assessment Approach for Remedial Investigation (RI) – Revised dated October 1, 2014 (CRA, 2014) (HHRA Work Plan). The purpose of the HHRA was to determine whether releases of chemicals to environmental media pose unacceptable risks to human health under specific exposure conditions. The HHRA also provides information to support risk management decisions concerning the need for further evaluation of remedial action, based upon current and reasonably anticipated future land use.

COPCs were identified in the various media through a comparison to the Delaware screening criteria. Surface soil, soil (including surface and subsurface soil), groundwater, sediment, and surface water were quantitatively evaluated within the HHRA as follows (Note: although total and dissolved metals were used for COPC screening, total metals were used for the risk assessment):

Medium	Receptor
Surface soil	• Resident (direct contact) • Trespasser (direct contact) • Outdoor Worker (direct contact)
Soil (surface and subsurface soil)	• Resident (inhalation of indoor air) • Indoor Worker (inhalation of indoor air) • Utility Worker (direct contact) • Construction Worker (direct contact)
Groundwater	• Resident (potable) • Resident (inhalation of indoor air) • Indoor Worker (inhalation of indoor air) • Utility Worker (direct contact) • Construction Worker (direct contact)
Sediment	• Trespasser (direct contact)
Surface Water	• Trespasser (direct contact)

The results of the COPC screening for OU-5 soils are presented on Figures 1.4 through 1.7. Figure 1.4 presents the non-metal COPCs exceeding screening criteria. Figures 1.5, 1.6, and 1.7 present the metal COPCs exceeding screening criteria for 0 2 feet bgs, 2 10 feet bgs, and greater than 10 feet bgs, respectively.

Cancer risks and non-carcinogenic hazards were calculated using the Risk Assessment Information System (RAIS) Calculator (RAIS, 2014) and compared to the target cancer risk level (Risk) of 1×10^{-5} and target hazard index (HI) of 1.0. For scenarios where RAIS could not be used to calculate the human health risks and hazards, the methodology and assumptions used are outlined for the exposure scenario in Section 5.0 of the HHRA.

The following provides a summary of the results for OU-5.

Medium	Receptor	Route	Risk >10E -5	HI > 1
Surface Soil	Resident	Direct Contact	Yes	Yes
	Trespasser	Direct Contact	No	No
	Outdoor Worker	Direct Contact	Yes	Yes
Surface and Subsurface Soils	Resident	Inhalation of Indoor Air	Yes	Yes
	Indoor Worker	Inhalation of Indoor Air	Yes	Yes
	Utility Worker	Direct Contact	Yes	No
	Construction Worker	Direct Contact	No	No

1.4.1 Resident Direct Contact with Soil

The major contributors to the risk for the resident direct contact with soil were arsenic (1.1E-4), ethylbenzene (1.9E-5), lead (1.2E-4), and naphthalene (1.2E-5). The major contributors to the calculated hazard index (20) for the resident direct contact with soil were antimony (7.3), arsenic (2.1), cadmium (5.9), and iron (1.4).

The resident risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required for OU-5 relative to resident direct contact with soil.

1.4.2 Resident Inhalation of Indoor Air (from Soil)

The major contributors to the calculated cancer risk (1.3E-2) for the resident inhalation of indoor air (from soil) were 1,4 dichlorobenzene (1.3E-3), ethylbenzene (1.1E-2), and naphthalene (9.6E-4). The major contributors to the calculated hazard index (116) for the resident inhalation of indoor air (from soil) were ethylbenzene (12), mercury (2.1), naphthalene (25), and xylenes (76).

The residential risk analysis is done as a baseline analysis and is not applicable to the Site based on current and future anticipated use of the Site. Therefore, no further action would be required to address indoor air at OU-5 relative to resident inhalation of indoor air. Furthermore, as discussed in the HHRA there are significant uncertainties associated with the soil to indoor air pathway and some regulatory jurisdictions do not recommend evaluating this pathway.

1.4.3 Indoor Worker Inhalation of Indoor Air (from Soil)

The major contributors to the calculated cancer risk (4.6E-3) for the indoor worker inhalation of indoor air (from soil) were 1,4 dichlorobenzene (4.3E-4), ethylbenzene (3.8E-3), and naphthalene (3.3E-4). The major contributors to the calculated hazard index (41) for the indoor worker inhalation of indoor air (from soil) were ethylbenzene (4.3), naphthalene (9.1), and xylenes (27).

OU-5 is a paved parking lot, and there are currently no buildings or structures present. Therefore, the indoor worker scenario is not currently applicable. The future anticipated use of the Site would be similar to the historical and current use of the Site. Therefore, no further action to address indoor worker inhalation is warranted at OU-5. Furthermore, as discussed in the HHRA there are significant uncertainties associated with the soil to indoor air pathway and some regulatory jurisdictions do not recommend evaluating this pathway.

1.4.4 Outdoor Worker Direct Contact with Soil

The major contributors to the calculated cancer risk (5.2E-5) for the outdoor worker direct contact with soil were arsenic (2.1E-5) and lead (2.3E-5). The major contributors to the calculated hazard index (1.3) for the outdoor worker direct contact with soil were antimony (0.44), arsenic (0.13), and cadmium (0.38). There were no individual COPCs with calculated hazard indices greater than the acceptable hazard index level of 1.0.

Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material would be implemented.

1.4.5 Utility Worker Direct Contact with Soil

The major contributors to the calculated cancer risk (1.2E-5) for the utility worker direct contact with soil were arsenic (4.6E-6) and lead (6.7E-6).

Exposure via direct contact (i.e., incidental ingestion, and dermal contact) by workers performing various tasks at the Site is expected to be minimal since it is likely that the operator of the Site will monitor worker activity at the Site. In addition, occupational health practices that allow for the safe handling of the material would be implemented.

2. Remedial Action Objectives (RAOs)

Remedial Action Objectives (RAOs) are medium specific goals for protecting human health and the environment. RAOs provide a basis for selecting potential remedial approaches and options for a site. The RAOs have been prepared consistent with the requirements of DNREC SIRS to address ecological pathways and receptors for soil media and consistent with the RI Report. The RI Report concluded that potential risk to human health related to groundwater was associated with OU-4 and therefore groundwater RAOs are not provided in this FFS. A separate FFS is being completed for OU-4 and groundwater.

Based on the conclusions of the RI Report for OU-5, the following soil RAOs were developed:

RAO 1 Prevent human direct contact exposure to soil impacted of the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA

RAO 2 Mitigate the potential for human inhalation exposure to indoor air vapors resulting from soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA

RAO 3 Protect surface water and sediments by mitigating the potential for erosion of impacted soils in OU-5 to the Little Mill Creek

2.1 Preliminary Remediation Goals (PRGs)

The preliminary remediation goals (PRGs) for soil in OU-5 have been developed based on RAO 1 and RAO 2 to protect human exposure pathways for direct contact/ingestion/inhalation exposure to soil impacted with contaminants of concern (COCs) and achieve an overall target cancer risk levels of less than 1.0×10^{-5} and a target non-cancer hazard index of 1.0 based on anticipated future land use (i.e., those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts). The specific receptor exposure routes to be addressed by the PRGs include the following:

- Outdoor Worker direct contact exposure to surface soil
- Utility Worker direct contact with surface soil and soil

The COCs, associated with these receptor exposure routes are presented below. The DNREC SIRS screening level for each COCs has been listed in parenthesis for reference purposes.

- Antimony (3.1 mg/kg)
- Arsenic (11 mg/kg, background)
- Cadmium (7 mg/kg)
- Lead (400 mg/kg)

As discussed in the RI Report, the DNREC SIRS screening levels are based on a residential exposure scenario and not an applicable remediation standard for this Site. However, they do provide a guideline for assessing the nature and extent of impacted soil in OU-5. The PRGs for the OU-5 soil will be to remove sufficient impacted soil containing COCs at elevated concentrations to reduce the overall target cancer risk levels to less than 1.0×10^{-5} and a target non-cancer hazard index of 1.0 for the outdoor worker and utility worker direct contact exposure scenarios evaluated in the HHRA. To achieve this, areas of impacted soils have been identified that will require remedial activities to either eliminate the exposure potential entirely or to a sufficient level, such that exposure is no longer a potential risk. During the design phase, further sampling and analysis will be conducted to identify locations and volumes of soil that need to be addressed to reduce the exposure risk associated with OU-5. The risk calculations will be rerun as part of the design to confirm the post remediation conditions will meet the acceptable risk criteria, as defined by the RAOs (i.e. either through removal, capping, or treatment). The conditions assessed in the design will then be confirmed through post remediation verification sampling, as needed.

3. Development and Screening of Technologies

3.1 General Response Actions

General Response Actions (GRAs) are medium specific actions that may satisfy the RAOs. During the development of alternatives, applicable areas of concern for soil were identified to which the GRAs may be applied. The GRAs developed for soil are discussed below.

The following GRAs, to be used singly or in combination, were identified for soil at the Site:

- No Action – The No Action response would maintain potential risks under existing conditions and provide a baseline against which the other GRAs can be compared.
- Institutional Controls – Institutional controls may be undertaken to isolate potential receptors from COCs in soil. Institutional controls may be necessary to reduce the likelihood of completed exposure pathways to certain receptors by providing property management guidelines and restrictions regarding on Site activities, coupled with compliance and enforcement mechanisms.
- Containment - Containment actions may be undertaken to isolate potential receptors from COCs in soil and to reduce mobility of COCs. These actions may be completed through on Site capping or a combination of on Site consolidation and capping.
- Excavation and Disposal – Excavation actions may be undertaken to physically remove impacted soil for off Site disposal at an appropriately permitted facility.
- Treatment – Treatment actions may be undertaken to complete on Site treatment in situ treatment of soil to reduce the toxicity, mobility, or volume (TMV) of media exhibiting unacceptable risk. Treatment actions may be undertaken to physically remove impacted media from in situ, followed by either on Site or off Site ex situ treatment to reduce the TMV of media exhibiting unacceptable risk.

3.2 Areas and Volumes of Impacted Material

Each impacted area was assessed based on the HHRA described above. The associated risk detailed in this section is an issue both collectively, for all of OU-5, and individually, for each impacted soil area described below.

In OU-5, there are three areas where impacted soil is present, which results in unacceptable exposure risk to human health. These areas were identified based on the soil parameters, locations, and depths which are contributing to the risk calculation or hazard index calculation and primarily consist of arsenic and lead, with additional contribution from antimony and cadmium. The areal extent of the three areas is provided on Figure 3.1. The areas not highlighted on Figure 3.1 as impacted areas were found to not have an associated exposure risk to human health. For the purposes of this FFS evaluation, the three impacted areas are referred to as the MW-29 Area, BH-34 11 Area, and the former Test Track Area (i.e., the main impacted area covering most of the northern portion of OU-5). The following table (Table 3.1) provides a summary of the estimated area and volume of impacted soil for each area.

Table 3.1 OU-5 Areas and Volumes for Impacted Soil

Area	Estimated Area (Square Feet)	Estimated Volume (Cubic Yards)	Notes/Assumptions
MW-29 Area	1,600	300	Assume impacts to 5 feet depth
BH 34 11 Area	1,600	300	Assume impacts to 5 feet depth
Test Track Area	705,500	53,000	Impacts to 2 feet depth

3.3 Identification and Technical Implementability Screening of Remedial Technology Types and Process Options

Remedial technologies and associated process options, corresponding to the identified GRAs, were developed and screened by evaluation of the process options with respect to technical implementability at the Site. Remedial technology types and process options are identified on Figure 3.2 for soil for each applicable GRA identified above in Section 3.1.

Within each of the identified remedial technology types (underlined below), the below process options were identified for soil (bulleted below), as follows:

No Action

- No action

Access Restriction Technologies

- Zoning restrictions
- Deed/use restrictions
- Restrictive covenants

Containment Technologies

- Capping

- Consolidation (soil relocation)/capping

Excavation Technologies

- Excavation and off Site disposal

Treatment Technologies

- In situ physical/chemical/biological treatment
- Ex situ physical/chemical/biological treatment

The identified process options were screened relative to technical implementability based on Site contaminant types and concentrations, and other Site specific characteristics. The identification of remedial technology types and process options for soil, a description of each process option, and the results of the technical implementability screening is presented on Figure 3.2.

3.4 Evaluation of Process Options

The process options for soil, which were identified on Figure 3.2, to be technically implementable were evaluated in greater detail to select one or a small number of process options to represent each remedial technology type. Each process option was evaluated based on effectiveness, implementability, and cost. The evaluation placed more emphasis on effectiveness and less emphasis on implementability and cost. Because the process options had already undergone technical implementability screening in Section 3.3, the implementability screening of the evaluation in this section placed greater emphasis on the institutional aspects of implementability. The evaluation criteria are discussed below.

Effectiveness

- The effectiveness in handling the estimated areas or volumes of contaminated media and meeting the remediation goals identified in the RAOs
- The effectiveness in protecting human health and the environment during the construction and implementation phase
- The effectiveness with respect to the COCs and conditions at the Site

Implementability

- Disruption to the project site and surrounding area
- Ability to obtain necessary permits, if required
- Availability of treatment, storage, and disposal services
- Availability of necessary specialized equipment and technically proficient workers to implement the technology

Cost

- Based on evaluating whether costs are low, moderate, or high relative to other processes in the same remedial technology type and capital versus operations, maintenance, and monitoring (OMM) costs

Figure 3.2 summarizes the results of the evaluation process for soil process options. The process options retained following evaluation represent an inventory of process options considered most suitable for addressing the media of interest at the Site. The remedial technology types and process options retained in this section may be used either alone or combined with others to develop remedial alternatives.

4. Alternatives Array

4.1 Assembly of Retained Remedial Technology Types and Process Options into Remedial Alternatives

The retained remedial technology types and process options were assembled into comprehensive soil remedial alternatives for OU-5.

The following remedial alternatives have been developed for soil:

- Remedial Alternative 1 – No Action
- Remedial Alternative 2 – Excavation, and Off Site Disposal
- Remedial Alternative 3 – Capping with Limited Excavation and Off Site Disposal
- Remedial Alternative 4 – In Situ/Ex Situ Treatment

Each remedial alternative is discussed in the following sections, including generalized design components and achievements of RAOs:

Section 4.1.1	Remedial Alternative 1 – No Action
Section 4.1.2	Remedial Alternative 2 – Excavation, and Off Site Disposal
Section 4.1.3	Remedial Alternative 3 – Capping with Limited Excavation and Off Site Disposal
Section 4.1.4	Remedial Alternative 4 – In Situ/Ex Situ Treatment

4.1.1 Remedial Alternative 1 – No Action

Alternative 1, the No Action alternative, is required for consideration and its purpose is to serve as a baseline for the comparative analysis of alternatives.

No active remediation would be performed at the Site under this alternative.

4.1.2 Remedial Alternative 2 – Excavation, and Off Site Disposal

Remedial Alternative 2 includes the excavation of impacted soil above the PRGs, the off Site disposal of impacted soil above the PRGs that does not meet the criteria, and implementation of institutional and/or engineering controls. Section 3.2 presents a summary of general approaches utilized when developing the conceptual excavation areas for Remedial Alternative 2.

The primary components of Soil Remedial Alternative 2 are:

- Pre design delineation of the vertical and horizontal extent of soil impacts in each area exceeding the PRGs and to determine the appropriate disposal facilities for the material
- Excavation of areas impacted above the PRGs for soil
- Off Site disposal of metals above the PRGs impacted material
- Backfilling of excavation areas with clean fill
- Restoration as appropriate to return the area to a nonresidential developable condition, including grading and compacting excavated areas
- Institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a Contaminated Materials Management Plan (CMMP), and compliance with a long term stewardship (LTS) plan.
- Development and submittal of a CMMP
- Preparation and submittal of a Remedial Action Completion Report
- A request for a Certification of Completion of Remedy (COCR)

4.1.3 Remedial Alternative 3 - Capping with Limited Excavation and Off Site Disposal

Remedial Alternative 3 includes the excavation of limited impacted soil above the PRGs (i.e., MW-29 Area and BH 34 11 Area), chosen based on the risk impacted soils pose to human health, and the off Site disposal of impacted soil above the PRGs that does not meet the criteria. The remaining areas of OU-5 which contain impacted soil above the PRGs (i.e., the Test Track Area) would be capped with an asphalt capping system (3A) or with a high density polyethylene (HDPE) liner system (3B) which has a longer lifespan to eliminate the potential exposure to the outdoor worker and is equivalent to an asphalt cap in protection and durability. The Test Track Area is already covered with asphalt; however, for cost purposes it was assumed the asphalt in the area is not suitable for a capping system. Alternative 3 would also include the implementation of institutional and/or engineering controls, which would include provisions for utility workers to conduct utility work in the Test Track area with appropriate precautions and personal protective equipment to prevent direct contact exposure to impacted soil. Section 3.2 presents a summary of general approaches utilized when developing the conceptual excavation areas for Remedial Alternative 3.

The primary components of Soil Remedial Alternative 3 are:

- Pre design delineation of the vertical and horizontal extent of soil impacts in each area exceeding the PRGs and to determine the appropriate disposal facilities for the material that will be identified for off Site disposal
- Excavation of limited areas impacted above the PRGs for soil
- Off Site disposal of metals above the PRGs impacted material
- Backfilling of excavation areas with clean fill

- Restoration as appropriate to return the area to a nonresidential developable condition, including grading and compacting excavated areas
- Placement of an asphalt cap (3A) or HDPE liner with gravel cover (3B) over the Test Track area to prevent direct contact with impacted soils
- Placement of permanent markers to identify the capped area for monitoring the cap integrity and consideration of the area in utility work
- Institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a CMMP, and compliance with a long term stewardship plan.
- Development and submittal of a CMMP
- Preparation and submittal of a Remedial Action Completion Report
- A request for a COCR

4.1.4 Remedial Alternative 4 – In Situ/Ex Situ Treatment

Remedial Alternative 4 includes the in situ or ex situ treatment of impacted soil above the PRGs by the use of solidifying/stabilizing agents, such as Portland cement or other proprietary reagents. It is estimated that the reagent will be mixed at 5 to 10 percent per volume and determined by a treatability study. The soils in areas MW-29 and BH 34 11 impacted above the PRGs to a depth of 5 feet will be treated in situ or ex situ based on cost and contractor preference. The remaining areas of OU-5 that contain impacted soil above the PRGs (i.e., the Test Track Area) would be treated in situ or ex situ based on contractor preference. No impacted soils will be removed from the Site for off Site disposal. Alternative 4 would also include the implementation of institutional and/or engineering controls. Section 3.2 presents a summary of general approaches utilized when developing the conceptual excavation areas for Remedial Alternative 4.

The primary components of Soil Remedial Alternative 4 are:

- Pre design delineation of the vertical and horizontal extent of soil impacts in each area exceeding the PRGs
- Removal of asphalt located above impacted soils
- Mixing of reagent into the soils at 5 to 10 percent by volume (estimated)
- Compaction of treated soils
- Restoration as appropriate to return the area to a nonresidential developable condition, including grading and compacting excavated areas
- Institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a CMMP, and compliance with a long term stewardship plan
- Development and submittal of a CMMP

- Preparation and submittal of a Remedial Action Completion Report
- A request for a COCR

4.2 Screening of Remedial Alternatives

The remedial alternatives were screened against the short and long term aspects of effectiveness, implementability, and cost. The effectiveness of each remedial alternative was assessed based on its ability to provide protection to human health and to meet the PRGs. The implementability of each remedial alternative was assessed from both the technical perspective (i.e., the ability to construct, reliably operate, and meet technology specific regulations for process options until a remedial action is complete, and operation, maintenance and monitoring after the remedial action is complete) and the administrative perspective (i.e., the ability to obtain approvals, equipment, and services). The estimated cost for each remedial alternative was assessed based on capital, the net present value (NPV) of operation, maintenance and monitoring, and engineering and design costs.

The results of screening based on effectiveness, implementability, and cost are discussed below in Sections 4.2.1, 4.2.2 and 4.2.3, respectively. The discussion below excludes Remedial Alternative 1 - No Action alternative for soil. Retained remedial alternatives are listed in Section 4.2.4.

4.2.1 Effectiveness

Remedial Alternative 2 and 3 are effective both in the short term and long term at reducing the volume of impacted materials on Site through the removal and off Site disposal of impacted materials above the PRGs. Alternative 3 does not reduce the entirety of the volume of impacted materials on Site due to the capping of impacted materials in the Test Track Area, but it does provide effective engineering controls to prevent direct contact. Remedial Alternative 4 is effective both in the short term and long term at reducing the mobility of the impacted materials on Site by solidifying/stabilizing the contaminants into their immobile forms or encasing the contamination. Alternative 4 does not reduce the volume of the impacted materials on Site, but it does provide an effective engineering control to prevent direct contact. Implementation of a Long-Term Stewardship Plan (LTS Plan), including periodic Site inspections and a contingency plan for the engineering controls incorporated in Remedial Alternatives 3 and 4 would ensure the controls remain effective and protective of human health and the environment.

Remedial Alternatives 2, 3, and 4 would require institutional controls as described above to be effective. Institutional controls are expected to be effective for both the short and long term in reducing the risks associated with impacted soils that would remain on Site after remedial action is complete.

4.2.2 Implementability

The implementability of each remedial alternative was assessed from both the technical perspective (i.e., the ability to construct, reliably operate, and meet technology specific regulations for process options until a remedial action is complete, and maintenance and monitoring after the remedial action is complete) and the administrative perspective (i.e., the ability to obtain approvals from other offices and agencies, the availability of treatment, storage, and disposal services and capacity).

The majority of the project would be limited to treatment of impacted soils, excavation of impacted soils from the Site, or capping of impacted soils. Similar alternatives have been successfully implemented at many other sites and can be readily accomplished. Contractors required to conduct specific tasks within the scope of work are available within the project area. The local availability of backfill soil materials that will meet the required PRGs will be assessed, and asphalt or liner for the cap should not be a barrier to completing the project.

Remedial Alternative 2 requires access to the Site to complete the excavation, waste load out, backfilling, consolidation, capping, and restoration activities. Remedial Alternative 3 requires access to the Site to complete excavation, load out of the waste, backfilling, restoration and capping. Remedial Alternative 4 requires access to the Site to complete removal of asphalt, solidification/stabilization of the waste, consolidation, and restoration activities. Prior to implementation of any remedial activities, access agreements will be secured with the current property owners.

Currently licensed landfills capable of accepting both the non-hazardous (i.e., non-RCRA) and hazardous regulated waste generated from the project are available, although the transportation distance for hazardous material is significant and could result in some logistics and scheduling constraints.

Maintenance and monitoring of engineering controls incorporated in Alternatives 3 and 4 are implementable through an LTS Plan that would include periodic Site inspections.

4.2.3 Cost

Table 4.1 (attached) presents the estimated capital and maintenance and monitoring costs to complete Alternatives 2, 3, and 4. For the purposes of estimating, the following assumptions have been used:

- The soil volumes and areas presented in Table 3.1 have been used
- For disposal purposes, it has been assumed that all impacted material from MW-29 Area and BH-34 11 Area would be classified as hazardous waste for disposal purposes with 50 percent of the material from the Test Track Area being classified as hazardous waste (this assumption would need to be verified during the pre-design investigation)
- It is assumed that the asphalt cap will require significant upgrades every 10 years after construction (i.e., in years 11 and 21)
- It is assumed that the cost difference of in situ versus ex situ treatment of soil is negligible.
- The following table provides a summary of the cost of each Remedial Alternative:

Item/Description	Alternative 2 Cost	Alternative 3 Cost		Alternative 4 Cost
		A	B	
Capital Costs	$29,943,220	$4,333,285	$1,852,575	$3,782,280
Engineering Costs	$275,000	$275,000	$275,000	$275,000
Maintenance & Monitoring Costs	$0	$1,576,445	$153,720	$153,720

Item/Description	Alternative 2 Cost	Alternative 3 Cost		Alternative 4 Cost
		A	B	
Total Cost of Alternative	**$30,218,220**	**$6,184,730**	**$2,291,295**	**$4,211,000**

Estimated capital costs for Remedial Alternative 2 (~$30.2 million) is significantly higher than Remedial Alternative 3A (~$6.2 million) and Remedial Alternative 3B (~$2.3 million) due to the volume of material to be removed for off Site disposal to meet the PRGs. However, since the impacted material would be removed from the Site, the maintenance and monitoring costs for Remedial Alternative 2 are minimal and have, therefore, been estimated at $0. The maintenance and monitoring costs for the Remedial Alternative 3A include an allowance for an annual inspection with some minor level of maintenance as well as a provision to perform significant upgrades to the asphalt cap at years 11 and 21, resulting in a present value of $1.6 million. The maintenance and monitoring costs for Remedial Alternative 3B include an allowance for an annual inspection with some minor level maintenance, resulting in a value of $153,720.

Remedial Alternative 4 (~$4.2 million) is the same order of magnitude to Alternative 3A and 3B in cost. Alternative 4 requires no potential cap upgrades; however, it does have annual inspection costs, resulting in a present value of $153,720.

Consistent with USEPA guidance on conducting feasibility studies, the cost estimates were prepared to provide accuracy in the range of 30 to +50 percent. The capital and maintenance and monitoring cost estimates are expressed in 2017 dollars. After development of the capital and maintenance and monitoring costs, NPV analysis of the overall remedial action costs associated with each alternative was conducted. An NPV analysis relates costs that occur over different time periods to present costs by discounting all future costs to the present value. This allows the cost of remedial alternatives to be compared on the basis of a single figure that represents the capital required in 2017 dollars to construct, operate, and maintain the remedial alternative throughout its planned life. The NPV calculations were based on a discount rate of 5 percent.

4.2.4 Retained Remedial Alternatives

The following Remedial Alternatives, including the No Action Alternative, have been retained for detailed analysis in Section 5.

Remedial Alternative 1 – No Action

Remedial Alternative 2 – Excavation, and Off Site Disposal

Remedial Alternative 3 – Capping with Limited Excavation and Off Site Disposal

Remedial Alternative 4 – In Situ/Ex Situ Treatment

5. Detailed Analysis of Remedial Alternatives

5.1 Introduction

This section presents the detailed analysis of retained remedial alternatives that are described in Section 4. The detailed analysis consists of an assessment of individual alternatives against each of seven evaluation criteria, and a comparative analysis that focuses on the relative performance of each alternative against those criteria. The seven evaluation criteria are categorized into two groups; namely threshold criteria that each alternative must meet in order to be eligible for selection (see Section 5.1.1) and primary balancing criteria (see Section 5.1.2). In addition, DNREC will evaluate two modifying criteria (see Section 5.1.3) that will be considered in remedy selection.

The nine evaluation criteria are categorized into three groups as follows:

Threshold Criteria – "statutory requirements that each alternative must satisfy in order to be eligible for selection"

Balancing Criteria – "technical criteria that are considered during the detail analysis"

Modifying Criteria – State support and agency acceptance, and community acceptance

5.1.1 Threshold Criteria

1. Overall Protection of Human Health and the Environment – GHD assessed the alternatives to determine whether they can adequately protect human health and the environment from unacceptable risks posed by exposure to media at concentrations greater than applicable criteria. This criterion also draws on the assessment of other criteria especially long term effectiveness and permanence, short term effectiveness, and compliance with regulations.
2. Compliance with Regulations – GHD assessed the alternatives to determine whether they comply with regulations or provide justification for invoking a variance.
3. Source Controls – GHD assessed the alternatives to determine whether they have adequate institutional controls in place in the form of environmental covenants to restrict use of the Site to non-residential uses, limit groundwater use, and comply with CMMP and LTS

5.1.2 Balancing Criteria

1. Long Term Effectiveness and Permanence – GHD assessed the alternatives for the long term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful considering the magnitude of residual risk and the adequacy and reliability of controls
2. Reduction of TMV through Treatment (TMV) – GHD assessed the alternatives to determine the degree to which alternatives employ recycling or treatment that reduces TMV of contaminants at the Site
3. Short Term Effectiveness – GHD assessed the alternatives to determine the short term impacts of alternatives considering the community, the workers, potential environmental contaminants, and timing

4. Implementability – GHD assessed the alternatives to determine the ease or difficulty of implementing the alternatives considering technical and administrative feasibility, and the availability of services and materials
5. Cost – GHD assessed the alternatives to determine their costs and the types of costs including capital and maintenance and monitoring costs

5.1.3 Modifying Criteria

1. Agency Acceptance Assessment of regulatory agency concerns/position related to the alternatives, regulatory compliance, and variances
2. Community Acceptance Assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This will be determined by a 20 day comment period open to the public with an optional public meeting.

5.2 Individual Analysis of Alternatives

In this section, each of the remedial alternatives that were developed undergoes a detailed analysis against each of the first seven of the nine evaluation criteria, with DNREC evaluating the last two evaluation criteria. Because the remedial alternatives were already described in Section 4.0, and given the descriptive nature of the titles of this section of the report, the detailed description of each alternative is not repeated in this section, but rather, the text proceeds directly to the detailed analysis of each of the individual alternatives. This section is structured as follows:

Section 5.1.1	Remedial Alternative 1 – No Action
Section 5.1.2	Remedial Alternative 2 – Excavation, and Off Site Disposal
Section 5.1.3	Remedial Alternative 3 – Capping with Limited Excavation and Off Site Disposal
Section 5.1.4	Remedial Alternative 4 – In Situ/Ex Situ Treatment

5.2.1 Remedial Alternative 1 – No Action

Overall Protection of Human Health and the Environment

This alternative provides no additional overall protection of human health and the environment. Risks posed by contaminated media would remain the same as those identified in the RI Report.

Compliance with Regulations

RAOs and DNREC regulations would not be met.

Long Term Effectiveness and Permanence

This alternative provides a low degree of long term effectiveness and permanence because there is no remedial action and no controls.

Reduction of TMV through Treatment

This alternative would not reduce the TMV of contaminated media through treatment.

Short Term Effectiveness

Short term effectiveness is not achieved by this alternative because it does not include remedial action, engineering controls, or institutional controls.

Implementability

This alternative is easily implemented because there is no construction or permitting considerations.

Cost

The NPV of Alternative 1 is estimated to be $0.

5.2.2 Remedial Alternative 2 – Excavation, and Off Site Disposal

Overall Protection of Human Health and the Environment

This alternative provides overall protection of human health and the environment through the following:

- Site risks posed by the COCs are eliminated, which makes them protective of human receptors, by the removal and off Site disposal of impacted soil.
- Remaining site risks posed by COCs in OU-5 are controlled, which makes them protective of human receptors in conjunction with the reduced Site risks, by the use of institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a CMMP, and compliance with a long term stewardship plan.

This alternative meets the RAOs for the OU by:

- Preventing human direct contact exposure to soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA
- Mitigating the potential for human inhalation exposure to indoor air vapors resulting from soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA (not a risk driver in OU-5)
- Protecting surface water and sediments by mitigating the potential for erosion of impacted soils in OU-5 to the Little Mill Creek through the removal of impacted soils

Compliance with Regulations

Alternative 2 complies with regulations under the DNREC cleanup program by providing a Site specific risk based approach to cleanup consistent with the anticipated future land use of the property and provides protection in the form of land use restrictions and environmental covenants.

Long Term Effectiveness and Permanence

The long term effectiveness and permanence of the Remedial Alternative 2 option is dependent on the effective design and implementation of the soil removal activities and compliance with the institutional controls. In general, implementation of the retained Remedial Alternative 2 would be expected to achieve the RAOs for the Site.

The combination of removal and off Site disposal of soils impacted above the PRGs is expected to produce a low residual risk to human health and the environment. Remedial Alternative 2 would provide long term effectiveness via removal of the inorganic soils remaining on Site above the PRGs. The expected ability of the remedy to maintain a reliable protection of human health and the environment over time is high. Verification sampling would be conducted during excavation to document the characteristics of the soil remaining in place are at or below the PRGs.

Reduction of TMV through Treatment

No reduction of TMV through treatment will be accomplished by Remedial Alternative 2. The overall reduction in toxicity will be accomplished through the removal and off Site disposal of materials above the PRGs. Impacted materials present on Site are considered low level threat waste for which removal/off Site disposal and containment are appropriate and treatment impracticable.

Short Term Effectiveness

Remedial Alternative 2 poses low level risks to the community during construction (e.g., dust, noise, transportation, emissions associated with excavation of waste) that can be readily mitigated through dust control, restricted work hours, engineering controls, compliance with USDOT regulations, and air monitoring. As part of the planning and design process, a Site transportation plan will be developed to restrict the times of day vehicles may enter/exit the site to minimize the impact that the construction traffic has on the community.

Remedial Alternative 2 poses risks to Site workers associated with construction (e.g., exposure to contaminated media, occupational hazards) that can be mitigated through a health and safety plan and personal protective equipment. Air monitoring will be conducted during excavation activities where soils have been determined to contain potentially harmful concentrations of metals. If, based on monitoring, the exposure to the contaminants are above the action level for one or more constituents, workers will be required to don a respirator with a particulate cartridge or combination cartridge if contaminants are present in the breathing zone. Good personal hygiene will be encouraged. Hand washing stations will be required at the contamination reduction zones. Decontamination stations will be required for workers to use prior to exiting the exclusion zones. Workers will not be allowed to eat, drink or smoke within the exclusion zone(s).

The environmental impacts to the Site in the short term will include exposure of additional impacted soils. Best management practices will be implemented including, but not limited to silt fence, turbidity curtain, and dust control (potable water). It is assumed that the majority of the soils targeted for off Site disposal will be direct loaded into trucks and will not be staged on Site.

Remedial design, contracting, and agency approval has been estimated to require 6 months to 1 year. Estimated time for construction is less than 1 year, at the conclusion of which the remedy will be operational and effective.

Implementability

The remedial components of Remedial Alternative 2 could be readily implemented and reliably designed and constructed. Soil excavation and transportation are commonly practiced technologies. Contractors with experience completing the components included in Remedial Alternative 2 are available in the general area.

Remedial Alternative 2 will include a component of off Site soil disposal. This component is considered reliable to reduce the amount of impacted soils on the Site. The effectiveness of the alternative is easily monitored. Verification soil samples will be collected prior to backfilling activities to document that the remaining soils meet the PRG objectives.

The soil Remedial Alternative 2 requires access to the Site to complete the excavation, backfilling, and off Site disposal handling activities. An access agreement with the Site owners will need to be in place for the Site.

Off Site disposal of impacted materials would require waste characterization sampling and landfill approval. Soils impacted with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals are anticipated to be transported to either a non-hazardous or hazardous waste disposal facility.

Cost

Table 4.1 provides a breakdown of costs for each technically feasible remedial alternative. The total cost to complete Remedial Alternative 2 is $30,218,220, which includes $29,943,220 in capital construction costs, $275,000 in engineering costs and minimal maintenance and monitoring. The capital cost is primarily for the excavation and off Site disposal.

5.2.3 Remedial Alternative 3 – Capping with Limited Excavation and Off Site Disposal

Overall Protection of Human Health and the Environment

This alternative provides overall protection of human health and the environment through the following:

- Site risks posed by the COCs are reduced, which makes them protective of human receptors by the removal and off Site disposal of impacted soil for selected areas of the OU
- Site risks posed by the COCs are contained, which makes them protective of human receptors by the capping of impacted soils for the primary area of impact in OU-5
- Remaining site risks posed by COCs in OU-5 are controlled, which makes them protective of human receptors in conjunction with the reduced Site risks by the use of institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a CMMP, and compliance with a long term stewardship plan.

This alternative meets the RAOs for the OU-by:

- Preventing human direct contact exposure to soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA
- Protecting surface water and sediments by mitigating the potential for erosion of impacted soils in OU-5 to the Little Mill Creek through the removal and capping of impacted soils

Compliance with Regulations

Alternative 3 complies with regulations under the DNREC cleanup program by providing a Site specific risk based approach to cleanup consistent with the anticipated future land use of the property and provides protection in the form of land use restrictions and environmental covenants.

Long Term Effectiveness and Permanence

The long term effectiveness and permanence of the Remedial Alternative 3 is dependent on the effective design, operation, maintenance, and monitoring of the cover systems and compliance with the institutional controls. In general, implementation of the retained Remedial Alternative 3 would be expected to achieve the RAOs for the Site.

Remedial Alternative 3 includes caveats regarding which soils will be disposed of off Site and which soils would be considered eligible to remain on site under a cover system consisting of an asphalt cap.

The combination of removal and off Site disposal of soils, capping soils with inorganics above the PRGs, institutional controls and long term maintenance of the cap(s) is expected to produce a low residual risk to human health and the environment. Remedial Alternative 3 would provide long term effectiveness via isolation of the inorganic soils remaining on Site above the PRGs by capping. Capping of the inorganic COCs would prevent direct contact and erosion of the soils.

The expected ability of the remedy to maintain a reliable protection of human health and the environment over time is high. Verification sampling will be conducted in each excavation area to document the characteristics of the soil remaining in place are at or below the PRGs. Capped soils will not be subject to rain infiltration and therefore should not migrate via this mechanism. The capped soils will be above the water table and therefore should not become dissolved and enter the groundwater.

Capping with institutional controls is proven technologies that meet the requirements for effectiveness and permanence. Off-site disposal at a properly licensed landfill of manifested soils from limited areas of the OU that make capping impractical would also achieve the requirements of effectiveness and permanence.

Reduction of TMV through Treatment

No reduction of TMV through treatment will be accomplished by Remedial Alternative 3. The overall reduction in toxicity will be accomplished through the removal and off Site disposal of materials and capping of soils above the PRGs. Impacted materials present on Site are considered low level threat waste for which removal/off Site disposal and containment are appropriate and treatment impracticable. The potential mobility of the impacted soils remaining on Site will be significantly reduced by the installation of the cap.

Short Term Effectiveness

Remedial Alternative 3 poses low level risks to the community during construction (e.g., dust, noise, transportation, emissions associated with excavation of waste) that can be readily mitigated through dust control, restricted work hours, engineering controls, compliance with United States Department of Transportation (USDOT) regulations, and air monitoring. As part of the planning and design process, a Site transportation plan will be developed to restrict the times of day vehicles may enter/exit the Site to minimize the impact that the construction traffic has on the community.

Remedial Alternative 3 poses risks to Site workers associated with construction (e.g., exposure to contaminated media, occupational hazards) that can be mitigated through a health and safety plan and personal protective equipment. Air monitoring will be conducted during excavation activities where soils have been determined to contain potentially harmful concentrations of metals. If, based on monitoring, the exposure to the contaminants are above the action level for one or more constituents, workers will be required to don a respirator with a particulate cartridge or combination cartridge if contaminants are present in the breathing zone. Good personal hygiene will be encouraged. Hand washing stations will be required at the contamination reduction zones. Decontamination stations will be required for workers to use prior to exiting the exclusion zones. Workers will not be allowed to eat, drink or smoke within the exclusion zone(s).

The environmental impacts to the Site in the short term will include exposure of additional impacted soils. Best management practices will be implemented including, but not limited to silt fence, turbidity curtain, and dust control (potable water). It is assumed that the majority of the soils targeted for off Site disposal will be direct loaded into trucks and will not be staged on Site.

Remedial design, contracting and agency approval has been estimated to require 6 months to 1 year. Estimated time for construction is less than 1 year, at the conclusion of which the remedy will be operational and effective.

Implementability

The remedial components of Remedial Alternative 3 could be readily implemented and reliably designed and constructed. Soil excavation and transportation, and capping of soils are commonly practiced technologies. Contractors with experience completing the components included in Remedial Alternative 3 are available in the general area.

Remedial Alternative 3 will include a component of off Site soil disposal. This component is considered reliable to reduce the amount of impacted soils on the Site. The effectiveness of the alternative is easily monitored. Verification soil samples will be collected prior to backfilling activities to document that the remaining soils meet the PRG objectives. Remedial Alternative 3 will also include a component of capping with an asphalt cap or an HDPE liner. This component is considered reliable to control the impacted soils at the OU. Pre design sampling will be conducted prior to the work to document that the soils remaining above the PRGs are adequately covered.

The soil Remedial Alternative 3 requires access to the Site to complete the excavation, backfilling, off Site disposal handling activities, and capping. An access agreement with the Site owners will need to be in place for the Site

Off Site disposal of impacted materials would require waste characterization sampling and landfill approval. Soils impacted with VOCs, SVOCs, and metals are anticipated to be transported to either a non-hazardous or hazardous waste disposal facility.

Cost

Table 4.1 provides a breakdown of costs for each technically feasible remedial alternative. The total cost to complete Remedial Alternative 3A with an asphalt cap is $6,184,730, which includes $4,333,285 in capital construction costs, $275,000 in engineering costs and $1,576,445 in maintenance and monitoring (as a present value). The capital cost is primarily for the construction/installation of the asphalt cap. The primary component of the maintenance and monitoring activities is the periodic upgrades to the cap approximately every 10 years. The total cost to complete Remedial Alternative 3B with an HPDE liner is $2,291,295, which includes $1,852,575 in capital construction costs and $275,000 in engineering costs and $153,720 in Maintenance and Monitoring costs. The capital cost is primarily for the HDPE lining and backfilling.

5.2.4 Remedial Alternative 4 – In Situ/Ex Situ Treatment

Overall Protection of Human Health and the Environment

This alternative provides overall protection of human health and the environmental through the following:

- Site risks posed by the COCs are contained, which makes them protective of human receptors by the stabilization and solidification of impacted soil for selected areas of the OU
- Remaining site risks posed by COCs are controlled, which makes them protective of human receptors in conjunction with the reduced Site risks by the use of institutional controls in the form of environmental covenants restricting the use of the Site to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts, limitations of groundwater use, compliance with a CMMP, and compliance with a long term stewardship plan.

This alternative meets the RAOs for the OU by:

- Preventing human direct contact exposure to soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA
- Mitigating the potential for human inhalation exposure to indoor air vapors resulting from soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA (not a risk driver in OU-5)
- Protecting surface water and sediments by mitigating the potential for erosion of impacted soils in OU-5 to the Little Mill Creek through the removal and capping of impacted soils

Compliance with Regulations

Alternative 4 complies with regulations under the DNREC cleanup program by providing a site specific risk based approach to cleanup consistent with the anticipated future land use of the property, and provides protection in the form of land use restrictions and environmental covenants.

Long Term Effectiveness and Permanence

The long term effectiveness and permanence of the Remedial Alternative 4 is dependent on the effective design, operation, maintenance, and monitoring of the solidified/stabilized soil and compliance with the institutional controls. In general, implementation of the retained Remedial Alternative 4 would be expected to achieve the RAOs for the Site.

The in situ/ex situ treatment of soils contaminated with inorganics above the PRGs and institutional controls are expected to produce a low residual risk to human health and the environment. Remedial Alternatives 4 would provide long term effectiveness via isolation of the inorganic soils remaining on Site above the PRGs by stabilization and solidification. Treatment of the inorganic COCs would prevent direct contact and erosion of the soils.

The expected ability of the remedy to maintain a reliable protection of human health and the environment over time is high. Solidified soils will not be subject to rain infiltration and therefore should not migrate via this mechanism. The solidified soils will be above the water table and therefore should not become dissolved and enter the groundwater.

In situ/ex situ treatment with institutional controls is a proven technology that meets the requirements for effectiveness and permanence.

Reduction of TMV through Treatment

Reduction of TMV through treatment will be accomplished by Remedial Alternative 4 depending on the reagent selected through the treatability study. The overall reduction in mobility may be accomplished through the stabilization/solidification of impacted soils above the PRGs. Impacted materials present on-Site will be either reduced to their immobile form or encapsulated within Portland cement.

Short Term Effectiveness

Remedial Alternative 4 poses low level risks to the community during construction (e.g., dust, noise, transportation, emissions associated with excavation of waste) that can be readily mitigated through dust control, restricted work hours, engineering controls, compliance with USDOT regulations, and air monitoring. As part of the planning and design process, a Site transportation plan will be developed to restrict the times of day vehicles may enter/exit the Site to minimize the impact that the construction traffic has on the community.

Remedial Alternative 4 poses risks to Site workers associated with construction (e.g., exposure to contaminated media, occupational hazards) that can be mitigated through a health and safety plan and personal protective equipment. Air monitoring will be conducted during treatment activities where soils have been determined to contain potentially harmful concentrations of metals. If, based on monitoring, the exposure to the contaminants are above the action level for one or more constituents, workers will be required to don a respirator with a particulate cartridge or combination cartridge if contaminants are present in the breathing zone. Good personal hygiene will be encouraged. Hand washing stations will be required at the contamination reduction zones. Decontamination stations will be required for workers to use prior to exiting the exclusion zones. Workers will not be allowed to eat, drink or smoke within the exclusion zone(s).

The environmental impacts to the Site in the short term will include exposure of additional impacted soils. Best management practices will be implemented including, but not limited to silt fence, turbidity curtain, and dust control (potable water).

Remedial design, contracting and agency approval has been estimated to require 6 months to 1 year. Estimated time for construction is less than 1 year, at the conclusion of which the remedy will be operational and effective.

Implementability

The remedial components of Remedial Alternative 4 could be readily implemented and reliably designed and constructed. Soil stabilization and solidification are well known and regularly practiced technologies. Contractors with experience completing the components included in Remedial Alternative 4 are available in the general area.

Remedial Alternative 4 will include a component of on Site in situ/ex situ soil treatment. This component is considered reliable to reduce the mobility of impacted soils on the Site. The effectiveness of the alternative can be monitored through past treatment sampling to confirm that the treated material meets the specified design requirements.

The Soil Remedial Alternative 4 requires access to the Site to complete the removal of asphalt, treatment of soils, compaction and restoration. An access agreement with the Site owners will need to be in place for the Site.

Cost

Table 4.1 provides a breakdown of costs for each technically feasible remedial alternative. The total cost to complete Remedial Alternative 4 is $4,211,000, which includes $3,782,280 in capital construction costs, $275,000 in engineering costs and $153,720 in maintenance and monitoring (as a present value). The capital cost is primarily for the treatment of soils and construction/restoration of the asphalt area. The primary component of the maintenance and monitoring activities is annual inspection, maintenance, and monitoring.

5.3 Summary

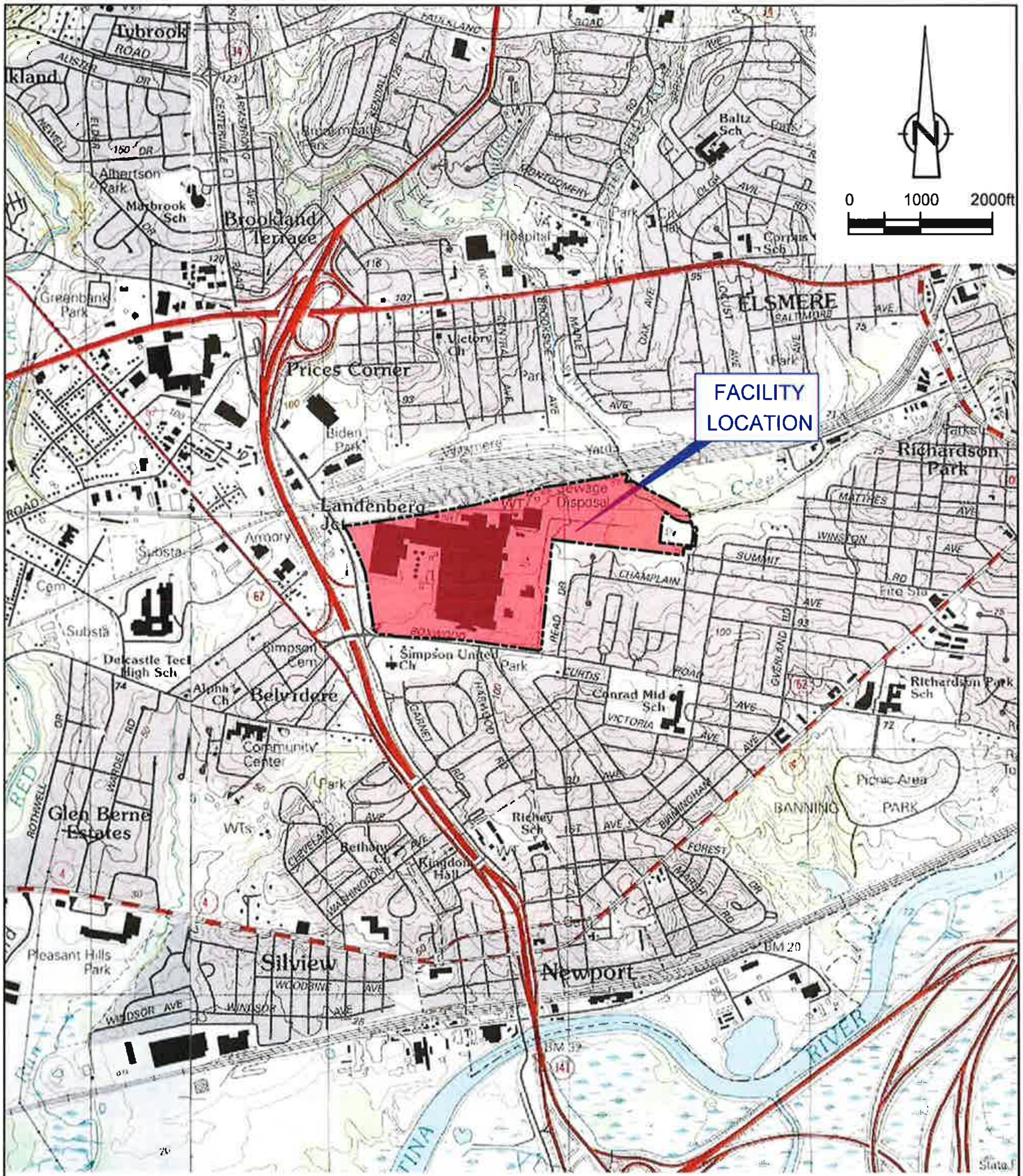
Based on the detailed and comparative analysis of the remedial alternatives presented in Section 5.2, Remedial Alternative 3B meets the remediation goals based on comparison criteria evaluated and is the most cost effective remedial alternative.

6. References

CRA, 2014. Memo to R. Galloway, DNREC from C. Barton and V. Nero, CRA, Proposed Risk Assessment Approach for Remedial Investigation, Former Wilmington Assembly Plant, Wilmington, Delaware, Conestoga Rovers & Associates, October 2014.

CRA, 2015. Remedial Investigation Report, Former GM Wilmington Assembly Plant, Wilmington, Delaware, Conestoga Rovers & Associates, July 2015.

Figures



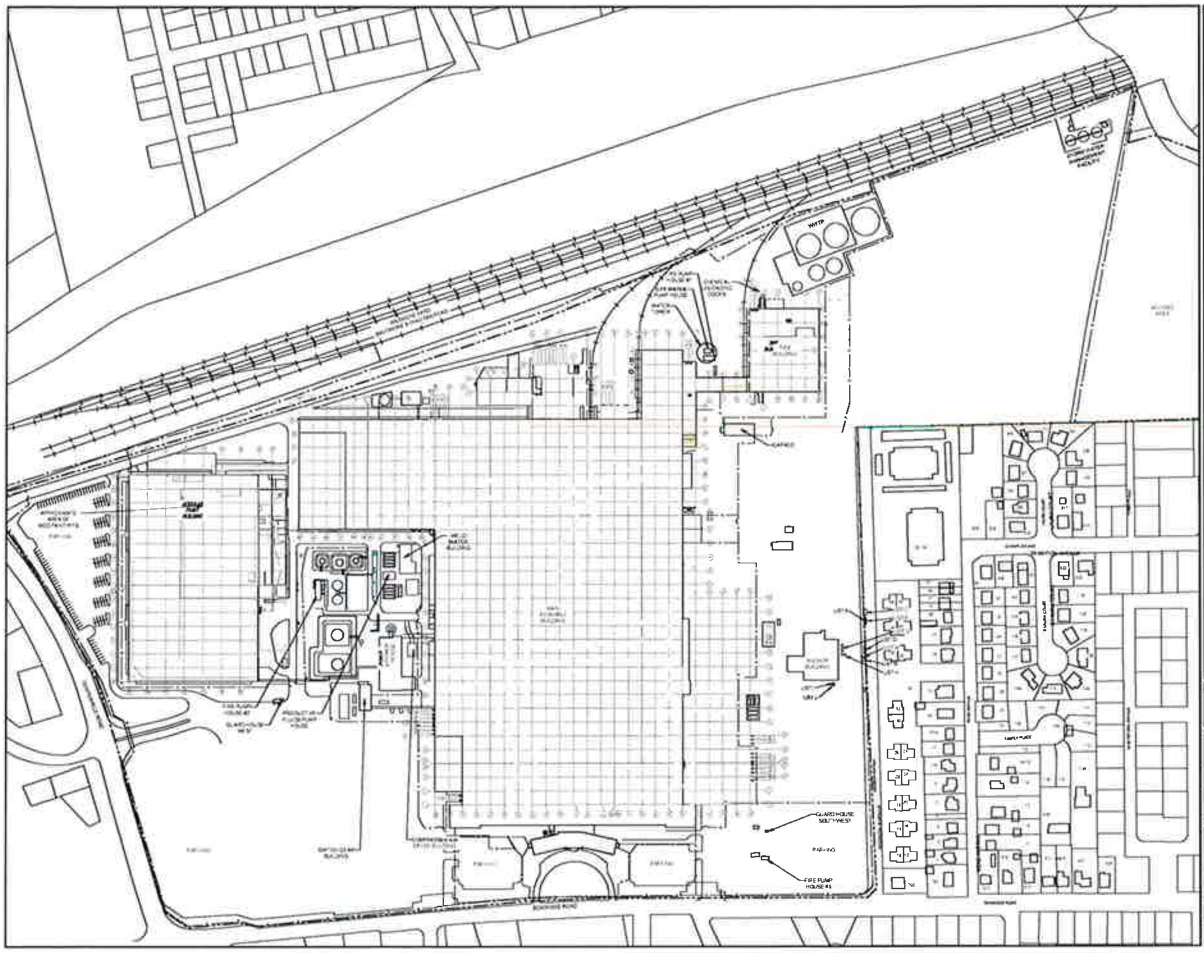
LEGEND

🟥 APPROXIMATE FACILITY BOUNDARY

figure 1.1

FACILITY LOCATION
OU-5 FOCUSED FEASIBILITY STUDY
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

REFERENCE:
USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5
MINUTES SERIES 1997 SCALE: 1:24,000



LEGEND

APPROXIMATE FACILITY BOUNDARY

FENCELINE

RAILWAY

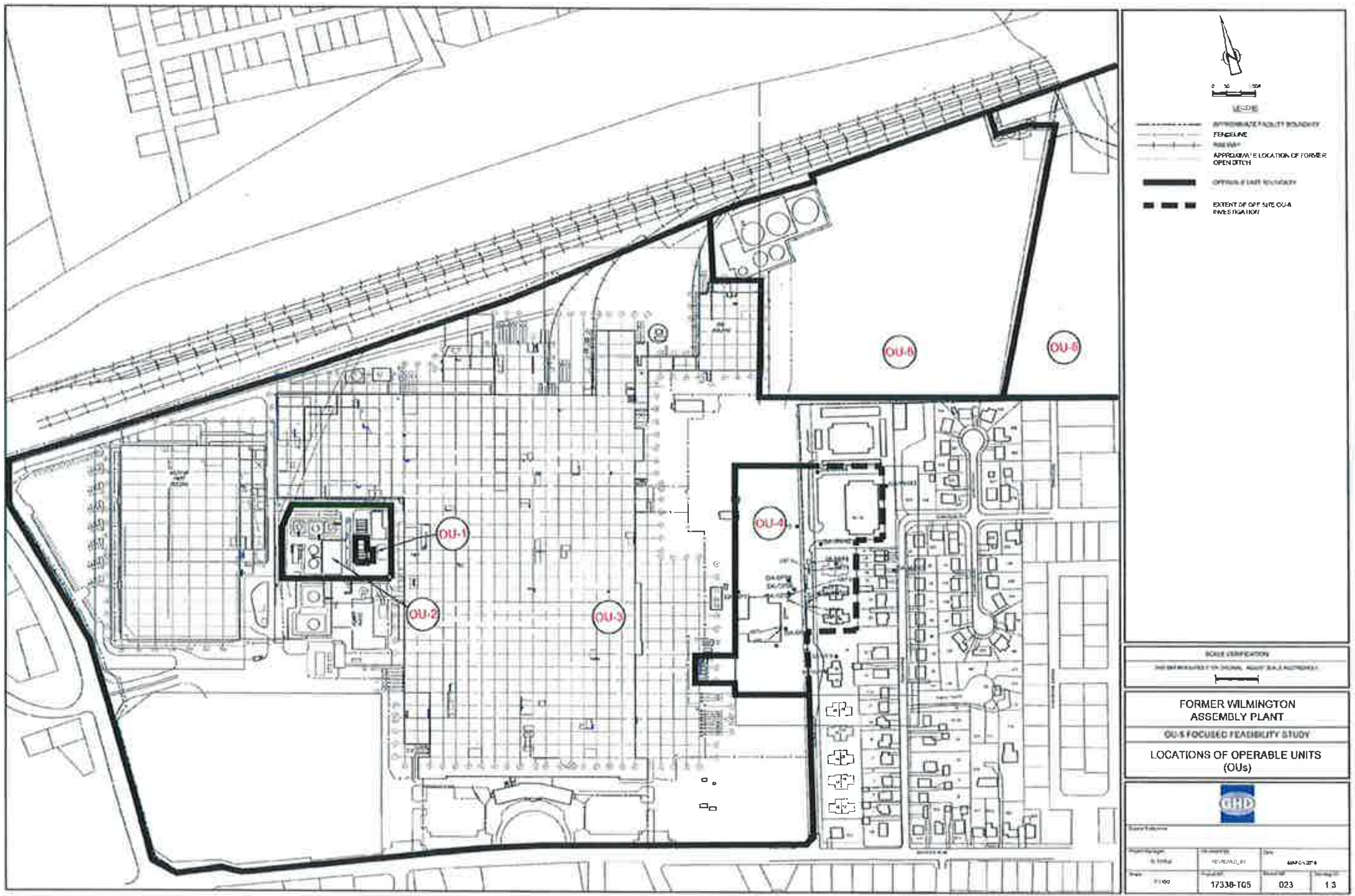
SCALE VERIFICATION

FORMER WILMINGTON
ASSEMBLY PLANT

OU 5 FOCUSED FEASIBILITY STUDY

FACILITY LAYOUT

E. CARLI	REVIEWED_BY	MARCH 2018	
	17338-T05	023	1 2



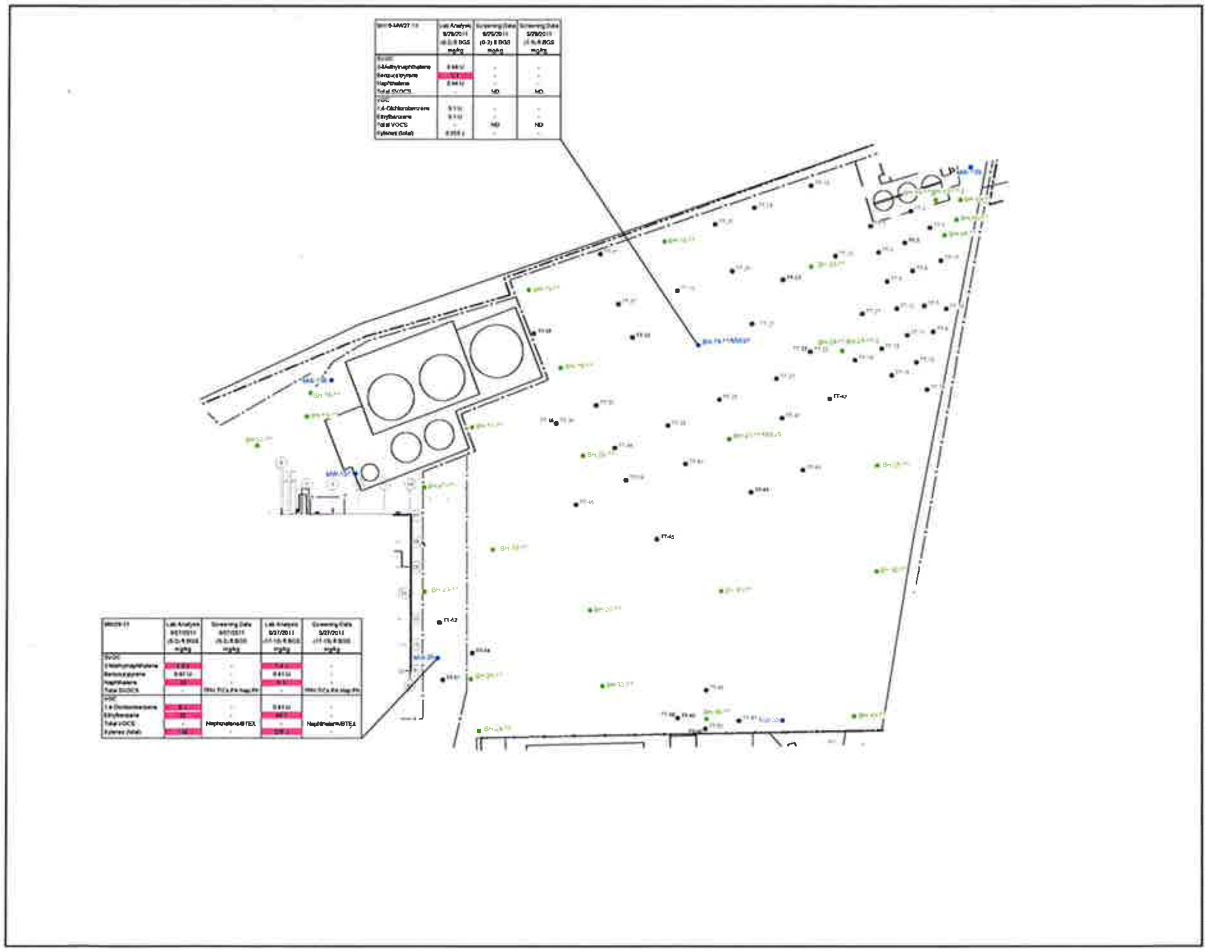
FORMER WILMINGTON
ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

LOCATIONS OF OPERABLE UNITS
(OUs)

GHD

REVIEWED_BY		MARCH 2016	
	17338-T05	023	1 3



SB?5-MW27 [illegible]	Lab Analysis 9/29/2011 (0-2) ft BGS mg/kg	Screening Data 9/29/2011 (0-2) ft BGS mg/kg	Screening Data 9/29/2011 [illegible] ft BGS mg/kg
SVOC			
2-Methylnaphthalene	0.66 U	-	-
Benzo(a)pyrene	[illegible]	-	-
Naphthalene	0.66 U	-	-
Total SVOCS	-	ND	ND
VOC			
1,4-Dichlorobenzene	0.1 U	-	-
Ethylbenzene	0.1 U	-	-
Total VOCS	-	ND	ND
Xylenes (total)	0.026 J	-	-

MW29-11	Lab Analysis 9/27/2011 [illegible] ft BGS mg/kg	Screening Data 9/27/2011 [illegible] ft BGS mg/kg	Lab Analysis 9/27/2011 (11-13) ft BGS mg/kg	Screening Data 9/27/2011 (11-13) ft BGS mg/kg
SVOC				
2-Methylnaphthalene	[illegible]	-	[illegible]	-
Benzo(a)pyrene	0.67 U	-	0.41 U	-
Naphthalene	[illegible]	-	[illegible]	-
Total SVOCS	-	[illegible]	-	[illegible]
VOC				
1,4-Dichlorobenzene	[illegible]	-	0.41 U	-
Ethylbenzene	[illegible]	-	[illegible]	-
Total VOCS	-	Naphthalene/BTEX	-	Naphthalene/BTEX
Xylenes (total)	[illegible]	-	[illegible]	-

0 40 80

LEGEND

	APPROXIMATE FACILITY BOUNDARY
	FENCELINE
	RAILWAY
●	MONITORING WELL
●	BOREHOLE
●	TEST TRACK METALS DELINEATION SAMPLE
▲	LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
🟥	INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
2-Methylnaphthalene	1
Benzo(a)pyrene	0.09
Naphthalene	5
1,4-Dichlorobenzene	2.4
Ethylbenzene	5.4
Xylenes (total)	63

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

FORMER WILMINGTON ASSEMBLY PLANT

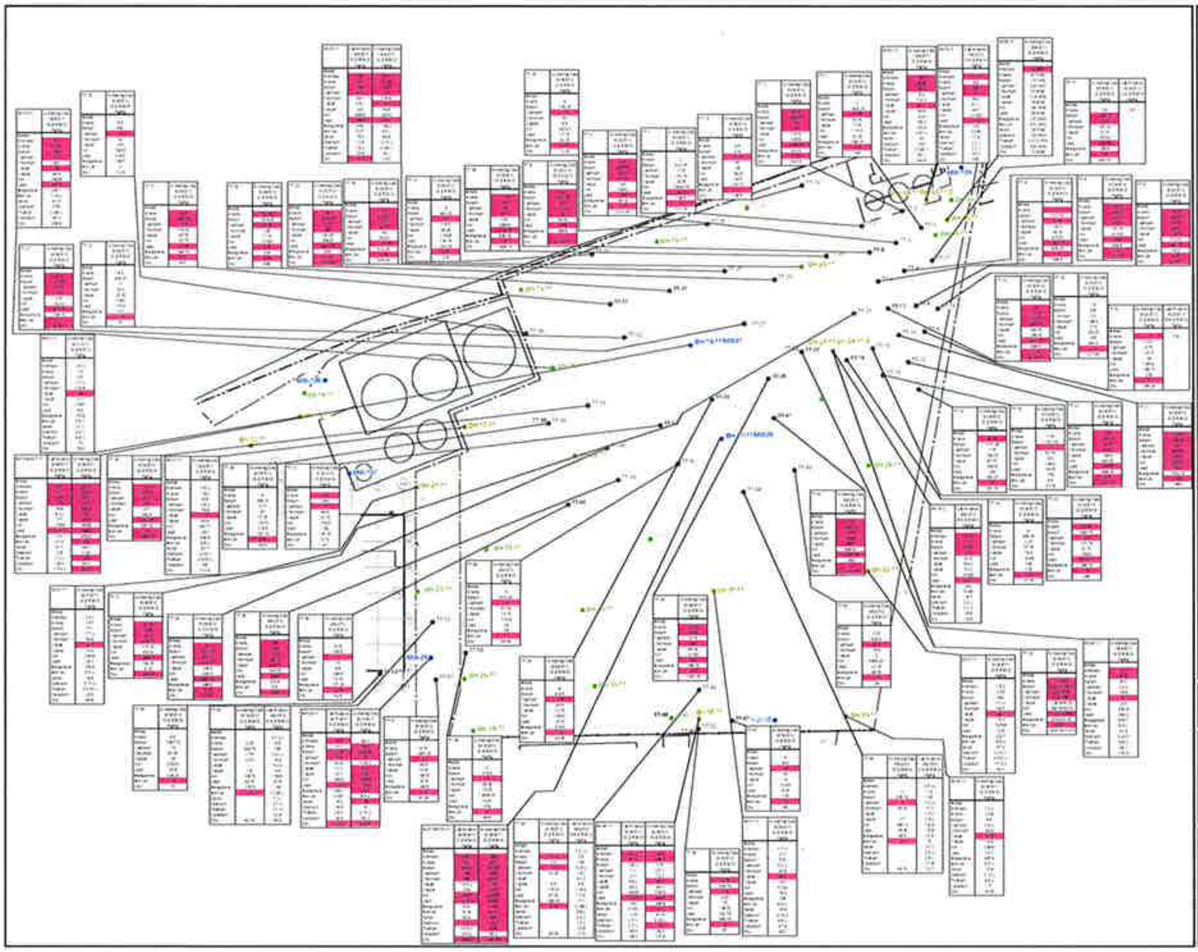
OU-5 FOCUSED FEASIBILITY STUDY

OU-5 SOIL NON-METAL COPCS EXCEEDING SCREENING CRITERIA

GHD

Source Reference

Project Manager	Reviewed By	Date	
[illegible] CARL	REVIEWED_BY	MARCH 2016	
Scale	Project No.	Report No.	Drawing No.
1" = 80'	17338-T05	023	14



PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	214
Cobalt	34
Copper	310
Iron	74787
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

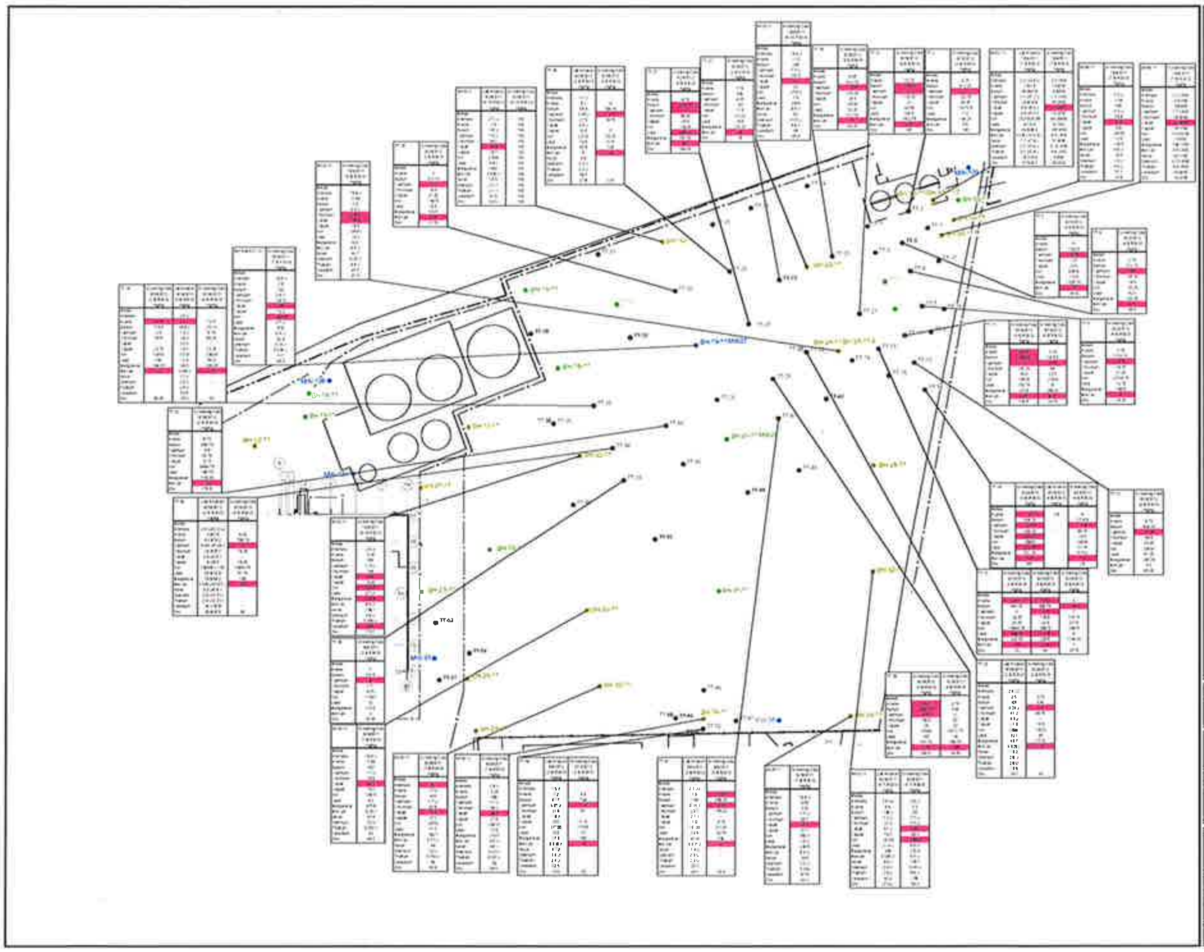
SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

OU-5 SOIL 0'-2' METAL COPCS EXCEEDING SCREENING CRITERIA

[illegible]	[illegible]	[illegible]	
[illegible]	17338-T05	023	1 5



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- ● MONITORING WELL
- ● BOREHOLE
- ● TEST TRACK METALS DELINEATION SAMPLE
- ● LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	*DNREC SIRS Screening Level (2014) (mg/kg)*
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	214
Cobalt	34
Copper	310
Iron	74787
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

SCALE VERIFICATION

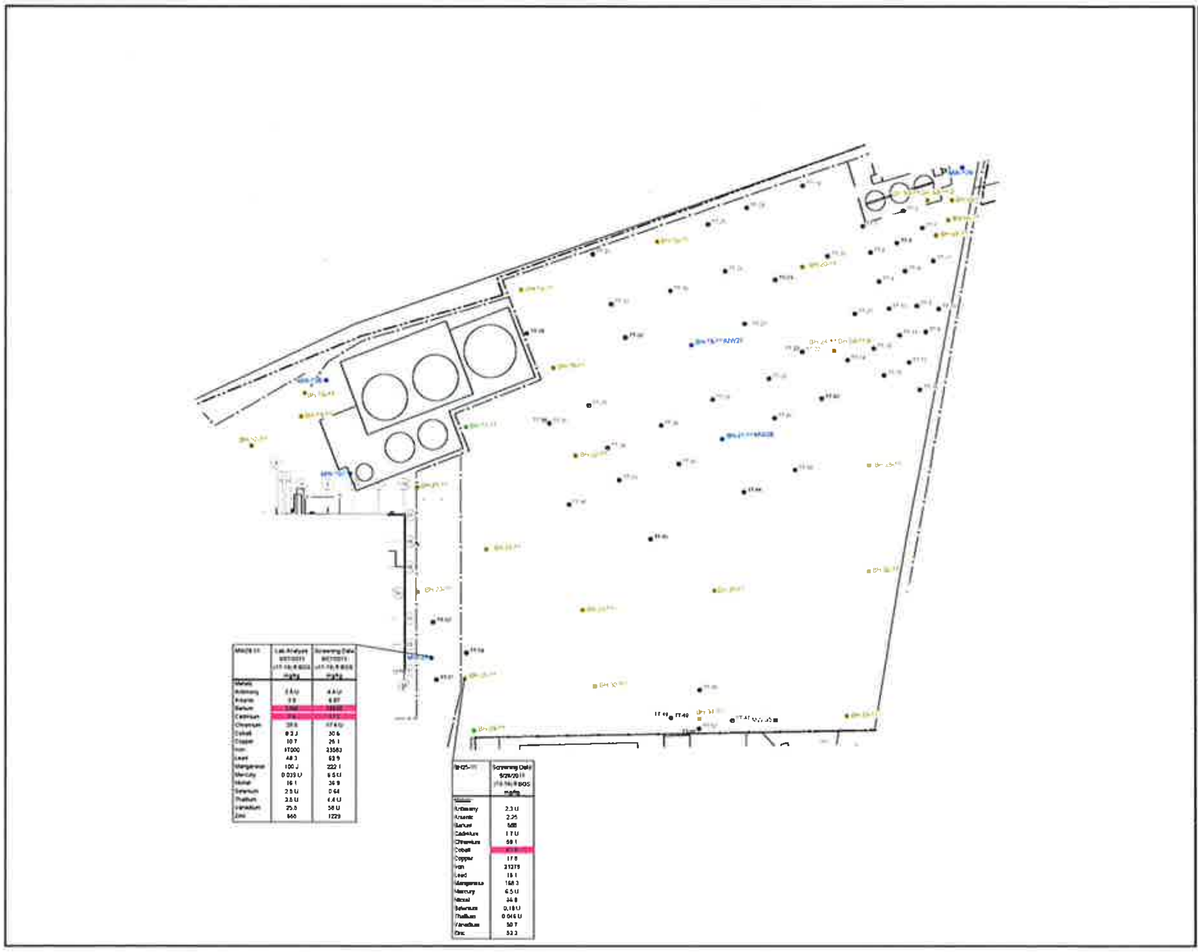
[illegible]

FORMER WILMINGTON ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

OU-5 SOIL 2'-10' METAL COPCS EXCEEDING SCREENING CRITERIA

[illegible]	REVIEWED_BY	[illegible]	
[illegible]	17338-T05	023	16



[illegible]	Lab Analysis [illegible] mg/kg	Screening Data [illegible] mg/kg
Metals		
Antimony	[illegible]	4.4 U
Arsenic	[illegible]	6.87
Barium	[illegible]	[illegible]
Cadmium	[illegible]	[illegible]
Chromium	39.6	47.4 U
Cobalt	8.3 J	30.6
Copper	10.7	26.1
Iron	17000	23583
Lead	48.3	62.9
Manganese	100 J	222.1
Mercury	0.039 U	6.5 U
Nickel	16.1	36.9
Selenium	2.5 U	0.64
Thallium	3.5 U	4.4 U
Vanadium	25.5	58 U
Zinc	668	1229

BH25-[illegible]	Screening Data 9/28/20[illegible] [illegible] BGS mg/kg
Metals	
Antimony	2.3 U
Arsenic	2.25
Barium	585
Cadmium	1.7 U
Chromium	58.1
Cobalt	[illegible]
Copper	17.8
Iron	21279
Lead	18.1
Manganese	168.3
Mercury	6.5 U
Nickel	34.8
Selenium	0.18 U
Thallium	0.046 U
Vanadium	50.7
Zinc	53.3

LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- ● MONITORING WELL
- ■ BOREHOLE
- ● TEST TRACK METALS DELINEATION SAMPLE
- ■ LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEEDANCE
- 🟥 INDICATES EXCEEDANCE OF CRITERIA

PARAMETER	DNREC SIRS Screening Level (2014) (mg/kg)
Antimony	3.1
Arsenic	11
Barium	1500
Cadmium	7
Chromium	314
Cobalt	34
Copper	310
Iron	74767
Lead	400
Manganese	2100
Mercury	1
Nickel	150
Selenium	39
Thallium	0.078
Vanadium	134
Zinc	2300

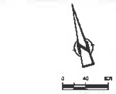
SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

OU-5 SOIL >10' METAL COPCS EXCEEDING SCREENING CRITERIA

Project Manager	Reviewed By	Date	
[illegible]	REVIEWED BY	MARCH [illegible]	
Scale	Project No.	Report No.	Drawing No.
1" 80'	17338-T05	023	1 7



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- FENCELINE
- RAILWAY
- ● MONITORING WELL
- ■ BOREHOLE
- ● TEST TRACK METALS DELINEATION SAMPLE
- ● LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS): NO EXCEEDANCE
- 🟩 ESTIMATED EXTENT OF IMPACTED SOIL WITH POTENTIAL EXPOSURE RISK

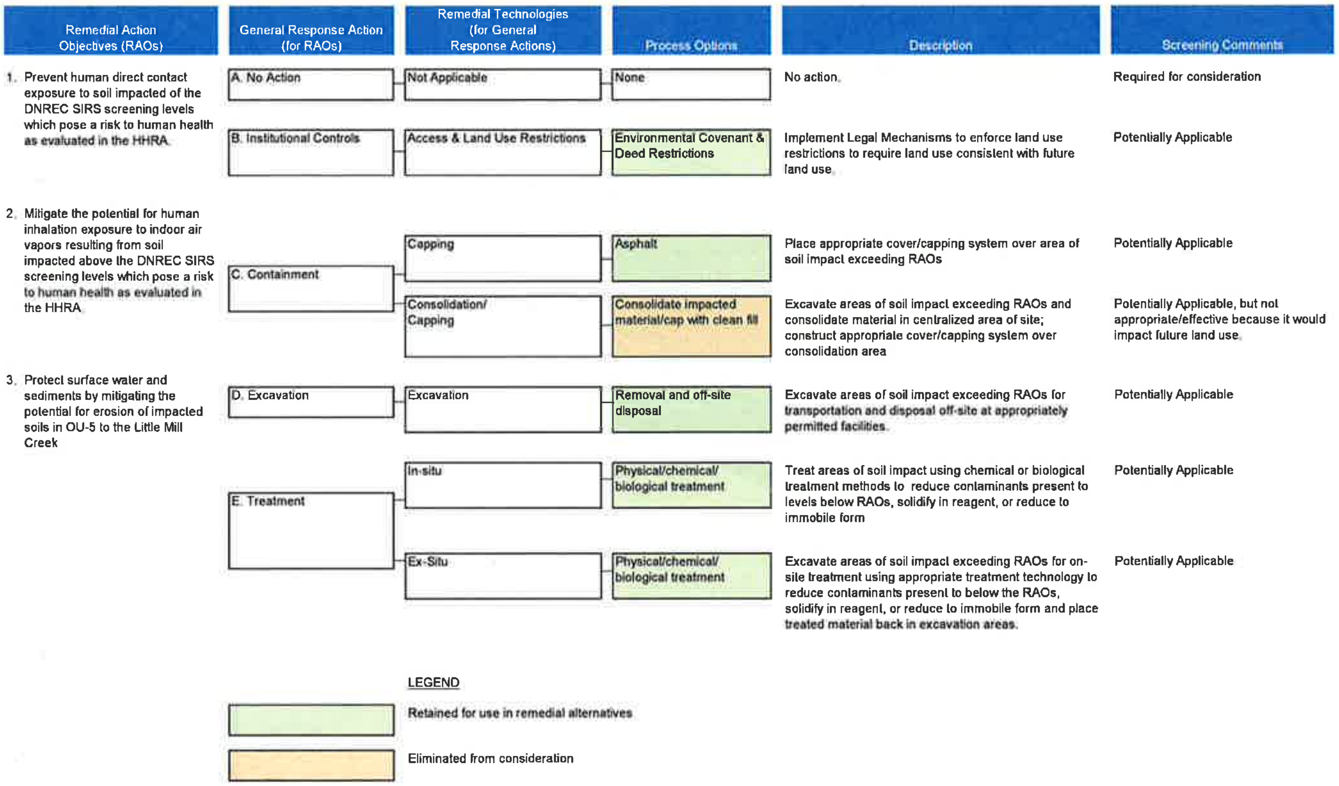
SCALE VERIFICATION

FORMER WILMINGTON ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

IMPACTED SOIL WITH POTENTIAL EXPOSURE RISK

[illegible]	REVIEWED_BY	MARCH 2018	
[illegible]	17338-T05	023	3 1



Remedial Action Objectives (RAOs)

1. Prevent human direct contact exposure to soil impacted of the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA.
2. Mitigate the potential for human inhalation exposure to indoor air vapors resulting from soil impacted above the DNREC SIRS screening levels which pose a risk to human health as evaluated in the HHRA.
3. Protect surface water and sediments by mitigating the potential for erosion of impacted soils in OU-5 to the Little Mill Creek

General Response Action (for RAOs)	Remedial Technologies (for General Response Actions)	Process Options	Description	Screening Comments
A. No Action	Not Applicable	None	No action.	Required for consideration
B. Institutional Controls	Access & Land Use Restrictions	🟩 Environmental Covenant & Deed Restrictions	Implement Legal Mechanisms to enforce land use restrictions to require land use consistent with future land use.	Potentially Applicable
C. Containment	Capping	🟩 Asphalt	Place appropriate cover/capping system over area of soil impact exceeding RAOs	Potentially Applicable
	Consolidation/ Capping	🟧 Consolidate impacted material/cap with clean fill	Excavate areas of soil impact exceeding RAOs and consolidate material in centralized area of site; construct appropriate cover/capping system over consolidation area	Potentially Applicable, but not appropriate/effective because it would impact future land use.
D. Excavation	Excavation	🟩 Removal and off-site disposal	Excavate areas of soil impact exceeding RAOs for transportation and disposal off-site at appropriately permitted facilities.	Potentially Applicable
E. Treatment	In-situ	🟩 Physical/chemical/ biological treatment	Treat areas of soil impact using chemical or biological treatment methods to reduce contaminants present to levels below RAOs, solidify in reagent, or reduce to immobile form	Potentially Applicable
	Ex-Situ	🟩 Physical/chemical/ biological treatment	Excavate areas of soil impact exceeding RAOs for on-site treatment using appropriate treatment technology to reduce contaminants present to below the RAOs, solidify in reagent, or reduce to immobile form and place treated material back in excavation areas.	Potentially Applicable

LEGEND

🟩 Retained for use in remedial alternatives

🟧 Eliminated from consideration

figure 3.2

OU-5 INITIAL SCREENING OF SOIL REMEDIAL TECHNOLOGIES
OU-5 FOCUSED FEASIBILITY STUDY
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

Tables

Table 4.1 Cost Estimates for Alternatives 2, 3, and 4

Item/Description		Unit Rate	Quantity Alt 2	Alternative 2 Cost	Quantity Alt 3A (Asphalt)	Alternative 3A (Asphalt) Cost	Quantity Alt 3B (HDPE liner)	Alternative 3B (HDPE liner) Cost	Quantity Alt 4	Alternative 4 Cost
Capital Costs										
Mobilizations & Set Up (5% of capital)	*LS*	--	--	*$1,393,000*	--	*$202,000*	--	*$86,000*	--	*$176,000*
Removal/disposal of existing asphalt	*Ton*	*$20*	--	*$0*	--	*$0*	*$26,248*	*$524,960*	*$26,248*	*$524,960*
Excavation & Backfilling	*CY*	*$35*	*53,600*	*$1,876,000*	*600*	*$21,000*	*$600*	*$21,000*	--	*$0*
Transportation & Disposal										
Non Hazardous	*Ton*	*$100*	*43,840*	*$4,384,000*	*0*	*$0*	--	*$0*	--	*$0*
Hazardous	*Ton*	*$500*	*42,400*	*$21,200,000*	*960*	*$480,000*	--	*$0*	--	*$0*
In-situ/Ex-situ Treatment										
Reagent	*Ton*	*$90*	--	*$0*	--	*$0*	--	*$0*	*$8,040*	*$723,600*
Soil Mixing/Placement	*CY*	*$35*	--	*$0*	--	*$0*	--	*$0*	*$53,600*	*$1,876,000*
Capping of Soils with Asphalt	*SY*	*$45*	--	*$0*	*78,389*	*$3,527,505*	*0*	*$0*	--	*$0*
Capping of Soils with HDPE liner	*SY*	*$15*	--	*$0*	--	*$0*	*$78,389*	*$1,175,835*	*0*	*$0*
Restoration	*SY*	*$5*	*78,744*	*$393,720*	*356*	*$1,780*	*$356*	*$1,780*	*$78,744*	*$393,720*
Demobilization (50% of mobilization)	*LS*	--	--	*$696,500*	--	*$101,000*	--	*$43,000*	--	*$88,000*
Subtotal Capital Costs				***$29,943,220***		***$4,333,285***		***$1,852,575***		***$3,782,280***
Engineering Costs										
Pre-Design Investigation & Design		--	--	*$100,000*	--	*$100,000*	--	*$100,000*	--	*$100,000*
Construction Oversight		--	--	*$75,000*	--	*$75,000*	--	*$75,000*	--	*$75,000*
Closeout Reporting		--	--	*$50,000*	--	*$50,000*	--	*$50,000*	--	*$50,000*
Environmental Covenants		--	--	*$50,000*	--	*$50,000*	--	*$50,000*	--	*$50,000*
Subtotal Engineering Costs				***$275,000***		***$275,000***		***$275,000***	--	***$275,000***

Table 4.1 Cost Estimates for Alternatives 2, 3, and 4

Item/Description		Unit Rate	Quantity Alt 2	Alternative 2 Cost	Quantity Alt 3A (Asphalt)	Alternative 3A (Asphalt) Cost	Quantity Alt 3B (HDPE liner)	Alternative 3B (HDPE liner) Cost	Quantity Alt 4	Alternative 4 Cost
Maintenance & Monitoring Costs										
Annual Cap Inspection & Maintenance		--	--	*$0*	--	*$10,000*	--	*$10,000*	--	*$10,000*
Cap Upgrades every 10 Years		--	--	*$0*	--	*$1,164,075*	--	*$0*	--	*$0*
Value of M&M Costs (30 years at 5%)				$0		*$1,576,445*		*$153,720*		*$153,720*
Total Cost of Alternative				**$30,218,220**		**$6,184,730**		**$2,291,295**		**$4,211,000**

Appendices

Appendix A
Site Photographs

OU-5 Photo 1 (from Figure A.1) Test Track Area

OU-5 Photo 2 (from Figure A.1) Test Track Area

OU-5 Photo 3 (from Figure A.1) Test Track Area

OU-5 Photo 4 (from Figure A.1) Test Track Area

OU-5 Photo 5 (from Figure A.1) Test Track Area

OU-5 Photo 6 (from Figure A.1) Test Track Area

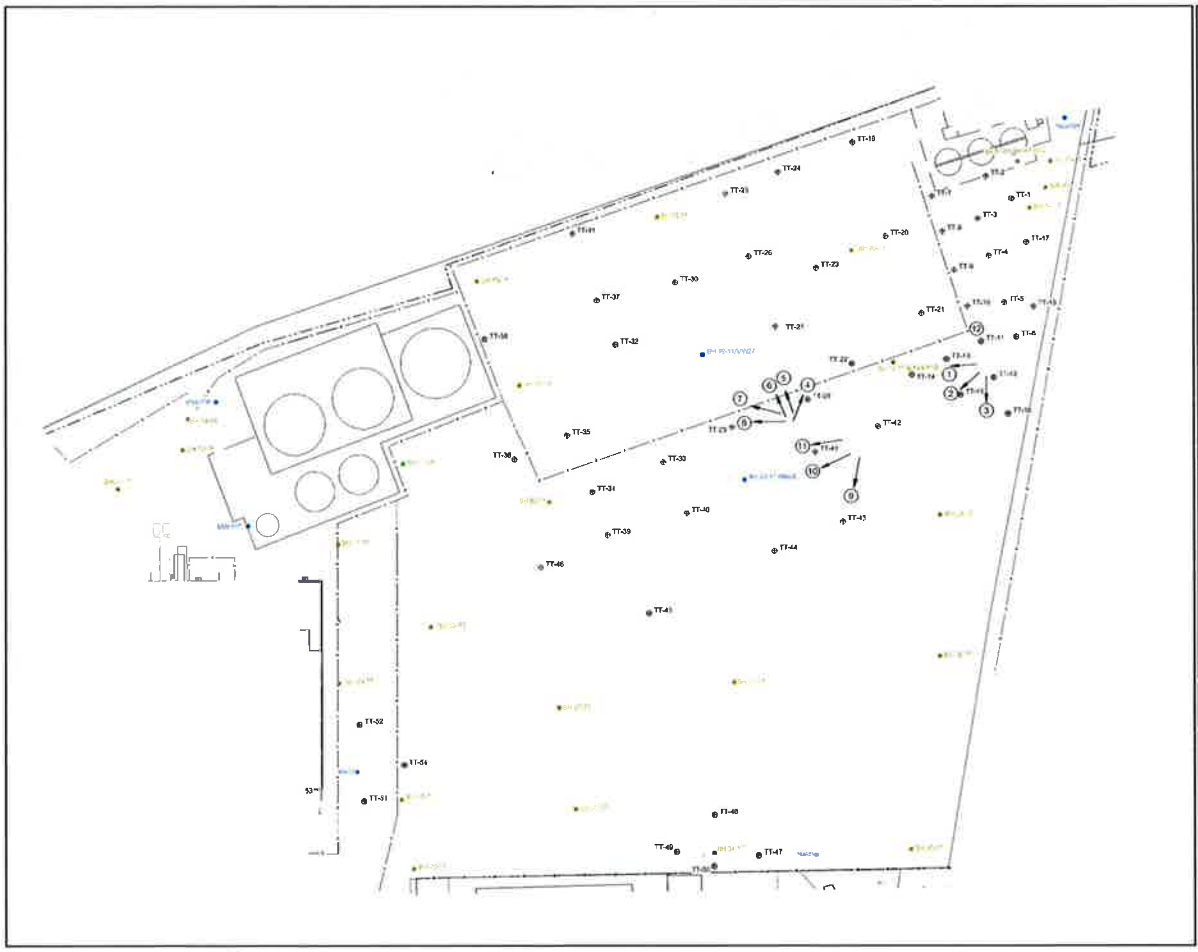
OU-5 Photo 7 (from Figure A.1) Test Track Area

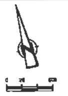
OU-5 Photo 8 (from Figure A.1) Test Track Area

OU-5 Photo 9 (from Figure A.1) Test Track Area

OU-5 Photo 10 (from Figure A.1) Test Track Area

OU-5 Photo 11 (from Figure A.1) Test Track Area





LEGEND

— - — - —	APPROXIMATE FACILITY BOUNDARY
—x—x—	FENCELINE
—+—+—	RAILWAY
●	MONITORING WELL
■	BOREHOLE
●	TEST TRACK METALS DELINEATION SAMPLE
■	LOCATION SAMPLED FOR COPC PARAMETER LIST(SCREENING OR LAB ANALYSIS)- NO EXCEDANCE
①	PHOTO
←—	DIRECTION OF PHOTO

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

FORMER WILMINGTON
ASSEMBLY PLANT

OU-5 FOCUSED FEASIBILITY STUDY

OU-5 TEST TRACK ASPHALT COVER
ASSESSMENT PHOTO LOCATIONS

D. CARLI

S. SARNOW

JUNE [illegible]

17338-T05

023

A.1

www.ghd.com

Exhibit 3

Monitoring Well Abandonment and Installation Work Plan

Former Wilmington Assembly Plant
Wilmington, Delaware

Revitalizing Auto Communities
Environmental Trust
(RACER Trust)

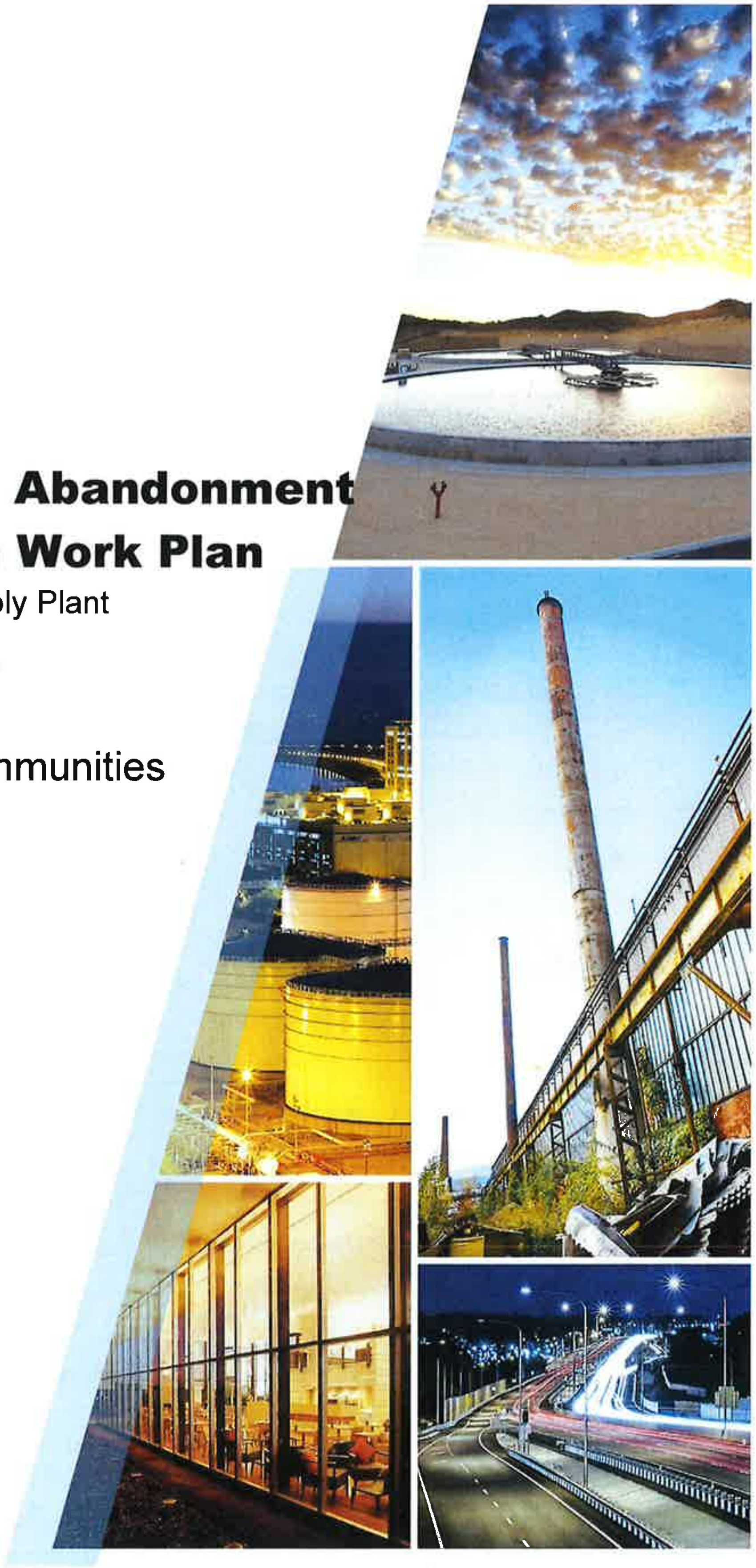


Table of Contents

Figure Index

Table Index

Appendix Index

1. Introduction

This Monitoring Well Abandonment and Installation Work Plan (Work Plan) has been developed by GHD, on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER Trust), and presents the proposed scope of work and procedures for abandoning groundwater monitoring wells and installing and sampling two groundwater monitoring wells on the eastern perimeter of operable unit 5 (OU-5) at the Former General Motors (GM) Corporation Wilmington Assembly Plant (Site or Facility) located at 801 Boxwood Road in Wilmington, Delaware. The objectives of the Work Plan are to:

(1) Abandon select monitoring wells in OU-2, OU-3, OU-4 and OU-5 to facilitate development at the Site;

(2) Install two monitoring wells on the eastern perimeter of OU-5 to monitor leaching or migration of contaminants off-Site.

The Site location is provided on Figure 1.1. The Site layout is shown on Figure 1.2.

2. Background

The Facility consists of two tax parcels totaling approximately 142 acres of land including a 3.2 million square foot Main Assembly Building, Waste Water Treatment Plant (WWTP), Pump Houses and a Powerhouse. The Facility was developed in 1945 by GM Corporation for the purpose of automobile assembly operation until July 2009 when the plant was idled. Due to GM Corporation's 2009 bankruptcy, certain operating assets of GM Corporation were sold on July 10, 2009, to General Motors LLC. Existing non-continuing assets, including the Site, remained the property of GM Corporation which was known as Motors Liquidation Company (MLC), in its capacity as debtor-in-possession in the bankruptcy case. The Site was sold by MLC to Fisker Automotive, Inc. (Fisker) in July 2010. On March 31, 2011, the Revitalizing Auto Communities Environmental Response Trust (RACER Trust) became effective and has been conducting, managing, and funding cleanup at the former Wilmington Assembly Plant.

Between July 2009 and April 2014, the plant remained idle with limited activities present at the Site while Fisker evaluated opportunities to revive the assembly plant. Fisker filed for bankruptcy in November 2013 and the Site was purchased by Wanxiang Delaware Real Estate Holdings (Wanxiang) in April 2014 as part of a purchase by Wanxiang of Fisker's assets out of the bankruptcy. In October 2017, Boxwood Industrial Park, LLC (Boxwood) purchased the Site from Wanxiang.

Boxwood is looking to begin redeveloping the Site. As such, RACER Trust has evaluated which monitoring wells can be abandoned at this time. Additionally, the Department of Natural Resources and Environmental Control (DNREC) requested two additional monitoring wells be installed on the eastern perimeter of OU-5 to monitor for leaching or migration of contaminants off-Site. RACER Trust is seeking approval from DNREC on the proposed monitoring wells to be abandoned, abandonment approach and location of the additional OU-5 monitoring wells.

3. Scope of Work

The proposed scope of work developed to meet the objectives of this Work Plan consists of sampling OU-2 monitoring wells (MW-8, MW-9 and MW-19 as shown on Figure 3.1) specified in the OU-2 Groundwater Monitoring Plan (GMP) of the Long-Term Stewardship Plan (LTS) prior to well abandonment. Following OU-2 groundwater monitoring, monitoring wells in OU-2 and OU-3, and selected monitoring wells in OU-4 and OU-5, specified on Figure 3.1 and in Table 3.1, will be abandoned. Wells were chosen that are not required for long-term groundwater monitoring or based on their location relative to planned development activities. It should be noted that some monitoring wells in OU-2 will be reinstalled at a later date to meet the requirements of the LTS.

Additionally, two monitoring wells will be installed along the northeastern perimeter of OU-5, as shown on Figure 3.1, between MW-48 and MW-109. Following installation, these wells will be developed and sampled.

3.1 OU-2 Groundwater Sampling

Water levels and groundwater samples will be collected from MW-8, MW-9 and MW-19 and analyzed in accordance with the OU-2 GMP.

3.2 OU-2, OU-3, OU-4 and OU-5 Groundwater Monitoring Well Abandonment

Monitoring wells that will be abandoned are listed in Table 3.1. All monitoring wells in OU-2 will be abandoned, including wells that are listed in the OU-2 GMP. These wells (MW-3, MW-11, MW-8, MW-9, and MW-19) will be reinstalled once planned development activities in OU-2 are completed in 2019. All monitoring wells will be abandoned in OU-3. MW-30 and MW-31 in OU-4 will also be abandoned. Monitoring wells along the eastern property boundary in OU-4 (MW-36S, MW-36D, MW-37, MW-49, and MW-50) will remain. MW-27 and MW-28 in OU-5 will be abandoned. Monitoring wells MW-35, MW-48 and MW-109 in OU-5 will remain to allow for continued monitoring along the eastern OU-5 boundary.

Prior to abandonment, a water level measurement and groundwater samples will be collected from MW-28 and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and metals.

3.2.1 Well Abandonment

Forty-four monitoring wells will be abandoned, consistent with DNREC's Regulations Governing the Construction and Use of Wells. The entire casing for each monitoring well will be removed via over-drilling with a hollow stem auger. After removal of the casing, wells will be sealed with Portland cement. Areas to be drilled will be cleared for utilities prior to drilling.

3.3 OU-5 Monitoring Well Installation and Development

Two shallow monitoring wells (MW-112 and MW-113) will be installed between MW-48 and MW-109 in OU-5, as shown on Figure 3.1. The wells will be installed in accordance with GHD's Standard Operating Procedure (SOP) for Monitoring Well Design and Construction (Appendix A) and

DNREC's SOP for Monitoring Well/Piezometer Installation/Development and Groundwater Sampling. The design of the permanent monitoring wells will be based on conditions encountered during drilling and will be screened across the water table. The wells are expected to be installed to a depth of approximately 17 ft with a screen length of 10 ft. A permit will be obtained from the DNREC's Well Permitting Branch prior to the installation of the monitoring wells.

All downhole equipment such as augers, drill casings, and drill rods will be decontaminated as discussed in Section 4. Drill cuttings and decontamination water will be managed as discussed in Section 5.

The monitoring wells will be constructed of a 2-inch diameter, 0.01-inch (#10 slot) PVC screen with threaded end caps. The riser will be 2-inch diameter PVC with flush-threaded joints.

Soil samples will be collected from the well screen intervals to confirm stratigraphic conditions. Soil samples will be collected using 2-inch diameter split-spoon samplers. Soil samples will be classified using the USCS in accordance with ASTM Method D-2488. The stratigraphic sequence observed at each borehole will be described on an Overburden Stratigraphy Log.

A bottom plug will be utilized to keep out soil and/or water that have a tendency to plug the bottom of the augers during drilling. If flowing sands are encountered, potable water may be poured into the augers to equalize the pressure to keep the formation materials and water from coming up into the auger once the bottom plug is removed.

The well screen and riser will be installed through the hollow stem augers. A filter pack consisting of sand (washed #2) or equivalent will be installed approximately 1 foot below the bottom of the well screen to 2 feet above the top of the well screen. Approximately 2 feet of bentonite pellets will be placed above the filter sand to provide a seal for the pure bentonite slurry grout. The remaining annular space above the bentonite pellets will be backfilled with pure bentonite slurry grout. The grout shall consist of Portland cement, bentonite, and clean water. The grout will be mixed in the proportion of no more than 6 gallons of water per 94 pound (lb) bag of cement, and bentonite will be added in at an amount not to exceed 14.2 lb/gallon. A flush mount completion will be set in the concrete over the well riser.

Following installation, MW-112 and MW-113 will be developed no sooner than 24 hours after grouting is completed using an inertial pump until turbidity reaches 10 nephelometric turbidity units (NTU) or 5 well volumes are purged, in accordance with GHD and DNREC SOPs. Initially, groundwater will be pumped from the wells using an inertial pump. After the initial pumping, the wells will be gently surged with a surge block for 5-10 minutes and then pumped again. The process will be repeated, moving down the well screen until the bottom of the well is reached.

Water quality will be monitored during well development. Turbidity, conductivity, oxygen reduction potential (ORP), dissolved oxygen (DO) and temperature will be monitored after removing 2, 2.5 and 3 well volumes. The wells will be considered developed if these parameters stabilize over three consecutive readings. If the parameters have not stabilized after these three readings, and the water is visually clear, the well will continue to be pumped, but not surged, and readings will be taken for each volume pumped. When the parameters have stabilized over three consecutive readings at one volume well intervals and the water is visually clear, the well will be considered developed.

3.4 OU-5 Groundwater Sampling

MW-112 andMW-113 will be sampled for VOCs, SVOCs and metals after allowing the well to stabilize for at least two weeks following well development. Groundwater samples will be collected in accordance with GHD and DNREC's SOPs.

Groundwater samples will be collected using low-flow sampling techniques. The monitoring wells will be purged until field parameters stabilize. Field parameters will consist of pH, specific conductivity, temperature, DO, ORP, and turbidity.

Groundwater samples will be placed in pre-cleaned laboratory-provided containers, properly labeled, placed on ice, and submitted under chain of custody protocol for selected laboratory analysis.

4. Equipment Decontamination

Decontamination procedures will be applicable to all drilling and sampling activities. The drill rig, augers, and downhole tooling shall be cleaned using high pressure/low volume steam cleaning. The drill rig, augers, and downhole tooling shall be decontaminated upon arrival at the Site, between each location, and prior to removal from the Site. Decontamination of the drill rig, augers, and downhole tooling shall be performed at a temporary decontamination area such that wash water and debris can be containerized.

Stainless steel split-spoon soil sampler and the groundwater purging and sampling equipment will be cleaned prior to use in accordance with the following procedure:

- Brush with soapy water
- Rinse with potable water
- Rinse with distilled water

The inertial pump used for well development will be decontaminated prior to use according to the following procedures:

- Wash – spray the pump with potable water to rinse off particulates
- Rinse – circulate potable water through the pump until all traces of soap are gone
- Final Rinse – operate pump in the basin with distilled or de-ionized water and pump out 1 to 2 gallons
- Wrap – the pump will be wrapped in aluminum foil for storage and transport

The tubing will be dedicated to each well and either left hanging within the well for reuse or disposed of after sampling of each well is complete.

5. Waste Handling

Waste materials that are expected to be produced during the field activities include drill cuttings, casings and annular materials, debris from well pads and covers, development and purge water from monitoring wells, decontamination water, and used personal protective equipment (PPE).

Drill cuttings and annular materials will be examined and will be set aside for reuse on-Site. Drill cutting and annular materials will be placed on plastic in a central location with the pile covered with plastic and secured to prevent soil movement by wind or rain. Any soil that has evidence of impact will be assessed to determine if placement in labeled 55-gallon closed top drums is necessary. Drill cuttings are expected to be reused on Site during development activities. Waste materials from casings and debris from well pads and covers will be placed in a roll off prior to off-Site disposal.

All generated decontamination water and purge water will be visually examined and will be discarded directly to the ground surface unless it has an odor, sheen, or NAPL. If odor, sheen, or NAPL is present, purge water will be placed in Department of Transportation (DOT) approved 55-gallon closed top drums prior to appropriate off-Site disposal.

Used PPE and used disposable sampling equipment will be placed in garbage bags, and at the completion of field activities, the material will be disposed of at a sanitary landfill.

6. Data Evaluation and Reporting

6.1 OU-2 Groundwater Sampling

OU-2 groundwater sampling results will be submitted to DNREC as specified in the GMP.

6.2 OU-2, OU-3, OU-4 and OU-5 Groundwater Monitoring Well Abandonment

Following well abandonment, a well abandonment summary letter will be prepared and submitted to DNREC. The driller will submit well abandonment forms to the DNREC well permitting section.

6.3 OU-5 Well Installation and Sampling

A summary letter will be prepared and submitted to DNREC within 90 days of MW-112 and MW-113 being installed, developed and sampled. The summary letter will include a soil boring log, monitoring well installation log, groundwater sampling sheets and groundwater monitoring results.

7. Schedule

Monitoring well abandonment, OU-2 groundwater sampling and installation of MW-112 and MW-113 in OU-5 is expected to begin in early to mid July 2018. Groundwater sampling at MW-112 and MW-113 is expected to occur mid to late July 2018.

8. References

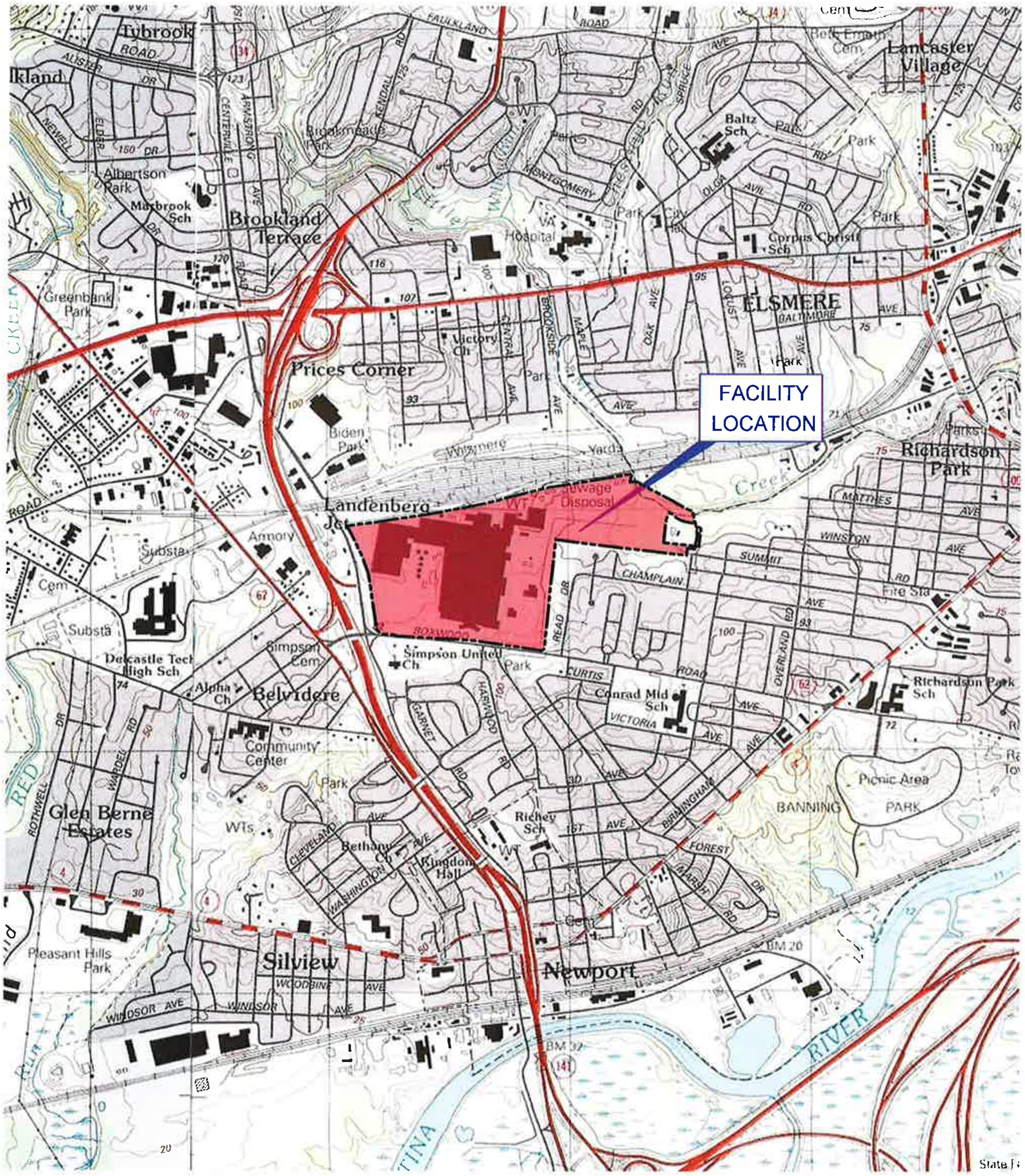
Conestoga-Rovers & Associates, Inc. (CRA). 2009. Groundwater Remedial Investigation and Feasibility Study Report, OU-2 Bulk Product Tank Area. January.

CRA. 2015. 2015 Remedial Investigation Report. July.

Department of Natural Resources and Environmental Control (DNREC). Standard Operating Procedure Monitoring Well/ Piezometer Installation/ Development and Groundwater Sampling.

DNREC. 2012. Regulations Governing the Construction and Use of Wells. 7 Del. Admin. C., 7301. February.

GHD. 2017. OU-2 Groundwater Monitoring Plan. April.



LEGEND

🟥 APPROXIMATE FACILITY BOUNDARY

REFERENCE:

USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5 MINUTES SERIES 1997 SCALE: 1:24,000

N

0 1000'

RACER - FORMER WILMINGTON ASSEMBLY PLANT
MONITORING WELL ABANDONMENT &
INSTALLATION WORK PLAN

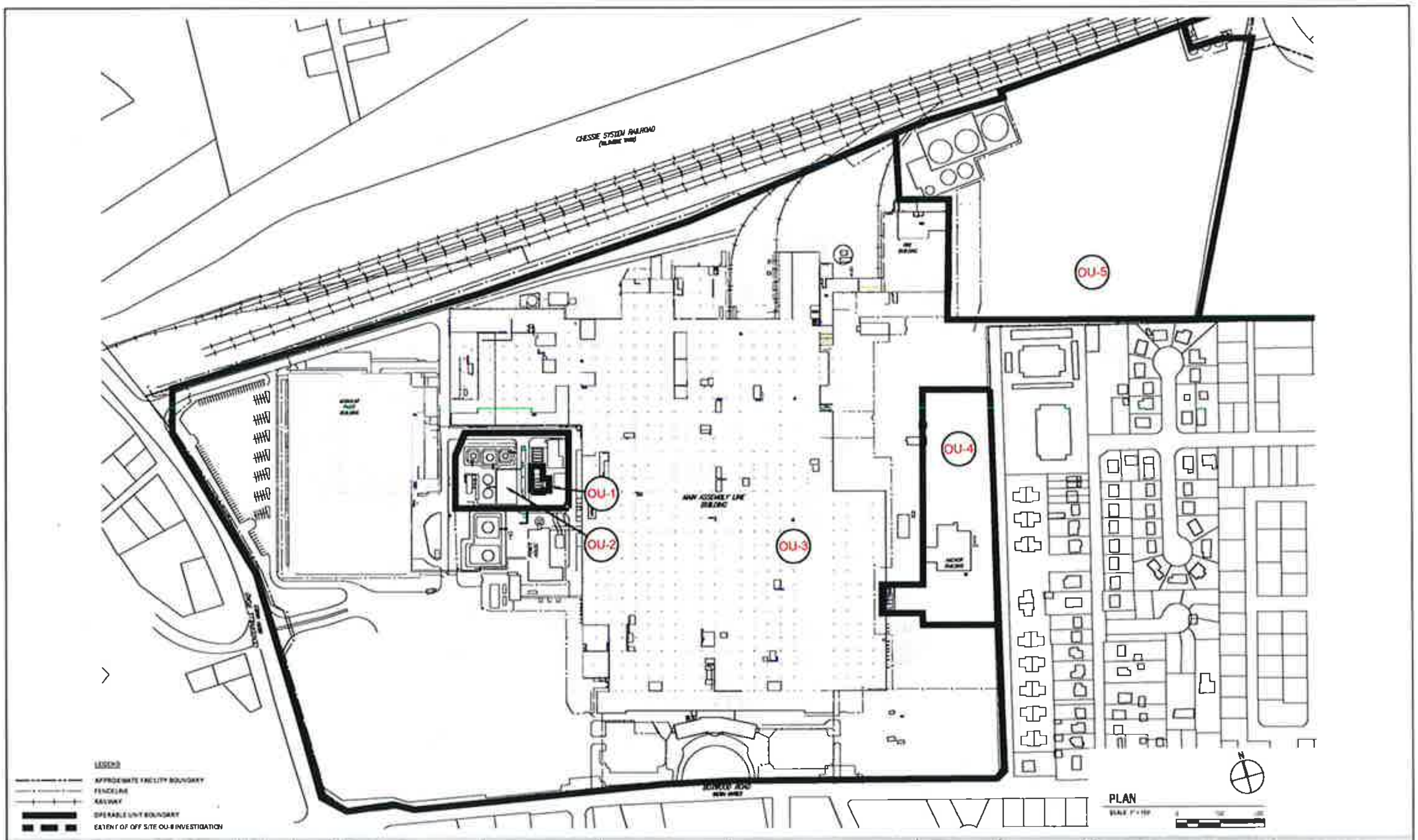
SITE LOCATION

Project No. **017338**
Report No. **037**
Date **MAY 2018**

FIGURE 1.1

Source:

Filename P:\Drawings\17000s\17338\17338-reports\17338-00(037)\CADD\Drawings\Figures\17338(037) - Figure 1.1.dwg
Plot Date: 31 May 2018 - 10:54 AM



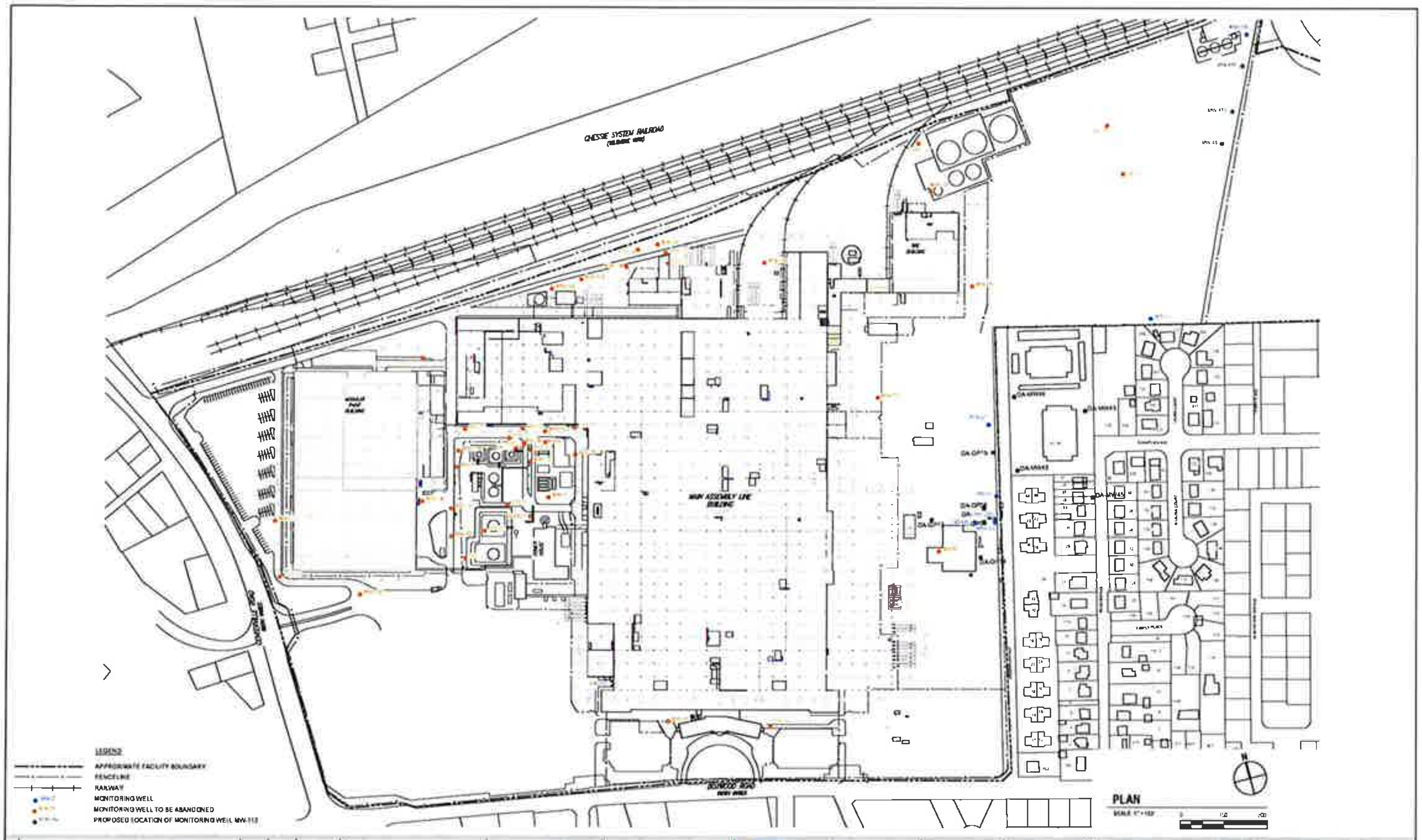
R. CHEVALIER	E. SAGNOW
E. SAGNOW	G. CARLI
G. CARLI	MAY 18
	AS NOTED

RACER - FORMER WILMINGTON ASSEMBLY PLANT
MONITORING WELL ABANDONMENT & INST. WORK PLAN
SITE LAYOUT

17338-30(037)

ANSI D

FIGURE 1.2



R. CHEVALIER	E. GASNOW
E. GASNOW	G. CARLI
G. CARLI	JUN 11
	Scale: AS NOTED

RACER - FORMER WILMINGTON ASSEMBLY PLANT
MONITORING WELL ABANDONMENT & INSTALLATION PLAN
SITE LAYOUT

17538-00(037)

ANSI D

FIGURE 3.1

Table 3.1

Monitoring Wells to Decommission
RACER Former Wilmington Assembly Plant
Wilmington, Delaware

Well ID	Measured Depth to Bottom (feet)
MW-2	14.21
MW-3	14.68
MW-3D	25.06
MW-6	19.31
MW-7	16.08
MW-8	18.58
MW-9	19.25
MW-10	19.13
MW-11	20.08
MW-11R	22.08
MW-12	19.60
MW-13	19.83
MW-14	18.14
MW-15	19.70
MW-16	19.65
MW-17	19.52
MW-18	19.32
MW-19	18.64
MW-20	18.52
MW-21	24.4
MW-22	14.96
MW-23	14.35
MW-24	14.77
MW-25	13.17
MW-26	14.78
MW-27	7.2*
MW-28	14.73
MW-29	19.66
MW-30	19.63
MW-31	23.45
MW-32	19.71
MW-33	11.70
MW-34	12.50
MW-100	20.97
MW-101	18.96
MW-102	15.8
MW-103	14.89
MW-104	15.85
MW-105	14.91
MW-106	18.34
MW-107	16.0
MW-108	14.8
MW-110	24.81
MW-111	19.96

Notes
* - Well obstructed at 3.68 feet

Appendices

Appendix A

GHD Monitoring Well Design and Construction Standard Operating Procedures

GHD Field Training Manual

Section 6.0
Monitoring Well Design and Construction Standard Operating Procedures

(T103)

200010 | Report No 2 | Revision 0 | July 1 2015

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Please adhere to the following Quality System training requirements:

- Employees who are required to conduct a specific field activity must be properly certified to do the work.
- This involves reviewing the SOP and completing the online training course and exam.
- Employees must also conduct this field work under supervised conditions on at least three occasions, and must be certified by a qualified mentor. Only then can an employee conduct a specific field activity on their own. This is documented on a Field Method Training Record (QSF-021).
- Complete the QSF-021 and forward it to trainingrecords-northamerica@ghd.com.

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6. Monitoring Well Design and Construction Standard Operating Procedures

6.1 Introduction

Monitoring well design and construction is conducted to characterize the hydraulic and groundwater quality at a site. Standard Operating Procedures (SOPs) are presented herein for obtaining a variety of hydraulic and groundwater quality results, including:

- Groundwater elevation data
- Performance of aquifer testing
- Collection of groundwater samples for groundwater quality analysis

This guideline is not intended to provide the basis for designing a groundwater monitoring network, but instead assumes that a groundwater monitoring network has been designed, a site-specific Work Plan has been established, and that a GHD representative is preparing to mobilize to the site.

Monitoring well design and construction procedures vary from project to project due to different chemicals of concern, different guidance provided by the state/province where the site is located, and the specific objectives of the project (i.e., hydraulic monitoring, groundwater sampling, aquifer testing). It is essential that all monitoring well design and construction activities conform to local, provincial/state, and federal regulations. Therefore, it is essential that the GHD representative carefully review the Work Plan requirements. The primary goal of monitoring well design and construction is the appropriate placement of monitoring wells in various geologic and groundwater environments. It is imperative appropriate monitoring well installation and construction techniques are chosen.

The remainder of this section is organized as follows:

Section 6.2	Background
Section 6.3	Planning and Preparation
Section 6.4	Safety and Health
Section 6.5	Quality Assurance/Quality Control
Section 6.6	Equipment Decontamination
Section 6.7	Location and Marking of Well Sites/Final Visual Check
Section 6.8	Drilling Methods
Section 6.9	Well Design Considerations
Section 6.10	Field Procedures for Well Installations
Section 6.11	Well Construction Techniques
Section 6.12	Well Installation Documentation

- Section 6.13 Well Installation Follow-up Activities
- Section 6.14 Well Development
- Section 6.15 Well Development Documentation
- Section 6.16 Well Development Follow-up Activities
- Section 6.17 References

6.2 Background

The design and installation of monitoring and extraction wells involves drilling boreholes into various types of geologic formations. Designing and installing monitoring wells may require several different drilling methods and installation procedures.

It is important that the drilling method used minimizes the disturbance of subsurface materials.

The drilling method should not contaminate the subsurface soils and groundwater. It is extremely important that drilling does not create a hydraulic link or conduit between different hydrostratigraphic units. Groundwater in monitoring and extraction wells must not be contaminated by drilling fluids or the borehole advancement process. Drilling equipment is decontaminated before use and between well locations to prevent cross-contamination between well locations and sites. Drilling equipment is decontaminated between all well locations regardless of whether or not contaminants are suspected. The Work Plan or Quality Assurance Project Plan (QAPP) will specify the required decontamination procedures for the site. At a minimum, decontamination procedures detailed in Section 6.6 should be used during monitoring well design and construction. The only time decontamination is not required is when boreholes are advanced on known clean sites for the purpose of collecting geologic information.

Finally, precleaned monitoring well construction materials are used in order to prevent the potential introduction of contaminants into a hydrostratigraphic unit.

> Caution: If using threaded low carbon steel (BIP) well materials, ensure that materials are thoroughly decontaminated. Threaded low carbon steel will have cutting oil on threads and on the inside and outside of the pipe. The outside of low carbon steel may also have a wax type coating which needs to be removed prior to installation.

6.3 Planning and Preparation

Prior to undertaking monitoring well design and construction:

1. Review the Work Plan and Site-Specific Health and Safety Plan (HASP), project documents, all available geologic and hydrogeologic mapping and reports, water well records, and historic site reports to become familiar with the geologic and hydrogeologic framework of the site and surrounding area. Review and become familiar with the health and safety requirements, and discuss the work activities with the Project Coordinator.

2. Complete a Field Equipment Requisition Form (QSF-014) and assemble all required equipment, materials, log books, and forms. Project Planning, Completion, and Follow-Up Checklist (Form SP-02) should be used for guidance throughout the project.
3. Obtain a site plan and previous stratigraphic logs. Determine the exact number, location, and depth of wells to be installed.
4. If not performed as part of borehole advancement, complete a Property Access/Utility Clearance Data Sheet (QSF-019). In most instances, the utility clearances and property access will have been completed as part of the well drilling and advancements.
5. Complete a Vendor Evaluation Form (QSF-012) and file in the Project file for any Vendors that do not have full approval status on or are not listed on the Approved Vendor List (QSL-004). Completion of a Safety and Health Schedule (QSF-030 for Canadian work; QSF-031 for U.S. work) is necessary for all Vendors who complete field services. Prior to mobilization on site, the Vendor must submit the form to the Regional Safety and Health Manager for review and approval (if not already posted on QSL-004).
6. Determine notification requirements with the Project Coordinator. Have all regulatory groups, the client, landowner, drilling contractor, and GHD personnel been informed of the well design and installation program?
7. Determine the methods for handling and disposal of well installation and decontamination fluids. Generally, this is dealt with as part of the well advancement activities.

In addition to the above, the following may be required when conducting monitoring well design and installation activities:

1. Establish a water source for well installation and decontamination. Pre-plan the methods of handling and disposal of well installation and decontamination fluids.
2. Arrange with the drilling contractor/client to provide a means of containment and disposal of fluids.

6.4 Safety and Health

GHD is committed to conducting field activities in accordance with sound safety and health practices. GHD adheres to high safety standards to protect the safety and health of all employees, subcontractors, customers, and communities in which they work. The safety and health of our employees takes precedence over cost and schedule considerations.

Field personnel are required to implement the Safety Means Awareness Responsibility Teamwork (SMART) program as follows:

1. Assure the HASP is specific to the job and approved by a Regional Safety & Health Manager.
2. Confirm that all HASP elements have been implemented for the job.
3. A Job Safety Analysis (JSA) for each task has been reviewed, modified for the specific site conditions and communicated to all appropriate site personnel. The JSAs are a component of the HASP.

4. Incorporate Stop Work Authority; Stop, Think, Act, Review (STAR) process; Safe Task Evaluation Process (STEP); Observations process; Near Loss and Incident Management process in the day-to-day operations of the job.
5. Review and implement applicable sections of the GHD Safety & Health Policy Manual.
6. Confirm that all site personnel have the required training and medical surveillance as defined in the HASP.
7. Be prepared for emergency situations, locating safety showers, fire protection equipment, evacuation route, rally point, and first aid equipment before you begin working, and make sure that the equipment is in good working order.
8. Maintain all required Personal Protective Equipment (PPE), safety equipment, and instrumentation necessary to perform the work effectively, efficiently and safely.
9. Be prepared to call the GHD Incident Hotline at 1-866-529-4886 for all incidents involving injury/illness, property damage, vehicle incident, and/or significant Near Loss.

It is the responsibility of the Project Manager to:

- Ensure that all GHD field personnel have received the appropriate health and safety and field training and are qualified to complete the work.
- Provide subcontractors with a job hazard analysis to enable them to develop their own HASP.
- Ensure that all subcontractors meet GHD's and the client's safety requirements.

6.5 Quality Assurance/Quality Control

A well-designed Quality Assurance/Quality Control (QA/QC) program will:

- Ensure that data of sufficient quality are obtained in order to facilitate good site management.
- Allow for monitoring of staff and contractor performance.
- Verify the quality of the data for the regulatory agency.

The QA/QC program is developed on a site-specific basis. QA/QC requirements are discussed in detail in Section 3.9.

6.6 Equipment Decontamination

Borehole Installation and Sampling

Prior to use and between each borehole location, drilling and sampling equipment must be decontaminated in accordance with the Work Plan, the QAPP, or the methods presented in the following section.

The minimum wash procedures for decontamination of drilling or excavating equipment are:

1. High pressure hot water detergent wash (brushing as necessary to remove particulate matter)
2. Potable, hot water, high pressure rinse

Cover the clean augers with clean plastic sheeting to prevent contact with foreign materials. For geotechnical, geologic, or hydrogeologic studies where no contaminants are present, it is sufficient to clean the drilling or excavating equipment simply by removing the excess soils.

On environmental sites, soil sampling equipment (e.g., split spoons, trowel, spoons, shovels, bowls) is typically cleaned as follows:

1. Wash with clean potable water and laboratory detergent, using a brush as necessary to remove particulates.
2. Rinse with tap water.
3. Rinse with deionized water.
4. Air dry for as long as possible.

In addition, the following steps may be added when sampling for volatile organic compounds (VOCs) and metals:

1. Rinse with 10 percent nitric acid (only if samples are to be analyzed for metals).
2. Rinse with deionized water.
3. Rinse with appropriate solvent (e.g., pesticide grade isopropanol, methanol, acetone, hexane).
4. Rinse again with deionized water.
5. Air dry for as long as possible.
6. Wrap equipment in aluminum foil to prevent contamination.

Caution: Confirm the cleaning protocol from the QAPP. The use of an incorrect cleaning protocol can invalidate chemical data.

6.7 Location and Marking of Well Installation Sites/Final Visual Check

The proposed well locations marked on the site plan are located and staked in the field. On most sites, this should be completed several days prior to the drill rig arriving on site. Well locations are required for the completion of utility locates. Generally, well locations are strategically placed to assess site hydrogeologic conditions.

Once the final well location has been selected and utility clearances are complete, one last visual check of the immediate area should be performed before drilling proceeds to confirm the locations of adjacent utilities (subsurface or overhead) and verify adequate clearance. If gravity sewers or conduits exist in the area, access manholes or chambers should be opened and the conduit/sewer alignments confirmed. Do not enter manholes unless confined space procedures are followed.

When possible, it is prudent to use a hand auger or post-hole digging equipment to a sufficient depth to confirm that there are no buried utilities or pipelines. This is particularly important in limited space sites where wells are being installed close to buried utilities. Alternatively, a Hydrovac truck can vacuum a large diameter hole to check for utilities, although soils collected this way may require containment on site. This procedure generally clears the area to the full diameter of the drilling equipment which will follow.

> Caution: Do not assume that site plan details regarding pipe alignment/position are correct. Visually inspect pipe alignment when advancing boreholes near sewers. Be prepared to find additional piping if outdated plans are being used. If possible confirm pipe locations with on-site employees or a client representative.

Well locations are selected primarily to provide a good geographical distribution across the site. Most often, the well locations specified in the Work Plan are not pre-verified to confirm clearance from underground or overhead utilities, nor to consider the site's specific characteristics (e.g., traffic patterns, drainage patterns). Consequently, it is the Field Supervisor's responsibility to perform the following:

1. Select the exact location of each well consistent with the site and project requirements.
2. If a well must be relocated more than 20 feet (5.7 m) from the initially identified location, confirm the new location's suitability with the Project Coordinator.
3. Ensure all utilities have been cleared prior to initiating borehole advancement activities.

To the extent practical, wells should be located adjacent to permanent structures (e.g., fences, buildings) that offer some form of protection and a reference point for future identification. Wells located in high traffic areas or road allowances or low-lying wet areas are undesirable, but may be unavoidable.

> Note: Field tie-ins must be completed to accurately identify each well location. These will ensure that the wells are properly identified on plans and for future identification in the field.

6.8 Drilling Methods

The following drilling methods are listed in order of preference. However, final selection will be based on site geologic and hydrogeologic conditions. The drilling methods outlined below are discussed in detail in Section 4.0.

Hollow-Stem Augering

Continuous flight hollow-stem augering (HSA) is the most frequently used method of borehole advancement. Its primary advantages are:

1. Generally, no additional drilling fluids are introduced into the formation.
2. Representative geologic samples can be obtained easily using split-spoon samplers in conjunction with the standard penetration test (SPT) and HSA.
3. A monitoring well can be installed through the auger, eliminating the need for a temporary borehole casing.

Information regarding split-spoon sampling is discussed in Section 5.0.

HSAs are available with an inside diameter of 2.5, 3.25, 4.25, 6.25, 8.25, and 10.25 inches (6.4, 8.3, 10.8, 15.9, and 26.0 cm). Some drilling contractors have inside diameter HSAs as large as 16.25 inches (41.3 cm). The most commonly used inside diameter is 4.25 inch for the installation of a 2-inch (5 cm) diameter monitoring well. Larger diameter HSAs, including 6.25, 8.25, and 10.25 inch (10.8, 15.9, 26.0 cm), are used for large diameter monitoring or extraction wells ranging in size from 4 to 8 inches (10 to 20 cm). Boreholes can usually be advanced to depths of about 100 feet (30 m) with an HSA in unconsolidated clays, silts, and sands.

Installation of a well through a HSA is a simple process, but precautions need to be taken to ensure that well construction, particular sealing, is properly completed.

Removing a HSA from flowing sand may be difficult since the auger has to be removed without rotation, if at all possible. A bottom plug or pilot bit assembly should be used to keep out soils and water that have a tendency to fill the bottom of the HSA during drilling. If flowing sands are encountered, potable water (analyzed for contaminants of concern) may be poured into the HSA to equalize the hydrostatic pressure, which will keep the formation materials and water from flowing into the HSA once the plug or pilot bit is removed.

Direct-Push Drilling

Direct-push refers to the sampler being "pushed" into the soil material without the use of drilling to remove the soil. This method relies on the drill unit static weight, combined with rapid hammer percussion, to advance the tool string. Discrete soil samples are continuously obtained.

Groundwater and vapor samples can also be collected utilizing this method and appropriate tooling. Subsurface investigations typically sample to depths of 30 feet (9.1 m) or more; however, depth will vary based on the site-specific geology.

This method is used extensively for initial site screening to establish site geology and delineate vertical and horizontal plume presence. Small diameter wells (3/4 inch or 1 inch [2 cm or 2.5 cm]) can be installed using direct-push methods.

SPT values cannot be obtained when sampling with a direct-push discrete soil sampler.

The direct-push method is becoming more popular due to the limited cuttings produced and the speed of the sampling process, which can be much faster than the sample description and sample preparation process.

Discrete continuous soil samples are collected in tube samplers (various lengths) affixed with a cutting shoe and internal liner (polyvinyl chloride [PVC], Teflon, or acetate are available). The soil sampler may be operated in "open-mode" (when borehole collapse is not a concern), or in "closed-mode" (when minimization of sample "slough" is desired). Closed-mode operation involves placement of a temporary drill-point in the cutting shoe and driving the assembled sampler to depth. At the required depth, the temporary drill–point is released (via internal threading) and the sampler is driven to the desired soil interval. The drill-point slides inside the sample liner, riding above the collected soil column. Once driven to depth, the sampler is retrieved to the ground surface and the sample liner, with soil, is removed for examination. Extra care must be taken when cutting open the sample tube; not open blade cutting tools may be used in the process, you must have an appropriate stabilizer/holder for the tube, and cut resistant hand protection must be included as part of the overall PPE. Please review and modify the JSA for the site conditions.

Dual-Wall Reverse Circulation Air Drilling

This method consists of two concentric strings of drill pipe (an outer casing and a slightly smaller inner casing). Compressed air is continually forced down the annulus between the inner casing carrying the drill cuttings and groundwater. At the surface, the inner casing is connected to a cyclone hopper where the drill cuttings and groundwater fall out from the bottom of the hopper, and air is disbursed from the top. The dual wall provides a fully cased borehole in which to install a well. The only soil or groundwater materials exposed at any time are those at the drill bit, so the potential for carrying contamination from one stratum to another is minimal. Depth-specific groundwater samples can be collected during drilling; however, since the groundwater is aerated, analysis for volatile organic compounds (VOCs) may not be valid.

Rotosonic Drilling

This method consists of a combination of rotation and high frequency vibration to advance a core barrel to the desired depth. Once the vibration is stopped, the core barrel is retrieved and the sample is vibrated or hydraulically extracted into a plastic sleeve or sample tray. The well is installed through an outer casing. Rotosonic drilling generally requires less time than more traditional methods and continuous, relatively undisturbed samples can be obtained through virtually any formation. Conventional sampling tools can be employed as attachments (e.g., hydropunch, split spoon, Shelby tube). No mud, air, water, or other circulating medium is required. The main limitation of this method is the availability of equipment.

Rotary Method

This method consists of a drill rod attached to a drill bit (for soils, a tricone or drag bit; for rock, a button studded or diamond studded bit) that rotates and cuts through the soils and rock. The cuttings produced are forced to the surface between the borehole wall and the drill rod by drilling fluids that generally consist of water or drilling mud, or air. The drilling fluid or air not only forces the cuttings to the surface but also keeps the drilling bit cool. Using the rotary method can be difficult as it requires several steps to complete the installation. First, the borehole is drilled, then temporarily cased, then the well is installed, and then the temporary casing is removed. In some cases, the borehole may remain open without installing a casing (e.g., cohesive soils).

Water Rotary

When using the water rotary method, the potable water supply must be analyzed for contaminants of concern. Water rotary is the preferred rotary method since potable water is the only fluid introduced into the borehole during drilling. However, this method is generally only successful when drilling in cohesive soils. The use of potable water also reduces well development time.

Air Rotary (typically used in rock)

When using the air rotary method, the air compressor must have an in-line oil filter system assembly to filter the oil mixed with the air coming from the compressor. This helps eliminate the introduction of contaminants into the formation. The oil filter system needs to be regularly inspected.

An air compressor with no in-line oil filter system is not acceptable for air rotary drilling. A cyclone velocity dissipater or similar air containment system must also be used to funnel the cuttings to one location rather than allowing them to blow uncontrolled out of the borehole. Air rotary may not be an acceptable method for well installation where certain contaminants are present in the formation. Alternatively, it may be necessary to provide treatment for the air being exhausted from the borehole during the installation process.

Mud Rotary

In some states (i.e., Ohio, Michigan), mud rotary is the least preferred rotary method because contamination can be introduced into the borehole from the constituents in the drilling mud. Drilling mud is generally non-toxic. However, it is possible for mud to commonly infiltrate and affect water quality by sorbing metals and polar organic compounds (Aller et al., 1991). Chemical composition and priority pollutants analysis can be obtained from the manufacturer. Mud rotary must utilize only potable water and pure (no additives) bentonite drilling mud. The viscosity of the drilling mud must be kept as low as possible. Proper well development is essential to ensure the removal of all the drilling mud and to return the formation to its previous undisturbed state.

Well Point

Occasionally, well points (sand points) are driven into place without using augers. This method provides no information on the geologic condition (other than the difficulty of driving which may be related to formation density). Well points are most often used simply to provide dewatering of a geologic unit prior to excavation in the area. Well points are also used in monitoring shallow hydrogeologic conditions such as in streambeds.

6.9 Well Design Considerations

Well design must be completed prior to initiating well installation activities.

The compatibility of the well construction materials with the groundwater environment should be verified. Certain materials are not compatible in a corrosive environment or where groundwater has high solvent concentrations. In deeper well applications, well material strength should be considered. Finally, the overall cost of the well materials should be considered.

6.9.1 Well Materials

The following well materials are commonly used:

- PVC well screen and riser pipe
- Stainless steel well screen and riser pipe
- Stainless steel screen and black iron (low carbon steel) riser pipe
- Stainless steel screen and PVC riser pipe

6.9.1.1 PVC Well Materials

PVC is generally either Schedule 40 or Schedule 80. Schedule 80 PVC is thicker and provides more strength than Schedule 40. Schedule 80 PVC is more resistant to heat caused by the placement and setting of grout. Because of the higher strength and greater heat resistance, Schedule 80 is preferred for well applications greater than 100 feet (30 m).

PVC is available in a variety of diameters, from 0.5 inch (1.5 cm) to 8 inch (20 cm). PVC is relatively inexpensive and readily supplied by drilling contractors well material suppliers. PVC is light and generally comes pre-cleaned and bagged.

PVC is resistant to corrosion, most acids, oxidizing agents, salt, alkaline, and oils and fuels. However, it may break down in environments with high solvent concentrations. PVC can become brittle over time and is not as strong as metal.

PVC installations may be difficult in deep applications through a large water column because of its buoyancy.

PVC wells should not be constructed using solvent cement.

Threaded PVC well materials should be used where possible.

PVC well materials should meet the National Sanitation Foundation (NSF) Standard 14.

6.9.1.2 Metallic Well Materials

Metallic materials include stainless steel, black iron (low carbon steel), and galvanized steel. Metallic well materials are less commonly used than PVC.

Metallic materials are suitable for deep well applications because of their high strength and resistance to the heat produced during grout and cement grout curing.

Black iron pipe (BIP) is susceptible to corrosive environments. Stainless steel well materials are generally pre-cleaned and bagged. Threaded BIP must be decontaminated prior to use to remove all waxes on the exterior of the pipe and to remove cutting oil from threads and the interior and exterior of the pipe.

Metallic well materials cost more than PVC.

6.9.2 Well Diameter

The diameter of a well is primarily dictated by the purpose of the well. Generally, wells installed for groundwater and hydraulic monitoring should be between 1 and 2 inches (2.5 and 5 cm) in diameter. The diameter is also dependent on the drilling method being used.

Small diameter wells allow for the installation of bladder pumps as well as small diameter tubing and bailers. Wells smaller than 1 inch (2.5 cm) should only be used for hydraulic monitoring. Due to the small diameter, sampling equipment cannot be used in wells smaller than 1 inch (2.5 cm) in diameter. The cost saving for wells smaller than 1 inch (2.5 cm) is negligible.

For groundwater extraction, 4- to 6-inch (10 to 15 cm) diameter wells are sufficient. Wells greater than 6 inches (15 cm) in diameter are generally installed for water supply and are project specific.

6.9.3 Screen Length and Placement

Screen lengths for wells can vary depending on a variety of factors including:

- Formation thickness
- Seasonal groundwater fluctuations
- Extraction/water supply

Screen length should be consistent with the hydrogeologic conditions and the desired monitored interval. A 10-foot (3.0 m) long screen is suitable for groundwater table wells when the screen is completely submerged and a specific monitoring interval is required.

If monitoring for light non-aqueous phase liquids (LNAPL), the screen length is generally 10 feet (3.0 m). A longer screen length can be installed to accommodate seasonal groundwater fluctuations. A 5- to 10-foot (1.5 to 3.0 m) screen length is adequate where the hydrostratigraphic formation is low and allows for the water level to be drawn down during sampling through the filter pack into the screened interval.

If monitoring for dense non-aqueous phase liquids (DNAPL), the screen needs to be placed at the bottom, or sumped slightly into the confining unit. In general, a 5-foot (1.5 m) long screen is suitable for wells designated for DNAPL monitoring. However, it is acceptable to use a 10-foot (3.0 m) long screen if the formation has sufficient saturated thickness.

Caution: Do not penetrate the confining unit during advancement, especially if DNAPL is suspected.

Monitoring wells installed in confined aquifer conditions can be installed using 5-foot (1.5 m) long screens.

Note: Well installations are not able to straddle a confined potentiometric surface.

6.9.4 Well Slot Size

Well slot sizes are described in thousandths of an inch. For most monitoring wells, a No. 10 slot (0.01-inch [0.25 mm]) well screen is adequate in most hydrostratigraphic units. PVC wells screens are typically available in No. 10 (0.01-inch [0.25 mm]) or No. 20 (0.02-inch [0.51 mm]) slot sizes. Stainless steel screens are available in a wider range of slot sizes. Typically, stainless steel screens must be specially ordered and require additional delivery time. Wells screens can be slotted, continuous slot, or louvered. Well points come in very limited slot sizes.

Some state/provincial and federal regulators require design of monitoring well screen slot sizing. The design of the slot size is based upon grain size results from the desired monitored interval.

Pre-pack screens are an effective screening method for deep installations or where flowing sands exist. A pre-pack screen consists of two screens with filter pack placed between the screens. Pre-pack screens are most commonly constructed of PVC and are available in No. 10 (0.01-inch [0.25 mm]) or No. 20 (0.02-inch [0.51 mm]) slot sizes.

Filter socks or cloths are for use in fine-grained soils. Filter socks or cloths should not be used when monitoring for the presence of LNAPL or DNAPL. An alternative to using filter socks or cloths is to install well points.

6.9.5 Sand Pack Sizing

The silica sand pack placed around the well screen should be no finer than the slot size of the screen. Some companies supply different sieve size ranges for the same sand size number. Grain size curves should be obtained from the driller or well materials supplier to ensure proper sand size prior to placement.

In some instances, generally in situations with flowing sands, a natural sand pack may be required. A natural sand pack is not desired because of the increase in development time.

6.9.6 Well Sealing

All wells must be properly sealed. A seal is placed over the silica sand pack. Cuttings must never be used to seal a well.

Certain well applications require specific well seals including:

- bentonite gravel or chips
- bentonite grout
- cement/bentonite grout
- cement grout

Prior to initiating well installation activities, confirm sealing requirements with local, state/provincial, or federal regulations.

6.10 Field Procedures for Well Installations

The following presents the field procedure and techniques for installing a well in overburden and bedrock. Typical overburden well installation details are provided on Figure 6.1. Typical bedrock well installation details are provided on Figure 6.2.

6.10.1 Installation Requirements

Well installation requires the following components:

1. Annular space
2. Instrumentation details
3. Filter pack placement
4. Bentonite seal
5. Grouting
6. Protective casings and well caps

7. Surface seal
8. Protective posts (if required)

6.10.2 Annular Space

The annular space is the space between the outside of the riser pipe or casing and the inside of the HSA, casing, or borehole wall.

The borehole diameter must be sufficient to allow well construction to proceed without difficulty. Check with local, state/provincial, or federal regulations to insure that the borehole annular space meets regulations. To assure adequate size, a minimum 2-inch (5 cm) annular space is required to allow a minimum 1.5-inch (4 cm) tremie line for placing filter pack, seal, and grout at the specific intervals. An annular space of less than 2 inches (5 cm) is not acceptable.

6.10.3 Instrumentation Details

Prior to installation through the auger or into the borehole, the well assembly (i.e., well screen and riser components) and the length of each component must be measured and recorded. The borehole must be measured to ensure installation at the desired interval to be monitored.

Note: Well screen and riser should only be handled using clean nitrile gloves.

Once the depth of the borehole has been confirmed and the length of the well assembly is known, well construction can proceed. Placement problems are easily identified by measuring the amount of riser stickup during installation and comparing to the measured depth of the borehole.

6.10.4 Filter Pack Placement

Primary Filter Pack (see ASTM D5092)

The primary filter pack is composed of graded washed silica sand. The silica sand size should be no finer than the screen size opening. The primary sand pack size may have to be designed based on the well screen slot size and the grain size of the hydrostratigraphic formation.

The primary filter pack is placed as follows:

1. The primary filter pack is placed using the tremie line method.
2. A minimum 6 inches (15 cm) of the primary filter pack material is placed under the bottom of the well screen. This interval of primary filter pack provides a firm footing for the well.
3. Where DNAPL is present, or is being monitored for, the well may be sumped into a confining unit. In this case, no primary filter pack is placed under the bottom of the well screen.
4. The top of the primary filter pack is determined in the field based on the geologic and hydrogeologic conditions encountered during borehole advancement.
5. The primary filter pack should extend a minimum of 2 feet (0.6 m) above the top of the well screen.

6. For shallow overburden wells it is common to extend the primary filter pack to about 2 feet (0.6 m) above the water table to account for anticipated seasonal groundwater fluctuations.
7. In shallow overburden wells the sand pack should not be extended across a native and fill unit. For deeper overburden wells, it is common to select a specific hydrogeologic unit to monitor.
8. The primary filter pack should never extend through a confining unit causing two or more permeable units to become connected.

Placing the primary filter pack by pouring may be acceptable if measurements are taken to ensure that the filter pack is reaching the assigned depth.

The primary filter pack must be carefully placed concurrent with the removal of the HSA or temporary casing when collapsing borehole conditions exists. The primary filter pack must be maintained in the HSA or temporary casing to ensure proper filter pack placement around the well screen.

Placement of the primary filter pack is typically a delicate and time-consuming operation. It requires a balance between placement of too much sand and "locking" the well components in the auger or temporary casing, or placing too little sand, which allows the formation materials to collapse around the well screen. A good well installation will involve constantly checking the primary filter pack level as the auger or temporary casing is extracted from the borehole. Constant measurement of the primary filter pack will allow for adjustment of the rate and amount of filter pack placement.

In certain situations it may be necessary to add potable water within the HSA or temporary casing to maintain a positive hydrostatic pressure on the formation materials. This will help stop the flow of formation materials into the HSA or temporary casing. This generally occurs in sandy/silty soils below the water table. If potable water is added, the volume of water added must be recorded and additional purging volumes will be required to remove the volume of potable water added.

Secondary Filter Pack (see ASTM D5097 and D5092)

The secondary filter pack is finer than the primary filter pack. The first secondary filter pack prevents the intrusion of grout from reaching the primary filter pack. The final secondary filter pack limits the migration of grout material into the bentonite seal. Generally, a bentonite seal over the primary filter pack is sufficient to stop grout from reaching the primary filter pack.

The secondary filter pack is a layer of fine-grained silica sand placed in the annular space between the primary filter pack and bentonite seal, and between the bentonite seal and grout seal. The secondary filter pack must be uniformly graded fine silica sand with 100 percent by weight passing the No. 30 U.S. Standard sieve, and less than 2 percent by weight passing the No. 200 U.S. Standard sieve. Blasting sand or "sugar" sand is typically used as a secondary filter pack.

6.10.5 Bentonite Seal

A bentonite seal is placed on top of the filter pack. This seal consists of high solids, pure bentonite material. Bentonite in either pellet or granular form is acceptable. Check with local, state/provincial, and federal regulations concerning bentonite seal material requirements.

Generally, 3/8-inch (1 cm) bentonite chips are used, but larger 3/4-inch (1.9 cm) bentonite chips may be used in larger annular spaces. Bentonite pellets have a machined surface and are good for deep well applications, or for adding bentonite seals through a long water column.

When placing a bentonite seal:

1. A tremie line is the preferred method. Pouring the bentonite seal is acceptable in shallow applications (less than 50 feet [15 m]) where the annular space is large enough to prevent bridging.
2. Take continuous measurements to ensure that the bentonite seal is being placed in the proper interval, and that bridging is not occurring.
3. Place the bentonite seal above the filter pack to a minimum of 2 feet (0.6 m) thick.
4. Allow the bentonite to hydrate before grouting.
5. If the water table is temporarily below the bentonite seal interval, use potable water to hydrate the bentonite.

6.10.6 Grouting

The annular space between the well casing and borehole wall must be filled with neat cement grout, cement/bentonite grout, or bentonite grout. Check required local, state/provincial, and federal regulations regarding well sealing requirements.

Bentonite grout does not crack or harden and is generally self-healing. Cement/bentonite grout may crack, but bentonite will typically seal any cracks. Cement/bentonite grout must contain at least 5 percent bentonite volume by weight. Neat cement will crack and may pull away from riser pipe or borehole wall.

When placing grout:

1. Prepare the grout in accordance with the manufacturer's specifications.
2. Using a tremie line, place the grout into the borehole, over the bentonite seal.
3. Place the grout from the top of the bentonite seal to within 2 feet (0.6 m) of the ground surface or, if possible, below the frost line.
4. Allow the grout to set for a minimum of 24 hours before installing a concrete surface seal. Grout will generally settle due to infiltration into medium- and coarse-grained soils. Check grout levels and, if required, add additional grout to the borehole to bring the grout level to the required depth.
5. When grouting on contaminated sites, collect and contain displaced fluids for future disposal.

When a concrete surface seal is not required, the grout is brought to within 0.5 to 1 foot (0.15 to 0.30 m) below ground surface. The remaining annular space is backfilled to match the surrounding ground surface conditions (e.g., asphalt, topsoil). This method will reduce surface water infiltration and well lifting due to frost.

6.10.7 Protective Casings

A protective casing is installed over the completed well and sealed in place. Once installed and grouted, the casing should extend about 2.5 feet (0.75 m) above ground surface. The outer protective casing is made of steel and has a locking cap that is hinged, waterproof, and resistant to vandalism. The protective casing should have sufficient clearance around the inner well casing so that no contact is made with the outer protective casing. A concrete surface seal is installed flush to promote drainage away from the outer protective casing at a depth below the frost line to deter frost heaving. Check local, state/provincial, and federal regulations pertaining to requirements for concrete surface seals.

Typically, a concrete form (sonatube) is used to provide a collar for the concrete around the protective casing. The concrete surface seal is placed as follows:

1. The concrete surface seal is sloped to promote surface drainage away from the well.
2. The protective casing is installed with two weep holes for drainage. The weep holes should be 1/4 inch (0.6 cm) in diameter and drilled into the protective casing slightly above the top of the concrete surface seal. The weep holes will prevent standing water from accumulating inside the protective casing and allow internal air pressure to be in equilibrium with atmospheric conditions.
3. Bentonite chips or pellets are placed in the annular space below ground level in the protective casing.
4. Silica sand is placed in the annular space above the bentonite chips or pellets and above the weep hole to prevent insect infestation.

Sometimes a well must be completed in a high traffic area. In this situation, the well is completed as a flush-mount installation. A waterproof protective casing is essential to ensure the integrity of the screened hydrostratigraphic unit. The protective casing is grouted in place and is fitted with bolts and a rubber gasket to deter surface water infiltration. For a flush-mount installation, the well top is generally fitted with a locking expandable cap with watertight screw-on connections (as referenced in ASTM F480). For a flush-mount installation, the well cap must have a lock to deter vandalism. The preferred cap is manufactured by OPW of Cincinnati, Ohio (OPW 634 TTM-7087). For above-grade installations, the well cap or well casing must be properly vented to allow air pressure to be in equilibrium with atmospheric conditions.

Flush-mount installations are typically more problematic and maintenance intensive. If possible, avoid the use of flush-mount installations.

A typical protective casing installation is shown on Figure 6.3.

Once all well installation activities are complete, wells are labeled with the appropriate well identification in at least two locations. Check for local, state/provincial, or federal regulations that may require that wells be assigned a specific well identification number. A well tag may be required on the well casing or embedded in the concrete surface seal.

Note: Lock all wells to prevent vandalism.

6.10.8 Protective Posts

When required, protective posts (bollards) can be constructed of 4-inch (10 cm) diameter Schedule 40 PVC; or low carbon steel pipe filled with concrete; or 4- by 4-inch (10 cm by 10 cm) wooden posts, and installed as follows:

1. Install the posts at least 3 to 4 feet (0.9 to 1.2 m) above ground surface. As many as four posts may be installed for each well location.
2. Set each post at least 2 feet (0.6 m) into the ground and install in a separate concrete seal.
3. Place the posts at the corners of the well concrete surface seal, 4 feet (1.2 m) radially from the center of the well at 90-degree increments.

If a well is installed in a heavily forested or vegetated area, identify the well location using a high visibility marker to allow for future identification.

6.11 Well Construction Techniques

6.11.1 Well Installation

Boreholes for well installations should be drilled as close to vertical as possible. Slanted boreholes are not acceptable unless specified in the well design or Work Plan. Well casings and screens should be installed plumb in the boreholes. Where critical, especially on installations deeper than 50 feet (15 m), centralizers may be used to help keep the screen as close as possible to the center of the borehole. An alternative method to setting a well casing and well assembly is to suspend the casing or assembly from the wireline on the drill rig.

Petroleum-based lubricating oils or grease should not be used on casing threads. Teflon tape can be used to ensure a watertight seal. No glue of any kind should be used to secure casing joints. For some steel casings, welded joint construction is acceptable.

The well is installed as follows:

1. Before placing the well assembly at the bottom of the borehole, place at least 6 inches (0.15 m) of filter pack at the bottom of the borehole to serve as a footing.
2. If monitoring for DNAPL, the well assembly may be set directly on the bottom of the borehole. Place the well into the borehole plumb.
3. On a well installed to a depth greater than 50 feet (5 m), centralizers are required. Place the centralizers on the well casing or well assembly above the proposed bentonite seal interval. Place the centralizers so as not to interfere with the placement of the filter pack, bentonite seal, and annular grout. (Generally, wells less than 50 feet (15 m) deep will not require centralizers unless required by local, state/provincial, or federal regulations, or the Work Plan.)
4. During well installation through a HSA, slowly pull back the auger as the filter pack, bentonite seal, and annular grout are tremied or poured in place.
5. When the well has been lowered into the borehole, place the filter pack around and above the top of the screen, as required.

6. When the filter pack has been installed, place a minimum 2-foot (0.6 m) thick bentonite seal directly on top of the filter pack.
7. Allow the bentonite seal to hydrate for a reasonable amount of time (generally, 30 minutes is sufficient).
8. When the bentonite seal has hydrated sufficiently, seal the remaining borehole annular space grout placed with a tremie line using positive displacement methods. Generally, the grout will be brought to 2 feet (0.6 m) below ground surface or below the frost line, whichever is greater. In situations where no concrete seal is being placed, the grout can be brought to 0.5 to 1 foot (0.15 to 0.3 m) below ground surface.
9. During grout placement, ensure the end of the tremie line is always submerged in the grout to ensure positive displacement.
10. During grout placement on contaminated sites, containerize all fluids for future disposal.
11. Allow the grout to set for about 24 hours before installing the concrete surface seal. If the grout level has subsided, top off the borehole annular space with grout or bentonite pellets to the required depth.
12. Install protective casings in a minimum 2-foot (0.6 m) thick concrete surface seal graded to divert surface water away from the monitoring well. Check local, state/provincial, and federal regulations for concrete surface seal requirements. Some agencies require that concrete pads be constructed around the wells.
13. When installation is complete, label the well in at least two locations for future identification.

For well installation in a high traffic area (i.e., parking lot, residential yard, road allowances) it may be necessary to install a flush-mount protective casing. It is important that the flush-mount protective casing be watertight to protect the screened hydrostratigraphic unit. Flush-mount protective casings are designed to extend from ground surface down into the concrete surface seal. Elevate the areas in the immediate vicinity of a flush-mount well to the extent possible to promote surface water drainage away from the flush-mount protective casing. Be aware of possible trip hazards associated with a flush-mount protective casing in areas of pedestrian traffic need. It is also important to avoid installing a well in a low-lying area that is susceptible to surface water accumulation and ponding.

Typical overburden well installation details are shown on Figure 6.1. Typical protective casing installations are shown on Figure 6.3.

6.11.2 Double-Cased Wells

A double-cased well is constructed when there is a possibility that interconnection between two aquifers may occur during borehole advancement or well construction. This interconnection may cause cross-contamination of deeper aquifer units from shallower aquifer units due to the presence of a conduit between the two aquifer units. Pilot borings are advanced through the overburden or impacted zone into a confining layer or bedrock. An outer casing, generally referred to as a surface casing, is then installed in the borehole. The borehole and outer casing should extend at least 2 feet (0.6 m) into the confining layer if possible. However, the depth of penetration will depend on the overall thickness of the confining layer. Generally, in bedrock, the borehole will be advanced until competent bedrock is encountered. Check with the Work Plan to confirm the depth stipulated for the outer casing. The outer casing must be of sufficient inside diameter to contain the inner casing and a 2-inch (5 cm) minimum annular space. The casing is sealed in place with cement grout or cement/bentonite grout using a tremie line and positive displacement methods. On contaminated sites, fluids displaced during the placement of the grout need to be contained for future disposal. Check local, state/provincial, and federal regulations regarding the type of grout required. The outer casing is allowed to set or cure for a minimum of 24 hours before advancing the borehole through the outer casing. When advancing through the seal, take care to avoid cracking, shattering, or washing away the outer casing seal.

The pumping method and the immersion method are the two most commonly used casing installation techniques.

Pumping Method

1. Drill a borehole.
2. Insert the casing into the borehole.
3. Insert the grout pumping tube and inflatable packer assembly into the casing.
4. Inflate the packer assembly (with the grout pumping tube extended through the center of the packer assembly).
5. Pump grout through the packer assembly until grout return is seen at ground surface. The grout will return to ground surface from around the outside of the casing (contain fluids if required for future disposal).
6. Tap the casing into the confining layer or bedrock.
7. Deflate and remove the packer assembly from the casing.

A typical casing installation using the pumping method is presented on Figure 6.4.

Immersion Method

1. Drill a borehole.
2. Fill the borehole with grout.
3. Install casing that has the bottom end plugged with grout (previously placed and set) into the borehole.
4. To aid installation, water may be added to inside of casing to overcome buoyancy.
5. Tap the casing into the confining layer or bedrock.

A casing installation using the immersion method is presented on Figure 6.5.

6.11.3 Bedrock Wells

Bedrock well installations may be accomplished using two methods.

Method 1

1. Advance a pilot borehole through the overburden and into upper bedrock.
2. Install an outer casing into the borehole and grout in place using the grouting methods described in Section 6.10.6.

After the grout has properly set, further borehole advancement can occur through the grout seal into the underlying bedrock. Bedrock is typically advanced using rock coring techniques. Bedrock coring makes a smooth, round hole through the seal and into the underlying bedrock minimizing the possibilities of shattering or cracking the outer surface casing seal. Roller cone bits are also commonly used in soft bedrock formations. However, this method can produce excessive water and pressures that may cause the seal to crack, shatter, or wash away. Coring is preferred because it provides a continuous bedrock core. The bedrock cores can be logged for lithology, structure, and fracture presence and orientation. Bedrock cores can be kept at the site for geologic record. When drilling is completed to the required depth, the finished well consists of an open corehole from the bottom of the outer casing to the bottom of the well. There is no inner casing installed with this bedrock installation type. The open rock interval is the desired monitoring interval. The outer casing installed into the upper bedrock can be extended to above ground surface to serve as the protective casing, or typical above-grade or flush-mount protective casings can be installed. If the outer casing becomes cracked or is broken off, the well is open to contamination from the ground surface. If this occurs, the well must be immediately repaired or abandoned. It may be desirable to install a protective casing over the outer casing as an extra precaution.

For wells installed to monitor bedrock units below the uppermost layers or below a suspected confining unit in the bedrock, a second casing is installed to the top of the desired monitored interval. The borehole is then extended through the seal and second casing into the bedrock interval selected for monitoring.

Method 2

1. Install an outer casing and advance the borehole into the bedrock.
2. Install an inner casing and well screen to the selected monitoring interval in the bedrock.
3. Place a filter pack around and above the well screen.
4. Place a minimum 2-foot (0.6 m) thick bentonite seal over the filter pack.
5. Seal the remaining annular space with grout placed using a tremie line and positive displacement methods.

This installation method enables isolation of the bedrock monitoring interval. This method is also used in cases of poor bedrock quality, where the corehole continually collapses.

Typical bedrock well installation details are shown on Figure 6.2. Typical protective casing installations are shown on Figure 6.3.

6.12 Well Installation Documentation

Details of each overburden well installation are recorded on a Stratigraphy Log (Overburden) (Form SP-14) and also in the field book. Well installation details, comprised of the following, are recorded on a Well Instrumentation Log (Form SP-15):

1. Drilling method
2. Borehole diameter
3. Borehole depth
4. Well screen length
5. Well screen depth
6. Well screen and riser diameter
7. Outer casing diameter if present
8. Filter pack interval
9. Filter pack material
10. Seal/plug interval
11. Seal material
12. Grout interval
13. Grout material
14. Stickup/flush-mount detail
15. Surface seal detail
16. Protective type detail
17. Date installed

Overburden stratigraphic details are recorded in detail, in accordance with the soil classification methods detailed in Section 5.0, on a Stratigraphic Log (Overburden) (Form SP-14). Bedrock lithology and descriptions are recorded on a Bedrock Coring and Drilling Stratigraphic Log (Form SP-16).

Details of a bedrock well installation are typically recorded and sketched in a GHD standard field book. A Bedrock Coring and Drilling Stratigraphic Log (Form SP-16) are used to log lithology and structure for bedrock cores and bedrock boreholes.

The field book records and sketches of bedrock well installations must include:

1. Corehole diameter
2. Corehole depth
3. Overburden depth
4. Outer casing depth

5. Grout depths
6. Grout material
7. Surface cap details
8. Date of installation

Each well must be marked in at least two locations to identify the well designation for future reference.

> Note: Field tie-ins must be completed to accurately identify each well location upon completion of installation. These will ensure that the wells are properly identified on plans and for future identification in the field.

6.13 Well Installation Follow-up Activities

Upon completion of monitoring well installation activities:

1. Submit all stratigraphic and instrumentation logs to GHD's hydrogeology department for input of data and generation of final stratigraphic and instrumentation logs.
2. Plot well locations on site plan, since well locations may have changed in the field due to underground/overhead utilities or field conditions.
3. Arrange for a surveyor to obtain horizontal and vertical control for well locations.
4. Tabulate well construction details.
5. Measure groundwater levels in accordance with Section 8.0 to confirm hydraulic stabilization and groundwater flow direction.
6. Prepare a summary report describing the field activities including, but not necessarily limited to, drilling method(s), well design and construction details, site geology, and site hydrogeology.
7. File the field book at the appropriate GHD office.

6.14 Well Development

Monitoring well development is the process of obtaining hydraulic stabilization of a monitoring well. To ensure hydraulic stabilization of a well, it is recommended to remove five to ten well volumes. The removal of well volumes will aid in achieving a sand-free condition with the lowest possible turbidity.

The most suitable methods of well development are:

1. Waterra™ (surge block)
2. Surge block
3. Pumping/overpumping/backwashing
4. Bailing

5. Airlifting
6. A combination of the above five methods

> Note: Ensure the development method chosen conforms to local, state/provincial, and federal regulations.

6.14.1 Waterra™ (Surge Block)

Waterra™ is an inertial foot valve attached to flexible or rigid tubing. For well depths greater than 50 feet (15 m) rigid tubing is used. The inertia pump may be pumped by hand or with a power pump. As the inertia pump is moved up and down in the well, water is lifted to the surface. Surge blocks can be attached to the inertia pump so that surging and purging is performed simultaneously.

This development method is cost effective and works well for shallow and small diameter wells. However, this method can be labor intensive.

6.14.2 Surge Block

When used effectively, surge blocks can destroy the bridging of fine-grained particles from the formation. Surging creates the agitation necessary in the proper development of a well. A surge block is generally used alternately with either bailing or pumping so that purging removes all agitated and loosened particulate in the well. The surge block assembly must be of sufficient weight to freefall through the water column and create a vigorous outward surge. Surging begins at the top of the screen so that sand or silt loosened by the initial surging action will not cascade down on the surge block and "lock" or "bind" the surge block in the well. Surging is initially gentle, and the energy of the action is increased throughout the development process. Surging and pumping continue until the water is free of suspended particulate in the purge water.

6.14.3 Pumping/Overpumping/Backwashing

The least expensive and most commonly used well development technique is pumping.

Overpumping causes an increase in the flow velocity of water through the well screen. This creates a rapid and effective migration of particulate toward and through the well screen.

With no backflow prevention valve (check valve) installed on a pump, the pump can be alternately started and stopped. This backwashing creates a surging action in the well and generally loosens the bridging of fine particles in the formation. Backwashing must only be used with dedicated pumps and hoses or pumps that have been thoroughly decontaminated between well locations. Pumps commonly used for well development include BK pump, submersible pumps, and jet pumps.

> Note: Particulate wears out submersible pumps. A 2-inch (5.0 cm) Grundfos™ pump should not be used for well development.

All of the above techniques are designed to remove the drilling effects from the monitored interval and restore the formation to its previous condition. The above techniques avoid the introduction of fluids, including air, into the monitored interval during development. This minimizes adverse effects on the water quality and restricts available development options.

6.14.4 Bailing

In a relatively clean permeable formation, bailing is an effective development technique. The bailer is allowed to freefall down the well until it strikes the water surface. That contact creates a strong outward surge of water through the screen into the formation. This action tends to break bridging that has occurred in the formation from the borehole advancement process. As the bailer fills and is rapidly removed from the water column, particulate matter outside the well intake flows through the well screen. Subsequent bailing will remove all accumulated particulate from inside the well. Bailing is continued until the water is free from suspended particulate matter.

6.14.5 Airlifting

Airlifting is an effective development technique that is generally used in larger diameter wells. Airlifting is commonly performed using the drill rig that advanced the borehole. Air is injected through small diameter drill rods or pipe to the bottom of the well. The air loosens particulate from the formation and is carried with the water into the well. The particulate is then extracted along with water to the ground surface. Airlifting provides good development for the sand pack and formation. It is an excellent well rehabilitation tool. This development method can produce large volumes of water which can create some difficulties for containment.

6.15 Well Development Documentation

A well is developed after installation to ensure hydraulic stabilization.

Details of well development are recorded on a Well Development, Purging, and Sampling Form (SP-06) or in a standard GHD field book, and must include:

1. Well identification number
2. Date of development
3. Development method
4. Well type including diameter and construction
5. Measuring point location and elevation (if known)
6. Measured water level
7. Measured bottom depth
8. Water column length
9. Screened interval
10. Well volume
11. Volumes purged
12. All field measurements

6.16 Follow-up Activities

Once well construction and development is completed:

1. Submit and complete stratigraphic logs.
2. Tabulate well installation and development details.
3. Summarize the development activities including development method, development duration, volumes removed, and field parameters.
4. File the field stratigraphic log forms and field book at the appropriate GHD office.
5. Document the water level in the well.
6. Arrange for surveys of wells for horizontal and vertical control.

6.17 References

Numerous publications are available describing current monitoring well design and construction procedures. Four excellent references are:

1. Driscoll, F.G., 1986. Groundwater and Wells, 2nd Edition. Johnson Division.
2. Freeze, R.A. and Cherry, J.A., 1979. Groundwater. Prentice Hall, Inc.
3. ASTM D5092. Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifer.
4. Nielsen, David M., 1991. Practical Handbook of Ground-Water Monitoring

In addition, the following ASTM publications apply:

ASTM D5474	Guide for Selection of Data Elements for Ground-Water Investigations
ASTM D5787	Practice for Monitoring Well Protection
ASTM D5521	Guide for Development of Ground-Water Monitoring Wells in Granular Aquifers
ASTM D5978	Guide for Maintenance and Rehabilitation of Ground-Water Monitoring Wells
ASTM D5299	Guide for Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes and Other Devices for Environmental Activities

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

www.ghd.com

Exhibit 4

November 15, 2018 Reference No. 017338

Mr. Rick Galloway
Department of Natural Resources and Environmental Control
Site Investigation and Restoration Section
391 Lukens Drive
New Castle, DE 19720

Dear Mr. Galloway:

Re: RACER Trust, Monitoring Well Abandonment, Installation and Sampling
2018 OU-5 Groundwater Monitoring Results
Former GM Assembly Plant, Wilmington, Delaware

GHD has prepared this letter, on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER Trust), summarizing the results from the 2018 monitoring well abandonment in Operable Unit 2 (OU-2), OU-3, OU-4, and OU-5 at the former General Motors (GM) Wilmington Assembly Plant located at 801 Boxwood Road in Wilmington, Delaware (Facility or Site), shown on Figures 1 and 2. Additionally, this letter summarizes the 2018 OU-5 monitoring well installation and groundwater sampling event. As requested by the Department of Natural Resources and Environmental Control (DNREC), and in accordance with the Monitoring Well Abandonment and Installation Work Plan (Work Plan), two monitoring wells were installed in OU-5 (MW-112 and MW-113) to assess groundwater near the perimeter of OU-5. Additionally, MW-28 was sampled prior to abandonment. The purpose of installing monitoring wells MW-112 and MW-113 is to ensure groundwater is not impacted with chemicals of concern (COC).

1. Monitoring Well Abandonment

GHD subcontracted Parratt-Wolff, Inc. (Parratt-Wolff) to abandon 44 monitoring wells from June 25-29, 2018 in OU-2, OU-3, OU-4, and OU-5 to facilitate development at the Site and in accordance with the Work Plan and DNREC's Regulations Governing the Construction and Use of Wells. Table 1 lists the 44 monitoring wells that were abandoned.

2. Monitoring Well Installation

GHD subcontracted Parratt-Wolff to install two flushmount shallow monitoring wells (MW-112 and MW-113) on June 27, 2018, in accordance with the Work Plan in OU-5, as shown on Figure 3. Monitoring well design was based on conditions encountered during drilling, and the screen was placed across the water table. Monitoring well stratigraphic construction logs are included in Attachment A.

3. Groundwater Sampling

Groundwater samples were collected from MW-112, MW-113 and MW-28 and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals. Table 2 presents groundwater elevation measurements. Figure 3 presents groundwater elevation contours from October 2017 groundwater elevation measurements.

4. Groundwater Monitoring

4.1 Well Development

Monitoring wells MW-112 and MW-113 were developed on June 28, 2018 in accordance with the Work Plan. Well development logs are included in Attachment B.

4.2 Groundwater Sampling

Groundwater samples were collected from three OU-5 wells (MW-28, MW-112 and MW-113) on June 26, 2018 and July 13, 2018. The monitoring wells were purged using low flow methodology, in accordance with the Work Plan. Groundwater sampling sheets are included in Attachment B.

Groundwater samples were submitted to TestAmerica Laboratories in Edison, New Jersey. Samples were analyzed for VOCs, SVOCs and metals. A GHD chemist performed the analytical quality assurance/ quality control (QA/QC) review and data validation prior to data evaluation. The data validation memo is included in Attachment C. Three tentatively identified compounds (TICs) (butyl citrate, 2,4-dichlorophenoxyacetic acid [2,4-D], and cyclohexane) were identified in two groundwater samples. 2,4-D and cyclohexane were detected below the DNREC's Site Investigation and Restoration Section (SIRS) Screening Levels. The low concentrations of these TICs did not affect the assessment of perimeter groundwater conditions in OU-5.

5. Results

Groundwater samples were collected to monitor for concentrations of COCs in OU-5 perimeter wells. Groundwater analytical results are compared to DNREC's-SIRS Screening Levels, United States Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL), and DNREC-SIRS Ecological Surface Water Fresh (Eco Fresh) Screening Levels.

5.1 MW-28

No VOCs or SVOCs were detected at concentrations exceeding DNREC-SIRS Screening Levels or MCLs in MW-28, as shown in Table 3 and Figure 4.

Four metals (arsenic, cobalt, iron and manganese) were detected at concentrations exceeding DNREC-SIRS Screening Levels in MW-28, as shown on Figure 5. Additionally, arsenic, barium, cobalt, iron and manganese were detected at concentrations exceeding the Eco Fresh screening levels. Arsenic (7.5 µg/L) was detected above screening levels (0.052 µg/L) and Eco Fresh screening levels (5 µg/L) and is consistent with historical concentrations, as presented in Attachment D. Cobalt (26.8 µg/L) was detected above screening levels (0.6 µg/L) and Eco Fresh screening levels (23 µg/L) and is consistent with historical concentrations. Iron (23,400 µg/L) was detected above screening levels (1,400 µg/L) and Eco Fresh screening levels (300 µg/L) and is consistent with historical concentrations. Manganese (3,290 µg/L) was detected above screening levels (43 µg/L) and Eco Fresh screening levels (120 µg/L) and is consistent with historical concentrations. Barium (182 µg/L) was detected above Eco Fresh screening levels (4 µg/L) and is consistent with historical concentrations. Arsenic, barium, cobalt, iron and manganese were all detected at concentrations below MCLs.

5.2 MW-112

One VOC (chloroform) was detected in MW-112 (1.5 µg/L) above DNREC-SIRS Screening Levels (0.22 µg/L) but below MCLs. No SVOCs were detected in MW-112 above DNREC-SIRS Screening Levels or MCLs. Three metals (arsenic, cobalt, and manganese) were detected at concentrations exceeding DNREC-SIRS Screening Levels, but below MCLS, in MW-112. Additionally, barium, iron and manganese were detected at concentrations exceeding the Eco Fresh screening levels. Arsenic (2.2 µg/L) was detected above screening levels (0.052 µg/L). Cobalt (10.8 µg/L) was detected above screening levels (0.6 µg/L). Barium (156 µg/L) and iron (1,330 µg/L) were detected above the Eco Fresh screening levels (4 µg/L and 300 µg/L, respectively). Manganese (3,840 µg/L) was detected above screening levels (43 µg/L) and Eco Fresh screening levels (120 µg/L). The concentration of manganese at MW-112 is consistent with historical concentrations at nearby wells MW-28 and MW-48, as presented in Attachment D. Arsenic and cobalt concentrations decrease from MW-28 to MW-112, moving northeast in the direction of groundwater flow.

5.3 MW-113

No VOCs or SVOCs were detected at concentrations exceeding DNREC-SIRS Screening Levels or MCLs in MW-113.

Four metals (arsenic, cobalt, iron, and manganese) were detected at concentrations exceeding DNREC-SIRS Screening Levels, but not MCLs, in MW-113. Additionally, barium, iron and manganese were detected at concentrations exceeding the Eco Fresh screening levels. Arsenic (0.77 µg/L) was detected above screening levels (0.052 µg/L). Cobalt (9.2 µg/L) was detected above screening levels (0.6 µg/L). Barium (226 µg/L) was detected above the Eco Fresh screening levels (4 µg/L). Iron (4,680 µg/L) was detected above screening levels (1,400 µg/L). Manganese (2,400 µg/L) was detected above screening levels (43 µg/L) and Eco Fresh screening levels (120 µg/L. The concentration of manganese at MW-113 is consistent with historical concentrations at nearby wells MW-28 and MW-48, as presented in Attachment D. Arsenic and cobalt concentrations decrease from MW-28 to MW-113, moving northeast in the direction of groundwater flow.

5.4 Ecological Impact to Surface Water

Groundwater results for specific metals (arsenic, barium, cobalt, iron and manganese) were compared to surface water criteria that are protective of potential ecological exposures. Such a comparison conservatively assumes that all groundwater discharges to surface water in the nearby stream, Little Mill Creek. With these conservative assumptions, groundwater was compared to Eco Fresh screening levels.

Arsenic and cobalt concentrations in groundwater exceed Eco Fresh screening levels in MW-28, but not in groundwater in perimeter wells MW-112 and MW-113. Barium, iron, and manganese concentrations in groundwater exceed Eco Fresh screening levels in wells MW-28, MW-112, and MW-113. Barium was detected in 2014 surface water samples from Little Mill Creek, but as discussed in the Ecological Risk Assessment (ERA; Appendix H of the RI Report), barium in surface water is attributed to natural sources, not the site, and does not pose a risk to aquatic life.

Iron and manganese were identified in the ERA as having the potential to migrate from groundwater to Little Mill Creek, however low concentrations of iron and manganese were detected below Eco Fresh screening levels at 2014 surface water sample locations in Little Mill Creek.

Additionally, iron and manganese concentrations were estimated in Little Mill Creek based on maximum concentrations in groundwater from MW-112 and MW-113 (Attachment E). The concentration of iron and manganese was conservatively calculated to be approximately 2.97 µg/L for iron and 2.44 µg/L for manganese, both below the respective Eco Fresh screening levels. This calculation conservatively assumed groundwater discharged directly into Little Mill Creek without taking into account attenuation.

6. Conclusion

Concentrations at OU-5 wells MW-28, MW-112 and MW-113 were, in general, consistent with historical concentrations at nearby wells (MW-28 and MW-48). MW-112 and MW-113 were installed to assess groundwater quality at the perimeter of OU-5, focusing on OU-5 COCs arsenic and lead. Lead did not exceed screening criteria in MW-28, MW-112 and MW-113. Arsenic was detected above DNREC-SIRS Screening Levels and below MCLs in all three wells. Arsenic concentrations were lower at both perimeter wells (MW-112 and MW-113) than at MW-28. Groundwater in OU-5 flows in the northeast direction, from MW-28 to MW-112 and MW-113. While arsenic, barium, cobalt, iron and manganese were detected in groundwater above the Eco Fresh surface water screening levels, only iron and manganese have the potential to migrate from groundwater to surface water in Little Mill Creek. The concentration of iron and manganese in surface water of Little Mill Creek was calculated based on groundwater concentrations in MW-112 and MW-113. Although loading from groundwater to surface water may be occurring, aquatic life is not impacted by migration of metals from the Site.

Sincerely,

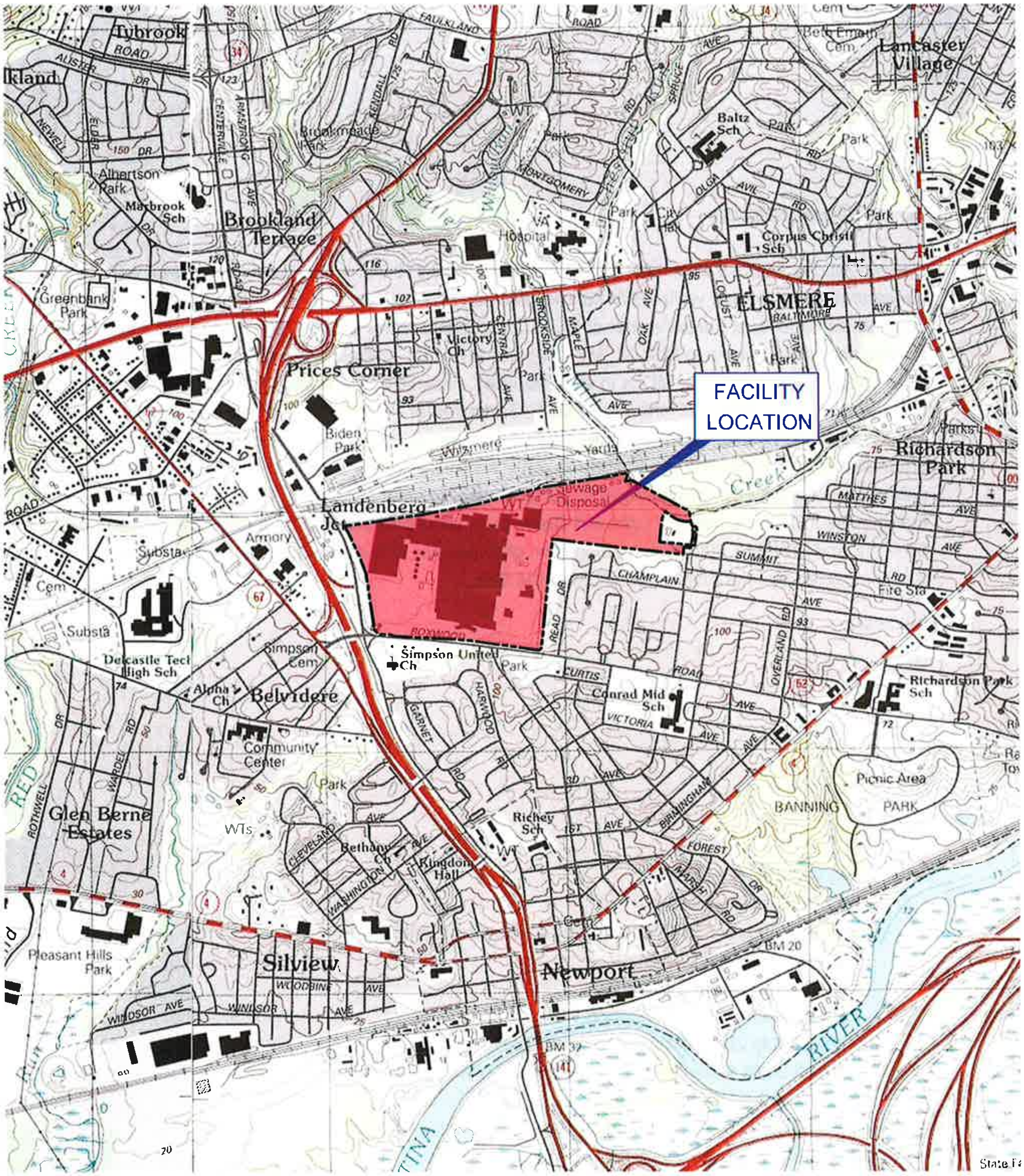
GHD

Gregory A. Carli

GAC/eew/8

Encl. Figure 1 Facility Location
Figure 2 Facility Layout
Figure 3 October 2017 Groundwater Elevation Contours
Figure 4 OU-5 VOC Results
Figure 5 OU-5 Metal Results
Table 1 Abandoned Monitoring Wells
Table 2 July 2018 OU-5 Water Level Elevations
Table 3 2018 Analytical OU-5 Groundwater Results
Attachment A Well Construction Logs
Attachment B Field Documentation
Attachment C Data Validation Memo
Attachment D Historical OU-5 Groundwater Analytical Results
Attachment E Groundwater Discharge to Little Mill Creek

cc: Pamela Barnett



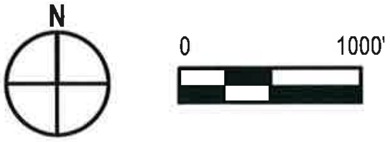
FACILITY LOCATION

LEGEND

🟥 APPROXIMATE FACILITY BOUNDARY

REFERENCE:

USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5 MINUTES SERIES 1997 SCALE: 1:24,000



RACER - FORMER WILMINGTON ASSEMBLY PLANT
OU-5 GROUNDWATER MONITORING RESULTS

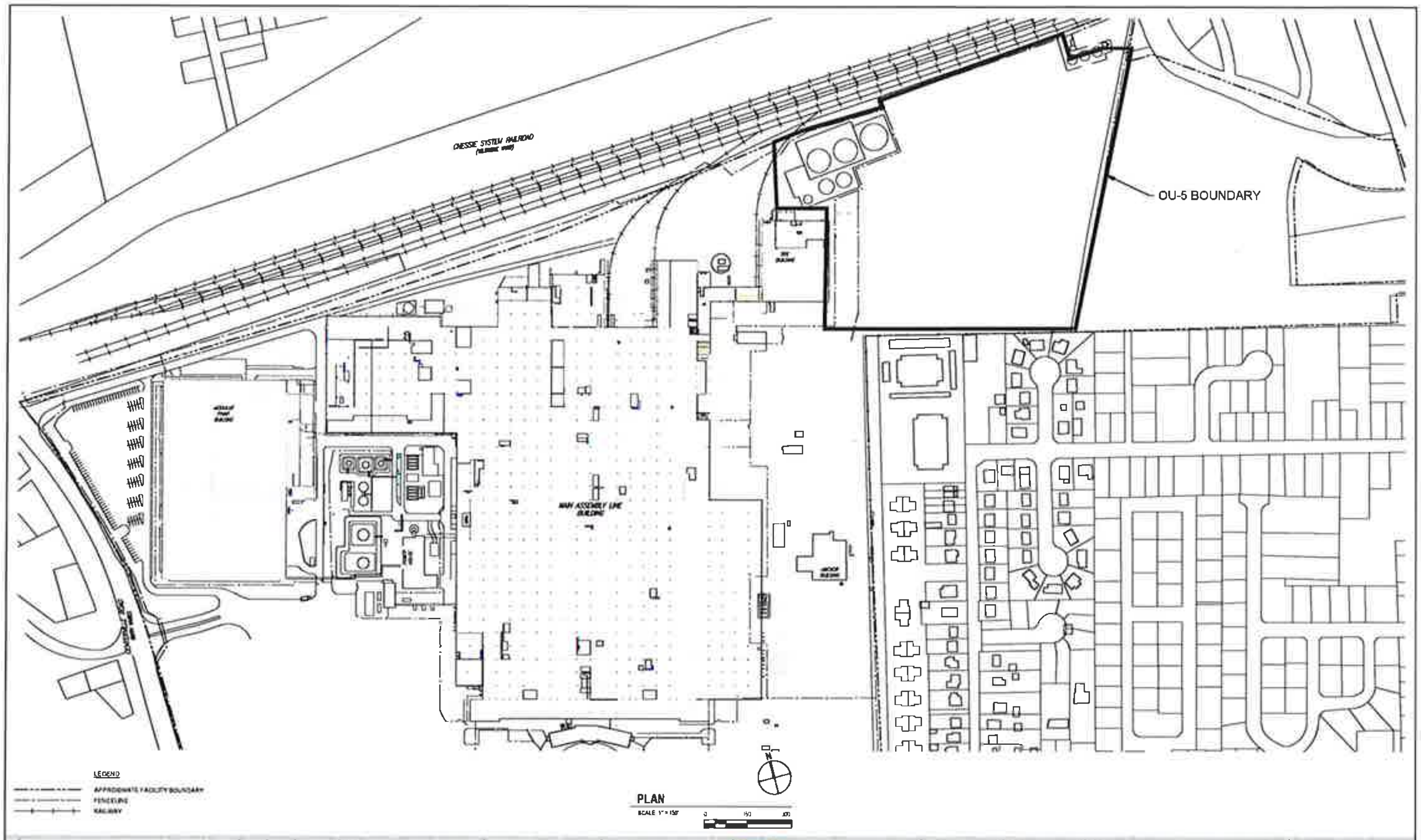
FACILITY LOCATION

Project No. **017338**
Report No. **GALL-8**
Date **SEP 2018**

FIGURE 1

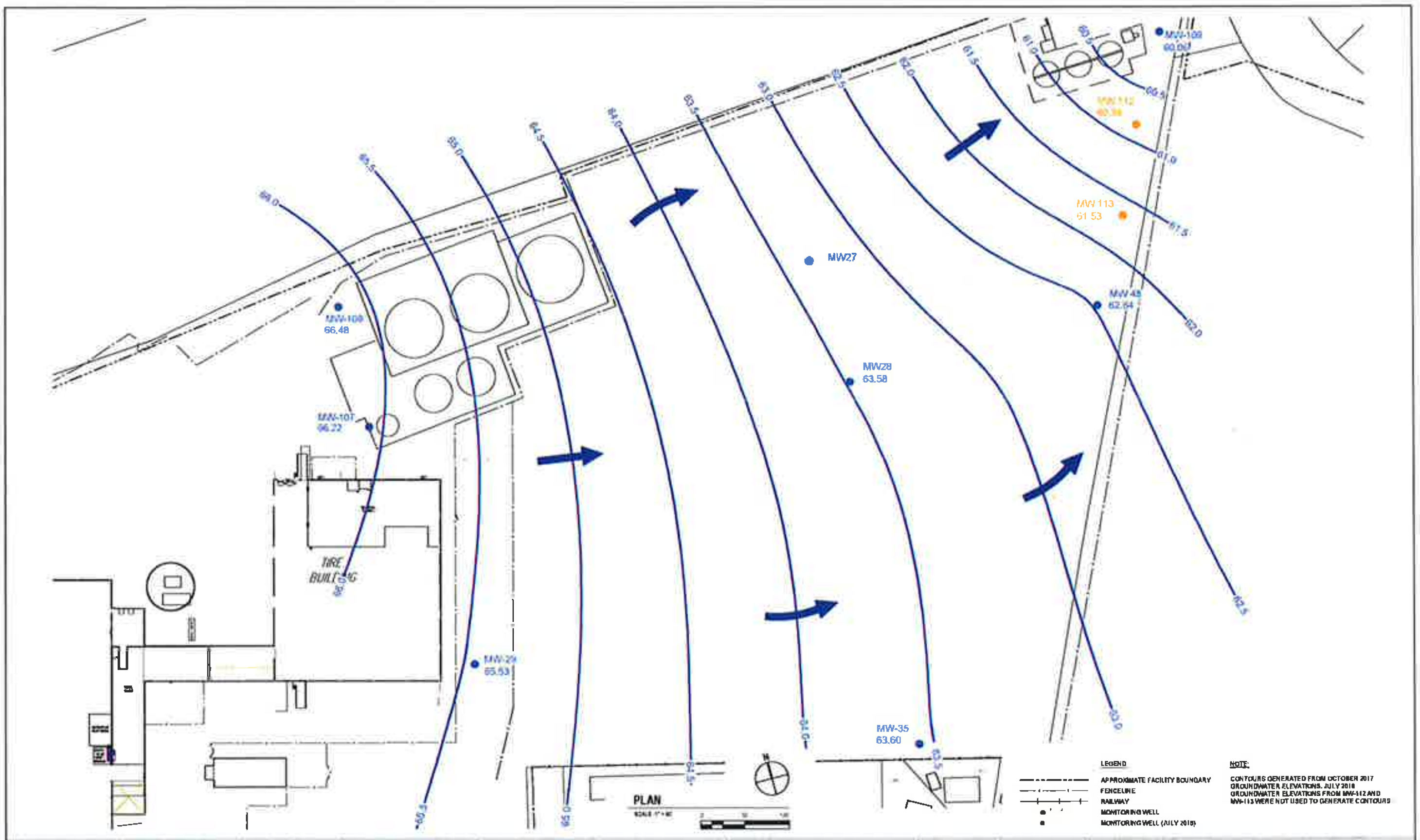
Filename: P:\Drawings\17000s\17338\17338-letter\17338-00(GALL08)\17338-GALL-8 - Figure 1.dwg
Plot Date: 9 October 2018 - 10:39 AM

Source:



GHD Consulting Services Inc.

Drawn R. CHEVALIER	Designer E. SASNOW	Client	RACER - FORMER WILMINGTON ASSEMBLY PLANT
Drafting Check E. SASNOW	Design Check	Project	OU-5 GROUNDWATER MONITORING RESULTS
		Title	FACILITY LAYOUT
	Scale 1" = 150'	ANSI D	Figure 2

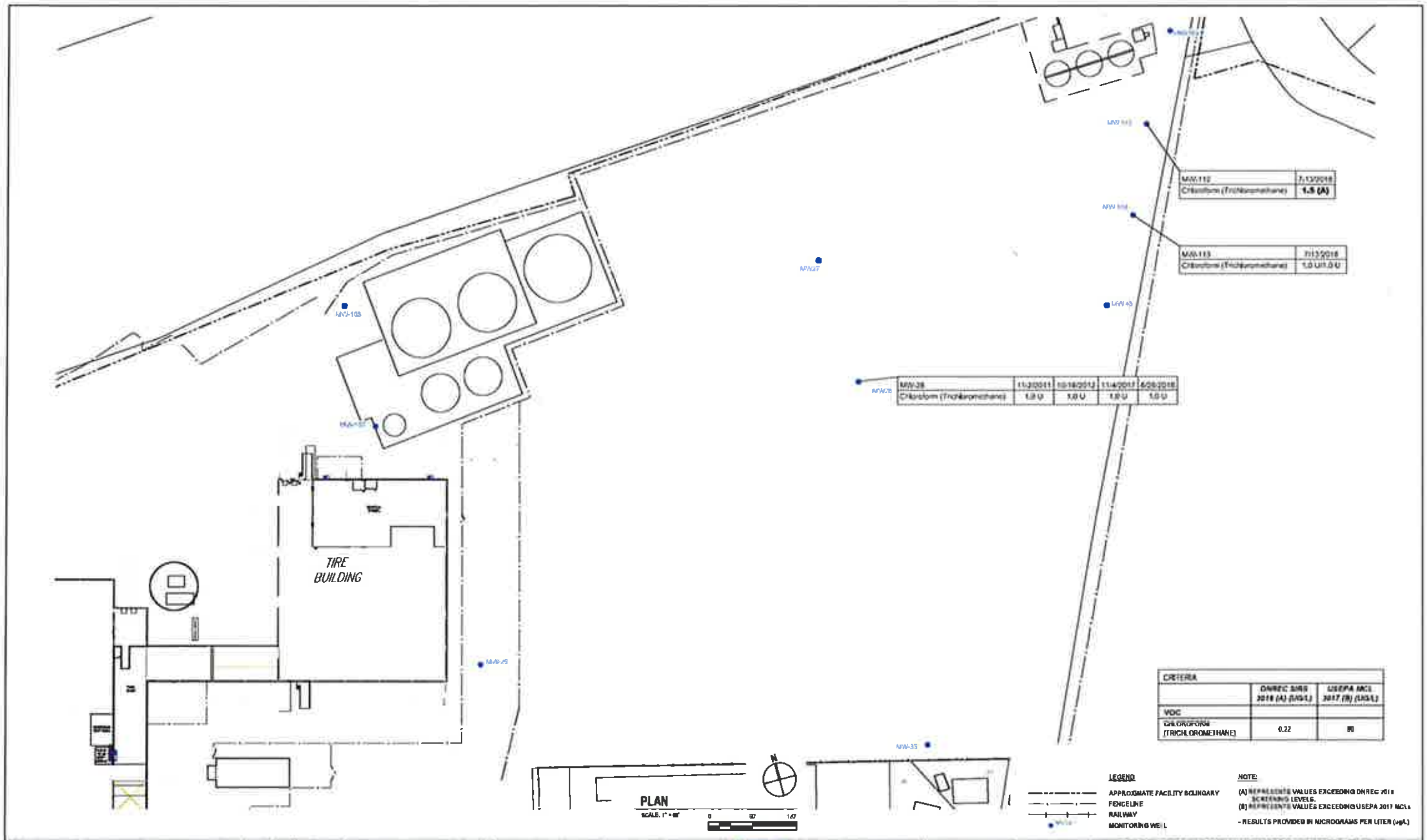


NOTE:
CONTOURS GENERATED FROM OCTOBER 2017 GROUNDWATER ELEVATIONS. JULY 2018 GROUNDWATER ELEVATIONS FROM MW-112 AND MW-113 WERE NOT USED TO GENERATE CONTOURS

GHD Consulting Services Inc.

Drawn R. CHEVALIER	Designer S. BARNOW	Client	RACER - FORMER WILMINGTON ASSEMBLY PLANT
Drafting Check S. BARNOW	Design Check	Project	OU-5 GROUNDWATER MONITORING RESULTS
Project Director G. CARLI	Date OCT 18	Title	OCTOBER 2017 OU-5 GROUNDWATER ELEVATION CONTOURS
		Project No.	17338-Oa5-8
		ANSI D	Figure 3

Sheet 3 of 5



MW-112	7/13/2018
Chloroform (Trichloromethane)	**1.5 (A)**

MW-113	7/13/2018
Chloroform (Trichloromethane)	1.0 U/1.0 U

MW-28	11/2/2011	10/18/2012	11/4/2017	6/26/2018
Chloroform (Trichloromethane)	1.0 U	1.0 U	1.0 U	1.0 U

CRITERIA		
	DNREC SIRS 2018 (A) (UG/L)	USEPA MCL 2017 (B) (UG/L)
VOC		
CHLOROFORM (TRICHLOROMETHANE)	0.22	80

LEGEND

—— - - ——	APPROXIMATE FACILITY BOUNDARY
—·—·—	FENCELINE
—+—+—	RAILWAY
●	MONITORING WELL

NOTE:

(A) REPRESENTS VALUES EXCEEDING DNREC 2018 SCREENING LEVELS.
(B) REPRESENTS VALUES EXCEEDING USEPA 2017 MCLs

- RESULTS PROVIDED IN MICROGRAMS PER LITER (ug/L)

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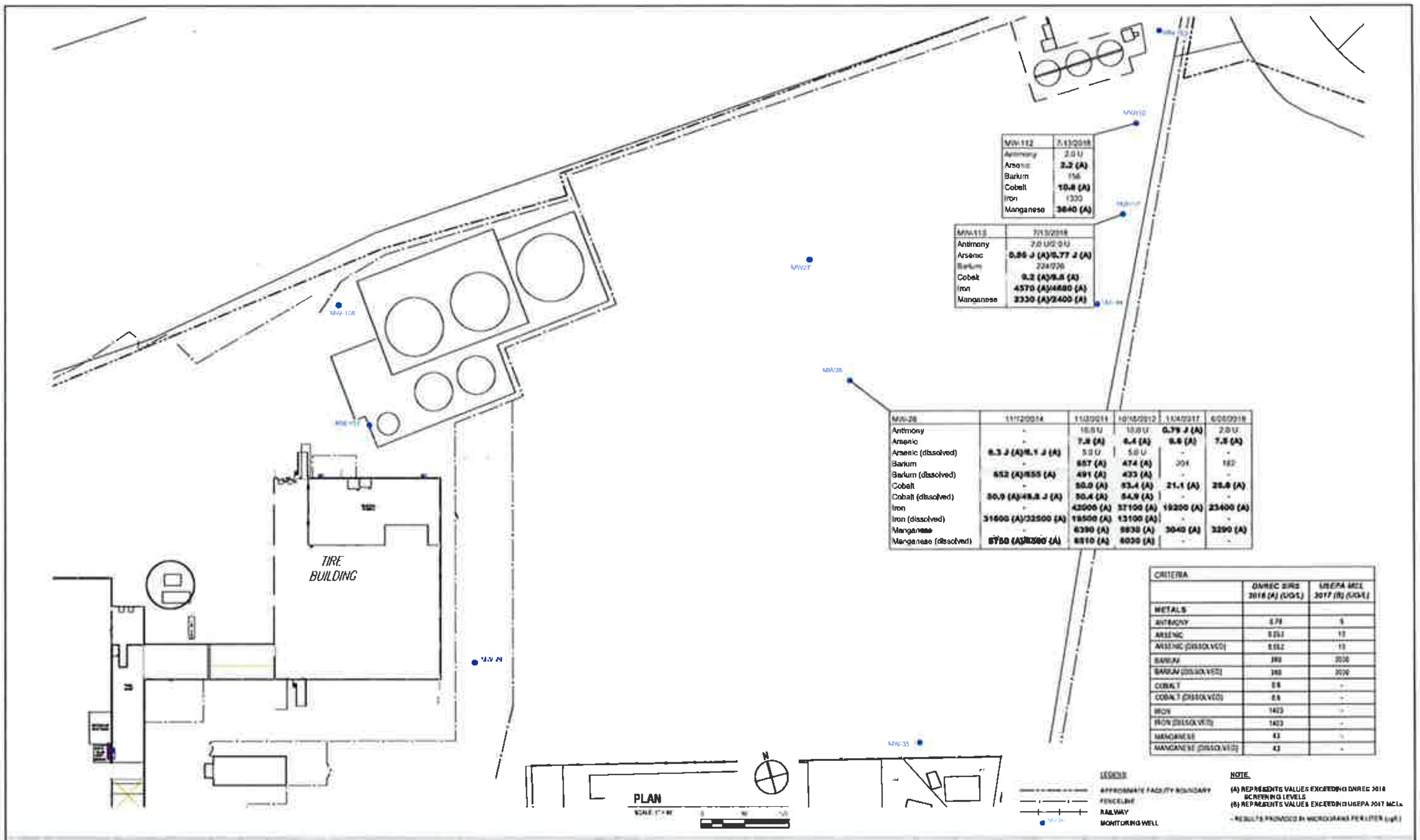
Designer E. BASNOW
Drafting Check E. BASNOW
Project Director G. CARLI
Scale 1" = 80'

Client RACER - FORMER WILMINGTON ASSEMBLY PLANT
Project OU-5 GROUNDWATER MONITORING RESULTS
Title OU-5 - VOC

ANSI D
Sheet No. **Figure 4**
Sheet 4 of 5



MW-112	7/13/2018
Antimony	2.0 U
Arsenic	**2.2 (A)**
Barium	156
Cobalt	**10.8 (A)**
Iron	1330
Manganese	**3840 (A)**

MW-113	7/13/2018
Antimony	2.0 U/2.0 U
Arsenic	**0.86 J (A)/0.77 J (A)**
Barium	224/226
Cobalt	**9.2 (A)/9.8 (A)**
Iron	**4570 (A)/4680 (A)**
Manganese	**2330 (A)/2400 (A)**

MW-28	11/12/2014	11/2/2011	10/18/2012	11/4/2017	6/20/2018
Antimony	-	10.0 U	10.0 U	**0.79 J (A)**	2.0 U
Arsenic	-	**7.8 (A)**	**6.4 (A)**	**9.6 (A)**	**7.5 (A)**
Arsenic (dissolved)	**6.3 J (A)/6.1 J (A)**	5.0 U	5.0 U	-	-
Barium	-	**557 (A)**	**474 (A)**	201	182
Barium (dissolved)	**552 (A)/555 (A)**	**491 (A)**	**433 (A)**	-	-
Cobalt	-	**50.0 (A)**	**53.4 (A)**	**21.1 (A)**	**25.6 (A)**
Cobalt (dissolved)	**50.9 (A)/49.8 J (A)**	**50.4 (A)**	**54.9 (A)**	-	-
Iron	-	**42000 (A)**	**37100 (A)**	**19200 (A)**	**23400 (A)**
Iron (dissolved)	**31600 (A)/32500 (A)**	**18500 (A)**	**13100 (A)**	-	-
Manganese	-	**6390 (A)**	**5830 (A)**	**3040 (A)**	**3290 (A)**
Manganese (dissolved)	**5750 (A)/5580 (A)**	**6510 (A)**	**6030 (A)**	-	-

CRITERIA		
	DNREC SIRS 2016 (A) (UG/L)	**USEPA MCL 2017 (B) (UG/L)**
METALS		
ANTIMONY	0.78	6
ARSENIC	0.052	10
ARSENIC (DISSOLVED)	0.052	10
BARIUM	380	2000
BARIUM (DISSOLVED)	380	2000
COBALT	0.6	-
COBALT (DISSOLVED)	0.6	-
IRON	1400	-
IRON (DISSOLVED)	1400	-
MANGANESE	43	-
MANGANESE (DISSOLVED)	43	-

LEGEND

— - - — - - —	APPROXIMATE FACILITY BOUNDARY
—ǀ——ǀ—	FENCELINE
—┼—┼—┼—	RAILWAY
●	MONITORING WELL

NOTE

(A) REPRESENTS VALUES EXCEEDING DNREC 2016 SCREENING LEVELS
(B) REPRESENTS VALUES EXCEEDING USEPA 2017 MCLs

- RESULTS PROVIDED IN MICROGRAMS PER LITER (µg/L)

GHD Consulting Services Inc.

Drawn R. CHEVALIER
Designer E. SASNOW
Drafting Check E. SASNOW
Project Director E. CARLI
Date OCT 18

RACER - FORMER WILMINGTON ASSEMBLY PLANT
OU-5 GROUNDWATER MONITORING RESULTS

OU-5 - METALS

Project No. 11138-Cell-4

ANSI D

Figure 5

Table 1

Abandoned Monitoring Wells
Former Wilmington Assembly Plant
Wilmington, Delaware

Well ID	Measured Depth to Bottom (feet)
MW-2	14.21
MW-3	14.68
MW-3D	25.06
MW-6	19.31
MW-7	16.08
MW-8	18.58
MW-9	19.25
MW-10	19.13
MW-11	20.08
MW-11R	22.08
MW-12	19.60
MW-13	19.83
MW-14	18.14
MW-15	19.70
MW-16	19.65
MW-17	19.52
MW-18	19.32
MW-19	18.64
MW-20	18.52
MW-21	24.4
MW-22	14.96
MW-23	14.35
MW-24	14.77
MW-25	13.17
MW-26	14.78
MW-27	7.2*
MW-28	14.73
MW-29	19.66
MW-30	19.63
MW-31	23.45
MW-32	19.71
MW-33	11.70
MW-34	12.50
MW-100	20.97
MW-101	18.96
MW-102	15.8
MW-103	14.89
MW-104	15.85
MW-105	14.91
MW-106	18.34
MW-107	16.0
MW-108	14.8
MW-110	24.81
MW-111	19.96

Notes

* - Well obstructed at 3.68 feet

Table 2

2018 Groundwater Elevations
Former Wilmington Assembly Plant
Wilmintgon, Delaware

Well ID	Reference Elevations (ft AMSL)	Measured Depth to Bottom (ft)	Bottom of Well Elevations (ft AMSL)	Depth to Water (ft)	Groundwater Elevation (ft AMSL)
MW-28	72.07	-	-	-	-
MW-112	70.05	16.70	53.35	9.67	60.38
MW-113	70.86	17.80	53.06	9.33	61.53

Notes

ft AMSL	- feet Above Mean Sea Level
'-'	- Not measured

Table 3

2018 Analytical OU-5 Groundwater Results
Former Wilmington Assembly Plant
Wilmington, Delaware

Sample Location:					MW-28	MW-112	MW-113	MW-113
Sample ID:					WG-17338-062618-AM-005	GW-01733818-0713-RM-01	GW-01733818-0713-RM-02	GW-01733818-0713-RM-03
Sample Date:					6/26/2018	7/13/2018	7/13/2018	7/13/2018 (Duplicate)
Parameters	**DNREC-SIRS Screening Levels (2018)$^{(1)}$**	**DNREC-SIRS Ecological Surface Water Fresh Screening Levels (2018)**	**USEPA MCL (2017)**	**Units**				
	a	b	c					
Volatile Organic Compounds								
1,1,1-Trichloroethane	200	11	200	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	0.076	610		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	0.041	1200	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	2.8	47		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	7	25	7	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	0.4	24	70	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	5.6			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	0.00033		0.2	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	0.0075		0.05	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	30	0.7	600	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.17	100	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	0.82		5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene			75	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	0.48	26	75	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	560	14000		µg/L	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	3.8	99		µg/L	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	630	170		µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	1400	1500		µg/L	11 U	5.0 U	5.0 U	5.0 U
Benzene	0.46	370	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	0.13		80	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	3.3	320	80	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	0.75			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	81	0.92		µg/L	1.0 U	0.27 J	1.0 U	1.0 U
Carbon tetrachloride	0.46	13.3	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	7.8	1.3	100	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	2100			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	0.22	1.8	80	µg/L	1.0 U	1.6^{a}	1.0 U	1.0 U
Chloromethane (Methyl chloride)	19			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	3.6		70	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene				µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	1300			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	0.87		80	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	20			µg/L	1.0 U	1.0 U	1.0 U	1.0 U

Table 3

2018 Analytical OU-5 Groundwater Results
Former Wilmington Assembly Plant
Wilmington, Delaware

Sample Location:					MW-28	MW-112	MW-113	MW-113
Sample ID:					WG-17338-062618-AM-005	GW-01733818-0713-RM-01	GW-01733818-0713-RM-02	GW-01733818-0713-RM-03
Sample Date:					6/26/2018	7/13/2018	7/13/2018	7/13/2018 (Duplicate)
Parameters	**DNREC-SIRS Screening Levels (2018)[1]**	**DNREC-SIRS Ecological Surface Water Fresh Screening Levels (2018)**	**USEPA MCL (2017)**	**Units**				
	a	b	c					
Volatile Organic Compounds (Continued)								
Ethylbenzene	1.5	90	700	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	45	2.6		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	2000			µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Methyl cyclohexane				µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	10	11070		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5	98.1	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100	72	100	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1	111	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	110	2	1000	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	36	970	100	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene				µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	0.28	21	5	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	520			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	1000			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	0.019	930	2	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	19	13	10000	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Semi-volatile Organic Compounds								
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	71			µg/L	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	120			µg/L	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	1.2	4.9		µg/L	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	4.6	11		µg/L	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	36			µg/L	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	3.9			µg/L	20 U	20 U	20 U	20 U
2,4-Dinitrotoluene	0.24	44		µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2,6-Dinitrotoluene	0.049	81		µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2-Chloronaphthalene	75			µg/L	10 U	10 U	10 U	10 U
2-Chlorophenol	9.1	24		µg/L	10 U	10 U	10 U	10 U
2-Methylnaphthalene	3.6	4.7		µg/L	10 U	10 U	10 U	10 U
2-Methylphenol	93	13		µg/L	10 U	10 U	10 U	10 U
2-Nitroaniline	19			µg/L	10 U	10 U	10 U	10 U
2-Nitrophenol				µg/L	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	0.13	4.5		µg/L	10 U	10 U	10 U	10 U

Table 3

2018 Analytical OU-5 Groundwater Results
Former Wilmington Assembly Plant
Wilmington, Delaware

Sample Location:					**MW-28**	**MW-112**	**MW-113**	**MW-113**
Sample ID:					**WG-17338-062618-AM-005**	**GW-01733818-0713-RM-01**	**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
Sample Date:					**6/26/2018**	**7/13/2018**	**7/13/2018**	**7/13/2018** **(Duplicate)**
Parameters	**DNREC-SIRS Screening Levels (2018)$^{(1)}$**	**DNREC-SIRS Ecological Surface Water Fresh Screening Levels (2018)**	**USEPA MCL (2017)**	**Units**				
	a	b	c					
Semi-volatile Organic Compounds (Continued)								
3-Nitroaniline				µg/L	10 U	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	0.15			µg/L	20 U	20 U	20 U	20 U
4-Bromophenyl phenyl ether				µg/L	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	140			µg/L	10 U	10 U	10 U	10 U
4-Chloroaniline	0.37	232		µg/L	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether				µg/L	10 U	10 U	10 U	10 U
4-Methylphenol	190	543		µg/L	10 U	10 U	10 U	10 U
4-Nitroaniline	3.8			µg/L	10 U	10 U	10 U	10 U
4-Nitrophenol				µg/L	20 U	20 U	20 U	20 U
Acenaphthene	53	5.8		µg/L	10 U	10 U	10 U	10 U
Acenaphthylene				µg/L	10 U	10 U	10 U	10 U
Acetophenone	190			µg/L	10 U	10 U	10 U	10 U
Anthracene	180	0.012		µg/L	10 U	10 U	10 U	10 U
Atrazine	0.3	1.8	3	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzaldehyde	19			µg/L	10 U	10 U	10 U	10 U
Benzo(a)anthracene	0.03	0.018		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	0.025	0.015	0.2	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	0.25			µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzo(g,h,i)perylene				µg/L	10 U	10 UJ	10 UJ	10 UJ
Benzo(k)fluoranthene	2.5			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	0.083	14		µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	5.9			µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	0.014			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	5.6	16	6	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	16	19		µg/L	10 U	10 U	10 U	10 U
Caprolactam	990			µg/L	10 U	10 U	10 U	10 U
Carbazole				µg/L	10 U	10 U	10 U	10 U
Chrysene	25			µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Dibenz(a,h)anthracene	0.025			µg/L	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Dibenzofuran	0.79	3.7		µg/L	10 U	10 U	10 U	10 U
Diethyl phthalate	1500	210		µg/L	10 U	10 U	10 U	10 U
Dimethyl phthalate				µg/L	10 U	10 U	10 U	10 U
Di-n-butylphthalate (DBP)	90	19		µg/L	10 U	10 U	10 U	10 U

Table 3

2018 Analytical OU-5 Groundwater Results
Former Wilmington Assembly Plant
Wilmington, Delaware

Parameters	DNREC-SIRS Screening Levels (2018)$^{(1)}$	DNREC-SIRS Ecological Surface Water Fresh Screening Levels (2018)	USEPA MCL (2017)	Units	MW-28	MW-112	MW-113	MW-113
Sample ID:					WG-17338-062618-AM-005	GW-01733818-0713-RM-01	GW-01733818-0713-RM-02	GW-01733818-0713-RM-03
Sample Date:					6/26/2018	7/13/2018	7/13/2018	7/13/2018 (Duplicate)
	a	b	c					
Semi-volatile Organic Compounds (Continued)								
Di-n-octyl phthalate (DnOP)	20	22		µg/L	10 U	10 U	10 U	10 U
Fluoranthene	80	0.04		µg/L	10 U	10 U	10 U	10 U
Fluorene	29	3		µg/L	10 U	10 U	10 U	10 U
Hexachlorobenzene	0.0098	0.0003	1	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobutadiene	0.14	1.3		µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	0.041		50	µg/L	10 U	10 U	10 U	10 U
Hexachloroethane	0.33	12		µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	0.25			µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Isophorone	78			µg/L	10 U	10 U	10 U	10 U
Naphthalene	0.17	1.1		µg/L	10 U	10 U	10 U	10 U
Nitrobenzene	0.14			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodi-n-propylamine	0.011			µg/L	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodiphenylamine	12	210		µg/L	10 U	10 U	10 U	10 U
Pentachlorophenol	0.041	0.5	1	µg/L	20 U	20 U	20 U	20 U
Phenanthrene	12	0.4		µg/L	10 U	10 U	10 U	10 U
Phenol		4		µg/L	10 U	10 U	10 U	10 U
Pyrene	12	0.025		µg/L	10 U	10 U	10 U	10 U
Metals								
Aluminum	2000	87		µg/L	29.6 J	39.5 J	22.4 J	40.0 U
Antimony	0.78	30	6	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	0.052	5	10	µg/L	7.5^{ab}	2.2^{a}	0.77 J^{a}	0.86 J^{a}
Barium	380	4	2000	µg/L	182^{b}	156^{b}	226^{b}	224^{b}
Beryllium	2.5	0.66	4	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Cadmium	0.92	0.25	5	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Calcium				µg/L	13500	37800	35100	34400
Chromium	10	85	100	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Cobalt	0.6	23		µg/L	26.8^{ab}	10.8^{a}	9.2^{a}	8.8^{a}
Copper	80	9	1300	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Iron	1400	300		µg/L	23400^{ab}	1330^{b}	4680^{ab}	4570^{ab}
Lead	15	2.5	15	µg/L	1.2 U	1.2 U	1.2 U	1.2 U
Magnesium				µg/L	21500	20900	26100	25100
Manganese	43	120		µg/L	3290^{ab}	3840^{ab}	2400^{ab}	2330^{ab}

Table 3

2018 Analytical OU-5 Groundwater Results
Former Wilmington Assembly Plant
Wilmington, Delaware

Parameters	**DNREC-SIRS Screening Levels (2018)[1]**	**DNREC-SIRS Ecological Surface Water Fresh Screening Levels (2018)**	**USEPA MCL (2017)**	**Units**				
Sample Location:					**MW-28**	**MW-112**	**MW-113**	**MW-113**
Sample ID:					**WG-17338-062618-AM-005**	**GW-01733818-0713-RM-01**	**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
Sample Date:					**6/26/2018**	**7/13/2018**	**7/13/2018**	**7/13/2018 (Duplicate)**
	a	b	c					
Metals (Continued)								
Mercury	0.063	0.026	2	µg/L	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	39	52		µg/L	3.3 J	3.7 J	1.5 J	1.9 J
Potassium				µg/L	2820	7050	7000	6820
Selenium	10	1	50	µg/L	10.0 U	10.0 U	10.0 U	10.0 U
Silver	9.4	3.2		µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Sodium				µg/L	122000	41600	61800	59500
Thallium	0.02	0.8	2	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Vanadium	8.6	20		µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Zinc	600	120		µg/L	16.0 U	16.0 U	16.0 U	16.0 U

Notes:

J - Estimated concentration
U - Not detected at the associated reporting limit
UJ - Not detected; associated reporting limit is estimated
µg/L - Micrograms per liter
[1] Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration (SIRS) Screening Levels
a - Concentration exceeds DNREC-SIRS Screening Level, 2018
b - Concentration exceeds DNREC-SIRS Ecological Surface Water Fresh Screening Level, 2018
c - Concentration exceeds USEPA 2017 Maximum Contaminant Level (MCL)
4.3 J - Concentration exceeds criteria

Attachment A

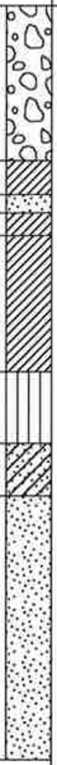
Well Construction Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

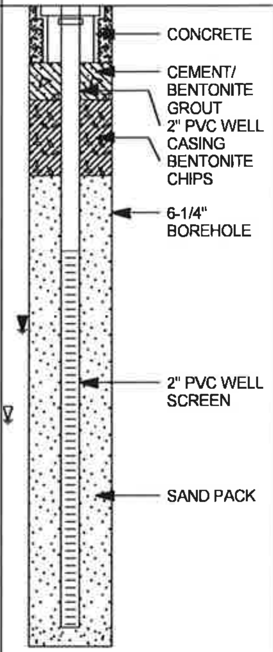
PROJECT NAME: FORMER WILMINGTON ASSEMBLY PLANT
PROJECT NUMBER: 01733818
CLIENT: RACER
LOCATION: WILMINGTON, DELAWARE

HOLE DESIGNATION: MW-112
DATE COMPLETED: 27 June 2018
DRILLING METHOD: HSA
FIELD PERSONNEL: R. MEHALICK

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft
	GP-GRAVEL	
2		
4	- fine grained, black at 3.9ft BGS	4.10
	CL-SILTY CLAY, trace organic material, with wood fragments, soft to firm, gray/green	5.00
		5.50
6	SP-SAND, with fine gravel, medium grained, dark gray	6.10
	CL-CLAY, soft, gray/green	
8	CL-SILTY CLAY, gray/green	9.70
10	ML-SILT, with coarse sand and fine gravel, gray	11.60
12	SC-CLAYEY SAND, fine to medium grained, gray, orange mottling	
	- some sandy clay, medium grained, no mottling at 12.3ft BGS	13.00
14	SP-SAND, medium grained, orange/tan, wet	
	- medium to fine grained at 14.3ft BGS	
16		
	- with fine gravel, fine to medium grained, gray/orange/tan at 17.1ft BGS	
18	- coarse grained at 18.3ft BGS	
	- clay lens, tan at 18.9ft BGS	
	- with fine to coarse gravel, fine to coarse grained at 19.0ft BGS	20.00
20	END OF BOREHOLE @ 20.0ft BGS	
22		
24		
26		
28		
30		
32		
34		



MONITORING WELL



WELL DETAILS
Screened interval:
6.50 to 16.50ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.50 to 4.50ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.50 to 17.00ft BGS
Material: #2 SAND

SAMPLE				
NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1HSA				0.4
2HSA				0.9 0.4 0.0
3HSA				0.0
4HSA				0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

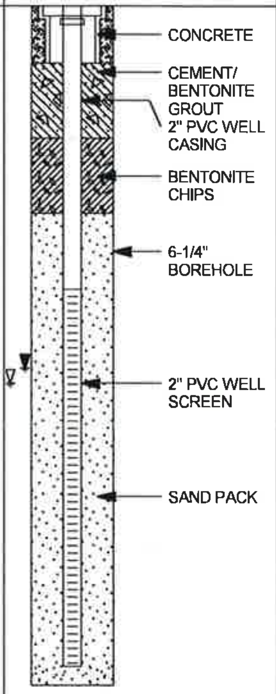
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: FORMER WILMINGTON ASSEMBLY PLANT
PROJECT NUMBER: 01733818
CLIENT: RACER
LOCATION: WILMINGTON, DELAWARE

HOLE DESIGNATION: MW-113
DATE COMPLETED: 27 June 2018
DRILLING METHOD: HSA
FIELD PERSONNEL: R. MEHALICK

DEPTH ft	STRATIGRAPHIC DESCRIPTION & REMARKS
0.10	ASPHALT
2.50	NO RECOVERY
3.20	SP-SAND, with silt and fine gravel, green/gray
3.80	SM-SILTY, fine to medium grained, green/gray
4.00	- clay lens, firm, gray/black at 3.6ft BGS
5.00	SP-SAND, with fine gravel, coarse grained, orange
	CL-SILTY CLAY, soft, green/gray
8.30	NO RECOVERY
10.00	SP-SAND, with silty clay and fine gravel, medium grained, gray/green - brown/orange at 9.7ft BGS
11.50	NO RECOVERY
16.00	SP-SAND, with fine gravel, some silt, medium to coarse grained, brown, saturated - medium grained, tan, with orange banding at 13.4ft BGS - medium to coarse grained, orange, saturated at 13.8ft BGS - clay lens, firm, gray at 15.8ft BGS
19.70	SP-SAND, medium to fine grained, orange/tan/gray - some silt, tan at 18.0ft BGS - medium grained, orange at 19.1ft BGS
20.00	ML-SANDY SILT, with fine sand, gray
	END OF BOREHOLE @ 20.0ft BGS

MONITORING WELL



WELL DETAILS
Screened interval:
7.50 to 17.50ft BGS
Length: 10ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
3.50 to 5.50ft BGS
Material: BENTONITE CHIPS
Sand Pack:
5.50 to 18.00ft BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1HSA				34.9 18.7 12.4
2HSA				2.6
3HSA				0.0 0.0
4HSA				0.0 0.4

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ∇ STATIC WATER LEVEL ▼

start purge 0950

Well Development, Purging, and Sampling Form
(Form SP-06)
Page 1 of 2

PROJECT #: 01733818 PROJECT NAME: RACER Wilmington DATE: 6/28/18

WELL ID: MW112 FIELD PERSONNEL: Russ mehalick

WELL DIAMETER 2" in

WELL DEPTH 17' m/ft

STATIC DEPTH TO WATER 8.52' m/ft

WATER COLUMN HEIGHT 8.48 m/ft

CASING VOLUME 1.36 L/gal

MEASURING REFERENCE POINT PVC

Well Diameter (in)	Casing Volume (L/m)	Casing Volume (US gallon/foot)
1.5	1.14	0.09
2	2.03	0.16
4	8.11	0.65
6	18.24	1.47

PURGING AND SAMPLING EQUIPMENT

DEDICATED PURGING EQUIPMENT? YES NO DEDICATED SAMPLING EQUIPMENT? YES NO

PURGING DEVICE	D	A - INERTIAL PUMP (WATERRA®)	B - BAILER	C - PERISTALTIC PUMP	D - SUBMERSIBLE PUMP	X - ______ OTHER (SPECIFY)
SAMPLING DEVICE	—	E - BLADDER PUMP	F - PURGE PUMP	G - DIPPER BOTTLE	H - GAS LIFT PUMP	
PURGING MATERIAL	C	A - POLYETHYLENE	B - TEFLON	C - PVC	D - POLYPROPYLENE	X - ______ OTHER (SPECIFY)
SAMPLING MATERIAL	—	E - STAINLESS STEEL				
TUBING PURGING	C	A - POLYETHYLENE	B - TEFLON	C - TYGON	D - POLYPROPYLENE	X - ______ OTHER (SPECIFY)
TUBING SAMPLING	—	E - SILICONE	F - ROPE	G - COMBINATION TEFLON/POLYPROPYLENE		
FILTERING DEVICES	—	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	PORE SIZE:	

DEVELOPMENT/PURGING FIELD MEASUREMENTS ARE RECORDED ON PAGE 2.

SAMPLING INFORMATION

SAMPLE DATE/TIME: No Samples

WEATHER CONDITIONS AT TIME OF SAMPLING:

SAMPLE ID:

SAMPLE WAS FILTERED FOR (ANALYSIS):

SAMPLE APPEARANCE:

PROJECT #: PROJECT NAME: DATE:

Well Development, Purging, and Sampling Form
(Form SP-06)
Page 2 of 2

Start purge 0950 @ 0.75gpm

WELL ID: MW 112 FIELD PERSONNEL: Russ Mehalek

FIELD MEASUREMENTS

DATE	TIME Units: Stabilization:	VOLUME (L) [✓ US gal] -	TEMPERATURE (°C) (°F) ±10%	CONDUCTIVITY (mS/cm) (µS/cm) ±10%	pH - ±0.1 units	TURBIDITY (NTU) <5	COLOUR - -	ODOUR - -	COMMENTS - -
8/28/18	1000	2	19.3	0.375	7.31	>1000	Turbid Tan	None	very slow yield
	1023	4	19.7	0.351	7.13	>1000	turbid Tan		
	1110	6.5	20.0	0.342	6.95	>1000	"		
	1145	8	20.8	0.342	7.05	>1000	"		
	1223	9.5	21.2	0.344	7.07	>1000	"		
	1254	11	20.9	0.351	7.01	>1000	"		
	1327	12.5	20.9	0.355	7.01	>1000	"		
	1400	14	21.5	0.355	7.03	710	"		
	1431	15.5	22.1	0.346	6.93	865	"		
	1501	17	21.7	0.340	6.95	591	"		
	1534	18.5	21.4	0.351	6.92	596	"		
	1615	20	20.5	0.349	6.93	598	"		

Pumped Dry in 1.5 minutes
- will continue to pump to dryness several times to Attempt to clear water

Well Development, Purging, and Sampling Form
(Form SP-06)
Page 1 of 2

PROJECT #: 01733818 PROJECT NAME: RACER Wilmington DATE: 6/28/18

WELL ID: MW113 FIELD PERSONNEL: Russ Mehslak'

WELL DIAMETER 2" in

WELL DEPTH 18' m/ft

STATIC DEPTH TO WATER 9.70 m/ft

WATER COLUMN HEIGHT 8.3' m/ft

CASING VOLUME 1.33 gals L/gal

MEASURING REFERENCE POINT pvc

Well	Casing Volume	
Diameter (in)	(L/m)	(US gallon/foot)
1.5	1.14	0.09
2	2.03	0.16
4	8.11	0.65
6	18.24	1.47

PURGING AND SAMPLING EQUIPMENT

DEDICATED PURGING EQUIPMENT? YES NO DEDICATED SAMPLING EQUIPMENT? YES NO

PURGING DEVICE	D	A - INERTIAL PUMP (WATERRA®)	B - BAILER	C - PERISTALTIC PUMP	D - SUBMERSIBLE PUMP	X - ______
SAMPLING DEVICE	—	E - BLADDER PUMP	F - PURGE PUMP	G - DIPPER BOTTLE	H - GAS LIFT PUMP	OTHER (SPECIFY)
PURGING MATERIAL	C[illegible]	A - POLYETHYLENE	B - TEFLON	C - PVC	D - POLYPROPYLENE	X - ______
SAMPLING MATERIAL	—	E - STAINLESS STEEL				OTHER (SPECIFY)
TUBING PURGING	AC	A - POLYETHYLENE	B - TEFLON	C - TYGON	D - POLYPROPYLENE	X - ______
TUBING SAMPLING		E - SILICONE	F - ROPE	G - COMBINATION TEFLON/POLYPROPYLENE		OTHER (SPECIFY)
FILTERING DEVICES	—	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	PORE SIZE : ______	

DEVELOPMENT/PURGING FIELD MEASUREMENTS ARE RECORDED ON PAGE 2.

SAMPLING INFORMATION

SAMPLE DATE/TIME: No samples

WEATHER CONDITIONS AT TIME OF SAMPLING:

SAMPLE ID:

SAMPLE WAS FILTERED FOR (ANALYSIS):

SAMPLE APPEARANCE:

PROJECT #: PROJECT NAME: DATE:

Well Development, Purging, and Sampling Form
(Form SP-06)
Page 2 of 2

Start purge @ 0828 @ 0.25 gpm

WELL ID: mw113 FIELD PERSONNEL: Russ mehalick

FIELD MEASUREMENTS

DATE	TIME Units: Stabilization:	VOLUME (L) [✓ (US gal)] -	TEMPERATURE [✓ (°C)] (°F) ±10%	CONDUCTIVITY [✓ (mS/cm)] (µS/cm) ±10%	pH - ±0.1 units	TURBIDITY (NTU) <5	COLOUR - -	ODOUR - -	COMMENTS - Surged then started pumping
6/28/18	0821	2.5	19.0	0.588	6.37	>1000	turbid tan	None	
	0826	8	18.4	0.488	6.70	>1000	turbid tan	None	shut off @ 0830 At ~11 gals to surge
	0840	18	15.8	0.470	6.71	>1000	turbid tan	None	restarted 0834
	0846	23	15.8	0.475	6.64	153	clearing	↓	
	0852	28	15.8	0.484	6.60	47.9	clear		Shut off @ 0853 to surge again
	0901	32	15.6	0.514	6.52	>1000	turbid tan		restarted 0855
	0907	37	15.7	0.524	6.48	153	clearing		
	0913	42	15.8	0.526	6.37	15.8	clear		
	0919	46	15.8	0.531	6.39	14.3	clear		
	0924	50	15.7	0.536	6.39	14.4	clear		

Attachment B
Field Documentation

7/18
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call off

truck after
vault.

Low-Flo
(For

7/13/18

0755 Russ Mehalick (GHD) arrives and meets Chris (Axis Surveying) waiting for his assistant Grace

weather: Mostly Sunny 70's-80's

0810 Grace Arrives and signs in.
Do tailgate H&S

0815 meet Scott - drive back and he unlocks gate for us.

-calibrated PID # PHI 06225 w/ 100ppm Isobutylene in Air from IE Monitoring
Lot # JBH-248-100-19 exp. 11/2021
Meter reading 100.3 ppm.

-calibrated Rental Horiba U52 from US Environmental #GTMOX5IM/P6KXNALG using auto cal soln from Aqua Phoenix
Lot# 8GB925 exp 2/2019

- Horiba was Lab calibrated in the Shop on 7/10/18 order #9402.

0855 begin Purging MW112 using dedicated "1/4" poly tubing and peristaltic pump see "GHD form SP-09" for purging info.

1100 Surveyors done and off site.

1200 Performed an equip Rinse blank by pumping Lab supplied water through new dedicated tubing and into sample

Well
olumes
d(4)

7/13/18

Bottles

1220 Finished packing all samples in a cooler w/ Ice to ship overnight fed-X to Test America labs in Edison NJ.

<u>Bottle list</u>

(3) 40ml glass w/ HCL for VOC's + TIC's

(2) 250ml amber glass unfixed for SVOC's + TIC's

(1) 250ml plastic w/ HNO3 to TAL metals.

1245 GHD offsite

Wilming

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Temp

ired$^{(5)}$: ±

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20
20
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20
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20.4
20.6

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matres (5-foo
and L are in in
not exceed 0.1
or until 20 well screen volumes have been purged (unless purge water remains visually turbid
parameters are varying slightly outside of the stabilization criteria and

CONTENTS

PAGE	REFERENCE	DATE
	017338 - Wilmington, DE Former RACER Ass. Plant	

7:10 on-site 6/26/18

8:00 start pumping

Bladder pump 1/4 x 1/4

WG-17338-062618-AM-001 voc, svoc, metal
T: 910 metal ms/msD

DUPE
WG-17338 062618-AM-002 voc, svoc, metal
T: 915

SVOC RB

RB-17338-062618-AM-001 T: 935

1000 set up on MW8 and start pumping
Bladder w/ 3/8 x 1/4 - tubing from last time

WG-17338-062618-AM-003 voc, svoc, metal
T 1050 voc ms/msD

RB-17338-062618-AM-002 - metals
T: 1105

Set up on MW9
Start pumping @ 1125
Bladder pump 1/4" x 3/8"

WG-17338-062618-AM-004 voc, svoc, metal.
T: 1335 svoc ms/msd

RB 17338-062618-AM-003
T: 1345 VOCs.

1420 Set up and start pumping
on MW28
Peristaltic pump w/ 1/4" tube

WG-17338-062618-AM-005 voc, svoc, metal
T: 1530
~~TB-17338-062618-AM-001 T: 1430~~
~~TB-17338-062618-AM-002 T: 1435~~

Monitoring Well Record for Low-Flow Purging
(Form SP-09)

Project Data:

Project Name: RACER Wilmington
Ref. No.: 01733818
Date: 7/13/18
Personnel: R-Menaldi

Monitoring Well Data:

Well No.: MW 112
Vapour PID (ppm): 2.2
Measurement Point: PVC
Constructed Well Depth (m/ft): 17'
Measured Well Depth (m/ft): 16.7
Depth of Sediment (m/ft):
Saturated Screen Length (m/ft): 10'
Depth to Pump Intake (m/ft)$^{(1)}$: 15'
Well Diameter, D (cm/in): 2"
Well Screen Volume, V_s (L)$^{(4)}$:
Initial Depth to Water (m/ft): 9.67

Time	Pumping Rate (mL/min)	Depth to Water (m/ft)	Drawdown from Initial Water Level$^{(3)}$ (m/ft)	Temperature °C	Conductivity (mS/cm)	Turbidity NTU	DO (mg/L)	pH	ORP (mV)	Volume Purged, Vp (L)	No. of Well Screen Volumes Purged$^{(4)}$
			Precision Required$^{(5)}$:	±3 %	±0.005 or 0.01$^{(5)}$	±10 %	±10 %	±0.1 Units	±10 mV		
0855	88	10.10		21.70	0.589	6.8	8.37	6.96	-1		
0905	83	10.34		20.49	0.581	12.5	0.38	7.09	-46		
0915	79	10.48		20.49	0.585	29.2	0.34	7.10	-52		
0925	80	10.55		20.31	0.588	32.8	0.31	7.09	-60		
0935	79	10.60		20.36	0.587	25.4	0.27	7.09	-69		
0945	79	10.63		20.36	0.582	14.3	0.23	7.10	-76		
0950	79	10.65		20.37	0.580	10.4	0.21	7.10	-79		
0955	79	10.68		20.42	0.577	9.1	0.20	7.10	-80		
1000	79	10.67		20.45	0.576	8.0	0.20	7.10	-81		
1005	79	10.65		20.62	0.572	6.1	0.18	7.10	-81		

Sample ID: GW-01733818-071318-RM-01
Sample Time: 1005

Notes: WQ: Clear   Volume purged 1.3 gals

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm. For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 500 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing). No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

Monitoring Well Record for Low-Flow Purging
(Form SP-09)

Project Data:

Project Name: RACER Wilmington
Ref. No.: 01733818
Date: 7/13/18
Personnel: Russ Mehalic

Monitoring Well Data:

Well No.: MW113
Vapour PID (ppm): 0.4
Measurement Point: PVC
Constructed Well Depth (m/ft): 18'
Measured Well Depth (m/ft): 17.8'
Depth of Sediment (m/ft):

Saturated Screen Length (m/ft): 10'
Depth to Pump Intake (m/ft)(1): 14'
Well Diameter, D (cm/in): 2"
Well Screen Volume, V_s (L)(2):
Initial Depth to Water (m/ft): 9.33

Time	Pumping Rate (mL/min)	Depth to Water (m/ft)	Drawdown from Initial Water Level(3) (m/ft)	Temperature °C	Conductivity (mS/cm)	Turbidity NTU	DO (mg/L)	pH	ORP (mV)	Volume Purged, Vp (L)	No. of Well Screen Volumes Purged(4)
			Precision Required(5):	±3 %	±0.005 or 0.01(5)	±10 %	±10 %	±0.1 Units	±10 mV		
1040	160	9.51		20.79	0.640	9.5	1.34	6.68	-38		
1050	160	9.57		20.01	0.667	1.0	0.10	6.71	-46		
1055	160	9.59		19.97	0.678	0.3	0.08	6.72	-50		
1100	160	9.59		20.05	0.682	0.5	0.07	6.73	-52		
1105	161	9.59		19.95	0.682	0.5	0.06	6.73	-52		
1110				19.79	0.684	0.0	0.05	6.73	-51		
1115	161	9.59		19.72	0.684	0.0	0.04	6.73	-51		
1120	160	9.59		19.81	0.683	0.0	0.03	6.72	-50		
1125	161	9.59		19.87	0.683	0.0	0.02	6.73	-50		
~~1130~~	~~161~~	~~9.59~~									

Sample ID: GW-01733818-071318-RM-02 MS/MSD
GW-017338-18-071318-RM-03 Duplicate

Sample Time: 1125 / Dup 1140

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom

(2) The well screen volume will be based on a 1.52 metres (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm
For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 500 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing). No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm

W/Q clear

Volume purged 1.7 gals

Well Development, Purging, and Sampling Form
(Form SP-06)

SAMPLE APPEARANCE: ______

PROJECT #: 17338-T02-2018 PROJECT NAME: Former RACER Ass. Plant DATE: 6/26/18
WELL ID: MW-28 FIELD PERSONNEL: A. Martin

FIELD MEASUREMENTS

DATE	TIME	VOLUME	TEMPERATURE	CONDUCTIVITY	pH	TURBIDITY	DO	ORP	COMMENTS
	Units:	(L) (US gal)	[✓ (°C)] (°F)	(mS/cm) (µS/cm)	-	(NTU)	mg/L	(mV)	-
	Stabilization:	-	±10%	±10%	±0.1 units	<5	±10%	±10 mV	-
6/26/18	1425		19.42	0.958	6.86	540	0.38	-94	0.50 L/m
	1440	3.25 gal	19.25	0.963	6.90	71.4	0.43	-95	
	1455		19.25	0.964	6.92	35.0	0.43	-94	
	1510		19.14	0.966	6.94	0.0	0.55	-93	
	1515		19.23	0.964	6.94	0.0	0.56	-93	
	1520	4 gal.	19.19	0.962	6.94	0.0	0.60	-93	Sample

WG-17338-062618-AM-005 T: 1330

Well Development, Purging, and Sampling Form
(Form SP-06)
Page 1 of 3

PROJECT #: 17338-T02-2018 PROJECT NAME: Former Racer Axe Plant DATE: 6/26/18

WELL ID: MW28 FIELD PERSONNEL: A. Martin

WELL DIAMETER 1 in
WELL DEPTH ______ m/ft
STATIC DEPTH TO WATER ______ m/ft
WATER COLUMN HEIGHT ______ m/ft
CASING VOLUME ______ L/gal
MEASURING REFERENCE POINT ______

Well	Casing Volume	
Diameter (in)	(L/m)	(US gallon/foot)
1.5	1.14	0.09
2	2.03	0.16
4	8.11	0.65
6	18.24	1.47

PURGING AND SAMPLING EQUIPMENT

DEDICATED PURGING EQUIPMENT? YES NO DEDICATED SAMPLING EQUIPMENT? [✓ YES] -tubing NO

PURGING DEVICE	☐	A - INERTIAL PUMP (WATERRA®)	B - BAILER	C - PERISTALTIC PUMP	D - SUBMERSIBLE PUMP	X - ______
SAMPLING DEVICE	C	E - BLADDER PUMP	F - PURGE PUMP	G - DIPPER BOTTLE	H - GAS LIFT PUMP	OTHER (SPECIFY)
PURGING MATERIAL	☐	A - POLYETHYLENE	B - TEFLON	C - PVC	D - POLYPROPYLENE	X - ______
SAMPLING MATERIAL	A	E - STAINLESS STEEL				OTHER (SPECIFY)
TUBING PURGING	☐	A - POLYETHYLENE	B - TEFLON	C - TYGON	D - POLYPROPYLENE	X - ______
TUBING SAMPLING	A	E - SILICONE	F - ROPE	G - COMBINATION TEFLON/POLYPROPYLENE		OTHER (SPECIFY)
FILTERING DEVICES	☐	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	PORE SIZE : ______	

DEVELOPMENT/PURGING FIELD MEASUREMENTS ARE RECORDED ON PAGE 2.

SAMPLING INFORMATION

SAMPLE DATE/TIME: 6/26/18
WEATHER CONDITIONS AT TIME OF SAMPLING: Clear, Sunny
SAMPLE ID: WG-017338-062618-AM-005
SAMPLE WAS FILTERED FOR (ANALYSIS): no

Attachment C

Data Validation Memo

Memorandum

August 9, 2018
Revised October 23, 2018

To:	Samantha Sasnow	Ref. No.:	017338-TO5
From:	scs Susan Scrocchi/adh/38	Tel:	716-205-1984

Subject: **Analytical Results and Full Validation**
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

1. Introduction

This document details a validation of analytical results for groundwater samples collected in support of the Site-Wide Groundwater Monitoring at the RACER Former Wilmington Assembly Plant site during June and July 2018. Samples were submitted to TestAmerica (TA) Laboratories, Inc. located in Edison, New Jersey. TA-Edison is a Hazardous Substance Cleanup Act (HSCA)-approved laboratory. All samples were analyzed per the Standard Operating Procedures for Chemical Analytical Programs (SOP CAP). A sample collection and analysis summary is presented in Table 1. The validated analytical results are summarized in Table 2. A summary of the analytical methodology is presented in Table 3.

Full Contract Laboratory Program (CLP) equivalent raw data deliverables were provided by the laboratory. Evaluation of the data was based on information obtained from the finished data sheets, raw data, chain of custody forms, calibration data, blank data, duplicate data, recovery data from surrogate spikes/laboratory control samples (LCS)/matrix spike (MS) samples, and field quality assurance/quality control (QA/QC) samples. The assessment of analytical and in-house data included checks for: data consistency (by observing comparability of duplicate analyses), adherence to accuracy and precision criteria, and transmittal errors.

The QA/QC criteria by which these data have been assessed are outlined in the analytical methods referenced in Table 3 and applicable guidance from the documents entitled:

i) "Remedial Investigation Workplan"; Section 6.0, August 2011, revision

ii) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review", United States Environmental Protection Agency (USEPA) 540-R-10-011, January 2010

iii) "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review", USEPA 540-R-08-01, June 2008

Items ii) and iii) will subsequently be referred to as the "Guidelines" in this Memorandum.

2. Sample Holding Time and Preservation

The sample holding time criteria for the analyses are summarized in Table 3. Sample chain of custody documents and analytical reports were used to determine sample holding times. All samples were prepared and analyzed within the required holding times.

All samples were properly preserved, delivered on ice, and stored by the laboratory at the required temperature (0-6°C).

3. Gas Chromatography/Mass Spectrometer (GC/MS) – Tuning and Mass Calibration (Instrument Performance Check) and Inductively Coupled Plasma/Mass Spectrometer (ICP/MS)

3.1 Organic Analyses

Prior to volatile organic compound (VOC) and semi-volatile organic compound (SVOC) analysis, GC/MS instrumentation is tuned to ensure optimization over the mass range of interest. To evaluate instrument tuning, methods require the analysis of specific tuning compounds bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), respectively. The resulting spectra must meet the criteria cited in the methods before analysis is initiated. Analysis of the tuning compound must then be repeated every 12 hours throughout sample analysis to ensure the continued optimization of the instrument.

Tuning compounds were analyzed at the required frequency throughout VOC and SVOC analysis periods. All tuning criteria were met indicating that proper optimization of the instrumentation was achieved.

3.2 Inorganic Analyses

To ensure adequate mass resolution, identification, and to some degree, sensitivity, the performance of each ICP/MS instrument used for metals analyses is checked prior to calibration and initiating an analysis sequence through the analysis of a tuning solution.

Instrument performance check data were reviewed. The tuning solution was analyzed at the required frequency throughout the analyses. The results of all instrument performance checks were within the method acceptance criteria, indicating that proper optimization of the instrumentation was achieved.

4. Initial Calibration - Organic Analyses

4.1 GC/MS

To quantify VOCs and SVOCs of interest in samples, calibration of the GC/MS over a specific concentration range must be performed. Initially, a five-point calibration curve containing all compounds of interest is analyzed to characterize instrument response for each analyte over a specific concentration range. Linearity of the calibration curve and instrument sensitivity are evaluated against the following criteria:

i) All relative response factors (RRFs) must be greater than or equal to 0.05 (0.01 for poor responders).

ii) The percent relative standard deviation (RSD) values must not exceed 20.0 percent (40.0 percent for poor responders) or a minimum correlation coefficient (R) of 0.99 and minimum coefficient of determination (R^2) of 0.99 if linear and quadratic equation calibration curves, respectively, are used.

The initial calibration data for VOCs and SVOCs were reviewed. All compounds met the above criteria for sensitivity. Some RSD values were outside of the criteria indicating possible non-linearity. All associated sample results were qualified as estimated (see Table 4).

5. Initial Calibration – Inorganic Analyses

Initial calibration of the instruments ensures that they are capable of producing satisfactory quantitative data at the beginning of a series of analyses. For ICP/MS analysis, a calibration blank and at least one standard must be analyzed at each wavelength to establish the analytical curve. For mercury atomic absorption (AA) analyses, a calibration blank and a minimum of five standards must be analyzed to establish the analytical curve, and resulting correlation coefficients (R) must be 0.995 or greater.

After the analyses of the calibration curves, an initial calibration verification (ICV) standard must be analyzed to verify the analytical accuracy of the calibration curves. All analyte recoveries from the analyses of the ICVs must be within the following control limits:

Analytical Method	Parameter	Control Limits
ICP/MS	Metals	90 - 110%
Cold Vapor AA	Mercury	80 - 120%

Upon review of the data, it was determined that the calibration curves and ICVs were analyzed at the proper frequencies and that all of the above-specified criteria were met. The laboratory effectively demonstrated that the instrumentation used for metals and general chemistry analyses were properly calibrated prior to sample analysis.

6. Continuing Calibration - Organic Analyses

6.1 GC/MS

To ensure that instrument calibration for VOC and SVOC analyses is acceptable throughout the sample analysis period, continuing calibration standards must be analyzed and compared to the initial calibration curve every 12 hours.

The following criteria were employed to evaluate continuing calibration data:

i) All RRF values must be greater than or equal to 0.05 (0.01 for poor responders).

ii) Percent difference (%D) values must not exceed 25 percent (40.0 percent for poor responders) for the opening calibration standard, and 50 percent for the closing calibration standard.

Calibration standards were analyzed at the opening and closing of the sequence, and the results met the above criteria for instrument sensitivity and stability with the exception of dibenzo(a,h)anthracene exhibiting a high %D. All associated sample results were previously qualified as estimated based on the initial calibration.

7. Continuing Calibration - Inorganic Analyses

To ensure that instrument calibration is acceptable throughout the sample analysis period, continuing calibration verification (CCV) standards are analyzed on a regular basis. Each CCV is deemed acceptable if all analyte recoveries are within the control limits specified above for the ICVs. If some of the CCV analyte recoveries are outside the control limits, samples analyzed before and after the CCV, up until the previous and proceeding CCV analyses, are affected.

For this study, CCVs were analyzed at the proper frequency. All analyte recoveries reported for the CCVs were within the specified limits.

8. Laboratory Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures. Additionally, initial and continuing calibration blanks (ICBs/CCBs) are routinely analyzed after each ICV/CCV for the inorganic parameters.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

8.1 Organic Analyses

All method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

8.2 Inorganic Analyses

All ICB, CCB, and method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

9. Surrogate Spike Recoveries

In accordance with the methods employed, all samples, blanks, and QC samples analyzed for organics are spiked with surrogate compounds prior to sample extraction and/or analysis. Surrogate recoveries provide a means to evaluate the effects of laboratory performance on individual sample matrices.

All samples submitted for VOC and SVOC determinations were spiked with the appropriate number of surrogate compounds prior to sample extraction and/or analysis.

Each individual surrogate compound is expected to meet the laboratory control limits with the exception of SVOC analyses. According to the "Guidelines" for SVOC analyses, up to one outlying surrogate in the base/neutral or acid fractions is acceptable as long as the recovery is at least 10 percent.

Surrogate recoveries were assessed against laboratory control limits. Most surrogate recoveries met the laboratory criteria. Some high recoveries were observed for the SVOC analyses. All associated sample results were non-detect and would not have been impacted by the implied high bias.

10. Internal Standards (IS) Analyses

IS data were evaluated for all VOC, SVOC, and ICP/MS sample analyses.

10.1 Organics Analyses

To ensure that changes in the GC/MS sensitivity and response do not affect sample analysis results, IS compounds are added to each sample prior to analysis. All results are then calculated as a ratio of the IS responses.

The sample IS results were evaluated against the following criteria:

i) The retention time of the IS must not vary more than ±30 seconds from the associated calibration standard.

ii) IS area counts must not vary by more than a factor of two (-50 percent to +100 percent) from the associated calibration standard.

All organic IS recoveries and retention times met the above criteria.

10.2 Inorganic Analyses

IS elements were added to all samples prior to metals analysis by ICP/MS. Overall instrument stability and performance for metals analyses were monitored using the IS intensity data. IS recoveries were assessed using control limits of 60-125 percent.

All inorganic IS recoveries were acceptable, demonstrating adequate analytical performance.

11. Laboratory Control Sample Analyses

LCS and/or laboratory control sample duplicates (LCSD) are prepared and analyzed as samples to assess the analytical efficiencies of the methods employed, independent of sample matrix effects. The relative percent difference (RPD) of the LCS/LCSD recoveries is used to evaluate analytical precision.

For this study, LCS and LCSD were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

11.1 Organic Analyses

The LSC and LCS/LCSD contained all compounds of interest. All LCS recoveries and RPDs, where applicable, were within the laboratory control limits, demonstrating acceptable analytical accuracy and precision with the exception of some high recoveries. All associated sample results were non-detect and would not have been impacted by the implied high bias.

11.2 Inorganic Analyses

The LCS contained all analytes of interest. LCS recoveries were assessed per the "Guidelines". All LCS recoveries were within the control limits, demonstrating acceptable analytical accuracy.

12. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

To evaluate the effects of sample matrices on the preparation process, measurement procedures, and accuracy of a particular analysis, samples are spiked with a known concentration of the analyte of concern and analyzed as MS/MSD samples. The RPD between the MS and MSD is used to assess analytical precision.

MS/MSD analyses were performed as specified in Table 1.

12.1 Organic Analyses

The MS/MSD samples were spiked with all compounds of interest. Several high recoveries and RPD values were observed. All associated sample results were non-detect and would not have been impacted by the implied high bias and variability.

13. Matrix Spike Analyses

To evaluate the effects of sample matrices on the preparation, measurement procedures, and accuracy of a particular analysis, samples are spiked with a known concentration of the analyte of concern and analyzed as MS samples. For this study, MS samples were prepared and analyzed by the laboratory as specified in Table 1.

The MS results were evaluated per the "Guidelines". In accordance with the "Guidelines", MS recoveries for samples with analyte concentrations significantly greater than the spike concentrations could not be assessed.

All MS analyses performed were acceptable, demonstrating acceptable analytical accuracy. Some metal concentrations were significantly greater than the spike concentration, and the recoveries were not assessed.

14. Duplicate Sample Analyses – Inorganic Analyses

Analytical precision is evaluated based on the analysis of laboratory duplicate samples. For this study, duplicate samples were prepared and analyzed by the laboratory as specified in Table 1. The laboratory performed additional site-specific duplicate analyses internally. The duplicate results were evaluated per the "Guidelines".

All duplicate analyses performed were acceptable, demonstrating acceptable analytical precision.

15. ICP/MS Serial Dilution

The serial dilution determines whether significant physical or chemical interferences exist due to sample matrix. A minimum of 1 per 20 investigative samples or at least 1 per analytical batch must be analyzed at a five-fold dilution. For samples with sufficient analyte concentrations (>50 times the method detection limit [MDL]), the serial dilution results must agree within 10 percent of the original results.

A serial dilution was performed on each MS/MSD sample. All results met the criteria above.

16. ICP Interference Check Sample Analysis (ICS)

To verify that the laboratory has established proper inter-element and background correction factors, ICSs are analyzed. These samples contain high concentrations of aluminum, calcium, magnesium, and iron and are analyzed at the beginning and end of each sample analysis period. The ICSs are evaluated against recovery control limits of 80 to 120 percent.

ICS analysis results were evaluated for all samples using the criteria in the "Guidelines". All ICS recoveries and results were acceptable.

17. Field QA/QC Samples

The field QA/QC consisted of two trip blank samples, four rinse blank samples, and two field duplicate sample sets.

17.1 Trip Blank Sample Analysis

To evaluate contamination from sample collection, transportation, storage, and analytical activities, two trip blanks were submitted to the laboratory for VOC analysis. All results were non-detect for the compounds of interest.

17.2 Rinse Blank Sample Analysis

To assess field decontamination procedures, ambient conditions at the site, and cleanliness of sample containers, four rinse blanks were submitted for analysis, as identified in Table 1. Most results were non-detect for the analytes of interest. Low level detections of acetone and antimony were observed. All associated sample results with similar concentrations were qualified as non-detect (see Table 5).

17.3 Field Duplicate Sample Analysis

To assess the analytical and sampling protocol precision, two field duplicate samples were collected and submitted "blind" to the laboratory, as specified in Table 1. The RPDs associated with these duplicate samples must be less than 50 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criterion is one times the RL value for water samples.

All field duplicate results were within acceptable agreement, demonstrating acceptable sampling and analytical precision.

18. Tentatively Identified Compounds (TICS)

Chromatographic peaks recorded during VOC and SVOC sample GC/MS analyses that are not target compounds, surrogates, or IS, are potential TICs.

A summary of the TICs reported by the laboratory is presented in Table 6. Per the "Guidelines", TICs that were present in the method blanks or identified as solvent preservatives/aldol reaction products were rejected and are not included in the table.

19. Analyte Reporting

The laboratory reported detected results down to the laboratory's MDL for each analyte. Positive analyte detections less than the practical quantitation limit (PQL) but greater than the MDL were qualified as estimated (J) in Table 2 unless qualified otherwise in this memorandum. Non-detect results were presented as non-detect at the RL in Table 2.

20. Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time and mass spectra (if applicable) were evaluated according to the identification criteria established by the methods. The organic compounds reported adhered to the specified identification criteria.

21. Conclusion

Based on the assessment detailed in the foregoing, the data summarized in Table 2 are acceptable with the specific qualifications noted herein.

Table 1

Sample Collection and Analysis Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

					Analysis/Parameters			
Sample Identification	**Location**	**Matrix**	**Collection Date (mm/dd/yyyy)**	**Collection Time (hr:min)**	**TAL Metals**	**TCL VOCs**	**TCL SVOCs**	**Comments**
WG-17338-062618-AM-001	MW-19	Groundwater	06/26/2018	09:10	X	X	X	MS/DUP-metals
WG-17338-062618-AM-002	MW-19	Groundwater	06/26/2018	09:15	X	X	X	FD(WG-17338-062618-AM-001)
RB-17338-062618-AM-001	-	Water	06/26/2018	09:35			X	Rinse Blank
WG-17338-062618-AM-003	MW-8	Groundwater	06/26/2018	10:50	X	X	X	MS/MSD-VOC
RB-17338-062618-AM-002	-	Water	06/26/2018	11:05	X			Rinse Blank
WG-17338-062618-AM-004	MW-9	Groundwater	06/26/2018	13:35	X	X	X	MS/MSD-SVOC
RB-17338-062618-AM-003	-	Water	06/26/2018	13:45		X		Rinse Blank
WG-17338-062618-AM-005	MW-28	Groundwater	06/26/2018	15:30	X	X	X	
TRIP BLANK	-	Water	06/26/2018	15:30		X		Trip Blank
GW-01733818-0713-RM-01	MW-112	Groundwater	07/13/2018	10:05	X	X	X	
GW-01733818-0713-RM-02	MW-113	Groundwater	07/13/2018	11:25	X	X	X	MS/MSD
GW-01733818-0713-RM-03	MW-113	Groundwater	07/13/2018	11:40	X	X	X	FD(GW-01733818-0713-RM-02)
RB-01733818-0713-RM-04	-	Water	07/13/2018	12:00	X	X	X	Rinse Blank
Trip Blank	-	Water	07/13/2018	12:00		X		Trip Blank

Notes:

DUP	- Laboratory Duplicate
FD	- Field Duplicate sample of sample in parenthesis
MS/MSD	- Matrix Spike/Matrix Spike Duplicate
TCL	- Target Compound List
VOCs	- Volatile Organic Compounds
SVOCs	- Semi-volatile Organic Compounds
TAL	- Target Analyte List
-	- Not applicable

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID:	**MW-8**	**MW-9**	**MW-19**	**MW-19**
	Sample Name:	**WG-17338-062618-AM-003**	**WG-17338-062618-AM-004**	**WG-17338-062618-AM-001**	**WG-17338-062618-AM-002**
	Sample Date:	**06/26/2018**	**06/26/2018**	**06/26/2018**	**06/26/2018**
					Duplicate
Parameters	**Unit**				
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	5.0 U	5.0 U	5.0 U	11 U
Benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Location ID:		MW-8	MW-9	MW-19	MW-19
Sample Name:		WG-17338-062618-AM-003	WG-17338-062618-AM-004	WG-17338-062618-AM-001	WG-17338-062618-AM-002
Sample Date:		06/26/2018	06/26/2018	06/26/2018	06/26/2018 Duplicate
Parameters	**Unit**				
VOCs-Continued					
Isopropyl benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Methyl cyclohexane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	1.0 U	0.68 J	1.0 U	1.0 U
Toluene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Semi-volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	µg/L	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	µg/L	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	µg/L	10 U	10 U	1.1 J	0.92 J
2,4-Dimethylphenol	µg/L	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	µg/L	20 U	20 U	20 U	20 U
2,4-Dinitrotoluene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2,6-Dinitrotoluene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2-Chloronaphthalene	µg/L	10 U	10 U	10 U	10 U
2-Chlorophenol	µg/L	10 U	10 U	10 U	10 U
2-Methylnaphthalene	µg/L	10 U	10 U	10 U	10 U
2-Methylphenol	µg/L	10 U	10 U	10 U	10 U
2-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
2-Nitrophenol	µg/L	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	µg/L	10 U	10 U	10 U	10 U
3-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	µg/L	20 U	20 U	20 U	20 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID:	**MW-8**	**MW-9**	**MW-19**	**MW-19**
	Sample Name:	**WG-17338-062618-AM-003**	**WG-17338-062618-AM-004**	**WG-17338-062618-AM-001**	**WG-17338-062618-AM-002**
	Sample Date:	**06/26/2018**	**06/26/2018**	**06/26/2018**	**06/26/2018**
					Duplicate
Parameters	**Unit**				
SVOCs-Continued					
4-Bromophenyl phenyl ether	µg/L	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	µg/L	10 U	10 U	10 U	10 U
4-Chloroaniline	µg/L	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	µg/L	10 U	10 U	10 U	10 U
4-Methylphenol	µg/L	10 U	10 U	10 U	10 U
4-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
4-Nitrophenol	µg/L	20 U	20 U	20 U	20 U
Acenaphthene	µg/L	10 U	10 U	10 U	10 U
Acenaphthylene	µg/L	10 U	10 U	10 U	10 U
Acetophenone	µg/L	10 U	10 U	10 U	10 U
Anthracene	µg/L	10 U	10 U	10 U	10 U
Atrazine	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzaldehyde	µg/L	10 U	10 U	10 U	10 U
Benzo(a)anthracene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzo(g,h,i)perylene	µg/L	10 U	10 UJ	10 UJ	10 UJ
Benzo(k)fluoranthene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	µg/L	10 U	10 U	10 U	10 U
Caprolactam	µg/L	10 U	10 U	10 U	10 U
Carbazole	µg/L	10 U	10 U	10 U	10 U
Chrysene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Di-n-butylphthalate (DBP)	µg/L	10 U	10 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	µg/L	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Dibenzofuran	µg/L	10 U	10 U	10 U	10 U
Diethyl phthalate	µg/L	10 U	10 U	10 U	10 U
Dimethyl phthalate	µg/L	10 U	10 U	10 U	10 U
Fluoranthene	µg/L	10 U	10 U	10 U	10 U
Fluorene	µg/L	10 U	10 U	10 U	10 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID: Sample Name: Sample Date:	MW-8 WG-17338-062618-AM-003 06/26/2018	MW-9 WG-17338-062618-AM-004 06/26/2018	MW-19 WG-17338-062618-AM-001 06/26/2018	MW-19 WG-17338-062618-AM-002 06/26/2018 Duplicate
Parameters	**Unit**				
SVOCs-Continued					
Hexachlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobutadiene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	µg/L	10 U	10 U	10 U	10 U
Hexachloroethane	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Isophorone	µg/L	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodiphenylamine	µg/L	10 U	10 U	10 U	10 U
Naphthalene	µg/L	10 U	10 U	10 U	10 U
Nitrobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	µg/L	20 U	20 U	20 U	20 U
Phenanthrene	µg/L	10 U	10 U	10 U	10 U
Phenol	µg/L	10 U	10 U	10 U	10 U
Pyrene	µg/L	10 U	10 U	10 U	10 U
Metals					
Aluminum	µg/L	845	344	946	778
Antimony	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	µg/L	7.9	2.0 U	1.4 J	1.3 J
Barium	µg/L	170	74.1	128	137
Beryllium	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Cadmium	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	µg/L	18700	11900	29400	31100
Chromium	µg/L	1.3 J	4.0	1.7 J	1.4 J
Cobalt	µg/L	10.9	4.0 U	4.0 U	4.0 U
Copper	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Iron	µg/L	34700	1540	2140	2170
Lead	µg/L	0.74 J	0.84 J	1.3	1.2
Magnesium	µg/L	18500	9700	7740	8080
Manganese	µg/L	598	93.8	206	214
Mercury	µg/L	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	µg/L	1.6 J	1.7 J	1.4 J	1.6 J
Potassium	µg/L	2180	2420	4080	4280
Selenium	µg/L	10.0 U	10.0 U	10.0 U	10.0 U
Silver	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Sodium	µg/L	49300	36000	34100	38100

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID: Sample Name: Sample Date:	MW-8 WG-17338-062618-AM-003 06/26/2018	MW-9 WG-17338-062618-AM-004 06/26/2018	MW-19 WG-17338-062618-AM-001 06/26/2018	MW-19 WG-17338-062618-AM-002 06/26/2018 Duplicate
Parameters	**Unit**				
Metals-Continued					
Thallium	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Vanadium	µg/L	1.2 J	4.0 U	3.0 J	2.9 J
Zinc	µg/L	16.0 U	16.0 U	16.0 U	16.0 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Location ID:		**MW-28**	**MW-112**	**MW-113**	**MW-113**
Sample Name:		**WG-17338-062618-AM-005**	**GW-01733818-0713-RM-01**	**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
Sample Date:		**06/26/2018**	**07/13/2018**	**07/13/2018**	**07/13/2018** **Duplicate**
Parameters	**Unit**				
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	µg/L	11 U	5.0 U	5.0 U	5.0 U
Benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	µg/L	1.0 U	0.27 J	1.0 U	1.0 U
Carbon tetrachloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	µg/L	1.0 U	1.5	1.0 U	1.0 U
Chloromethane (Methyl chloride)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Location ID: Sample Name: Sample Date:		MW-28 WG-17338-062618-AM-005 06/26/2018	MW-112 GW-01733818-0713-RM-01 07/13/2018	MW-113 GW-01733818-0713-RM-02 07/13/2018	MW-113 GW-01733818-0713-RM-03 07/13/2018 Duplicate
Parameters	**Unit**				
VOCs-Continued					
Isopropyl benzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	µg/L	5.0 U	5.0 U	5.0 U	5.0 U
Methyl cyclohexane	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Semi-volatile Organic Compounds (SVOCs)					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	µg/L	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	µg/L	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	µg/L	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	µg/L	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	µg/L	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	µg/L	20 U	20 U	20 U	20 U
2,4-Dinitrotoluene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2,6-Dinitrotoluene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
2-Chloronaphthalene	µg/L	10 U	10 U	10 U	10 U
2-Chlorophenol	µg/L	10 U	10 U	10 U	10 U
2-Methylnaphthalene	µg/L	10 U	10 U	10 U	10 U
2-Methylphenol	µg/L	10 U	10 U	10 U	10 U
2-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
2-Nitrophenol	µg/L	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	µg/L	10 U	10 U	10 U	10 U
3-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	µg/L	20 U	20 U	20 U	20 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID:	MW-28	MW-112	MW-113	MW-113
	Sample Name:	WG-17338-062618-AM-005	GW-01733818-0713-RM-01	GW-01733818-0713-RM-02	GW-01733818-0713-RM-03
	Sample Date:	06/26/2018	07/13/2018	07/13/2018	07/13/2018
					Duplicate
Parameters	**Unit**				
SVOCs-Continued					
4-Bromophenyl phenyl ether	µg/L	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	µg/L	10 U	10 U	10 U	10 U
4-Chloroaniline	µg/L	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	µg/L	10 U	10 U	10 U	10 U
4-Methylphenol	µg/L	10 U	10 U	10 U	10 U
4-Nitroaniline	µg/L	10 U	10 U	10 U	10 U
4-Nitrophenol	µg/L	20 U	20 U	20 U	20 U
Acenaphthene	µg/L	10 U	10 U	10 U	10 U
Acenaphthylene	µg/L	10 U	10 U	10 U	10 U
Acetophenone	µg/L	10 U	10 U	10 U	10 U
Anthracene	µg/L	10 U	10 U	10 U	10 U
Atrazine	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzaldehyde	µg/L	10 U	10 U	10 U	10 U
Benzo(a)anthracene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Benzo(g,h,i)perylene	µg/L	10 U	10 UJ	10 UJ	10 UJ
Benzo(k)fluoranthene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	µg/L	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	µg/L	10 U	10 U	10 U	10 U
Caprolactam	µg/L	10 U	10 U	10 U	10 U
Carbazole	µg/L	10 U	10 U	10 U	10 U
Chrysene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Di-n-butylphthalate (DBP)	µg/L	10 U	10 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	µg/L	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	µg/L	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Dibenzofuran	µg/L	10 U	10 U	10 U	10 U
Diethyl phthalate	µg/L	10 U	10 U	10 U	10 U
Dimethyl phthalate	µg/L	10 U	10 U	10 U	10 U
Fluoranthene	µg/L	10 U	10 U	10 U	10 U
Fluorene	µg/L	10 U	10 U	10 U	10 U

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

	Location ID:	**MW-28**	**MW-112**	**MW-113**	**MW-113**
	Sample Name:	**WG-17338-062618-AM-005**	**GW-01733818-0713-RM-01**	**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
	Sample Date:	**06/26/2018**	**07/13/2018**	**07/13/2018**	**07/13/2018**
					Duplicate
Parameters	**Unit**				
SVOCs-Continued					
Hexachlorobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobutadiene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	µg/L	10 U	10 U	10 U	10 U
Hexachloroethane	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Isophorone	µg/L	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodiphenylamine	µg/L	10 U	10 U	10 U	10 U
Naphthalene	µg/L	10 U	10 U	10 U	10 U
Nitrobenzene	µg/L	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	µg/L	20 U	20 U	20 U	20 U
Phenanthrene	µg/L	10 U	10 U	10 U	10 U
Phenol	µg/L	10 U	10 U	10 U	10 U
Pyrene	µg/L	10 U	10 U	10 U	10 U
Metals					
Aluminum	µg/L	29.6 J	39.5 J	22.4 J	40.0 U
Antimony	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Arsenic	µg/L	7.5	2.2	0.77 J	0.86 J
Barium	µg/L	182	156	226	224
Beryllium	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Cadmium	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Calcium	µg/L	13500	37800	35100	34400
Chromium	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Cobalt	µg/L	26.8	10.8	9.2	8.8
Copper	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Iron	µg/L	23400	1330	4680	4570
Lead	µg/L	1.2 U	1.2 U	1.2 U	1.2 U
Magnesium	µg/L	21500	20900	26100	25100
Manganese	µg/L	3290	3840	2400	2330
Mercury	µg/L	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	µg/L	3.3 J	3.7 J	1.5 J	1.9 J
Potassium	µg/L	2820	7050	7000	6820
Selenium	µg/L	10.0 U	10.0 U	10.0 U	10.0 U
Silver	µg/L	2.0 U	2.0 U	2.0 U	2.0 U
Sodium	µg/L	122000	41600	61800	59500

Table 2

Analytical Results Summary
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Location ID: **Sample Name:** **Sample Date:**		**MW-28** **WG-17338-062618-AM-005** **06/26/2018**	**MW-112** **GW-01733818-0713-RM-01** **07/13/2018**	**MW-113** **GW-01733818-0713-RM-02** **07/13/2018**	**MW-113** **GW-01733818-0713-RM-03** **07/13/2018** **Duplicate**
Parameters	**Unit**				
Metals-Continued					
Thallium	µg/L	0.80 U	0.80 U	0.80 U	0.80 U
Vanadium	µg/L	4.0 U	4.0 U	4.0 U	4.0 U
Zinc	µg/L	16.0 U	16.0 U	16.0 U	16.0 U

Notes:

J	- Estimated concentration
U	- Not detected at the associated reporting limit
UJ	- Not detected; associated reporting limit is estimated

Table 3

Analytical Methods
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Parameter	Method	Matrix	Preservation	Holding Time Collection to Extraction (Days)	Holding Time Collection or Extraction to Analysis (Days)
Volatile Organic Compounds (VOCs)	SW-846 8260	Water	pH < 2 and Iced, 0-6° C	-	14
Semi-volatile Organic Compounds (SVOCs)	SW-846 8270	Water	Iced, 0-6° C	7	40
Metals	SW-846 6020/6010B	Water	pH < 2 and Iced, 0-6° C	-	180
Mercury	SW-846 7470A	Water	pH < 2 and Iced, 0-6° C	-	28

Notes:

\- - Not applicable

Method References:
SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, 1986, with subsequent revisions

Table 4

Qualified Sample Results Due to Outlying Initial Calibration Results
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Parameter	Analyte	Calibration Date (mm/dd/yyyy)	RRF	%RSD or Curve Coefficient	Associated Sample ID	Qualified Result	Units
SVOC	Benzo(g,h,i)perylene	06/21/2018	>0.05	25	WG-17338-062618-AM-004	10 UJ	µg/L
					GW-01733818-0713-RM-01	10 UJ	µg/L
					WG-17338-062618-AM-001	10 UJ	µg/L
					WG-17338-062618-AM-002	10 UJ	µg/L
					GW-01733818-0713-RM-02	10 UJ	µg/L
					GW-01733818-0713-RM-03	10 UJ	µg/L
SVOC	Dibenz(a,h)anthracene	06/21/2018	>0.05	25	WG-17338-062618-AM-004	1.0 UJ	µg/L
					GW-01733818-0713-RM-01	1.0 UJ	µg/L
					WG-17338-062618-AM-001	1.0 UJ	µg/L
					WG-17338-062618-AM-002	1.0 UJ	µg/L
					GW-01733818-0713-RM-02	1.0 UJ	µg/L
					GW-01733818-0713-RM-03	1.0 UJ	µg/L

Notes:

RRF - Relative Response Factor
%RSD - Percent Relative Standard Deviation
UJ - Not detected; associated reporting limit is estimated
SVOC - Semi-volatile Organic Compounds

Table 5

Qualified Sample Data Due to Analyte Concentrations in the Rinse Blanks
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Parameter	Rinse Blank ID	Blank Date (dd/mm/yyyy)	Analyte	Blank Result	Associated Sample ID	Original Result	Qualified Result	Units
VOC	RB-17338-062618-AM-003	06/26/2018	Acetone	11	WG-17338-062618-AM-002	10	11 U	µg/L
					WG-17338-062618-AM-005	5.7	11 U	µg/L
Metals	RB-01733818-0713-RM-04	07/13/2018	Antimony	1.2 J	GW-01733818-0713-RM-02	1.4 J	2.0 U	µg/L
					GW-01733818-0713-RM-03	1.3 J	2.0 U	µg/L
					GW-01733818-0713-RM-01	1.6 J	2.0 U	µg/L

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
VOC - Volatile Organic Compounds

Table 6

Qualified Tentatively Identified Compounds
Site-Wide Groundwater Monitoring
RACER Trust
Wilmington, Delaware
June-July 2018

Parameter	Sample ID	Analyte	Qualified Result	Units
SVOC	GW-01733818-0713-RM-01	Butyl citrate A	9.7 J	µg/L
		Unknown	6.9 J	µg/L
SVOC	WG-17338-062618-AM-001	2,4-Dichlorophenoxyacetic acid (2,4-D) A	9.3 J	µg/L
		Cyclohexane A	65 J	µg/L
		Unknown	37 J	µg/L
SVOC	WG-17338-062618-AM-002	2,4-Dichlorophenoxyacetic acid (2,4-D) A	13 J	µg/L
SVOC	WG-17338-062618-AM-005	Unknown	7.3 J	µg/L

Notes:

SVOC	- Semi-volatile Organic Compounds
J	- Estimated concentration

Attachment D

Historical OU-5 Groundwater Analytical Results

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Parameters	DNREC-SIRS Screening Levels (2016)[1]	DNREC-SIRS Ecological Surface Water Fresh criteria (2018)	USEPA MCL (2017)	Units							
Sample Location:					OU-5 MW-28	OU-5 MW-28	OU-5 MW-28	OU-5 MW-28	OU-5 MW-28	OU-5 MW-28	OU-5 MW-48
Sample ID:					GW-17338-110211-MW28-12	WG-17338-101812-MW28-MM-260	WG-17338-111214-RR-003	WG-17338-111214-RR-004	WG-17338-110417-SG-022	WG-17338-062618-AM-005	WG-17338-111214-RR-001
Sample Date:					11/2/2011	10/18/2012	11/12/2014	11/12/2014	11/4/2017	6/26/2018	11/12/2014
								(Duplicate)			
	a	b	c								
Volatile Organic Compounds											
1,1,1-Trichloroethane	200	11	200	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,1,2,2-Tetrachloroethane	0.076	610		µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,1,2-Trichloroethane	0.041	1200	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,1-Dichloroethane	2.8	47		µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,1-Dichloroethene	7	25	7	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,2,4-Trichlorobenzene	0.4	24	70	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,2,4-Trimethylbenzene	5.6			µg/L	-	-	-	-	1.0 U	1.0 U	-
1,2-Dibromo-3-chloropropane (DBCP)	0.00033		0.2	µg/L	1.0 UJ	1.0 U	-	-	1.0 U	1.0 U	-
1,2-Dibromoethane (Ethylene dibromide)	0.0075		0.05	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,2-Dichlorobenzene	30	0.7	600	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,2-Dichloroethane	0.17	100	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,2-Dichloropropane	0.62		5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,3-Dichlorobenzene			75	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
1,4-Dichlorobenzene	0.48	26	75	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
2-Butanone (Methyl ethyl ketone) (MEK)	560	14000		µg/L	R	R	-	-	5.0 U	5.0 U	-
2-Hexanone	3.8	99		µg/L	10 U	5.0 U	-	-	5.0 U	5.0 U	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	630	170		µg/L	10 U	5.0 U	-	-	5.0 U	5.0 U	-
Acetone	1400	1500		µg/L	R	R	-	-	5.0 U	11 U	-
Benzene	0.46	370	5	µg/L	1.0 U	0.12 J	-	-	1.0 U	1.0 U	-
Bromodichloromethane	0.13		80	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Bromoform	3.3	320	80	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Bromomethane (Methyl bromide)	0.75			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Carbon disulfide	81	0.92		µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Carbon tetrachloride	0.46	13.3	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Chlorobenzene	7.8	1.3	100	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Chloroethane	2100			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Chloroform (Trichloromethane)	0.22	1.8	80	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Chloromethane (Methyl chloride)	19			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
cis-1,2-Dichloroethene	3.6		70	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
cis-1,3-Dichloropropene				µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Cyclohexane	1300			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Dibromochloromethane	0.67		80	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Dichlorodifluoromethane (CFC-12)	20			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Ethylbenzene	1.5	90	700	µg/L	1.0 U	0.37 J	-	-	1.0 U	1.0 U	-
Isopropyl benzene	45	2.6		µg/L	1.0 U	0.097 J	-	-	1.0 U	1.0 U	-
Methyl acetate	2000			µg/L	2.0 U	R	-	-	5.0 U	5.0 U	-
Methyl cyclohexane				µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Methyl tert butyl ether (MTBE)	10	11070		µg/L	0.32 J	1.0 U	-	-	1.0 U	1.0 U	-
Methylene chloride	5	98.1	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Styrene	100	72	100	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Tetrachloroethene	1	111	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Toluene	110	2	1000	µg/L	1.0 U	1.0 U	-	-	0.35 J	1.0 U	-
trans-1,2-Dichloroethene	36	970	100	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
trans-1,3-Dichloropropene				µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Trichloroethene	0.28	21	5	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Trichlorofluoromethane (CFC-11)	520			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Trifluorotrichloroethane (CFC-113)	1000			µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Vinyl chloride	0.019	930	2	µg/L	1.0 U	1.0 U	-	-	1.0 U	1.0 U	-
Xylenes (total)	19	13	10000	µg/L	3.0 U	1.5 J	-	-	2.0 U	2.0 U	-

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Parameters	DNREC-SIRS Screening Levels (2016)[1]	DNREC-SIRS Ecological Surface Water Fresh criteria (2018)	USEPA MCL (2017)	Units	OU-5 MW-28 GW-17338-110211-MW28-12 11/2/2011	OU-5 MW-28 WG-17338-101812-MW28-MM-260 10/18/2012	OU-5 MW-28 WG-17338-111214-RR-003 11/12/2014	OU-5 MW-28 WG-17338-111214-RR-004 11/12/2014 (Duplicate)	OU-5 MW-28 WG-17338-110417-SG-022 11/4/2017	OU-5 MW-28 WG-17338-062618-AM-005 6/26/2018	OU-5 MW-48 WG-17338-111214-RR-001 11/12/2014
	a	b	c								
Semi-volatile Organic Compounds											
2,2'-Oxybis(1 chloropropane) (bis(2 Chloroisopropyl) ether)	71	—		µg/L	10 U	-	-	-	10 U	10 U	-
2 4 5-Trichlorophenol	120	—		µg/L	10 U	-	-	-	10 U	10 U	-
2 4,6-Trichlorophenol	1 2	4 9		µg/L	10 U	-	-	-	10 U	10 U	-
2,4 Dichlorophenol	4 6	11		µg/L	10 U	-	-	-	10 U	10 U	-
2,4 Dimethylphenol	36	—		µg/L	10 U	-	-	-	10 U	10 U	-
2 4-Dinitrophenol	3 9	—		µg/L	30 U	-	-	-	20 U	20 U	-
2 4 Dinitrotoluene	0 24	44		µg/L	2 0 U	-	-	-	2 0 U	2 0 U	-
2,6-Dinitrotoluene	0 049	81		µg/L	2 0 U	-	-	-	2 0 U	2 0 U	-
2 Chloronaphthalene	75	—		µg/L	10 U	-	-	-	10 U	10 U	-
2 Chlorophenol	9 1	24		µg/L	10 U	-	-	-	10 U	10 U	-
2 Methylnaphthalene	3 6	4 7		µg/L	10 U	-	-	-	10 U	10 U	-
2 Methylphenol	93	13		µg/L	10 U	-	-	-	10 U	10 U	-
2 Nitroaniline	19	—		µg/L	20 U	-	-	-	10 U	10 U	-
2 Nitrophenol				µg/L	10 U	-	-	-	10 U	10 U	-
3 3' Dichlorobenzidine	0 13	4 5		µg/L	20 U	-	-	-	10 U	10 U	-
3-Nitroaniline				µg/L	20 U	-	-	-	10 U	10 U	-
4 6-Dinitro-2 methylphenol	0 15	—		µg/L	30 U	-	-	-	20 U	20 U	-
4-Bromophenyl phenyl ether				µg/L	10 U	-	-	-	10 U	10 U	-
4-Chloro-3-methylphenol	140	—		µg/L	10 U	-	-	-	10 U	10 U	-
4-Chloroaniline	0 37	232		µg/L	10 U	-	-	-	10 U	10 U	-
4-Chlorophenyl phenyl ether				µg/L	10 U	-	-	-	10 U	10 U	-
4 Methylphenol	190	543		µg/L	10 U	-	-	-	10 U	10 U	-
4 Nitroaniline	3 8	—		µg/L	20 U	-	-	-	10 U	10 U	-
4 Nitrophenol				µg/L	30 U	-	-	-	20 U	20 U	-
Acenaphthene	53	5 8		µg/L	10 U	-	-	-	10 U	10 U	-
Acenaphthylene				µg/L	10 U	-	-	-	10 U	10 U	-
Acetophenone	190	---		µg/L	10 U	-	-	-	10 U	10 U	-
Anthracene	180	0 012		µg/L	10 U	-	-	-	10 U	10 U	-
Atrazine	0 3	1 8	3	µg/L	10 U	-	-	-	2 0 U	2 0 U	-
Benzaldehyde	19	---		µg/L	10 UJ	-	-	-	10 U	10 U	-
Benzo(a)anthracene	0 03	0 018		µg/L	0 051 U	-	-	-	1 0 U	1 0 U	-
Benzo(a)pyrene	0 025	0 015	0 2	µg/L	0 051 U	-	-	-	1 0 U	1 0 U	-
Benzo(b)fluoranthene	0 25	—		µg/L	0 051 U	-	-	-	1 0 U	2 0 U	-
Benzo(g h i)perylene				µg/L	10 U	-	-	-	10 U	10 U	-
Benzo(k)fluoranthene	2 5	---		µg/L	1 0 U	-	-	-	1 0 U	1 0 U	-
Biphenyl (1 1 Biphenyl)	0 083	14		µg/L	10 U	-	-	-	10 U	10 U	-
bis(2-Chloroethoxy)methane	5 9	—		µg/L	10 U	-	-	-	10 U	10 U	-
bis(2-Chloroethyl)ether	0 014	—		µg/L	1 0 U	-	-	-	1 0 U	1 0 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	5 6	16	6	µg/L	10 U	-	-	-	2 0 U	2 0 U	-
Butyl benzylphthalate (BBP)	16	19		µg/L	10 U	-	-	-	10 U	10 U	-
Caprolactam	990	—		µg/L	10 U	-	-	-	10 U	10 U	-
Carbazole				µg/L	10 U	-	-	-	10 U	10 U	-
Chrysene	25	---		µg/L	10 U	-	-	-	2 0 U	2 0 U	-
Dibenz(a h)anthracene	0 025	—		µg/L	1 0 U	-	-	-	1 0 U	1 0 U	-
Dibenzofuran	0 79	3 7		µg/L	10 U	-	-	-	10 U	10 U	-
Diethyl phthalate	1500	210		µg/L	10 U	-	-	-	10 U	10 U	-
Dimethyl phthalate				µg/L	10 U	-	-	-	10 U	10 U	-
Di-n-butylphthalate (DBP)	90	19		µg/L	10 U	-	-	-	10 U	10 U	-
Di-n-octyl phthalate (DnOP)	20	22		µg/L	10 U	-	-	-	10 U	10 U	-

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Sample Location:					OU-5	OU-5	OU-5	OU-5	OU-5	OU-5	OU-5
Sample ID:					MW-28	MW-28	MW-28	MW-28	MW-28	MW-28	MW-48
Sample Date:					GW-17338-110211-MW28-12	WG-17338-101812-MW28-MM-260	WG-17338-111214-RR-003	WG-17338-111214-RR-004	WG-17338-110417-SG-022	WG-17338-062618-AM-005	WG-17338-111214-RR-001
					11/2/2011	10/18/2012	11/12/2014	11/12/2014	11/4/2017	6/26/2018	11/12/2014
Parameters	DNREC-SIRS Screening Levels (2018)[1] a	DNREC-SIRS Ecological Surface Water Fresh criteria (2018) b	USEPA MCL (2017) c	Units				(Duplicate)			
Semi-volatile Organic Compounds (Continued)											
Fluoranthene	80	0 04		µg/L	10 U	-	-	-	10 U	10 U	-
Fluorene	29	3		µg/L	10 U	-	-	-	10 U	10 U	-
Hexachlorobenzene	0 0098	0 0003	1		0 020 U	-	-	-	1 0 U	1 0 U	-
Hexachlorobutadiene	0 14	1 3		µg/L	2 0 U	-	-	-	1 0 U	1 0 U	-
Hexachlorocyclopentadiene	0 041	---	50	µg/L	10 U	-	-	-	10 U	10 U	-
Hexachloroethane	0 33	12		µg/L	1 0 U	-	-	-	1 0 U	2 0 U	-
Indeno(1 2,3-cd)pyrene	0 25	---		µg/L	1 0 U	-	-	-	1 0 U	2 0 U	-
Isophorone	78	—		µg/L	10 U	-	-	-	10 U	10 U	-
Naphthalene	0 17	1 1		µg/L	10 U	-	-	-	10 U	10 U	-
Nitrobenzene	0.14	—		µg/L	1 0 U	-	-	-	1 0 U	1 0 U	-
N-Nitrosodi-n-propylamine	0.011	—		µg/L	1 0 U	-	-	-	1.0 U	1 0 U	-
N-Nitrosodiphenylamine	12	210		µg/L	10 U	-	-	-	10 U	10 U	-
Pentachlorophenol	0 041	0 5	1	µg/L	0 20 U	-	-	-	20 U	20 U	-
Phenanthrene	12	0 4		µg/L	10 U	-	-	-	10 U	10 U	-
Phenol		4		µg/L	10 U	-	-	-	10 U	10 U	-
Pyrene	12	0 025		µg/L	10 U	-	-	-	10 U	10 U	-
Metals											
Aluminum	2000	87		µg/L	200 U	500^b	-	-	21 9 J	29 6 J	-
Aluminum (dissolved)	2000	87		µg/L	200 U	200 U	560^b	500^b	-	-	250^b
Antimony	0 78	30	6	µg/L	10 0 U	10 0 U	-	-	0.79 J^a	2 0 U	-
Antimony (dissolved)	0 78	30	6	µg/L	10 0 U	10.0 U	20 0 U	20 0 U	-	-	20 0 U
Arsenic	0 052	5	10	µg/L	7.5^ab	6.4^ab	-	-	9.6^ab	7.5^ab	-
Arsenic (dissolved)	0 052	5	10	µg/L	5 0 U	5 0 U	6.3 J^ab	6.1 J^ab	-	-	15 0 U
Barium	380	4	2000	µg/L	557^ab	474^ab	-	-	294^b	182^b	-
Barium (dissolved)	380	4	2000	µg/L	491^ab	433^ab	855^ab	652^ab	-	-	258^b
Beryllium	2 5	0 66	4	µg/L	2 0 U	2 0 U	-	-	0 80 U	0 80 U	-
Beryllium (dissolved)	2 5	0.66	4	µg/L	2 0 U	2 0 U	2 0 U	2 0 U	-	-	2 0 U
Cadmium	0 92	0 25	5	µg/L	5 0 U	5 0 U	-	-	2 0 U	2 0 U	-
Cadmium (dissolved)	0 92	0 25	5	µg/L	5 0 U	5 0 U	4 0 U	4 0 U	-	-	4 0 U
Calcium				µg/L	36100	29200	-	-	13400	13500	-
Calcium (dissolved)				µg/L	38100	30400	26100	25500	-	-	26600
Chromium	10	85	100	µg/L	10 0 U	10 0 U	-	-	4 0 U	4 0 U	-
Chromium (dissolved)	10	85	100	µg/L	10 0 U	10 0 U	10 0 U	10 0 U	-	-	10 0 U
Cobalt	0 6	23		µg/L	30.0^ab	53.8^ab	-	-	21.1^a	25.9^ab	-
Cobalt (dissolved)	0 6	23		µg/L	50.4^ab	54.9^ab	53.3^ab	49.8 J^ab	-	-	8.1 J^a
Copper	80	9	1300	µg/L	25 0 U	25 0 U	-	-	4 0 U	4 0 U	-
Copper (dissolved)	80	9	1300	µg/L	25 0 U	25 0 U	25 0 U	25 0 U	-	-	25 0 U
Iron	1400	300		µg/L	42000^ab	37100^ab	-	-	19200^ab	23400^ab	-
Iron (dissolved)	1400	300		µg/L	19500^ab	13100^ab	32500^ab	31600^ab	-	-	3610^ab
Lead	15	2 5	15	µg/L	5 0 U	5 0 U	-	-	1 2 U	1 2 U	-
Lead (dissolved)	15	2 5	15		5 0 U	5 0 U	10 0 U	10 0 U	-	-	10 0 U
Magnesium					66800	56100	-	-	21000	21500	-
Magnesium (dissolved)					82200	58100	46000	44100	-	-	26400
Manganese	43	120			6390^ab	5920^ab	-	-	3040^ab	3290^ab	-
Manganese (dissolved)	43	120			6510^ab	6020^ab	5750^ab	5560^ab	-	-	6370^ab
Mercury	0 063	0 026	2		0 20 U	0 20 U	-	-	0 20 U	0 20 U	-
Mercury (dissolved)	0 063	0 026	2		0 20 U	0 20 U	0 20 U	0 20 U	-	-	0 20 U
Nickel	39	52			6 5 J	6 3 J	-	-	5 6 U	3 3 J	-

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Parameters	DNREC-SIRS Screening Levels (2018)(1)	DNREC-SIRS Ecological Surface Water Fresh criteria (2018)	USEPA MCL (2017)	Units							
Sample Location:					OU-5	OU-5	OU-5	OU-5	OU-5	OU-5	OU-5
Sample ID:					MW-28	MW-28	MW-28	MW-28	MW-28	MW-28	MW-40
Sample Date:					GW-17338-110211-MW28-12	WG-17338-101612-MW28-MM-260	WG-17338-111214-RR-003	WG-17338-111214-RR-004	WG-17338-110417-SG-022	WG-17338-062618-AM-005	WG-17338-111214-RR-001
					11/2/2011	10/16/2012	11/12/2014	11/12/2014	11/4/2017	6/26/2018	11/12/2014
								(Duplicate)			
	a	b	c								
Metals (Continued)											
Nickel (dissolved)	39	52			7.5 J	6.4 J	40.0 U	40.0 U	-	-	40.0 U
Potassium					6050	5050	-	-	3400	2820	-
Potassium (dissolved)					5850	5240	4420 J	4210 J	-	-	3730 J
Selenium	10	1	50		10.0 U	10.0 U	-	-	10.0 U	10.0 U	-
Selenium (dissolved)	10	1	50		10.0 U	10.0 U	20.0 U	20.0 U	-	-	20.0 U
Silver	9.4	3.2			10.0 U	10.0 U	-	-	2.0 U	2.0 U	-
Silver (dissolved)	9.4	3.2			10.0 U	10.0 U	4.1 J^{b}	3.9 J^{b}	-	-	3.7 J^{b}
Sodium					175000	197000	-	-	114000	122000	-
Sodium (dissolved)					170000	208000	159000	151000	-	-	92300
Thallium	0.02	0.8	2		10.0 U	10.0 U	-	-	0.80 U	0.80 U	-
Thallium (dissolved)	0.02	0.8	2		10.0 U	10.0 U	20.0 U	20.0 U	-	-	20.0 U
Vanadium	8.6	20			50.0 U	50.0 U	-	-	4.0 U	4.0 U	-
Vanadium (dissolved)	8.6	20			50.0 U	50.0 U	50.0 U	50.0 U	-	-	50.0 U
Zinc	600	120			101	35.7	-	-	16.0 U	16.0 U	-

Notes

J - Estimated concentration
U - Not detected at the associated reporting limit
UJ - Not detected, associated reporting limit is estimated
µg/L - Micrograms per liter
(1) - Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration (SIRS) Screening Levels
a - concentration exceeds DNREC-SIRS Screening Level, 2018
b - concentration exceeds DNREC-SIRS Ecological Surface Water Fresh, 2018
c - concentration exceeds USEPA 2017 Maximum Contaminant Level (MCL)
4.3 J - Concentration exceeds criteria

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Sample Location:					OU-5
Sample ID:					MW-48
Sample Date:					WG-17338-110417-DT-021
					11/4/2017
Parameters	**DNREC-SIRS Screening Levels (2016)[1]** a	**DNREC-SIRS Ecological Surface Water Fresh criteria (2018)** b	**USEPA MCL (2017)** c	**Units**	
Volatile Organic Compounds					
1,1,1-Trichloroethane	200	11	200	µg/L	1.0 U
1,1,2,2-Tetrachloroethane	0.076	610		µg/L	1.0 U
1,1,2-Trichloroethane	0.041	1200	5	µg/L	1.0 U
1,1-Dichloroethane	2.8	47		µg/L	1.0 U
1,1-Dichloroethene	7	25	7	µg/L	1.0 U
1,2,4-Trichlorobenzene	0.4	24	70	µg/L	1.0 U
1,2,4-Trimethylbenzene	5.6			µg/L	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	0.00033		0.2	µg/L	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	0.0075		0.05	µg/L	1.0 U
1,2-Dichlorobenzene	30	0.7	600	µg/L	1.0 U
1,2-Dichloroethane	0.17	100	5	µg/L	1.0 U
1,2-Dichloropropane	0.82		5	µg/L	1.0 U
1,3-Dichlorobenzene			75	µg/L	1.0 U
1,4-Dichlorobenzene	0.48	26	75	µg/L	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	560	14000		µg/L	5.0 U
2-Hexanone	3.8	99		µg/L	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	630	170		µg/L	5.0 U
Acetone	1400	1500		µg/L	5.0 U
Benzene	0.46	370	5	µg/L	1.0 U
Bromodichloromethane	0.13		80	µg/L	1.0 U
Bromoform	3.3	320	80	µg/L	1.0 U
Bromomethane (Methyl bromide)	0.75			µg/L	1.0 UJ
Carbon disulfide	81	0.92		µg/L	1.0 U
Carbon tetrachloride	0.46	13.3	5	µg/L	1.0 U
Chlorobenzene	7.8	1.3	100	µg/L	1.0 U
Chloroethane	2100			µg/L	1.0 U
Chloroform (Trichloromethane)	0.22	1.8	80	µg/L	1.0 U
Chloromethane (Methyl chloride)	19			µg/L	1.0 U
cis-1,2-Dichloroethene	3.6		70	µg/L	1.0 U
cis-1,3-Dichloropropene				µg/L	1.0 U
Cyclohexane	1300			µg/L	1.0 U
Dibromochloromethane	0.87		80	µg/L	1.0 U
Dichlorodifluoromethane (CFC-12)	20			µg/L	1.0 U
Ethylbenzene	1.5	90	700	µg/L	1.0 U
Isopropyl benzene	45	2.6		µg/L	1.0 U
Methyl acetate	2000			µg/L	5.0 U
Methyl cyclohexane				µg/L	1.0 U
Methyl tert butyl ether (MTBE)	10	11070		µg/L	1.0 U
Methylene chloride	5	98.1	5	µg/L	1.0 U
Styrene	100	72	100	µg/L	1.0 U
Tetrachloroethene	1	111	5	µg/L	1.0 U
Toluene	110	2	1000	µg/L	1.0 U
trans-1,2-Dichloroethene	38	970	100	µg/L	1.0 U
trans-1,3-Dichloropropene				µg/L	1.0 U
Trichloroethene	0.28	21	5	µg/L	1.0 U
Trichlorofluoromethane (CFC-11)	520			µg/L	1.0 U
Trifluorotrichloroethane (CFC-113)	1000			µg/L	1.0 U
Vinyl chloride	0.019	930	2	µg/L	1.0 U
Xylenes (total)	19	13	10000	µg/L	2.0 U

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Parameters	DNREC-SIRS Screening Levels (2018)[1]	DNREC-SIRS Ecological Surface Water Fresh criteria (2018)	USEPA MCL (2017)	Units	OU-5
Sample Location:					OU-5
Sample ID:					MW-46
Sample Date:					WG-17338-110417-DT-021
					11/4/2017
	a	b	c		
Semi-volatile Organic Compounds					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	71	—		µg/L	10 U
2,4,5-Trichlorophenol	120	---		µg/L	10 U
2,4,6-Trichlorophenol	1.2	4.9		µg/L	10 U
2,4-Dichlorophenol	4.6	11		µg/L	10 U
2,4-Dimethylphenol	36	---		µg/L	10 U
2,4-Dinitrophenol	3.9	—		µg/L	20 U
2,4-Dinitrotoluene	0.24	44		µg/L	2.0 U
2,6-Dinitrotoluene	0.049	81		µg/L	2.0 U
2-Chloronaphthalene	75	—		µg/L	10 U
2-Chlorophenol	9.1	24		µg/L	10 U
2-Methylnaphthalene	3.6	4.7		µg/L	10 U
2-Methylphenol	93	13		µg/L	10 U
2-Nitroaniline	19	—		µg/L	10 U
2-Nitrophenol				µg/L	10 U
3,3'-Dichlorobenzidine	0.13	4.5		µg/L	10 U
3-Nitroaniline				µg/L	10 U
4,6-Dinitro-2-methylphenol	0.15	—		µg/L	20 U
4-Bromophenyl phenyl ether				µg/L	10 U
4-Chloro-3-methylphenol	140	—		µg/L	10 U
4-Chloroaniline	0.37	232		µg/L	10 U
4-Chlorophenyl phenyl ether				µg/L	10 U
4-Methylphenol	190	543		µg/L	10 U
4-Nitroaniline	3.8	—		µg/L	10 U
4-Nitrophenol				µg/L	20 U
Acenaphthene	53	5.8		µg/L	10 U
Acenaphthylene				µg/L	10 U
Acetophenone	190	—		µg/L	10 U
Anthracene	180	0.012		µg/L	10 U
Atrazine	0.3	1.8	3	µg/L	2.0 U
Benzaldehyde	19	---		µg/L	10 U
Benzo(a)anthracene	0.03	0.018		µg/L	1.0 U
Benzo(a)pyrene	0.025	0.015	0.2	µg/L	1.0 U
Benzo(b)fluoranthene	0.25	---		µg/L	1.0 U
Benzo(g,h,i)perylene				µg/L	10 U
Benzo(k)fluoranthene	2.5	—		µg/L	1.0 U
Biphenyl (1,1-Biphenyl)	0.083	14		µg/L	10 U
bis(2-Chloroethoxy)methane	5.9	—		µg/L	10 U
bis(2-Chloroethyl)ether	0.014	—		µg/L	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	5.6	16	6	µg/L	2.0 U
Butyl benzylphthalate (BBP)	16	19		µg/L	10 U
Caprolactam	990	—		µg/L	10 U
Carbazole				µg/L	10 U
Chrysene	25	—		µg/L	2.0 U
Dibenz(a,h)anthracene	0.025	—		µg/L	1.0 U
Dibenzofuran	0.79	3.7		µg/L	10 U
Diethyl phthalate	1500	210		µg/L	10 U
Dimethyl phthalate				µg/L	10 U
Di-n-butylphthalate (DBP)	90	19		µg/L	10 U
Di-n-octyl phthalate (DnOP)	20	22		µg/L	10 U

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Sample Location:					**OU-5**
Sample ID:					**MW-46**
Sample Date:					**WG-17338-110417-DT-021**
					11/4/2017
Parameters	**DNREC-SIRS Screening Levels (2016)$^{[1]}$**	**DNREC-SIRS Ecological Surface Water Fresh criteria (2018)**	**USEPA MCL (2017)**	**Units**	
	a	b	c		
Semi-volatile Organic Compounds (Continued)					
Fluoranthene	80	0 04		µg/L	10 U
Fluorene	29	3		µg/L	10 U
Hexachlorobenzene	0 0098	0 0003	1		1 0 U
Hexachlorobutadiene	0 14	1.3		µg/L	1 0 U
Hexachlorocyclopentadiene	0 041	---	50	µg/L	10 U
Hexachloroethane	0 33	12		µg/L	1 0 U
Indeno(1,2,3-cd)pyrene	0 25	—		µg/L	1 0 U
Isophorone	78	—		µg/L	10 U
Naphthalene	0.17	1.1		µg/L	10 U
Nitrobenzene	0 14	—		µg/L	1 0 U
N-Nitrosodi-n-propylamine	0 011	—		µg/L	1 0 U
N-Nitrosodiphenylamine	12	210		µg/L	10 U
Pentachlorophenol	0 041	0 5	1	µg/L	20 U
Phenanthrene	12	0 4		µg/L	10 U
Phenol		4		µg/L	10 U
Pyrene	12	0 025		µg/L	10 U
Metals					
Aluminum	2000	87		µg/L	22 8 J
Aluminum (dissolved)	2000	87		µg/L	-
Antimony	0.78	30	6	µg/L	2 0 U
Antimony (dissolved)	0 78	30	6	µg/L	-
Arsenic	0 052	5	10	µg/L	2 0 U
Arsenic (dissolved)	0 052	5	10	µg/L	-
Barium	380	4	2000	µg/L	193^{b}
Barium (dissolved)	380	4	2000	µg/L	-
Beryllium	2 5	0.66	4	µg/L	0 80 U
Beryllium (dissolved)	2.5	0 66	4	µg/L	-
Cadmium	0.92	0 25	5	µg/L	2 0 U
Cadmium (dissolved)	0 92	0.25	5	µg/L	-
Calcium				µg/L	27800
Calcium (dissolved)				µg/L	-
Chromium	10	85	100	µg/L	4 0 U
Chromium (dissolved)	10	85	100	µg/L	-
Cobalt	0 6	23		µg/L	$3.6\ J^{a}$
Cobalt (dissolved)	0 6	23		µg/L	-
Copper	80	9	1300	µg/L	4 0 U
Copper (dissolved)	80	9	1300	µg/L	-
Iron	1400	300		µg/L	64 7 J
Iron (dissolved)	1400	300		µg/L	-
Lead	15	2.5	15	µg/L	1 2 U
Lead (dissolved)	15	2.5	15		-
Magnesium					28200
Magnesium (dissolved)					-
Manganese	43	120			6000^{ab}
Manganese (dissolved)	43	120			-
Mercury	0 063	0 026	2		0 20 U
Mercury (dissolved)	0 063	0 026	2		-
Nickel	39	52			5 6 U

Table D.1

OU-5 Groundwater Analytical Results
Former Wilmington Assembly Plant
Wilmintong, Delaware

Sample Location:					**OU-5**
Sample ID:					**MW-48**
Sample Date:					**WG-17338-110417-DT-021**
					11/4/2017
Parameters	**DNREC-SIRS Screening Levels (2018)[1]** a	**DNREC-SIRS Ecological Surface Water Fresh criteria (2018)** b	**USEPA MCL (2017)** c	**Units**	
Metals (Continued)					
Nickel (dissolved)	39	52			-
Potassium					3300
Potassium (dissolved)					-
Selenium	10	1	50		10 0 U
Selenium (dissolved)	10	1	50		-
Silver	9 4	3 2			2 0 U
Silver (dissolved)	9 4	3 2			-
Sodium					64000
Sodium (dissolved)					-
Thallium	0 02	0 8	2		0 80 U
Thallium (dissolved)	0 02	0 8	2		-
Vanadium	8 6	20			4 0 U
Vanadium (dissolved)	8 6	20			-
Zinc	600	120			30 5 U

Notes

J - Estimated concentration
U - Not detected at the associated reporting limit
UJ - Not detected, associated reporting limit is estimated
µg/L - Micrograms per liter
[1] - Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration (SIRS) Screening Levels
a - concentration exceeds DNREC-SIRS Screening Level, 2018
b - concentration exceeds DNREC-SIRS Ecological Surface Water Fresh, 2018
c - concentration exceeds USEPA 2017 Maximum Contaminant Level (MCL)
8.3 J - concentration exceeds criteria

Attachment E

Groundwater Discharge to Little Mill Creek

ATTACHMENT E

Estimation of Current Shallow Groundwater Flow Rate and Groundwater Discharge of Iron and Manganese from the Facility to Little Mill Creek

The discharge of groundwater in the shallow saturated zone from the Facility to Little Mill Creek may occur currently along the Facility's northeastern boundary extending from the northeastern property limit to the eastern end of operable unit (OU) 5.

Under current conditions, the flow rate of groundwater in the shallow saturated zone from the Facility to Little Mill Creek is estimated using Darcy's law, as follows:

$$Q = A \cdot K \frac{dh}{dx}$$

where:

Q = flow rate (ft^3/s)
A = cross-sectional area of flow (ft^2)
K = hydraulic conductivity (ft/s)
dh/dx = hydraulic gradient (ft/ft)

The cross-sectional area of shallow groundwater flow (A) is estimated to be approximately 2,500 ft^2. This estimate is based on the distance from monitoring wells MW-48 to MW-109 along the eastern boundary of OU-5. The average saturated thickness of the shallow saturated zone along the perimeter of the property, which is approximately 7 ft, was determined based on the watertable at the eastern perimeter wells MW-112 and MW-113. This is likely an overestimate of the discharge area to Little Mill Creek.

The hydraulic conductivity (K) of the shallow saturated zone was estimated using saturated hydraulic conductivity for sandy loam soil from the National Resources Conservation Service (NRCS). The average of the low and high hydraulic conductivities was used, which is approximately 28.2 μm/s or 9.3×10^{-6} ft/s.

The hydraulic gradient (*dh/dx*) is estimated to range from approximately 0.005 to 0.007 ft/ft, based on the groundwater elevations from MW-28 to MW-113 and MW-112, respectively.

Using the high end of the range of hydraulic gradients and the other estimated values discussed above, the discharge of shallow groundwater is conservatively calculated to be approximately 1.6×10^{-4} ft^3/s.

Under current conditions, the stream concentration was calculated, assuming groundwater discharge into the stream, as follows:

$$C_s = C_g \, (Q_g/Q_s)$$

where:

C_s = stream concentration (µg/L)
C_g = groundwater concentration (µg/L)
Q_g = groundwater flow rate (ft^3/s)
Q_s = 1Q10 Little Mill Creek flow rate (ft^3/s)

The highest groundwater concentration for iron (4,680 µg/L) and manganese (3,840 µg/L) in MW-112 and MW-113 was used to calculate stream concentration.

Using the 1Q10 flow rate for Little Mill Creek from StreamStats (station ID 01480100), the concentration of iron and manganese from the estimated discharge of groundwater is conservatively calculated to be approximately 2.97 µg/L for iron and 2.44 µg/L for manganese. The concentrations are significantly below the DNREC-SIRS Ecological Surface Water Fresh standards for iron and manganese, 300 and 120 µg/L, respectively.

Exhibit 5

Memorandum

December 20, 2018

To:	Rick Galloway	Ref. No.:	017338-T07
From:	Francis C. Ramacciotti; Greg Carli; Samantha Sasnow/eew/39	Tel:	716-297-6150
CC:	Qazi Salahuddin; Pam Barnett; Jenna Harwanko		
Subject:	**VI Re-Evaluation for OU-5** **Former GM Wilmington Assembly Plant** **Wilmington, Delaware**		

This memorandum has been prepared to summarize the results and reevaluation of the vapor intrusion (VI) evaluation that was performed at Operable Unit (OU)-5 of the Former General Motors (GM) Wilmington Assembly Plant (Site). This re-evaluation was performed at the request of Delaware Department of Natural Resources and Environmental Control (DNREC) in support of redevelopment activities at the Site.

The risk from potential exposure via vapor intrusion was evaluated in the 2015 Human Health Risk Assessment (HHRA) of the Remedial Investigation (RI) Report. This memorandum summarizes the results for potential non-residential vapor intrusion exposures from the 2015 HHRA. It also evaluates potential post-remedy exposure risks in OU-5 that will remain after completion of the planned corrective actions. Finally, this memorandum includes updated vapor intrusion screening tables, as requested by DNREC, to confirm that any updates to VI screening levels or recent groundwater concentrations would not change the risk assessment conclusions relative to potential VI.

1. 2015 HHRA Results

The 2015 HHRA calculated cumulative cancer risk and non-cancer hazard indices (HIs) to evaluate the potential for significant future vapor intrusion exposure from groundwater and soil into hypothetical future buildings in OU-5.

The 2015 HHRA calculated cumulative cancer risk and non-cancer HIs that did not exceed DNREC's risk levels of 1×10^{-5} and 1, respectively, for potential non-residential vapor intrusion from groundwater at the Site using groundwater data collected through 2012. However, this evaluation did not calculate potential VI risks from vinyl chloride, which was detected at MW-29, because there were no current or planned buildings in OU-5 at the time. The potential for significant VI from vinyl chloride is evaluated in the revised screening in Section 3 of this memorandum.

The cancer risk and HI estimates for potential non-residential vapor intrusion from soil in OU-5 exceed the acceptable risk levels, primarily resulting from the detected concentrations of 1,4-dichlorobenzene, ethyl benzene, naphthalene, and xylenes in soil at concentrations of 1, 4.6, 22 and 220 mg/kg, respectively, which were detected in locations MW-29 or BH 34-11.

2. Evaluation of Post-Remedy Conditions in OU-5

The 2015 HHRA evaluated the significance of reasonable maximum exposures (RME) to affected environmental media under current and reasonably expected future land use at and around the Facility. The results of the HHRA were used to assist in identifying where a release of hazardous constituents from the Facility may cause the RME to be significant enough to warrant corrective measures. Based on the conclusions in the 2015 HHRA, soil in portions of OU-5 was identified for future action to address the risks from potential VI and direct contact exposure to soil at locations MW-29, BH 34-11, and BH-27/MW 28-11.

The exposure point concentrations used to estimate an RME in the intake equation is the arithmetic average of the concentration that is contacted over the exposure period (per USEPA's RAGS Part A). To evaluate the post-remedy risks after soil at locations MW-29, BH 34-11, and BH-27/MW 28-11 are addressed, the exposure point concentrations in the 2015 HHRA were updated. Approximately 40 feet by 40 feet areas around locations MW-29, BH 34-11, and BH-27/MW 28-11 will be excavated to a depth of 5 feet below ground surface. The detected concentrations in the samples from these locations were removed from this post-remedy assessment. The exposure point concentrations used in the reevaluation of potential VI were also updated to exclude soil samples collected below the groundwater measured at or in the vicinity of each location.

The exposure point concentrations, after accounting for the planned excavations and soil samples that would not be a source for potential VI, were conservatively calculated as the maximum detected concentration in any sample within OU-5. The use of maximum detected concentrations, rather than estimates of the mean, for many constituents introduces more conservatism than necessary for RME estimates because it assumes constant, simultaneous worst case exposure to many constituents, when the RME generally would not have so many constituents at worst case concentrations at all times.

These exposure point concentrations were used to recalculate the risk estimates in the 2015 HHRA. The non-cancer HI for potential vapor intrusion into nonresidential buildings that were recalculated using the 2015 HHRA approach is 0.05, which does not exceed the HI limit. The cumulative cancer risk would not be calculated because all carcinogens evaluated in the 2015 HHRA will be non-detect after removal is complete. The HI estimate was calculated by scaling the risk estimate in the 2015 HHRA by the ratio of the post-remedy exposure point concentration to the exposure concentration in the 2015 HHRA for xylenes, which is the only constituent included in the VI evaluation in the 2015 HHRA with a detected concentration after the remedy is complete. For xylenes, the non-cancer HI from the 2015 HHRA (27) was scaled using the ratio of the post-remedy exposure point concentration (0.059 mg/kg) to the original exposure point concentration (35.2 mg/kg) to calculate a post-remedy hazard quotient of 0.045.

As discussed above, the potential for significant VI exposure from groundwater in OU-5 is evaluated below in Section 3.

3. Revised Screening

The screening from the 2015 HHRA was updated to use DNREC's HSCA Groundwater VI Screening Levels and USEPA 2018 Vapor Intrusion Screening Levels (VISL). Table 1 presents a comparison of DNREC's 2018 HSCA Groundwater VI Screening Levels, USEPA November 2018 VISL, and the criteria used in the 2015 HHRA. Table 2 shows the OU-5 groundwater data screened against DNREC HSCA Groundwater VI Screening Levels and the VISLs.

As shown in Table 1, the DNREC's HSCA Groundwater VI Screening Levels and USEPA VISL are higher (i.e., less conservative) than the screening levels used in the 2015 HHRA. As shown in Table 2, vinyl chloride was detected at MW-29 at concentrations that exceeded the USEPA VISL in 2011 and 2012 at concentrations of 42 and 31 µg/L, respectively, which were presented in the 2015 HHRA. However, in 2017 the detected concentration of vinyl chloride in this location was 0.31 µg/L, which did not exceed the USEPA VISL, nor did it exceed USEPA's maximum contaminant level (MCL) of 2 µg/L. The MCLs are enforceable standards that represent the highest level of a contaminant that is allowed in drinking water, which is a more direct potential inhalation exposure than potential VI from groundwater, through the vadose zone and into a potential building. Therefore, there is no significant exposure via VI into future nonresidential buildings from groundwater in OU-5.

4. Conclusions

The above evaluation using current groundwater results and post-remedy (e.g., post-soil excavation) soil conditions at OU-5, including updated screening, concluded that there are no significant exposures via VI into future nonresidential buildings from soil or groundwater at the Site.

Table 1

Criteria Comparison
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			2018 VI Reevaluation Criteria	
Parameters	Units	2015 HHRA Criteria(1)	DNREC-SIRS 2018 Groundwater VI Screening Levels	USEPA 2018 VISL (TCR=1E-5 or THQ=1)
Volatile Organic Compounds				
1,1,1-Trichloroethane	ug/L	200	---	31100
1,1,2,2-Tetrachloroethane	ug/L	0.076	---	141
1,1,2-Trichloroethane	ug/L	0.041	---	26
1,1-Dichloroethane	ug/L	0.558	---	334
1,1-Dichloroethene	ug/L	7	---	821
1,2,4-Trichlorobenzene	ug/L	0.4	---	151
1,2,4-Trimethylbenzene	ug/L	1.5	---	1040
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	0.00033	---	3
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.0075	---	8
1,2-Dichlorobenzene	ug/L	30	---	11200
1,2-Dichloroethane	ug/L	0.17	---	98
1,2-Dichloropropane	ug/L	0.44	---	152
1,3-Dichlorobenzene	ug/L	---	---	---
1,4-Dichlorobenzene	ug/L	0.48	---	113
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	560	---	9410000
2-Hexanone	ug/L	3.35	---	34500
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	120	---	2330000
Acetone	ug/L	1400	---	94500000
Benzene	ug/L	0.45	---	69
Bromodichloromethane	ug/L	0.13	---	38
Bromoform	ug/L	9.2	---	5100
Bromomethane (Methyl bromide)	ug/L	0.75	---	73
Carbon disulfide	ug/L	81	---	5210
Carbon tetrachloride	ug/L	0.45	0.43	18
Chlorobenzene	ug/L	7.8	---	1720
Chloroethane	ug/L	2100	---	96500
Chloroform (Trichloromethane)	ug/L	0.22	---	36
Chloromethane (Methyl chloride)	ug/L	19	---	1090
cis-1,2-Dichloroethene	ug/L	1.04	---	---
cis-1,3-Dichloropropene	ug/L	---	---	---
Cyclohexane	ug/L	1300	---	4290
Dibromochloromethane	ug/L	0.17	---	---
Dichlorodifluoromethane (CFC-12)	ug/L	20	0.75	31
Ethylbenzene	ug/L	1.5	---	152

Table 1

Criteria Comparison
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

Parameters	Units	2015 HHRA Criteria(1)	2018 VI Reevaluation Criteria	
			DNREC-SIRS 2018 Groundwater VI Screening Levels	USEPA 2018 VISL (TCR=1E-5 or THQ=1)
Volatile Organic Compounds (continued)				
Isopropyl benzene	ug/L	28.6	---	3730
Methyl acetate	ug/L	2000	---	---
Methyl cyclohexane	ug/L	---	---	---
Methyl tert butyl ether (MTBE)	ug/L	10	---	19700
Methylene chloride	ug/L	5	---	19800
Styrene	ug/L	100	---	39000
Tetrachloroethene	ug/L	0.849	---	242
Toluene	ug/L	110	---	80700
trans-1,2-Dichloroethene	ug/L	36	---	---
trans-1,3-Dichloropropene	ug/L	---	---	---
Trichloroethene	ug/L	0.28	---	22
Trichlorofluoromethane (CFC-11)	ug/L	110	---	---
Trifluorotrichloroethane (CFC-113)	ug/L	5500	150	1020
Vinyl chloride	ug/L	0.019	---	25
Xylenes (total)	ug/L	19	---	1620
Semi-Volatile Organic Compounds				
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	0.36	---	---
2,4,5-Trichlorophenol	ug/L	120	---	---
2,4,6-Trichlorophenol	ug/L	1.2	---	---
2,4-Dichlorophenol	ug/L	4.6	---	---
2,4-Dimethylphenol	ug/L	36	---	---
2,4-Dinitrophenol	ug/L	3.9	---	---
2,4-Dinitrotoluene	ug/L	0.24	---	---
2,6-Dinitrotoluene	ug/L	0.048	---	---
2-Chloronaphthalene	ug/L	75	---	---
2-Chlorophenol	ug/L	9.1	---	---
2-Methylnaphthalene	ug/L	3.6	---	---
2-Methylphenol	ug/L	93	---	---
2-Nitroaniline	ug/L	19	---	---
2-Nitrophenol	ug/L	---	---	---
3,3'-Dichlorobenzidine	ug/L	0.12	---	---
3-Nitroaniline	ug/L	---	---	---
4,6-Dinitro-2-methylphenol	ug/L	0.15	---	---
4-Bromophenyl phenyl ether	ug/L	---	---	---

Table 1

Criteria Comparison
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

Parameters	Units	2015 HHRA Criteria[1]	2018 VI Reevaluation Criteria	
			DNREC-SIRS 2018 Groundwater VI Screening Levels	USEPA 2018 VISL (TCR=1E-5 or THQ=1)
Semi-volatile Organic Compounds (continued)				
4-Chloro-3-methylphenol	ug/L	140	---	---
4-Chloroaniline	ug/L	0.36	---	---
4-Chlorophenyl phenyl ether	ug/L	---	---	---
4-Methylphenol	ug/L	190	---	---
4-Nitroaniline	ug/L	3.8	---	---
4-Nitrophenol	ug/L	---	---	---
Acenaphthene	ug/L	53	---	---
Acenaphthylene	ug/L	---	---	---
Acetophenone	ug/L	190	---	---
Anthracene	ug/L	180	---	---
Atrazine	ug/L	0.3	---	---
Benzaldehyde	ug/L	190	---	---
Benzo(a)anthracene	ug/L	0.034	---	4170
Benzo(a)pyrene	ug/L	0.0034	---	---
Benzo(b)fluoranthene	ug/L	0.034	---	---
Benzo(g,h,i)perylene	ug/L	---	---	---
Benzo(k)fluoranthene	ug/L	0.34	---	---
Biphenyl (1,1-Biphenyl)	ug/L	0.083	---	139
bis(2-Chloroethoxy)methane	ug/L	5.9	---	---
bis(2-Chloroethyl)ether	ug/L	0.014	---	535
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	5.6	---	---
Butyl benzylphthalate (BBP)	ug/L	16	---	---
Caprolactam	ug/L	990	---	---
Carbazole	ug/L	---	---	---
Chrysene	ug/L	3.4	---	---
Dibenz(a,h)anthracene	ug/L	0.0034	---	---
Dibenzofuran	ug/L	0.79	---	---
Diethyl phthalate	ug/L	1500	---	---
Dimethyl phthalate	ug/L	---	---	---
Di-n-butylphthalate (DBP)	ug/L	90	---	---
Di-n-octyl phthalate (DnOP)	ug/L	20	---	---
Fluoranthene	ug/L	80	---	---
Fluorene	ug/L	29	---	---
Hexachlorobenzene	ug/L	0.049	---	4
Hexachlorobutadiene	ug/L	0.3	---	13

Table 1

Criteria Comparison
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			2018 VI Reevaluation Criteria	
Parameters	**Units**	**2015 HHRA Criteria[1]**	**DNREC-SIRS 2018 Groundwater VI Screening Levels**	**USEPA 2018 VISL (TCR=1E-5 or THQ=1)**
Semi-volatile Organic Compounds (continued)				
Hexachlorocyclopentadiene	ug/L	3.1	0.018	1
Hexachloroethane	ug/L	0.69	---	70
Indeno(1,2,3-cd)pyrene	ug/L	0.034	---	---
Isophorone	ug/L	78	---	---
Naphthalene	ug/L	0.17	---	201
Nitrobenzene	ug/L	0.14	---	3120
N-Nitrosodi-n-propylamine	ug/L	0.011	---	---
N-Nitrosodiphenylamine	ug/L	12	---	---
Pentachlorophenol	ug/L	0.04	---	---
Phenanthrene	ug/L	---	---	---
Phenol	ug/L	580	---	---
Pyrene	ug/L	12	---	---

Notes:

[1] 2015 HHRA screening criteria consisted of DNREC-SIRS 2014 Groundwater Screening Levels and J&E model screening levels
Grey shaded values indicate J&E model screening levels used as screening criteria.
HHRA - Human Health Risk Assessment
J&E - Johnson & Ettinger (1991) model

DNREC-SIRS - Department of Natural Resources and Environmental Control Site Investigation and Restoration Section
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	**OU-5**	**OU-5**	**OU-5**
			Sample Location:	**MW-27**	**MW-27**	**MW-28**
			Sample ID:	**GW-17338-110111-MW27-09**	**WG-17338-101812-MW27-MM-262**	**GW-17338-110211-MW28-12**
			Sample Date:	**11/1/2011**	**10/18/2012**	**11/2/2011**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**			
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 UJ	1.0 U	1.0 UJ
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	R	R	R
2-Hexanone	ug/L	---	34500	10 U	5.0 U	10 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	10 U	5.0 U	10 U
Acetone	ug/L	---	94500000	R	R	R
Benzene	ug/L	---	69	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	---	4280	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	1.0 U	0.21 J	1.0 U
Isopropyl benzene	ug/L	---	3730	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	---	---	2.0 U	R	2.0 U
Methyl cyclohexane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	---	19700	1.0 U	1.0 U	0.32 J
Methylene chloride	ug/L	---	19800	1.0 U	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	1.0 U
Toluene	ug/L	---	80700	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				**OU-5**	**OU-5**	**OU-5**
Sample Location:				**MW-27**	**MW-27**	**MW-28**
Sample ID:				**GW-17338-110111-MW27-09**	**WG-17338-101812-MW27-MM-262**	**GW-17338-110211-MW28-12**
Sample Date:				**11/1/2011**	**10/18/2012**	**11/2/2011**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1) b**			
Volatile Organic Compounds (continued)						
Trichloroethene	ug/L	---	22	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	---	1620	3.0 U	0.95 J	3.0 U
Semi-Volatile Organic Compounds						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	-	10 U
2,4,5-Trichlorophenol	ug/L	---	---	10 U	-	10 U
2,4,6-Trichlorophenol	ug/L	---	---	10 U	-	10 U
2,4-Dichlorophenol	ug/L	---	---	10 U	-	10 U
2,4-Dimethylphenol	ug/L	---	---	10 U	-	10 U
2,4-Dinitrophenol	ug/L	---	---	31 U	-	30 U
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	-	2.0 U
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	-	2.0 U
2-Chloronaphthalene	ug/L	---	---	10 U	-	10 U
2-Chlorophenol	ug/L	---	---	10 U	-	10 U
2-Methylnaphthalene	ug/L	---	---	10 U	-	10 U
2-Methylphenol	ug/L	---	---	10 U	-	10 U
2-Nitroaniline	ug/L	---	---	20 U	-	20 U
2-Nitrophenol	ug/L	---	---	10 U	-	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	20 U	-	20 U
3-Nitroaniline	ug/L	---	---	20 U	-	20 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	31 U	-	30 U
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	-	10 U
4-Chloro-3-methylphenol	ug/L	---	---	10 U	-	10 U
4-Chloroaniline	ug/L	---	---	10 U	-	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	-	10 U
4-Methylphenol	ug/L	---	---	10 U	-	10 U
4-Nitroaniline	ug/L	---	---	20 U	-	20 U
4-Nitrophenol	ug/L	---	---	31 U	-	30 U
Acenaphthene	ug/L	---	---	10 U	-	10 U
Acenaphthylene	ug/L	---	---	10 U	-	10 U
Acetophenone	ug/L	---	---	10 U	-	10 U
Anthracene	ug/L	---	---	10 U	-	10 U
Atrazine	ug/L	---	---	10 U	-	10 U
Benzaldehyde	ug/L	---	---	10 UJ	-	10 UJ
Benzo(a)anthracene	ug/L	---	4170	0.051 U	-	0.051 U
Benzo(a)pyrene	ug/L	---	---	0.051 U	-	0.051 U
Benzo(b)fluoranthene	ug/L	---	---	0.051 U	-	0.051 U
Benzo(g,h,i)perylene	ug/L	---	---	10 U	-	10 U
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	-	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	-	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	-	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

Parameters	Units	DNREC-SIRS 2018 Groundwater VI Screening Levels a	USEPA 2018 VISL (TCR=1E-05 or THQ=1) b	OU-5	OU-5	OU-5
Sample Location:				MW-27	MW-27	MW-28
Sample ID:				GW-17338-110111-MW27-09	WG-17338-101812-MW27-MM-262	GW-17338-110211-MW28-12
Sample Date:				11/1/2011	10/18/2012	11/2/2011
Semi-volatile Organic Compounds (continued)						
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	-	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	10 U	-	10 U
Butyl benzylphthalate (BBP)	ug/L	---	---	10 U	-	10 U
Caprolactam	ug/L	---	---	10 U	-	10 U
Carbazole	ug/L	---	---	10 U	-	10 U
Chrysene	ug/L	---	---	10 U	-	10 U
Dibenz(a,h)anthracene	ug/L	---	---	1.0 U	-	1.0 U
Dibenzofuran	ug/L	---	---	10 U	-	10 U
Diethyl phthalate	ug/L	---	---	10 U	-	10 U
Dimethyl phthalate	ug/L	---	---	10 U	-	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	10 U	-	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	10 U	-	10 U
Fluoranthene	ug/L	---	---	10 U	-	10 U
Fluorene	ug/L	---	---	10 U	-	10 U
Hexachlorobenzene	ug/L	---	4	0.020 U	-	0.020 U
Hexachlorobutadiene	ug/L	---	13	2.0 U	-	2.0 U
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	-	10 U
Hexachloroethane	ug/L	---	70	1.0 U	-	1.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	1.0 U	-	1.0 U
Isophorone	ug/L	---	---	10 U	-	10 U
Naphthalene	ug/L	---	201	10 U	-	10 U
Nitrobenzene	ug/L	---	3120	1.0 U	-	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	1.0 U	-	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	10 U	-	10 U
Pentachlorophenol	ug/L	---	---	0.20 U	-	0.20 U
Phenanthrene	ug/L	---	---	10 U	-	10 U
Phenol	ug/L	---	---	10 U	-	10 U
Pyrene	ug/L	---	---	10 U	-	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exeedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Section (SIRS) Groundwater Vapor Intrusion (VI) Screening Levels, February 2018
🟥 4.3 - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	OU-5	OU-5	OU-5
			Sample Location:	MW-28	MW-28	MW-28
			Sample ID:	WG-17338-101812-MW28-MM-260	WG-17338-110417-SG-022	WG-17338-062818-AM-005
			Sample Date:	10/18/2012	11/4/2017	6/26/2018
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	28	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	-	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	R	5.0 U	5.0 U
2-Hexanone	ug/L	---	34500	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	5.0 U	5.0 U	5.0 U
Acetone	ug/L	---	94500000	R	5.0 U	11 U
Benzene	ug/L	---	69	0.12 J	1.0 U	1.0 U
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	---	4290	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	0.37 J	1.0 U	1.0 U
Isopropyl benzene	ug/L	---	3730	0.097 J	1.0 U	1.0 U
Methyl acetate	ug/L	---	---	R	5.0 U	5.0 U
Methyl cyclohexane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	---	19700	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	---	19800	1.0 U	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	1.0 U
Toluene	ug/L	---	80700	1.0 U	0.35 J	1.0 U
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	**OU-5**	**OU-5**	**OU-5**
			Sample Location:	**MW-28**	**MW-28**	**MW-28**
			Sample ID:	**WG-17338-101812-MW28-MM-260**	**WG-17338-110417-SG-022**	**WG-17338-062618-AM-005**
			Sample Date:	**10/18/2012**	**11/4/2017**	**6/26/2018**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**			
Volatile Organic Compounds (continued)						
Trichloroethene	ug/L	---	22	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	---	1620	1.5 J	2.0 U	2.0 U
Semi-Volatile Organic Compounds						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	-	10 U	10 U
2,4,5-Trichlorophenol	ug/L	---	---	-	10 U	10 U
2,4,6-Trichlorophenol	ug/L	---	---	-	10 U	10 U
2,4-Dichlorophenol	ug/L	---	---	-	10 U	10 U
2,4-Dimethylphenol	ug/L	---	---	-	10 U	10 U
2,4-Dinitrophenol	ug/L	---	---	-	20 U	20 U
2,4-Dinitrotoluene	ug/L	---	---	-	2.0 U	2.0 U
2,6-Dinitrotoluene	ug/L	---	---	-	2.0 U	2.0 U
2-Chloronaphthalene	ug/L	---	---	-	10 U	10 U
2-Chlorophenol	ug/L	---	---	-	10 U	10 U
2-Methylnaphthalene	ug/L	---	---	-	10 U	10 U
2-Methylphenol	ug/L	---	---	-	10 U	10 U
2-Nitroaniline	ug/L	---	---	-	10 U	10 U
2-Nitrophenol	ug/L	---	---	-	10 U	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	-	10 U	10 U
3-Nitroaniline	ug/L	---	---	-	10 U	10 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	-	20 U	20 U
4-Bromophenyl phenyl ether	ug/L	---	---	-	10 U	10 U
4-Chloro-3-methylphenol	ug/L	---	---	-	10 U	10 U
4-Chloroaniline	ug/L	---	---	-	10 U	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	-	10 U	10 U
4-Methylphenol	ug/L	---	---	-	10 U	10 U
4-Nitroaniline	ug/L	---	---	-	10 U	10 U
4-Nitrophenol	ug/L	---	---	-	20 U	20 U
Acenaphthene	ug/L	---	---	-	10 U	10 U
Acenaphthylene	ug/L	---	---	-	10 U	10 U
Acetophenone	ug/L	---	---	-	10 U	10 U
Anthracene	ug/L	---	---	-	10 U	10 U
Atrazine	ug/L	---	---	-	2.0 U	2.0 U
Benzaldehyde	ug/L	---	---	-	10 U	10 U
Benzo(a)anthracene	ug/L	---	4170	-	1.0 U	1.0 U
Benzo(a)pyrene	ug/L	---	---	-	1.0 U	1.0 U
Benzo(b)fluoranthene	ug/L	---	---	-	1.0 U	2.0 U
Benzo(g,h,i)perylene	ug/L	---	---	-	10 U	10 U
Benzo(k)fluoranthene	ug/L	---	---	-	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	-	10 U	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	-	10 U	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	**OU-5**	**OU-5**	**OU-5**
			Sample Location:	**MW-28**	**MW-28**	**MW-28**
			Sample ID:	**WG-17338-101812-MW28-MM-280**	**WG-17338-110417-SG-022**	**WG-17338-062618-AM-005**
			Sample Date:	**10/18/2012**	**11/4/2017**	**6/26/2018**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Semi-volatile Organic Compounds (continued)						
bis(2-Chloroethyl)ether	ug/L	---	535	-	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	-	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	ug/L	---	---	-	10 U	10 U
Caprolactam	ug/L	---	---	-	10 U	10 U
Carbazole	ug/L	---	---	-	10 U	10 U
Chrysene	ug/L	---	---	-	2.0 U	2.0 U
Dibenz(a,h)anthracene	ug/L	---	---	-	1.0 U	1.0 U
Dibenzofuran	ug/L	---	---	-	10 U	10 U
Diethyl phthalate	ug/L	---	---	-	10 U	10 U
Dimethyl phthalate	ug/L	---	---	-	10 U	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	-	10 U	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	-	10 U	10 U
Fluoranthene	ug/L	---	---	-	10 U	10 U
Fluorene	ug/L	---	---	-	10 U	10 U
Hexachlorobenzene	ug/L	---	4	-	1.0 U	1.0 U
Hexachlorobutadiene	ug/L	---	13	-	1.0 U	1.0 U
Hexachlorocyclopentadiene	ug/L	0.018	1	-	10 U	10 U
Hexachloroethane	ug/L	---	70	-	1.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	-	1.0 U	2.0 U
Isophorone	ug/L	---	---	-	10 U	10 U
Naphthalene	ug/L	---	201	-	10 U	10 U
Nitrobenzene	ug/L	---	3120	-	1.0 U	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	-	1.0 U	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	-	10 U	10 U
Pentachlorophenol	ug/L	---	---	-	20 U	20 U
Phenanthrene	ug/L	---	---	-	10 U	10 U
Phenol	ug/L	---	---	-	10 U	10 U
Pyrene	ug/L	---	---	-	10 U	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exceedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3" - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU: Sample Location: Sample ID: Sample Date:				OU-5 MW-29 GW-17338-110111-DUP-08 11/1/2011 (Duplicate)	OU-5 MW-29 GW-17338-110111-MW29-07 11/1/2011	OU-5 MW-29 WG-17338-101812-MW29-MM-259 10/18/2012
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 UJ	1.0 UJ	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	0.29 J	0.26 J	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	R	R	R
2-Hexanone	ug/L	---	34500	10 U	10 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	2.2 J	1.9 J	5.0 U
Acetone	ug/L	---	94500000	21 J	32 J	R
Benzene	ug/L	---	69	15	13	11
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	9.2	8.9	2.6
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	---	4290	6.9	6.5	3.6
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	29	27	5.9
Isopropyl benzene	ug/L	---	3730	2.5	2.5	0.79 J
Methyl acetate	ug/L	---	---	2.0 U	2.0 U	R
Methyl cyclohexane	ug/L	---	---	8.6	8.5	3.5
Methyl tert butyl ether (MTBE)	ug/L	---	19700	0.62 J	0.75 J	0.52 J
Methylene chloride	ug/L	---	19800	1.0 U	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	1.0 U
Toluene	ug/L	---	80700	31	30	1.5
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU: Sample Location: Sample ID: Sample Date:				OU-5 MW-29 GW-17338-110111-DUP-08 11/1/2011 (Duplicate)	OU-5 MW-29 GW-17338-110111-MW29-07 11/1/2011	OU-5 MW-29 WG-17338-101812-MW29-MM-259 10/18/2012
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Volatile Organic Compounds (continued)						
Trichloroethene	ug/L	---	22	0.62 J	0.69 J	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	42^{b}	41^{b}	31^{b}
Xylenes (total)	ug/L	---	1620	140	140	7.9
Semi-Volatile Organic Compounds						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	10 U	-
2,4,5-Trichlorophenol	ug/L	---	---	10 U	10 U	-
2,4,6-Trichlorophenol	ug/L	---	---	10 U	10 U	-
2,4-Dichlorophenol	ug/L	---	---	10 U	10 U	-
2,4-Dimethylphenol	ug/L	---	---	10 U	10 U	-
2,4-Dinitrophenol	ug/L	---	---	31 U	31 U	-
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	-
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	-
2-Chloronaphthalene	ug/L	---	---	10 U	10 U	-
2-Chlorophenol	ug/L	---	---	10 U	10 U	-
2-Methylnaphthalene	ug/L	---	---	10 U	10 U	-
2-Methylphenol	ug/L	---	---	10 U	10 U	-
2-Nitroaniline	ug/L	---	---	20 U	20 U	-
2-Nitrophenol	ug/L	---	---	10 U	10 U	-
3,3'-Dichlorobenzidine	ug/L	---	---	20 U	20 U	-
3-Nitroaniline	ug/L	---	---	20 U	20 U	-
4,6-Dinitro-2-methylphenol	ug/L	---	---	31 U	31 U	-
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	10 U	-
4-Chloro-3-methylphenol	ug/L	---	---	10 U	10 U	-
4-Chloroaniline	ug/L	---	---	10 U	10 U	-
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	10 U	-
4-Methylphenol	ug/L	---	---	10 U	10 U	-
4-Nitroaniline	ug/L	---	---	20 U	20 U	-
4-Nitrophenol	ug/L	---	---	31 U	31 U	-
Acenaphthene	ug/L	---	---	10 U	10 U	-
Acenaphthylene	ug/L	---	---	10 U	10 U	-
Acetophenone	ug/L	---	---	10 U	10 U	-
Anthracene	ug/L	---	---	10 U	10 U	-
Atrazine	ug/L	---	---	10 U	10 U	-
Benzaldehyde	ug/L	---	---	10 UJ	10 UJ	-
Benzo(a)anthracene	ug/L	---	4170	0.051 U	0.051 U	-
Benzo(a)pyrene	ug/L	---	---	0.051 U	0.051 U	-
Benzo(b)fluoranthene	ug/L	---	---	0.051 U	0.051 U	-
Benzo(g,h,i)perylene	ug/L	---	---	10 U	10 U	-
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	1.0 U	-
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	10 U	-
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	10 U	-

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	OU-5	OU-5	OU-5
			Sample Location:	**MW-29**	**MW-29**	**MW-29**
			Sample ID:	**GW-17338-110111-DUP-08**	**GW-17338-110111-MW29-07**	**WG-17338-101812-MW29-MM-259**
			Sample Date:	**11/1/2011 (Duplicate)**	**11/1/2011**	**10/18/2012**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Semi-volatile Organic Compounds (continued)						
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	1.0 U	-
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	—	10 U	10 U	-
Butyl benzylphthalate (BBP)	ug/L	---	—	10 U	10 U	-
Caprolactam	ug/L	---	—	10 U	10 U	-
Carbazole	ug/L	---	—	10 U	10 U	-
Chrysene	ug/L	---	—	10 U	10 U	-
Dibenz(a,h)anthracene	ug/L	---	—	1.0 U	1.0 U	-
Dibenzofuran	ug/L	---	—	10 U	10 U	-
Diethyl phthalate	ug/L	---	—	10 U	10 U	-
Dimethyl phthalate	ug/L	—	—	10 U	10 U	-
Di-n-butylphthalate (DBP)	ug/L	—	—	10 U	10 U	-
Di-n-octyl phthalate (DnOP)	ug/L	---	—	10 U	10 U	-
Fluoranthene	ug/L	—	—	10 U	10 U	-
Fluorene	ug/L	—	—	10 U	10 U	-
Hexachlorobenzene	ug/L	---	4	0.020 U	0.020 U	-
Hexachlorobutadiene	ug/L	---	13	2.0 U	2.0 U	-
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	10 U	-
Hexachloroethane	ug/L	---	70	1.0 U	1.0 U	-
Indeno(1,2,3-cd)pyrene	ug/L	---	—	1.0 U	1.0 U	-
Isophorone	ug/L	---	—	10 U	10 U	-
Naphthalene	ug/L	---	201	7.7 J	9.4 J	-
Nitrobenzene	ug/L	---	3120	1.0 U	1.0 U	-
N-Nitrosodi-n-propylamine	ug/L	---	—	1.0 U	1.0 U	-
N-Nitrosodiphenylamine	ug/L	—	—	10 U	10 U	-
Pentachlorophenol	ug/L	---	—	0.20 U	0.20 U	-
Phenanthrene	ug/L	---	—	10 U	10 U	-
Phenol	ug/L	—	—	10 U	10 U	-
Pyrene	ug/L	---	—	10 U	10 U	-

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exeedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3* - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5
Sample Location:				MW-29	MW-35	MW-35
Sample ID:				WG-17338-110517-SG-028	WG-17338-101812-MW35-MM-261	WG-17338-111812-MW35-CG-268
Sample Date:				11/5/2017	10/18/2012	11/16/2012
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	-
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	-
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U	-
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	-
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	-
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	-
1,2,4-Trimethylbenzene	ug/L	---	1040	9.1	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 U	1.0 U	-
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	-
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	-
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	-
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	-
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	-
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U	-
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	5.0 U	R	-
2-Hexanone	ug/L	---	34500	5.0 U	5.0 U	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	5.0 U	5.0 U	-
Acetone	ug/L	---	94500000	5.0 U	R	-
Benzene	ug/L	---	69	7.4	0.45 J	-
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	-
Bromoform	ug/L	---	5100	1.0 U	1.0 U	-
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 UJ	1.0 U	-
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	-
Carbon tetrachloride	ug/L	0.43	16	1.0 U	1.0 U	-
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	-
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	-
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	-
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	-
cis-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	-
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	-
Cyclohexane	ug/L	---	4290	4.2	1.0 U	-
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	-
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	-
Ethylbenzene	ug/L	---	152	0.74 J	0.28 J	-
Isopropyl benzene	ug/L	---	3730	1.8	1.0 U	-
Methyl acetate	ug/L	---	---	5.0 U	R	-
Methyl cyclohexane	ug/L	---	---	6.7	1.0 U	-
Methyl tert butyl ether (MTBE)	ug/L	---	19700	0.44 J	1.0 U	-
Methylene chloride	ug/L	---	19600	1.0 U	1.0 U	-
Styrene	ug/L	---	39000	1.0 U	1.0 U	-
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	-
Toluene	ug/L	---	80700	1.0 U	1.0 U	-
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	-
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	-

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	OU-5	OU-5	OU-5
			Sample Location:	MW-29	MW-35	MW-35
			Sample ID:	WG-17338-110517-SG-028	WG-17338-101812-MW35-MM-261	WG-17338-111612-MW35-CG-268
			Sample Date:	11/5/2017	10/18/2012	11/16/2012
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**			
Volatile Organic Compounds (continued)						
Trichloroethene	ug/L	---	22	1.0 U	0.87 J	-
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	-
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	-
Vinyl chloride	ug/L	---	25	0.31 J	1.0 U	-
Xylenes (total)	ug/L	---	1620	17	1.3 J	-
Semi-Volatile Organic Compounds						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	-	10 U
2,4,5-Trichlorophenol	ug/L	---	---	10 U	-	10 U
2,4,6-Trichlorophenol	ug/L	---	---	10 U	-	10 U
2,4-Dichlorophenol	ug/L	---	---	10 U	-	10 U
2,4-Dimethylphenol	ug/L	---	---	10 U	-	10 U
2,4-Dinitrophenol	ug/L	---	---	20 U	-	31 U
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	-	2.1 U
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	-	2.1 U
2-Chloronaphthalene	ug/L	---	---	10 U	-	10 U
2-Chlorophenol	ug/L	---	---	10 U	-	10 U
2-Methylnaphthalene	ug/L	---	---	10 U	-	10 U
2-Methylphenol	ug/L	---	---	10 U	-	10 U
2-Nitroaniline	ug/L	---	---	10 U	-	21 U
2-Nitrophenol	ug/L	---	---	10 U	-	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	10 U	-	21 U
3-Nitroaniline	ug/L	---	---	10 U	-	21 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	20 U	-	31 U
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	-	10 U
4-Chloro-3-methylphenol	ug/L	---	---	10 U	-	10 U
4-Chloroaniline	ug/L	---	---	10 U	-	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	-	10 U
4-Methylphenol	ug/L	---	---	10 U	-	10 U
4-Nitroaniline	ug/L	---	---	10 U	-	21 U
4-Nitrophenol	ug/L	---	---	20 U	-	31 U
Acenaphthene	ug/L	---	---	10 U	-	10 U
Acenaphthylene	ug/L	---	---	10 U	-	10 U
Acetophenone	ug/L	---	---	10 U	-	10 U
Anthracene	ug/L	---	---	10 U	-	10 U
Atrazine	ug/L	---	---	2.0 U	-	10 U
Benzaldehyde	ug/L	---	---	10 U	-	10 UJ
Benzo(a)anthracene	ug/L	---	4170	1.0 U	-	0.052 U
Benzo(a)pyrene	ug/L	---	---	1.0 U	-	0.052 U
Benzo(b)fluoranthene	ug/L	---	---	1.0 U	-	0.052 U
Benzo(g,h,i)perylene	ug/L	---	---	10 U	-	10 U
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	-	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	-	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	-	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5
Sample Location:				**MW-29**	**MW-35**	**MW-35**
Sample ID:				**WG-17338-110517-SG-028**	**WG-17338-101812-MW35-MM-281**	**WG-17338-111612-MW35-CG-258**
Sample Date:				**11/5/2017**	**10/18/2012**	**11/16/2012**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**			
Semi-volatile Organic Compounds (continued)						
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	-	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	2.0 U	-	10 U
Butyl benzylphthalate (BBP)	ug/L	---	---	10 U	-	10 U
Caprolactam	ug/L	---	---	10 U	-	10 U
Carbazole	ug/L	---	---	10 U	-	10 U
Chrysene	ug/L	---	---	2.0 U	-	10 U
Dibenz(a,h)anthracene	ug/L	---	---	1.0 U	-	1.0 U
Dibenzofuran	ug/L	---	---	10 U	-	10 U
Diethyl phthalate	ug/L	---	---	10 U	-	10 U
Dimethyl phthalate	ug/L	---	---	10 U	-	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	10 U	-	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	10 U	-	10 U
Fluoranthene	ug/L	---	---	10 U	-	10 U
Fluorene	ug/L	---	---	10 U	-	10 U
Hexachlorobenzene	ug/L	---	4	1.0 U	-	0.021 U
Hexachlorobutadiene	ug/L	---	13	1.0 U	-	2.1 U
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	-	10 U
Hexachloroethane	ug/L	---	70	1.0 U	-	1.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	1.0 U	-	1.0 UJ
Isophorone	ug/L	---	---	10 U	-	10 U
Naphthalene	ug/L	---	201	6.3 J	-	10 U
Nitrobenzene	ug/L	---	3120	1.0 U	-	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	1.0 U	-	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	10 U	-	10 U
Pentachlorophenol	ug/L	---	---	20 U	-	0.21 U
Phenanthrene	ug/L	---	---	10 U	-	10 U
Phenol	ug/L	---	---	10 U	-	10 U
Pyrene	ug/L	---	---	10 U	-	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exceedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3* - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5	OU-5
Sample Location:				MW-35	MW-48	MW-107	MW-108
Sample ID:				WG-17338-110417-DT-019	WG-17338-110417-DT-021	WG-17338-110317-DT-010	WG-17338-110317-DT-009
Sample Date:				11/4/2017	11/4/2017	11/3/2017	11/3/2017
Parameters	Units	DNREC-SIRS 2018 Groundwater VI Screening Levels a	USEPA 2018 VISL (TCR=1E-05 or THQ=1) b				
Volatile Organic Compounds							
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	ug/L	---	34500	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	ug/L	---	94500000	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	---	69	0.52 J	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 UJ	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	0.46 J	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	---	4290	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	---	3730	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	---	---	5.0 U	5.0 U	5.0 U	5.0 U
Methyl cyclohexane	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	---	19700	0.20 J	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	---	19600	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	---	80700	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5	OU-5
Sample Location:				MW-35	MW-48	MW-107	MW-108
Sample ID:				WG-17338-110417-DT-019	WG-17338-110417-DT-021	WG-17338-110317-DT-010	WG-17338-110317-DT-009
Sample Date:				11/4/2017	11/4/2017	11/3/2017	11/3/2017
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b				
Volatile Organic Compounds (continued)							
Trichloroethene	ug/L	---	22	3.6	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	---	1620	2.0 U	2.0 U	2.0 U	2.0 U
Semi-Volatile Organic Compounds							
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	ug/L	---	---	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	ug/L	---	---	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	ug/L	---	---	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	ug/L	---	---	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	ug/L	---	---	20 U	20 U	20 U	20 U
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	2.0 U	2.0 U
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	2.0 U	2.0 U
2-Chloronaphthalene	ug/L	---	---	10 U	10 U	10 U	10 U
2-Chlorophenol	ug/L	---	---	10 U	10 U	10 U	10 U
2-Methylnaphthalene	ug/L	---	---	10 U	10 U	10 U	10 U
2-Methylphenol	ug/L	---	---	10 U	10 U	10 U	10 U
2-Nitroaniline	ug/L	---	---	10 U	10 U	10 U	10 U
2-Nitrophenol	ug/L	---	---	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	10 U	10 U	10 U	10 U
3-Nitroaniline	ug/L	---	---	10 U	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	20 U	20 U	20 U	20 U
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	ug/L	---	---	10 U	10 U	10 U	10 U
4-Chloroaniline	ug/L	---	---	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	10 U	10 U	10 U
4-Methylphenol	ug/L	---	---	10 U	10 U	10 U	10 U
4-Nitroaniline	ug/L	---	---	10 U	10 U	10 U	10 U
4-Nitrophenol	ug/L	---	---	20 U	20 U	20 U	20 U
Acenaphthene	ug/L	---	---	10 U	10 U	10 U	10 U
Acenaphthylene	ug/L	---	---	10 U	10 U	10 U	10 U
Acetophenone	ug/L	---	---	10 U	10 U	10 U	10 U
Anthracene	ug/L	---	---	10 U	10 U	10 U	10 U
Atrazine	ug/L	---	---	2.0 U	2.0 U	2.0 U	2.0 U
Benzaldehyde	ug/L	---	---	10 U	10 U	10 U	10 U
Benzo(a)anthracene	ug/L	---	4170	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	ug/L	---	---	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	10 U	10 U	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5	OU-5
Sample Location:				MW-35	MW-48	MW-107	MW-108
Sample ID:				WG-17338-110417-DT-019	WG-17338-110417-DT-021	WG-17338-110317-DT-010	WG-17338-110317-DT-009
Sample Date:				11/4/2017	11/4/2017	11/3/2017	11/3/2017
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b				
Semi-volatile Organic Compounds (continued)							
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	2.0 U	2.0 U	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	ug/L	---	---	10 U	10 U	10 U	10 U
Caprolactam	ug/L	---	---	10 U	10 U	10 U	10 U
Carbazole	ug/L	---	---	10 U	10 U	10 U	10 U
Chrysene	ug/L	---	---	2.0 U	2.0 U	2.0 U	2.0 U
Dibenz(a,h)anthracene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Dibenzofuran	ug/L	---	---	10 U	10 U	10 U	10 U
Diethyl phthalate	ug/L	---	---	10 U	10 U	10 U	10 U
Dimethyl phthalate	ug/L	---	---	10 U	10 U	10 U	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	10 U	10 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	10 U	10 U	10 U	10 U
Fluoranthene	ug/L	---	---	10 U	10 U	10 U	10 U
Fluorene	ug/L	---	---	10 U	10 U	10 U	10 U
Hexachlorobenzene	ug/L	---	4	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorobutadiene	ug/L	---	13	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	10 U	10 U	10 U
Hexachloroethane	ug/L	---	70	1.0 U	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
Isophorone	ug/L	---	---	10 U	10 U	10 U	10 U
Naphthalene	ug/L	---	201	10 U	10 U	10 U	10 U
Nitrobenzene	ug/L	---	3120	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	10 U	10 U	10 U	10 U
Pentachlorophenol	ug/L	---	---	20 U	20 U	20 U	20 U
Phenanthrene	ug/L	---	---	10 U	10 U	10 U	10 U
Phenol	ug/L	---	---	10 U	10 U	10 U	10 U
Pyrene	ug/L	---	---	10 U	10 U	10 U	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exeedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3* - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				OU-5	OU-5	OU-5
Sample Location:				MW-109	MW-109	MW-112
Sample ID:				WG-17338-110417-SG-018	WG-17338-110417-SG-020	GW-01733818-0713-RM-01
Sample Date:				11/4/2017	11/4/2017 (Duplicate)	7/13/2018
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b			
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	5.0 U	5.0 U	5.0 U
2-Hexanone	ug/L	---	34500	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	5.0 U	5.0 U	5.0 U
Acetone	ug/L	---	94500000	5.0 U	5.0 U	5.0 U
Benzene	ug/L	---	69	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U	0.27 J
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U	1.5
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	---	4290	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	---	3730	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	---	---	5.0 U	5.0 U	5.0 U
Methyl cyclohexane	ug/L	---	---	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	---	19700	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	---	19800	1.0 U	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U	1.0 U
Toluene	ug/L	---	80700	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU: Sample Location: Sample ID: Sample Date:				OU-5 MW-109 WG-17338-110417-SG-018 11/4/2017	OU-5 MW-109 WG-17338-110417-SG-020 11/4/2017 (Duplicate)	OU-5 MW-112 GW-01733818-0713-RM-01 7/13/2018
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**			
Volatile Organic Compounds (continued)						
Trichloroethene	ug/L	---	22	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	---	1620	2.0 U	2.0 U	2.0 U
Semi-Volatile Organic Compounds						
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	10 U	10 U
2,4,5-Trichlorophenol	ug/L	---	---	10 U	10 U	10 U
2,4,6-Trichlorophenol	ug/L	---	---	10 U	10 U	10 U
2,4-Dichlorophenol	ug/L	---	---	10 U	10 U	10 U
2,4-Dimethylphenol	ug/L	---	---	10 U	10 U	10 U
2,4-Dinitrophenol	ug/L	---	---	20 U	20 U	20 U
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	2.0 U
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U	2.0 U
2-Chloronaphthalene	ug/L	---	---	10 U	10 U	10 U
2-Chlorophenol	ug/L	---	---	10 U	10 U	10 U
2-Methylnaphthalene	ug/L	---	---	10 U	10 U	10 U
2-Methylphenol	ug/L	---	---	10 U	10 U	10 U
2-Nitroaniline	ug/L	---	---	10 U	10 U	10 U
2-Nitrophenol	ug/L	---	---	10 U	10 U	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	10 U	10 U	10 U
3-Nitroaniline	ug/L	---	---	10 U	10 U	10 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	20 U	20 U	20 U
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	10 U	10 U
4-Chloro-3-methylphenol	ug/L	---	---	10 U	10 U	10 U
4-Chloroaniline	ug/L	---	---	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	10 U	10 U
4-Methylphenol	ug/L	---	---	10 U	10 U	10 U
4-Nitroaniline	ug/L	---	---	10 U	10 U	10 U
4-Nitrophenol	ug/L	---	---	20 U	20 U	20 U
Acenaphthene	ug/L	---	---	10 U	10 U	10 U
Acenaphthylene	ug/L	---	---	10 U	10 U	10 U
Acetophenone	ug/L	---	---	10 U	10 U	10 U
Anthracene	ug/L	---	---	10 U	10 U	10 U
Atrazine	ug/L	---	---	2.0 U	2.0 U	2.0 U
Benzaldehyde	ug/L	---	---	10 U	10 U	10 U
Benzo(a)anthracene	ug/L	---	4170	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	ug/L	---	---	1.0 U	1.0 U	2.0 U
Benzo(g,h,i)perylene	ug/L	---	---	10 U	10 U	10 UJ
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	10 U	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

Parameters	Units	DNREC-SIRS 2018 Groundwater VI Screening Levels a	USEPA 2018 VISL (TCR=1E-05 or THQ=1) b	OU: OU-5 Sample Location: MW-109 Sample ID: WG-17338-110417-SG-018 Sample Date: 11/4/2017	OU: OU-5 Sample Location: MW-109 Sample ID: WG-17338-110417-SG-020 Sample Date: 11/4/2017 (Duplicate)	OU: OU-5 Sample Location: MW-112 Sample ID: GW-01733818-0713-RM-01 Sample Date: 7/13/2018
Semi-volatile Organic Compounds (continued)						
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	2.0 U	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	ug/L	---	---	10 U	10 U	10 U
Caprolactam	ug/L	---	---	10 U	10 U	10 U
Carbazole	ug/L	---	---	10 U	10 U	10 U
Chrysene	ug/L	---	---	2.0 U	2.0 U	2.0 U
Dibenz(a,h)anthracene	ug/L	---	---	1.0 U	1.0 U	1.0 UJ
Dibenzofuran	ug/L	---	---	10 U	10 U	10 U
Diethyl phthalate	ug/L	---	---	10 U	10 U	10 U
Dimethyl phthalate	ug/L	---	---	10 U	10 U	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	10 U	10 U	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	10 U	10 U	10 U
Fluoranthene	ug/L	---	---	10 U	10 U	10 U
Fluorene	ug/L	---	---	10 U	10 U	10 U
Hexachlorobenzene	ug/L	---	4	1.0 U	1.0 U	1.0 U
Hexachlorobutadiene	ug/L	---	13	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	10 U	10 U
Hexachloroethane	ug/L	---	70	1.0 U	1.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	1.0 U	1.0 U	2.0 U
Isophorone	ug/L	---	---	10 U	10 U	10 U
Naphthalene	ug/L	---	201	10 U	10 U	10 U
Nitrobenzene	ug/L	---	3120	1.0 U	1.0 U	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	1.0 U	1.0 U	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	10 U	10 U	10 U
Pentachlorophenol	ug/L	---	---	20 U	20 U	20 U
Phenanthrene	ug/L	---	---	10 U	10 U	10 U
Phenol	ug/L	---	---	10 U	10 U	10 U
Pyrene	ug/L	---	---	10 U	10 U	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exeedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3 - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

Parameters	Units	DNREC-SIRS 2018 Groundwater VI Screening Levels	USEPA 2018 VISL (TCR=1E-05 or THQ=1)		
OU:				OU-5	OU-5
Sample Location:				MW-113	MW-113
Sample ID:				GW-01733818-0713-RM-02	GW-01733818-0713-RM-03
Sample Date:				7/13/2018	7/13/2018 (Duplicate)
		a	b		
Volatile Organic Compounds					
1,1,1-Trichloroethane	ug/L	---	31100	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	---	141	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	---	26	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	---	334	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	---	821	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	---	151	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	---	1040	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	---	3	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	---	8	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	---	11200	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	---	98	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	---	152	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	---	---	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	---	113	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	---	9410000	5.0 U	5.0 U
2-Hexanone	ug/L	---	34500	5.0 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	---	2330000	5.0 U	5.0 U
Acetone	ug/L	---	94500000	5.0 U	5.0 U
Benzene	ug/L	---	69	1.0 U	1.0 U
Bromodichloromethane	ug/L	---	38	1.0 U	1.0 U
Bromoform	ug/L	---	5100	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	---	73	1.0 U	1.0 U
Carbon disulfide	ug/L	---	5210	1.0 U	1.0 U
Carbon tetrachloride	ug/L	0.43	18	1.0 U	1.0 U
Chlorobenzene	ug/L	---	1720	1.0 U	1.0 U
Chloroethane	ug/L	---	96500	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	---	36	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	---	1090	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U
Cyclohexane	ug/L	---	4290	1.0 U	1.0 U
Dibromochloromethane	ug/L	---	---	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	0.75	31	1.0 U	1.0 U
Ethylbenzene	ug/L	---	152	1.0 U	1.0 U
Isopropyl benzene	ug/L	---	3730	1.0 U	1.0 U
Methyl acetate	ug/L	---	---	5.0 U	5.0 U
Methyl cyclohexane	ug/L	---	---	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	---	19700	1.0 U	1.0 U
Methylene chloride	ug/L	---	19800	1.0 U	1.0 U
Styrene	ug/L	---	39000	1.0 U	1.0 U
Tetrachloroethene	ug/L	---	242	1.0 U	1.0 U
Toluene	ug/L	---	80700	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	---	---	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	---	---	1.0 U	1.0 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

OU:				**OU-5**	**OU-5**
Sample Location:				**MW-113**	**MW-113**
Sample ID:				**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
Sample Date:				**7/13/2018**	**7/13/2018 (Duplicate)**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** a	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** b		
Volatile Organic Compounds (continued)					
Trichloroethene	ug/L	---	22	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	---	---	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	150	1020	1.0 U	1.0 U
Vinyl chloride	ug/L	---	25	1.0 U	1.0 U
Xylenes (total)	ug/L	---	1620	2.0 U	2.0 U
Semi-Volatile Organic Compounds					
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	---	---	10 U	10 U
2,4,5-Trichlorophenol	ug/L	---	---	10 U	10 U
2,4,6-Trichlorophenol	ug/L	---	---	10 U	10 U
2,4-Dichlorophenol	ug/L	---	---	10 U	10 U
2,4-Dimethylphenol	ug/L	---	---	10 U	10 U
2,4-Dinitrophenol	ug/L	---	---	20 U	20 U
2,4-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U
2,6-Dinitrotoluene	ug/L	---	---	2.0 U	2.0 U
2-Chloronaphthalene	ug/L	---	---	10 U	10 U
2-Chlorophenol	ug/L	---	---	10 U	10 U
2-Methylnaphthalene	ug/L	---	---	10 U	10 U
2-Methylphenol	ug/L	---	---	10 U	10 U
2-Nitroaniline	ug/L	---	---	10 U	10 U
2-Nitrophenol	ug/L	---	---	10 U	10 U
3,3'-Dichlorobenzidine	ug/L	---	---	10 U	10 U
3-Nitroaniline	ug/L	---	---	10 U	10 U
4,6-Dinitro-2-methylphenol	ug/L	---	---	20 U	20 U
4-Bromophenyl phenyl ether	ug/L	---	---	10 U	10 U
4-Chloro-3-methylphenol	ug/L	---	---	10 U	10 U
4-Chloroaniline	ug/L	---	---	10 U	10 U
4-Chlorophenyl phenyl ether	ug/L	---	---	10 U	10 U
4-Methylphenol	ug/L	---	---	10 U	10 U
4-Nitroaniline	ug/L	---	---	10 U	10 U
4-Nitrophenol	ug/L	---	---	20 U	20 U
Acenaphthene	ug/L	---	---	10 U	10 U
Acenaphthylene	ug/L	---	---	10 U	10 U
Acetophenone	ug/L	---	---	10 U	10 U
Anthracene	ug/L	---	---	10 U	10 U
Atrazine	ug/L	---	---	2.0 U	2.0 U
Benzaldehyde	ug/L	---	---	10 U	10 U
Benzo(a)anthracene	ug/L	---	4170	1.0 U	1.0 U
Benzo(a)pyrene	ug/L	---	---	1.0 U	1.0 U
Benzo(b)fluoranthene	ug/L	---	---	2.0 U	2.0 U
Benzo(g,h,i)perylene	ug/L	---	---	10 UJ	10 UJ
Benzo(k)fluoranthene	ug/L	---	---	1.0 U	1.0 U
Biphenyl (1,1-Biphenyl)	ug/L	---	139	10 U	10 U
bis(2-Chloroethoxy)methane	ug/L	---	---	10 U	10 U

Table 2

Groundwater Analytical Results Summary
VI Reevaluation for OU 5
Former GM Wilmington Assembly Plant
Wilmington, Delaware

			OU:	**OU-5**	**OU-5**
			Sample Location:	**MW-113**	**MW-113**
			Sample ID:	**GW-01733818-0713-RM-02**	**GW-01733818-0713-RM-03**
			Sample Date:	**7/13/2018**	**7/13/2018** **(Duplicate)**
Parameters	**Units**	**DNREC-SIRS 2018 Groundwater VI Screening Levels** **a**	**USEPA 2018 VISL (TCR=1E-05 or THQ=1)** **b**		
Semi-volatile Organic Compounds (continued)					
bis(2-Chloroethyl)ether	ug/L	---	535	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	---	---	2.0 U	2.0 U
Butyl benzylphthalate (BBP)	ug/L	---	---	10 U	10 U
Caprolactam	ug/L	---	---	10 U	10 U
Carbazole	ug/L	---	---	10 U	10 U
Chrysene	ug/L	---	---	2.0 U	2.0 U
Dibenz(a,h)anthracene	ug/L	---	---	1.0 UJ	1.0 UJ
Dibenzofuran	ug/L	---	---	10 U	10 U
Diethyl phthalate	ug/L	---	---	10 U	10 U
Dimethyl phthalate	ug/L	---	---	10 U	10 U
Di-n-butylphthalate (DBP)	ug/L	---	---	10 U	10 U
Di-n-octyl phthalate (DnOP)	ug/L	---	---	10 U	10 U
Fluoranthene	ug/L	---	---	10 U	10 U
Fluorene	ug/L	---	---	10 U	10 U
Hexachlorobenzene	ug/L	---	4	1.0 U	1.0 U
Hexachlorobutadiene	ug/L	---	13	1.0 U	1.0 U
Hexachlorocyclopentadiene	ug/L	0.018	1	10 U	10 U
Hexachloroethane	ug/L	---	70	2.0 U	2.0 U
Indeno(1,2,3-cd)pyrene	ug/L	---	---	2.0 U	2.0 U
Isophorone	ug/L	---	---	10 U	10 U
Naphthalene	ug/L	---	201	10 U	10 U
Nitrobenzene	ug/L	---	3120	1.0 U	1.0 U
N-Nitrosodi-n-propylamine	ug/L	---	---	1.0 U	1.0 U
N-Nitrosodiphenylamine	ug/L	---	---	10 U	10 U
Pentachlorophenol	ug/L	---	---	20 U	20 U
Phenanthrene	ug/L	---	---	10 U	10 U
Phenol	ug/L	---	---	10 U	10 U
Pyrene	ug/L	---	---	10 U	10 U

Notes:

U - Not detected at the associated reporting limit
J - Estimated concentration
UJ - Not detected; associated reporting limit is estimated
R - Rejected
No exeedances of the Department of Natural Resources and Environmental Control (DNREC) Site Investigation and Restoration Sectio
4.3* - Exceeds USEPA Vapor Intrusion Screening Levels (VISL), May 2018
VISL - Vapor Intrusion Screening Levels, May 2018
TCR - Target cancer risk
THQ - Target hazard quotient

Exhibit 6

DNREC-Site Investigation and Restoration Section (DNREC-SIRS)

LEGAL NOTICE

PROPOSED PLAN OF REMEDIAL ACTION FOR THE GENERAL MOTORS CORP. WILMINGTON ASSEMBLY PLANT OU-5
(DE-1149)

The Department invites public comment on a proposal to clean up a portion of the General Motors Corp. Wilmington Assembly Plant Operable Unit 5 located in Wilmington, Delaware. OU-5 soil was impacted by antimony, arsenic, cadmium, and lead.

DNREC-SIRS will be holding a community workshop on the Proposed Plan for OU-5 on Wednesday, January 16, 2019 from 6 pm to 8 pm at the Five Points Fire Hall, 200 S. Maryland Avenue, Wilmington, DE.

Details of the Proposed Plan are available at the office of DNREC-SIRS (391 Lukens Drive, New Castle, DE, 19720), or online at

http://www.nav.dnrec.delaware.gov/DEN3/

The comment period ends on January 28, 2019. For additional information, please contact Rick Galloway, Project Manager at (302)395-2600 or rick.galloway@state.de.us.
1/6-NJ

January 6, 2019

Exhibit 7

PROPOSED PLAN OF REMEDIAL ACTION

General Motors Corp. Wilmington Assembly Plant OU-5
Wilmington, Delaware
DNREC Project No. DE-1149

January 2019

Delaware Department of Natural Resources and Environmental Control
Division of Waste and Hazardous Substances
Site Investigation & Restoration Section
391 Lukens Drive
New Castle, Delaware 19720

CONTENTS

- Figures: 1 & 2
- Glossary of Terms

PROPOSED PLAN OF REMEDIAL ACTION

General Motors Corp. Wilmington Assembly Plant OU- 5
Wilmington, Delaware
DNREC Project No. DE-1149

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Approval:
This Proposed Plan meets the requirements of the Hazardous Substance Cleanup Act.

Approved by:

Timothy Ratsep, Environmental Program Administrator
Site Investigation & Restoration Section

January 2, 2019
Date

General Motors Corp. Wilmington Assembly Plant OU- 5

What is the Proposed Plan of Remedial Action?

The Proposed Plan of Remedial Action (Proposed Plan) summarizes the clean-up (remedial) actions that are being proposed to address contamination found at the Site for public comment. A legal notice is published in the newspaper for a 20-day comment period. DNREC considers and addresses all public comments received and publishes a Final Plan of Remedial Action (Final Plan) for the Site.

What is the GM Site OU-5?

The General Motors Corp. Wilmington Assembly Plant is located at 801 Boxwood Road in Wilmington, Delaware, and consists of two tax parcels (07-042.10-055 and 07.042-20.010), totaling approximately 142 acres (Figure 1). The nearest intersection to the Site is Boxwood Road and Centerville Road. The Site consists of a 3.2 million square foot Main Assembly Building, Waste Water Treatment Plant (WWTP), Pump Houses, and Powerhouse and is zoned heavy industrial (Figure 2).

This proposed plan addresses Operable Unit-5 (OU-5). The location of the OUs is shown on Figure 2. A brief description of the OUs is provided in the table below.

Operable Units	***Description***
OU-1	The pump house and aboveground storage tanks (AST) L through Tank O in the AST containment area. Covers soil and groundwater
OU-2	Large AST Area/Truck Unloading Rack and surrounding areas. Cover Soil and groundwater.
OU-3	Main Assembly Plant Area soil and groundwater Not included in other OUs.
OU-4	Former Petroleum Dispensing and UST Area soil plus groundwater under OU-4
OU-5	Former Test Track Area. Covers soil and groundwater.
OU-6	Wooded Area adjacent to Little Mill Creek. Covers soil and groundwater.

OU-1, OU-2, OU-3, and OU-6 have been addressed in separate Proposed Plans. OU-4 will be addressed in separate Proposed Plan.

What happened at the GM Site OU-5?

The Site was developed in 1945 by GM Corporation for the purpose of automobile assembly. Prior to 1945, the Site was undeveloped land. GM Corporation began operations at the Site in

1946 and continued automobile assembly operations until July 2009 when the plant was idled. The Site was sold to Fisker Automotive, Inc. (Fisker) in July 2010. On March 31, 2011, the Revitalizing Auto Communities Environmental Response Trust (RACER Trust) became effective and has been conducting, managing, and funding cleanup at 89 sites including the former Wilmington Assembly Plant. In April 2014, the Site was purchased by Wanxiang Delaware Real Estate Holdings (Wanxiang). Boxwood Industrial Park, LLC purchased the property in October 2017.

The Site contained operations for the manufacturing of automobiles including but not limited to petroleum products for fueling and heating, painting, wastewater treatment plant, cleaning parts, and hazardous waste storage. Each of these operations used various chemicals. Releases occurred at the Site likely as a result of historic operations, which impacted the soil and groundwater beneath the Site.

What is the environmental problem at the GM Site OU-5?

A Remedial Investigation (RI) Report completed in 2015 found that the soil in OU-5 contained **metals** (antimony, arsenic, cadmium, and lead) over DNREC risk criteria for commercial use of the property (outdoor and indoor workers) and utility workers. To fully evaluate all risk pathways, the risk assessment assumes that the soil is not capped and is fully accessible. Residential reuse of the entire Site is restricted by previous proposed plans for OU-1, OU-2, and OU-3. The areas of impacted soil are located in four (4) areas identified on Figure 3 as MW-29 Area (small orange square area to the southwest), BH-34 11 Area (small orange square area to the south), BH-27/MW 28-11 Area (small orange square area within the large green area), and Test Track Area (large green area).

Groundwater in OU-5 contained **metals** (arsenic, barium, cobalt, iron and manganese) and **volatile organic compounds (VOCs)** (benzene, ethylbenzene) and the **semi-volatile organic compound (SVOC)**, naphthalene, which is above the standards for potable use. Use of the groundwater is restricted by previous proposed plans for OU-1 to OU-3 for the entire Site for potable use. A previous ecological evaluation indicated that the groundwater contamination would not impact surface water. Two new wells, MW-112 and MW-113 were installed to determine if leaching was occurring and metals potentially migrating offsite. Results from these new monitoring wells as well as other monitoring wells indicated that metals are not migrating offsite at concentrations that would represent an ecological concern.

The risk for vapor intrusion from OU-5 soil and groundwater into indoor air was also re-evaluated based on the potential for a new commercial building construction in this OU. The evaluation was conducted excluding soil data from MW-29 Area and BH-34 11 Area since the soil from these areas are planned to be removed due to elevated metals concentrations. BH-27/MW 28-11 was also excluded from the risk since this soil is planned to be removed due to elevated VOCs in soil. The re-evaluation for vapor intrusion did not indicate a risk to indoor air above DNREC standards.

What clean-up actions have been taken at the GM Site OU-5?

No interim actions have been conducted in OU-5.

What does the owner want to do at the GM Site OU-5?

The property owner is evaluating commercial re-development options. No re-development plans have been finalized but a new building may be constructed in the future.

What additional clean-up actions are needed at the GM Site OU-5?

DNREC proposes the following remedial actions for the Site, which need to be completed before a Certificate of Completion of Remedy (COCR) can be issued. The remedial actions are proposed on an OU basis.

1) Prepare a Remedial Action Work Plan for the four (4) impacted soil areas identified on Figure 3 within 120 days of the issuance of the Final Plan of Remedial Action. The soil from the three (3) smaller areas will be excavated and backfilled with DNREC-approved clean fill. A temporary cap will be placed over the Test Track Area to prevent contact with the impacted soils until a building or permanent cap is constructed. A permanent cap or building will be constructed within 5 years.

2) An Environmental Covenant, consistent with Delaware's Uniform Environmental Covenants Act (7 Del.C. Chapter 79, Subchapter II) must be recorded in the Office of the New Castle County Recorder of Deeds within 90 days of the issuance of the Final Plan of Remedial Action. The environmental covenant will cover New Castle County tax parcel 07-042.10-055 which includes OU-1 to OU-5. Therefore, the restrictions will cover OU-1 to OU-5 even if the restrictions are not necessary for every OU. The Environmental Covenant must include the following activity and/or use restrictions:

    [a.] Use Restriction. Use of the Property shall be restricted solely to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts;

    [b.] Limitation of Groundwater Withdrawal. No groundwater wells shall be installed and no groundwater shall be withdrawn from any well on the Property without the prior written approval of DNREC-SIRS and DNREC Division of Water;

    [c.] Compliance with Contaminated Materials Management Plan. All work required by the Contaminated Materials Management Plan must be performed to DNREC's satisfaction in accordance with the Plan;

    [d.] Compliance with the Long Term Stewardship Plan. For OU-2 and OU-3 and OU-5, all work required by the Long Term Stewardship Plan must be performed to DNREC's satisfaction in accordance with the Plan.

3) A Long-Term Stewardship Plan (LTS) updated with OU-5 requirements shall be submitted to DNREC for approval within 60 days of the issuance of the Remedial Action Work Plan. The LTS plan will detail: 1) the temporary cap and the cap inspection process for the Test Track Area, 2) the site-inspection schedule to be followed in order to ensure the long-term integrity of the remedy and 3) the Groundwater monitoring program to ensure that groundwater is not migrating offsite to impact receptors. The temporary cap inspection must be conducted on a quarterly basis until a permanent cap or building is constructed.

4) A Contaminated Materials Management Plan (CMMP) updated with OU-5 requirements shall be submitted to DNREC within 60 days of the issuance of the Remedial Action Work Plan. The CMMP will provide guidance to enable construction workers to safely handle any potential contaminated soil, prevent soil migration (soil and air borne dust) and groundwater at the Site.

5) Remedial Action Completion Report must be submitted to DNREC within 60 days of the completion of the remedial actions required in this Proposed Plan.

3) A request for a Certification of Completion of Remedy (COCR) must be submitted to DNREC within 60 days of approval of the Remedial Action Completion Report.

What are the long term plans for the Site after the cleanup?

The property owner is evaluating commercial re-development options. No re-development plans have been finalized.

How can I find additional information or comment on the Proposed Plan?

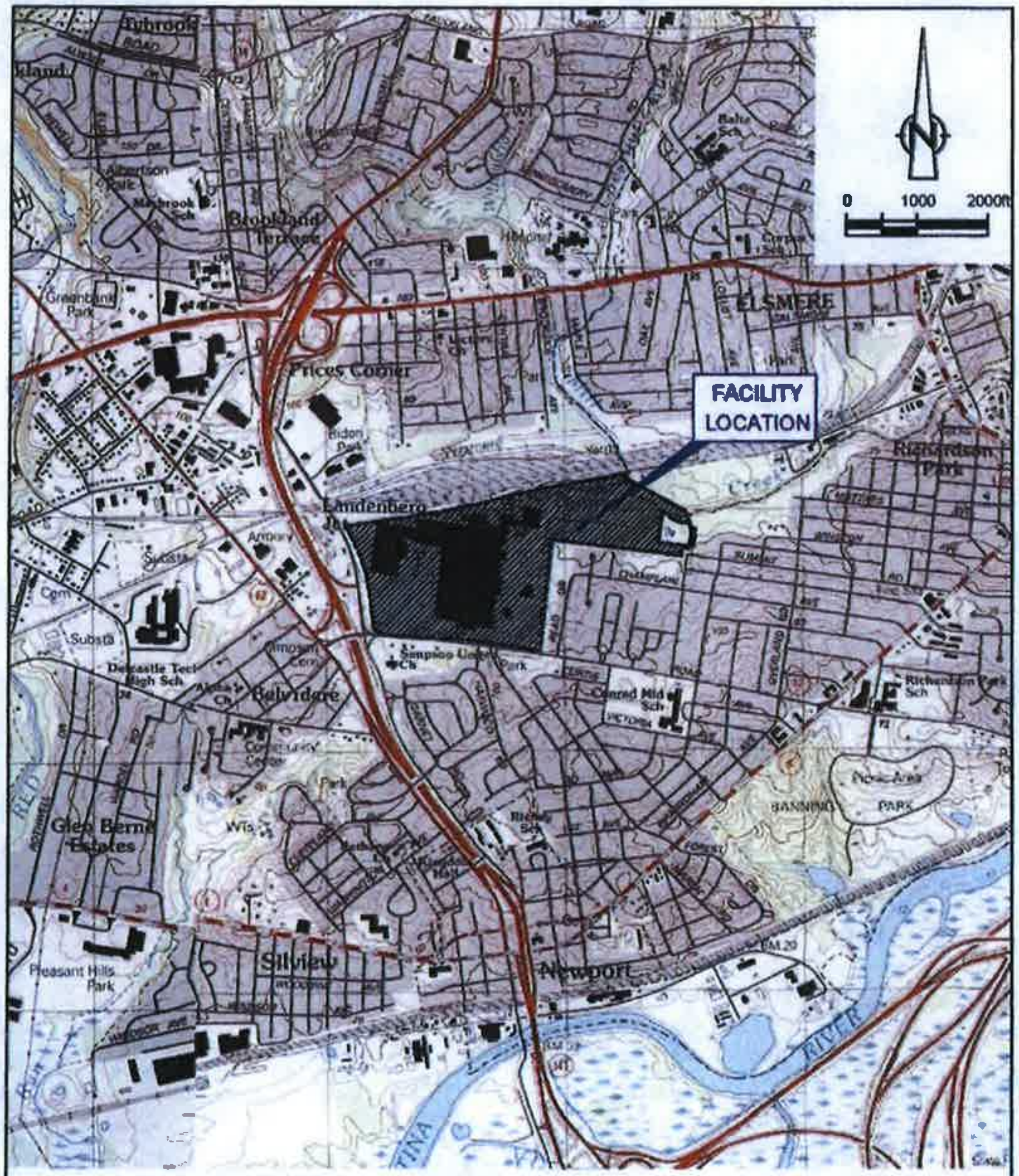
The complete file on the Site including the Remedial Investigation Report and the various reports are available at the DNREC office, 391 Lukens Drive in New Castle, 19720. Most documents are also found on:

http://www.nav.dnrec.delaware.gov/DEN3/

The 20-day public comment period begins on January 6, 2019 and ends at close of business (4:30 pm) on January 28, 2019. Please send written comments to the DNREC office at 391 Lukens Drive, New Castle, DE 19720 to Rick Galloway, Project Officer at (302) 395-2614 or via email to rick.galloway@state.de.us.

Figure 1: Site Location Map
Figure 2: Site Map with Operable Units
Figure 3: OU-5 Soil Impacted Areas

RMG:gpb
RMG19002.doc
DE 1149 II B 8



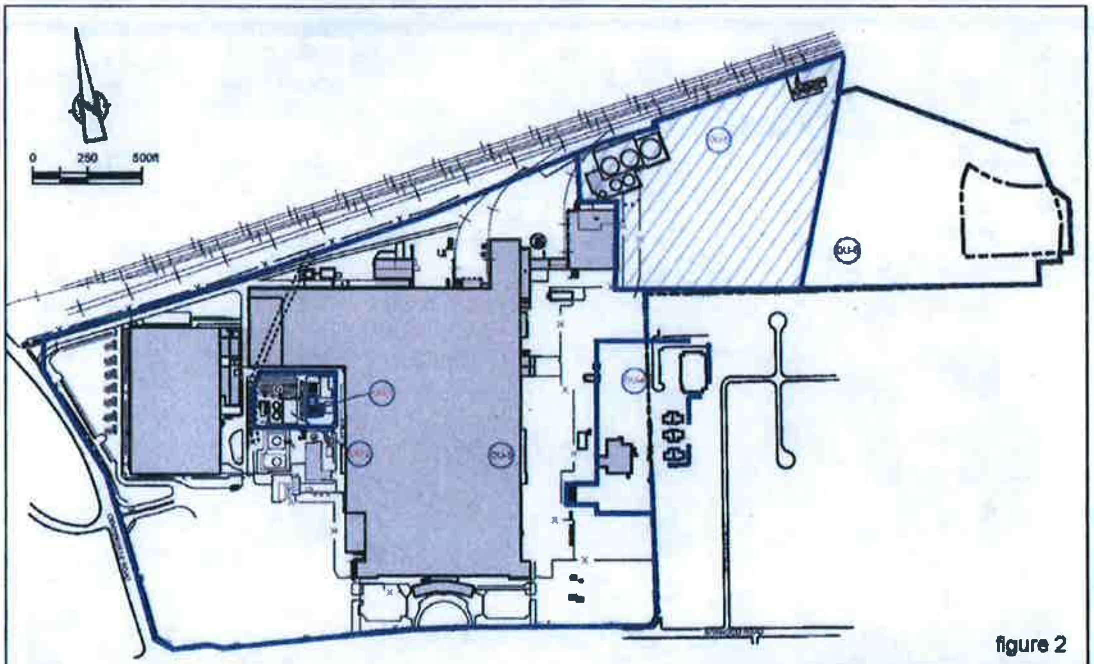
LEGEND

▨ APPROXIMATE FACILITY BOUNDARY

FIGURE 1
FACILITY LOCATION
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

REFERENCE:
USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5
MINUTES SERIES 1997 SCALE: 1:24,000

017338-T04(PRES005)GN-SC002 OCT 30, 2015



LEGEND

▨ OPERABLE UNIT (OU) 5

figure 2

LOCATIONS OF AREA OF INTEREST
OPERABLE UNITS
REMEDIAL INVESTIGATION REPORT
Wilmington, Delaware

017338-T04(PRES005)GN-SC001 NOV 16, 2015

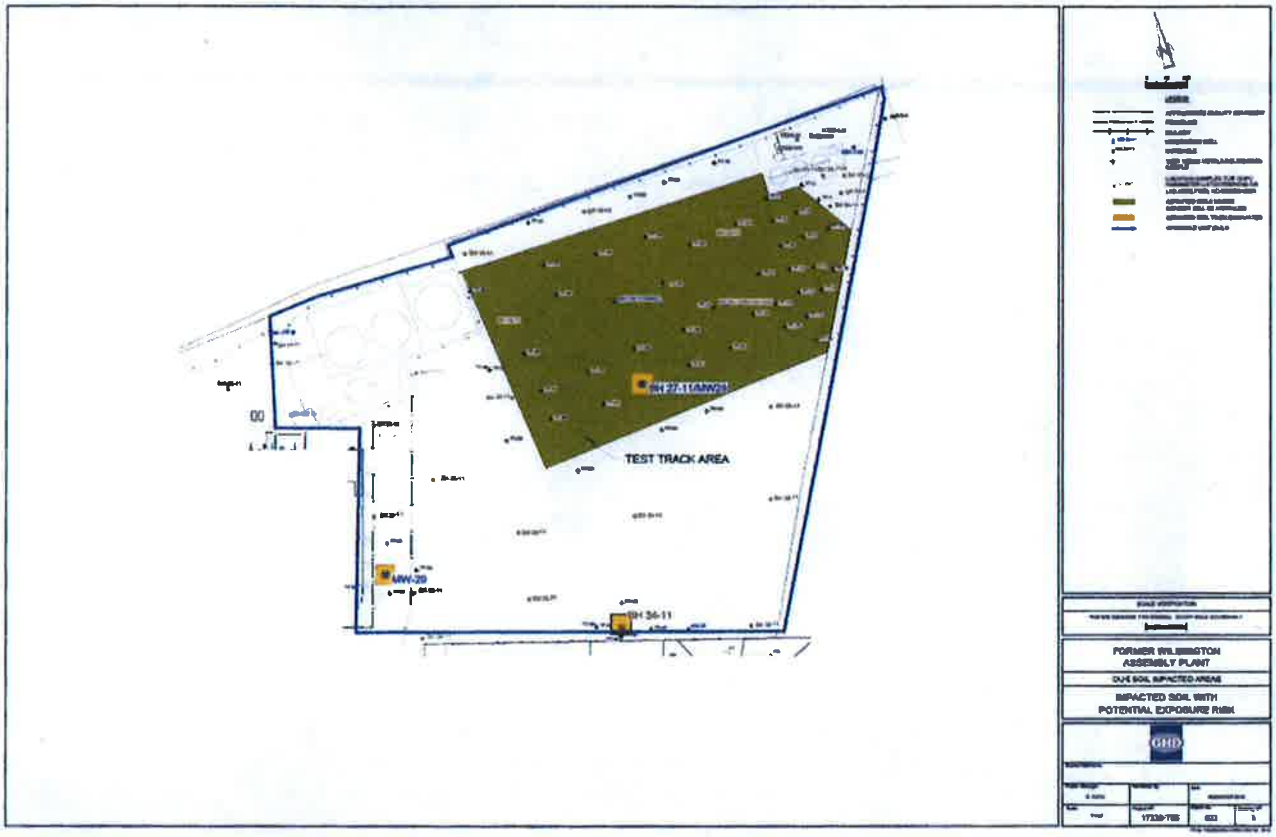
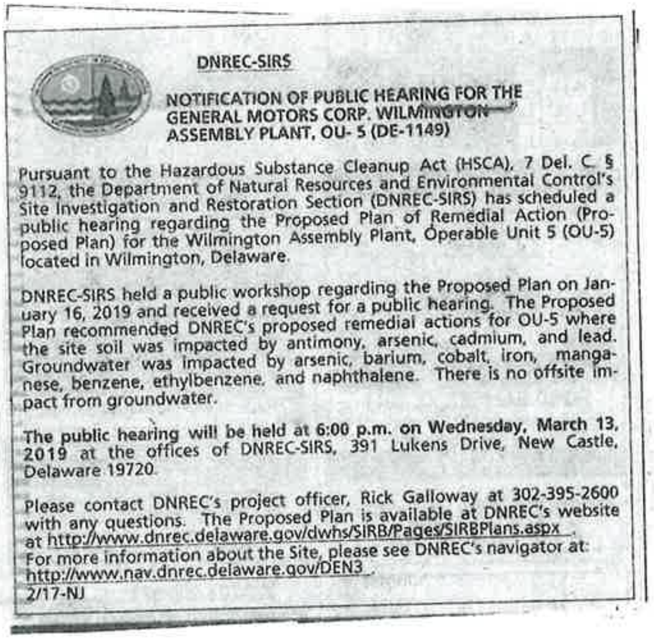

TEST TRACK AREA
BH 27-11/MW28
MW-20
BH 34-11
FORMER WILMINGTON ASSEMBLY PLANT
IMPACTED SOIL WITH POTENTIAL EXPOSURE RISK
GHD
17339-T05

Figure 3

Glossary of Terms Used in this Proposed Plan

Certification of Completion of Remedy (COCR)	A formal determination by the Secretary of DNREC that remedial activities required by the Final Plan of Remedial Action have been completed.
Contaminant of Concern (COC)	Potentially harmful substances at concentrations above Acceptable levels.
Contaminated Materials Management Plan	A written plan specifying how potentially contaminated material at a Site will be sampled, evaluated, staged, transported, and disposed of properly.
Final Plan of Remedial Action	DNREC's adopted plan for cleaning up a hazardous site.
Risk	Likelihood or probability of injury, disease, or death.
Restricted Use	Commercial or Industrial setting
SIRS	Site Investigation Restoration Section of DNREC, which oversees cleanup of sites that were contaminated as a result of past use, from dry cleaners to chemical companies

Exhibit 8



DNREC-SIRS

NOTIFICATION OF PUBLIC HEARING FOR THE GENERAL MOTORS CORP. WILMINGTON ASSEMBLY PLANT, OU- 5 (DE-1149)

Pursuant to the Hazardous Substance Cleanup Act (HSCA), 7 Del. C. § 9112, the Department of Natural Resources and Environmental Control's Site Investigation and Restoration Section (DNREC-SIRS) has scheduled a public hearing regarding the Proposed Plan of Remedial Action (Proposed Plan) for the Wilmington Assembly Plant, Operable Unit 5 (OU-5) located in Wilmington, Delaware.

DNREC-SIRS held a public workshop regarding the Proposed Plan on January 16, 2019 and received a request for a public hearing. The Proposed Plan recommended DNREC's proposed remedial actions for OU-5 where the site soil was impacted by antimony, arsenic, cadmium, and lead. Groundwater was impacted by arsenic, barium, cobalt, iron, manganese, benzene, ethylbenzene, and naphthalene. There is no offsite impact from groundwater.

The public hearing will be held at 6:00 p.m. on Wednesday, March 13, 2019 at the offices of DNREC-SIRS, 391 Lukens Drive, New Castle, Delaware 19720.

Please contact DNREC's project officer, Rick Galloway at 302-395-2600 with any questions. The Proposed Plan is available at DNREC's website at http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/SIRBPlans.aspx .
For more information about the Site, please see DNREC's navigator at: http://www.nav.dnrec.delaware.gov/DEN3 .
2/17-NJ

Exhibit 9

DNREC-SIRS Presentation
General Motors Corp. Operable Unit 5
Proposed Plan of Remedial Action
Public Hearing

Rick Galloway

Project Manager

March 13, 2019

GM OU-5 Public Hearing Presentation

On January 6, 2019, DNREC-Site Investigation & Restoration Section (SIRS) issued a Proposed Plan of Remedial Action (Proposed Plan) for General Motors Corporation Operable Unit 5 (OU-5) under Hazardous Substance Cleanup Act (HSCA) (7 Del. C. Section 9107 (e) (1)):

9107 Remedies. Subsection (e) Before conducting a remedial action, the Secretary shall:

(1) Propose a plan of remedial action based on any investigation or study conducted by or for the Secretary, the potentially responsible party, or others.

Exhibits

1. **July 17, 2015** - Remedial Investigation Report (Appendices A-H links below)
2. **June 30, 2017** - OU-5 Focused Feasibility Study Report
3. **October 9, 2018 -** Monitoring Well Abandonment and Installation Work Plan
4. **November 15, 2018 -** OU-5 Groundwater Monitoring results Report
5. **December 20, 2018** - VI Evaluation for OU-5 Memo
6. **January 2, 2019** - Legal Notice for Proposed Plan of Remedial Action and Public Workshop for **OU-5**
7. **January 2, 2019** - Proposed Plan of Remedial Action OU-5
8. **February 17, 2019 -** Legal Notice for Public Hearing regarding the Proposed Plan of Remedial Action-OU-5, General Motors Corp-Wilmington Assembly Plant
9. **March 13, 2019 -** Public Hearing Presentation regarding the Proposed Plan of Remedial Action-OU-5, General Motors Corp-Wilmington Assembly Plant

Facility Location Map

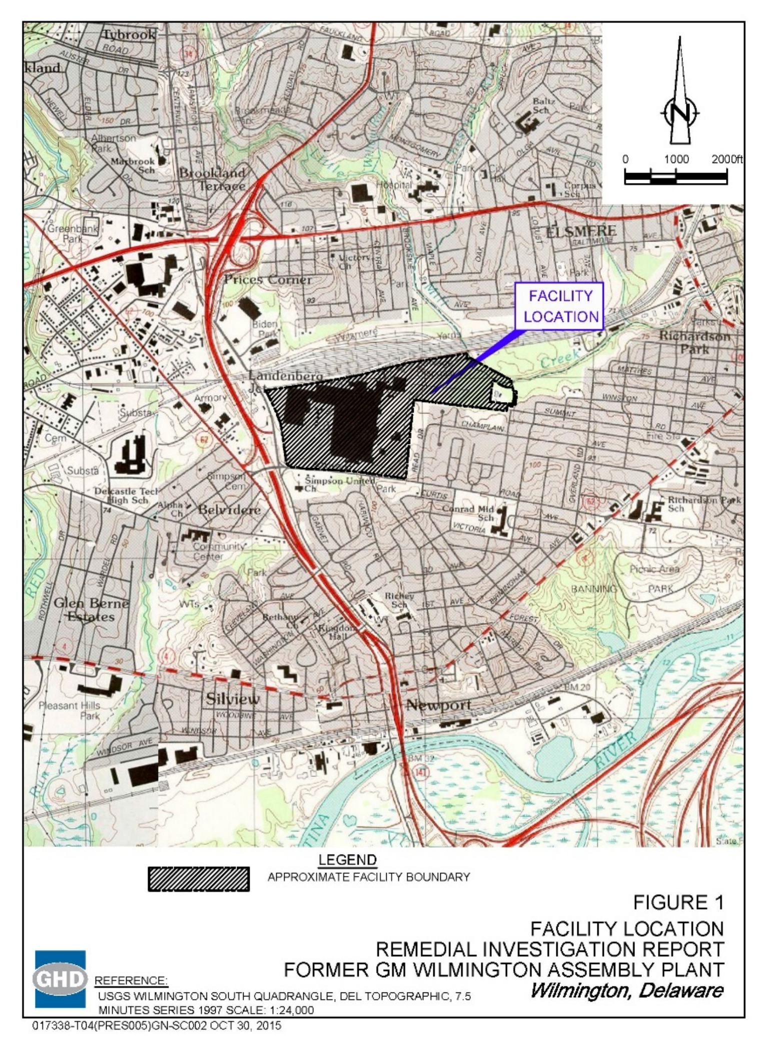


FIGURE 1
FACILITY LOCATION
REMEDIAL INVESTIGATION REPORT
FORMER GM WILMINGTON ASSEMBLY PLANT
Wilmington, Delaware

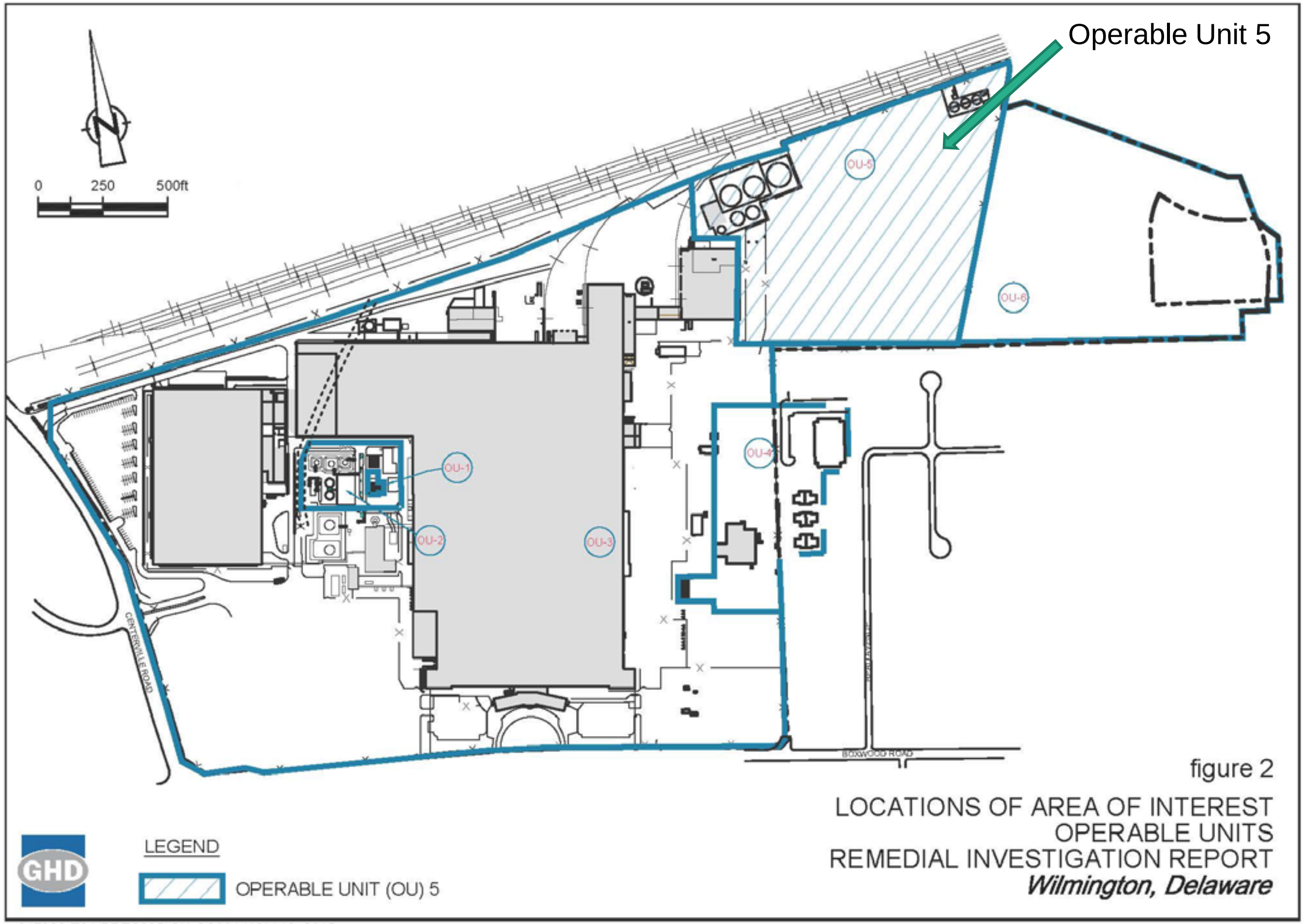
REFERENCE:
USGS WILMINGTON SOUTH QUADRANGLE, DEL TOPOGRAPHIC, 7.5
MINUTES SERIES 1997 SCALE: 1:24,000

017338-T04(PRES005)GN-SC002 OCT 30, 2015

Site History

- Site was developed in 1945 by General Motors Corp as an automobile assembly plant.
- Operations were from 1946-July 2009.
- In July 2010, Fisker Automotive, Inc. purchased.
- In April 2014, Wanxiang Delaware Real Estate Holdings purchased the Site.
- In October 2017, Boxwood Industrial Park, LLC purchased the Site.
- Site buildings included Main Assembly Building (3.2 Million Square Ft.), Waste Water Treatment Plant, Pump Houses and Powerhouses.
- Operations included automobile assembly including painting, filling cars with fluids, fueling cars, waste water treatment, etc.
- A portion of OU-5 was used to burn extra wooden pallets then used as a car test track. Areas of OU-5 were filled.
- OU-5 likely became contaminated due to historic land filling.

Site Operable Units (OUs) Map



LEGEND

▨ OPERABLE UNIT (OU) 5

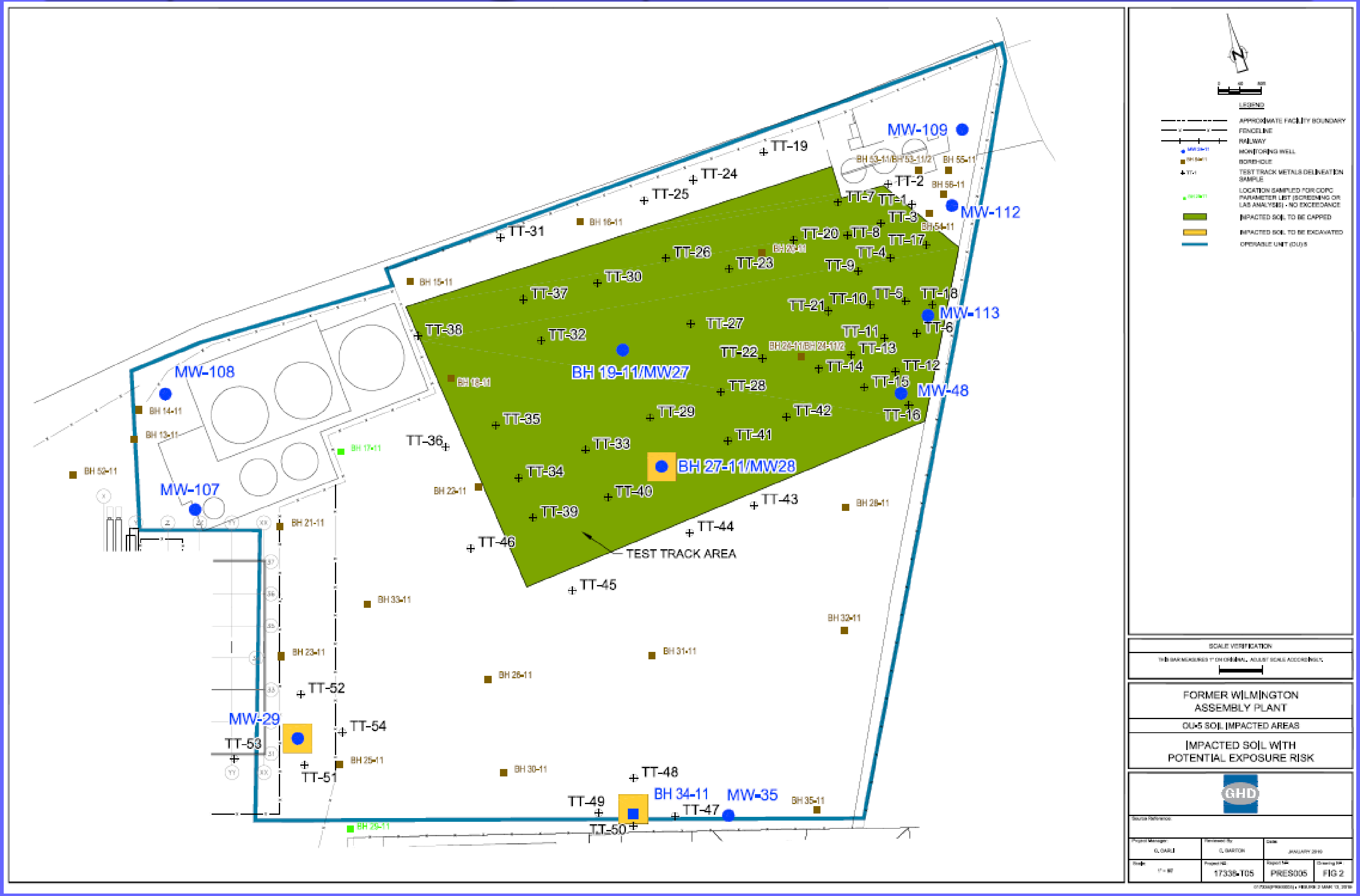
figure 2

LOCATIONS OF AREA OF INTEREST
OPERABLE UNITS
REMEDIAL INVESTIGATION REPORT
Wilmington, Delaware

017338-T04(PRES005)GN-SC001 NOV 16, 2015

GM OU-5 Public Hearing Presentation

Map Showing Impacted Soil in OU-5



Investigation Results

July 2015 Remedial Investigation- OU-5 Results

- 123 soil samples analyzed, 8 monitoring wells sampled.
- Soil contamination- antimony, arsenic, cadmium, lead.
- Soil presents potential risk to indoor workers, outdoor workers, and utility workers above cancer risk of $1*10^{-5}$ (1 in 100,000) and/or non-cancer risk Hazard Index (HI) of 1. These are HSCA risk standards.
- Four areas identified- MW-29 Area, BH-34 Area, BH-27 Area, and Test Track Area.
- Groundwater contamination-
  - Metals - arsenic, barium, cobalt, iron and manganese.
  - Volatile organic Compounds (VOCs)- benzene and ethylbenzene.
  - Semi-VOCs (SVOCs)-naphthalene

Investigation Results (continued)

July 2015 Remedial Investigation- OU-5 Results (cont.)

- Groundwater presents a possible drinking water (potable) ingestion risk above cancer risk of $1*10^{-5}$ (1 in 100,000) and/or Hazard Index (HI) of 1. There is no use of groundwater onsite.
- Groundwater contamination above cancer risk of $1*10^{-5}$ (1 in 100,000) and/or Hazard Index (HI) of 1 is not migrating offsite.
- Little Mill Creek sampling- no metals or site related contaminants above HSCA standards in surface water or sediment.

June 2017 OU-5 Focused Feasibility Study

- Four remedial alternatives were evaluated-
  - Alternative 1- No Action (As a Baseline Condition)
  - Alternative 2- Excavation and Offsite Disposal of Soil
  - Alternative 3- Capping with limited excavation and offsite disposal of soil.
  - Alternative 4- In Situ/Ex Situ Treatment of soil.
- Alternative 3 was chosen because it meets remediation goals and is most cost effective.

Investigation Results (continued)

November 2018 OU-5 Groundwater Monitoring Results

- Two new wells installed at the eastern side of OU-5. Installed hydraulically down-gradient of source areas.
- Samples collected from OU-5 groundwater.
- Arsenic, cobalt, iron and manganese over HSCA risk standards.
- Ecological evaluation indicates no ecological impact to Little Mill Creek.
- Little Mill Creek RI sampling- no metals or site related contaminants above HSCA standards in surface water or sediment.

December 2018 Vapor Intrusion Re-Evaluation of OU-5

- Due to potential building on OU-5, previous groundwater and soil data was re-evaluated for vapor intrusion (VI) risk.
- BH-27 Area soil removal added to remedy to eliminate VI risk above DNREC standards.
- No vapor intrusion risk above HSCA risk standards to building occupants.

Proposed Plan- Proposed Remedy

1. **Prepare a Remedial Action Work Plan** for the four (4) impacted soil areas identified on Figure 3 within 120 days of the issuance of the Final Plan of Remedial Action. The soil from the three (3) smaller areas will be excavated and backfilled with DNREC-approved clean fill. A temporary cap will be placed will be placed over the Test Track Area to prevent contact with the impacted soils until a building or permanent cap is constructed. A permanent cap or building will be constructed within 5 years.

2. **An Environmental Covenant**, consistent with Delaware's Uniform Environmental Covenants Act (7 Del.C. Chapter 79, Subchapter II) must be recorded in the Office of the New Castle County Recorder of Deeds within 90 days of the issuance of the Final Plan of Remedial Action. The Environmental Covenant must include the following activity and/or use restrictions:

    [a.] Use Restriction. Use of the Property shall be restricted solely to those non-residential type uses permitted within Commercial, Manufacturing, or Industrial Districts;

    [b.] Limitation of Groundwater Withdrawal. No groundwater wells shall be installed and no groundwater shall be withdrawn from any well on the Property without the prior written approval of DNREC-SIRS and DNREC Division of Water;

    [c.] Compliance with Contaminated Materials Management Plan. All work required by the Contaminated Materials Management Plan must be performed to DNREC's satisfaction in accordance with the Plan;

    [d.] Compliance with the Long Term Stewardship Plan. For OU-2 and OU-3 and OU-5, all work required by the Long Term Stewardship Plan must be performed to DNREC's satisfaction in accordance with the Plan.

Proposed Plan- Proposed Remedy (Cont.)

3) **A Long-Term Stewardship Plan (LTS)** updated with OU-5 requirements shall be submitted to DNREC for approval within 60 days of the issuance of the Remedial Action Work Plan. The LTS plan will detail: 1) the temporary cap and the cap inspection process for the Test Track Area, 2) the site-inspection schedule to be followed in order to ensure the long-term integrity of the remedy and 3) the Groundwater monitoring program to ensure that groundwater is not migrating offsite to impact receptors. The temporary cap inspection must be conducted on a quarterly basis until a permanent cap or building is constructed.

4) **A Contaminated Materials Management Plan (CMMP)** updated with OU-5 requirements shall be submitted to DNREC within 60 days of the issuance of the Remedial Action Work Plan. The CMMP will provide guidance to enable construction workers to safely handle any potential contaminated soil, prevent soil migration (soil and air borne dust) and groundwater at the Site.

5) **Remedial Action Completion Report** must be submitted to DNREC within 60 days of the completion of the remedial actions required in this Proposed Plan.

6) **A request for a Certification of Completion of Remedy (COCR)** must be submitted to DNREC within 60 days of approval of the Remedial Action Completion Report.

Contact Information

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Additional Information

https://dnrec.alpha.delaware.gov/events/227/public-hearing-general-motors-wilmington-assembly-plant-remedial-action-plan/