# UNILOCK CORPORATION

## 51 INTERNATIONAL BOULEVARD, BREWSTER, NEW YORK

# Site Characterization Work Plan

**NYSDEC Site #: D340037**
**AKRF Project Number: 220234**

**Prepared for:**

Unilock Corporation
51 International Boulevard
Brewster, New York 10601

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**NOVEMBER 2023**

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# CERTIFICATION

I, Marc S. Godick, QEP, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Site Characterization Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

| | | |
|---|---|---|
| Marc S. Godick, LEP | | 11/09/2023 |
| Name | Signature | Date |

# 1.0 INTRODUCTION

This Site Characterization Work Plan (SCWP) has been prepared by AKRF, Inc. (AKRF) on behalf of the Unilock Corporation (Unilock) for the property located at 51 International Boulevard, Brewster, New York (the Site). The Site is approximately 11 acres, contains offices and a commercial production area (the facility), and is defined by the Village of Brewster as Tax Map/Parcel No. 45-1-19. A Site Location Map is provided as Figure 1, and a Site and Surrounding Properties Plan is provided as Figure 2.

Unilock utilizes the Site for the manufacturing of a variety of paver bricks. Potable and production water for the facility is supplied by a single private on-site supply well. Water supply sampling, which is routinely conducted for well permitting purposes, has detected per- and polyfluoroalkyl substances (PFAS) since 2021. Based upon the detections of PFAS compounds in Unilock's private water supply, particularly perfluorobutanesulfonic acid (PFBS), the New York State Department of Environmental Conservation (NYSDEC) issued correspondence on May 6, 2022 stating that the Site may be a potential Drinking Water Contamination Site (DWCS) and requested that Unilock enter into a Consent Order (CO) to investigate and potentially remediate the PFAS compounds detected at the Site. During the process of negotiating the CO, Unilock completed a preliminary assessment (PA) and a follow up investigation to determine whether the PFAS compounds detected at the Site are attributable to Unilock's operations. The results of the assessment and sampling identified residual PFAS compounds in on-site soil, sediment, drinking water, discharge water, and surface water, as well as the private well water. However, the assessment was not conclusive with respect to confirming the source(s) for the PFAS compounds present at the Site. NYSDEC identified the site as a Drinking Water Contamination Site (DWCS) with a Site No. D340037. Notwithstanding, since a full Site Characterization Investigation would be necessary to confirm if a PFAS source was present at the Site, Unilock agreed enter into a CO to allow for the investigation to be conducted under oversight of NYSDEC.

This SCWP describes the procedures to be used during the field investigation to further define the nature and extent of the identified PFAS plume and determine whether a source of PFAS contamination is present at the Site. All investigation work will be completed in accordance with this SCWP, which includes a Quality Assurance Project Plan (QAPP) as Appendix A and a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) as Appendix B. The CAMP will be implemented during all subsurface disturbance activities at the Site, including all established reporting requirements to be provided to NYSDEC and the New York State Department of Health (NYSDOH). Pending approval of this SCWP by NYSDEC, we anticipate initiating the field sampling program by November 2023, as detailed in Section 8.0.

# 2.0 SITE DETAILS

## 2.1 Site Description and Surrounding Land Use

The 11-acre Site, which was previously vacant and undeveloped prior to being occupied by Unilock, was developed in 1989 over an area of approximately 7 contiguous acres, with the remaining northwestern 4 acres serving as undeveloped wetlands. The developed area was reported to be constructed predominantly on bedrock, with thin layers of fill consisting of leftover crushed rock that was the result of on-site blasting at the time of development. The PA documented areas with up to 2 inches of fill between ground surface and bedrock. The Site is bordered to the east and northeast by International Boulevard followed by commercial properties, to the north by a commercial property followed by baseball fields, to the west and southwest by Interstate 84, and to the southeast by a vacant commercial/industrial property. See Figure 2 for a depiction of the Site and surrounding properties.

The on-site developed area includes a commercial building with management offices and a paver production area, which is located in the central southern portion of the Site. The remaining developed area is covered by paving consisting primarily of concrete and pavers, and is used for Site access, parking, and storage of raw materials and finished products. A 1,000-gallon diesel aboveground storage tank (AST) was located on the southeastern side of the Site. Figure 3 includes a Site plan with location/use details for each portion of the developed area.

Based on reports compiled by the U.S. Geological Survey (Brewster, NY Quadrangle), the facility and parking/product storage areas lie within a relatively flat area between 630 and 640 elevation (National Geodetic Vertical Datum of 1929 and an approximation of mean sea level). The elevation steeply drops off to the northwest into a low-lying wetland at an elevation of approximately 600 feet.

The groundwater supply consists of a single on-site bedrock well that is located on the eastern side of the Site near the southern entrance, and is permitted as a non-transient, non-community water supply system. Groundwater is delivered via the well pump to a holding tank within a pump room in the central portion of the facility. We note that Unilock is not currently using the water for drinking water purposes. Stormwater runoff collected on the asphalt is managed by a series of catch basins located throughout the concrete/paver area. The catch basins are piped underground to a single line that discharges to an outfall in the northwest wetland.

## 2.2 Manufacturing Process

The paver/block production area includes two brick presses, brick curing racks, material storage areas, and a wastewater treatment area. Three types of bricks were reported to be produced at the Site: a standard aggregate brick (70-75% of production), a Series brick (5% of total production), and an Umbriano brick (20-25% of production). Off-spec bricks of all types are collected and transferred to an outdoor storage area (See Figure 3).

The base production process for all bricks includes mixing Portland cement, sand/aggregate, pigment, water, and a water repellent/sealer compound (base mixture). The base mixture is loaded onto a conveyor belt system and carried into a hydraulic press fitted with certain templates/molds to pressure form a specified block size and thickness. The pressed blocks are transferred via storage racks to a curing kiln. The cured materials are sent to dry packaging where they are placed on and secured to pallets, and then transported outside to open storage areas prior to being loaded on a flatbed semi-trailer for transport to a retail sales center.

The Series bricks include a coarse base topped with a finer Portland mixture containing pigment and aggregate. A top wash is performed to expose the top layer prior to sending the bricks to the kiln. The Umbriano bricks include a cement overspray that binds into the aggregate. The operations include a spray booth to contain and collect excess spray material, which is then reintroduced into the base mixture of the bricks.

Wastewater is collected only during the production of the Series product during the top wash process, which averages about once per month, and treats approximately 10,000 gallons per day when in operation. Wastewater is treated using an Alar system and associated holding tank, which includes bentonite clay and separating agents to absorb particles and encapsulate solids. The treated wash water is discharged from the holding tank to an outdoor catch basin, where the treated water is directed to the outlet/outfall located at the wetland. Beginning in July 2023, the wastewater is now recycled as part of the operations, and no wastewater is currently discharged from the Site to on-site catch basins or to the stormwater outfall.

## 2.3 Raw Material Review

The chemicals stored/used at the Site include sand, mortar, aggregate chips, limestone, cement, pigments, sealers, and top spray. A separate storage room also included cleaners, sealers, joint compounds, and glues for products that are sold, but not used in the shop. Materials of note include:

- U9HP Efflorescence Control/Water Repellant – added to all bricks as part of the production process;
- CT Compound Umbriano 6599 – top coating for the Umbriano product, which is stored in on-site totes;
- GB Permaphob EF – additive for concrete mixtures;
- Metal Oxide Pigments – color additive for bricks;
- Sure Bond SB-1300 Sealer;
- Sure Bond SB 8700 Wet Look Sealer; and
- SB-10 Paver Bond Adhesive.

Unilock provided safety data sheets for the products used in production. Although PFAS compounds were not noted in any of them, the sheets included trademark products and trade name chemicals that do not identify individual chemicals/formulations that were included as part of the mixture. Copies of the product safety data sheets are provided in Appendix C.

## 2.4 Water Supply System

Water is pumped from the on-site production well to a holding tank located in a central utility room inside the production area. Water delivery for building usage splits into two streams after the holding tank. The first stream includes a line that delivers potable water to fixtures in the office area, inclusive of the break room. Treatment for the potable line includes a bag filter for sediment, a water softening unit, and an ionizer to raise the pH. The second stream includes a line that delivers water for use as process water, a wash tank, and eye wash stations on the production floor. The process water line only includes sediment filtration for treatment.

# 3.0 PFAS HISTORY AND REGULATORY STATUS

PFAS are a group of more than 3,000 manufactured fluorinated organic chemicals that have been produced since the mid-1900s. The unique properties of PFAS (fluid repellency, temperature resistance, and non-stick surfaces) have been used in coatings for clothing, paper products, and cookware, for the formulation of firefighting foam, and have been applied in many sectors, including the electronics, aviation, space, automotive, construction, and semiconductor industries. Polytetrafluoroethylene (PTFE) was the first to hit the market as Teflon® in the 1940s as non-stick coatings on pans. Between 1950 and 1960, perfluorooctanoic acid (PFOA) was developed for use as protective coatings, and perfluorooctane sulfonic acid (PFOS) was introduced and used as water resistant products and firefighter foam. In the 1980s, perfluorononanoic acid (PFNA) was introduced to the market for use as architectural resins, and fluorotelomers were used as another option for firefighting foam. Perfluorobutane sulfonate (PFBS) has been documented as being used in industrial processes as surfactants and in consumer products as water- and stain-resistant coatings.

Certain PFAS compounds, including the long chain perfluoroalkyl acids (PFAAs), which include PFOA and PFOS, are very mobile, do not readily break down in the environment, and bio-accumulate in people. The awareness of PFAS-related health effects has been rapidly evolving in recent years, and in 2016 the United States Environmental Protection Agency (EPA) issued a Lifetime Health Advisory (LHA) for PFOA and PFOS, and established 70 nanograms per liter (ng/L) or parts per trillion (ppt) for these compounds as the long-term exposure criterion. PFOA and PFOS were the focus of PFAS regulation at the start since they were identified as the most widely detected in the environment. Due to emerging health and environmental concerns, there has been a reduction in the manufacturing and use of PFAAs, including PFOA and PFOS, which were phased out of production in the United States between 2002 and 2015.

In January 2016, New York became the first state in the nation to regulate PFOA as a hazardous substance followed by the regulation of PFOS in April 2016. The regulation requires proper storage of the substances and limited releases to the environment, and enables the State to use its legal authority and the resources of the State Superfund program to advance investigations and cleanups of impacted sites. The Final Rule for PFOA and PFOS became effective on March 3, 2017.

In January 2020, NYSDEC released a guidance document for the sampling and analysis of PFAS compounds under their Part 375 remedial programs. The guidance was revised several times as the regulatory oversight evolved, and the latest version is titled *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), Under NYSDEC's Part 375 Remedial Programs, April 2023*. The guidance document (referred to herein as the NYSDEC PFAS guidance document) was designed to ensure consistency in sampling, analysis, and reporting of PFAS investigations, and includes preliminary Soil Cleanup Objectives (SCOs) for PFOA and PFOS. Until NYSDEC establishes specific SCOs for PFAS, the NYSDEC PFAS guidance document states that NYSDEC will determine on a case-by-case basis if PFAS-contaminated media will be subject to remediation.

In July 2020, the New York State Public Health and Health Planning Council adopted a health-based Maximum Contaminant Level (MCL) of 10 ppt each for PFOA and PFOS in finished drinking water, which was approved and adopted as the new drinking water standards on August 26, 2020. On March 15, 2023, NYSDEC released final water quality guidance values for PFOA and PFOS, and indicated that groundwater samples should be compared to the human health criteria of 6.7 ppt for PFOA, and 2.7 ppt for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life.

In March 2023, EPA issued a proposed rule to regulate six PFAS compounds in drinking water, inclusive of PFOA, PFOS, and PFBS. Specific MCLs were established for PFOA and PFOS (4 ppt for each compound), and a hazard index was developed for the remaining compounds, inclusive of PFBS. As part of the proposed rule, EPA established a Health Based Water Concentration (HBWC) for PFBS of 2,000 ppt.

# 4.0 ON-SITE PFAS AND REGULATORY BACKGROUND

PFAS have been tested as part of routine water supply sampling at the Site since 2021. The compound PFBS has been detected at variable concentrations ranging from 7.5 to 2,680 ng/L. The PFAS compounds PFOA and PFOS have been detected at concentrations of 6.15 to 8.28 ng/L. Although NYSDOH has established MCLs for public water supplies for PFOS and PFOA of 10 ng/L, MCLs have not been established in New York State for private water supplies for other PFAS compounds, including PFBS.

At the request of NYSDOH, NYSDEC initially referred to the Environmental Conservation Law (ECL) Article 27 Title 12, which allows NYSDEC to perform, or cause to perform, investigation and/or remediation related to the presence of PFBS in the Site well. Furthermore, NYSDOH had determined that the Site may be a DWCS based upon the concentrations of PFBS in the Site well. Due to these designations and regulatory influences, NYSDEC issued correspondence on May 6, 2022 stating that the Site may be a potential DWCS and requested that Unilock enter into a CO to investigate and potentially remediate the PFAS compounds detected at the Site.

AKRF attended a virtual meeting with representatives of Unilock, Zarin & Steinmetz (legal counsel for Unilock), NYSDEC, and NYSDOH on August 1, 2022. Prior to entering into a CO, members of Zarin & Steinmetz and AKRF proposed that a PA be conducted to determine if the PFAS compounds detected at the Site were attributable to Unilock's operations. The scope of work for the PA included an inspection of the Site and surrounding properties, a regulatory database review, sampling of the water supply system, and, if necessary, sampling and laboratory analysis of targeted on-site environmental media.

The PA was conducted from August 2022 through June 2023, and included the collection and analysis of soil, sediment, surface water, groundwater, and treated process water discharge samples. The results of the PA are described in Section 5.0. After completion of the PA, Unilock and NYSDEC entered into a CO with an effective date of August 24, 2023. This SCWP has been prepared to fulfill Step II.A. of the CO, which requires the SCWP to be submitted within 30 days of the effective date of the CO (September 25, 2023).

# 5.0 PRELIMINARY ASSESSMENT

Between August 2022 and June 2023, AKRF completed the PA based on the scope of work established in Section 4.0. The PA included a review of the materials stored/used and the production processes, the collection and laboratory analysis of water supply system samples for both potable and process water, and the collection and laboratory analysis of soil, catch basin sediment, treated water discharge, and co-located surface water/wetland sediment samples. Raw materials used in the production process were also collected for laboratory analysis. Each sample was collected in accordance with the protocols listed in the NYSDEC PFAS guidance document, and included Category B reporting, including the required quality assurance/quality control (QA/QC) sampling, to be included as part of a Site characterization data set. This Section includes a review of the PA results.

## 5.1 Site/Surrounding Properties Inspection and Database Review

The inspection results are detailed in Section 2.0 (Site Details). In summary, PFAS compounds were not identified during the inspection as part of any documented uses or known business processes for the Site or surrounding properties.

ARKF reviewed information provided by an environmental database report prepared by Environmental Data Resources, Inc. (EDR) on August 15, 2022. The database report included historical aerial photographs, United States Geological Survey (USGS) Maps, City Directories, and a radius report review of federal, state, and local environmental records that was consistent with the EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312) and the American Society for Testing Materials (ASTM) Standard Practice for Environmental Site Assessments (E1527-21).

The aerial photographs, USGS Maps, and City Directories were inconclusive with respect to owners, operators, manufacturers, or users of PFAS compounds. The Site and surrounding properties were identified in the radius report as summarized in this Section below.

The Site was listed in the following databases:

- FINDS (EPA's Facility Index System/facility Registry System) – Registry ID 110019329779;
- ECHO (EPA's Enforcement & Compliance History Information);
- ERNS (National Response Center – Emergency Response Notification System);
- LTANKS (Leaky Storage Tanks);
- NYSPILLS (New York Spills Database);
- AIRS (EPA's Aerometric Information Retrieval System); and
- SPDES (State Pollutant Discharge Elimination System).

Four listings in the AST and LTANKS databases were also included for surrounding commercial properties, including Westchester Tractor, Verizon New York Inc., and New York State Electric and Gas (NYSEG).

In summary, the environmental database review included information related to petroleum spills, petroleum storage, stormwater discharge, and air discharge for the Site and surrounding properties, but did not contain any definitive data about the production, storage, use, or release of PFAS compounds.

## 5.2 Water System Sampling

On August 24, 2022, AKRF personnel collected the following samples associated with the on-site water system:

- Inlet Pre-T1: Pump Room Inlet (1st draw)
- Inlet Pre-T2: Alar Room Fixture Near Eyewash/Shower-Inlet for Production (1st draw)
- Fixture POST-T1: Office Break Room Faucet (1st draw)
- Fixture POST-T2: Office Break Room Faucet (15-minute flush)
- Fixture POST-T3: Duplicate of Fixture POST-T2

For QA/QC purposes, and to allow for adherence to NYSDEC analytical service protocol (ASP) Category B laboratory deliverables, sampling also included a field duplicate and matrix spike/matrix spike duplicate (MS/MSD). The samples were analyzed by Eurofins TestAmerica of Edison, New Jersey (Eurofins), a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory, using EPA Method 537.1 for the Unregulated Contaminant Monitoring Rule (UCMR) Cycle 3 list of six (6) PFAS compounds, including PFBS, PFOA, and PFOS. The water sampling results are summarized in In-Text Table T1 below. The previous sampling results collected between January 2021 and May 2022 have been included for reference and comparison.

**Table T1**
**Summary of PFAS Sampling Results – Water System**

| | | **Sampling Results (ng/L)** | | |
|---|---|---|---|---|
| **Date** | **Sampling Location** | **PFOA** | **PFOS** | **PFBS** |
| 1/25/2021 | Pump House | 7.46 | 6.39 | NR |
| 5/4/2021 | Pump House | 6.32 | 6.15 | NR |
| 8/18/2021 | Pump House | 7.68 | 7.81 | 576 |
| 11/18/2021 | Pump House | 6.29 | 7.08 | 2,680 |
| 2/8/2022 | Pump House | 8.28 | 6.96 | 7.5 |
| 5/4/2022 | Pump House | 7.21 | 7.97 | 23.5 |
| 8/24/2022 | Inlet Pre-T1: Pump Room Inlet (1st draw) | 6.12 | 5.26 | 1,780 |
| 8/24/2022 | Inlet Pre-T2: Alar Room Fixture Near Eyewash/Shower-Inlet for Production (1st draw) | 5.94 | 5.06 | 2,240 |
| 8/24/2022 | Fixture POST-T1: Office Break Room Faucet (1st draw) | 6.43 | 4.81 | 2,000 |
| 8/24/2022 | Fixture POST-T2: Office Break Room Faucet (15-min flush) | 6.1 | 5.35 | 2,430 |
| 8/24/2022 | Fixture POST-T3: Duplicate of Fixture POST-T2 | 6.33 | 5.13 | 2,500 |

NR = Not Reported

The sampling results confirmed that PFBS was detected in the samples at concentrations within the historical range of detections and averaging approximately 2,000 ng/L. The PFAS compounds PFOA and PFOS were detected at concentrations ranging from 4.81 to 6.43 ng/L.

## 5.3 Soil, Sediment, and Surface Water Sampling

AKRF's water system sampling conducted in August 2022 confirmed that PFBS exists in the on-site supply well. AKRF recommended additional sampling to confirm whether high concentrations of PFBS could be attributed to on-site source(s), including the on-site production materials (i.e., raw materials, finished materials, or off-spec materials) or the surrounding environmental media (i.e., soil, sediment, surface water). On November 9, 2022, AKRF collected raw material samples, as well as soil, sediment, and surface water samples from the Site.

The raw material samples that were collected and analyzed for PFBS included:

- RM-1 - GB Permaphob EF – additive for concrete mixtures (liquid);
- RM-2 - CT Compound Umbriano 6599 – top coating for the Umbriano product, which is stored in on-site totes (liquid);
- RM-3 - Sure Bond SB-1300 Sealer (liquid);
- RM-4 - Sure Bond SB 8700 Wet Look Sealer (liquid);
- RM-5 - U9HP Efflorescence Control/Water Repellant (liquid);
- RM-6 - Metal Oxide Pigment – Maize (solid);
- RM-7 – Metal Oxide Pigment – Black (solid); and
- RM-8 - SB-10 Paver Bond Adhesive (solid).

The environmental media samples that were collected and analyzed for PFBS included:

- S-1 to S-4 – Soil samples collected below pavers/concrete paving to evaluate whether PFBS was present in shallow soil in the wastewater discharge area, and storage areas for finished product and off-spec materials.
- CB-1 to CB-4 – Sediment samples from catch basins to evaluate whether PFBS was present in the rainwater and wastewater collection/discharge system.
- SW/SED-1 and SW/SED-2 – Co-located sediment and surface water samples to evaluate whether PFBS was present in the wetland.

The soil samples were collected using a dedicated trowel after coring through the overlying brick or concrete layer and exposing the underlying soil. The catch basin sediment samples were collected using a hand auger, and surface water/sediment samples were collected from the wetland using a sampling cup (surface water) and hand auger (sediment). The procedures for sampling and decontamination, and requirements for sampling materials, field gear, and personal protective equipment, were conducted in accordance with the NYSDEC PFAS guidance document. Each sample was analyzed by Eurofins for PFAS compounds by EPA Method 537. This sampling event was completed before laboratories were capable of completing Draft EPA Method 1633 for PFAS, and using Method 537 would also allow for consistency with the August 2022 water system sampling event.

Attached Table 1 includes the laboratory analytical results for the water system sampling, Attached Table 2 includes the analytical results for PFAS compounds in the soil, sediment, and solid raw materials samples, Attached Table 3 includes the results for the surface water and liquid raw material samples, and Attached Table 4 includes the wastewater discharge samples. The sampling locations are shown on Figure 3.

Testing of the liquid raw material samples (RM-01 through RM-05) was a challenge as the raw material samples contained a mixture of pure chemicals that included ammonia, acetone, caustic bases, alcohols, and petroleum compounds. Due to existing analyte abundance, only one area NYSDOH-certified laboratory (Eurofins) was willing to analyze the samples, and significant dilutions were required to allow the samples to be extracted and run through the testing equipment. PFAS was not detected in the liquid raw material samples. However, we noted that the minimum detection limit ranged between 10,000 and 25,000 ng/L, and thus we considered this result technically inconclusive as to whether PFAS compounds were present.

PFBS was not detected in the solid raw material samples (RM-06 through RM-08). PFOA was detected in RM-08 at a concentration of 6.43 micrograms per kilogram (µg/kg) or parts per billion (ppb). Four residual PFAS compounds (not including PFBS or PFOS) were detected in RM-6 at concentrations ranging from 0.027 to 0.072 µg/kg. PFAS were not detected in RM-7.

PFBS was detected in soil samples S-01, S-02, and S-03 at concentrations of an estimated 0.4 µg/kg, 50.9 µg/kg, and 2.03 µg/kg, respectively. Sample S-02 was collected from a soil boring located adjacent to the off-spec brick storage area. Between one and four additional PFAS compounds were detected in the soil samples (S-01 to S-04) at concentrations of an estimated 0.15 µg/kg to 7.76 µg/kg. PFOA and PFOS were not detected in the soil samples.

PFBS was detected in catch basin sediment samples CB-01, CB-02, and CB-03 at concentrations of 0.54 µg/kg, 10.4 µg/kg, and 1.51 µg/kg, respectively. Sample CB-02 was collected from the catch basin located adjacent to the wastewater discharge area. Between three and six additional PFAS compounds were detected in the catch basin sediment samples at concentrations ranging from an estimated 0.034 µg/kg to 21.1 µg/kg. PFOA and PFOS were not detected in the catch basin sediment samples.

PFBS was detected in the two wetland surface water samples, SW-01 and SW-02, at concentrations of 1,730 ng/L and 1,480 ng/L, respectively. The concentration of PFBS in the wetland surface water was consistent with the water system sampling. PFOA and PFOS were detected in the surface water samples at concentrations ranging from 4.85 ng/L to 6.43 ng/L. An additional 10 to 11 PFAS compounds were also detected at concentrations ranging from 0.46 ng/L to 141 ng/L. PFBS was detected in the wetland sediment samples, SED-01 and SED-02, at concentrations of 0.83 µg/kg and 0.87 µg/kg, respectively. PFOA was detected in SED-01 and SED-02 at concentrations of 0.052 µg/kg and 0.041 µg/kg, respectively. PFOS was not detected in the wetland sediment samples. Between seven and eight additional PFAS compounds were detected in the wetland sediment samples at concentrations ranging from an estimated 0.027 ng/L to 0.48 ng/L.

The soil, sediment, and surface water sampling program did not identify a source of the PFAS contamination at the Site.

### 5.4 Wastewater Discharge Sampling

Following the testing of raw materials, soil, sediment, and surface water, AKRF coordinated with Unilock to collect discharge water from the Alar system holding tank. The production of Series bricks, and subsequent wastewater treatment/discharge, only occurred approximately once per month until July 2023. On May 31, 2023, AKRF mobilized to the Site to collect treated wastewater discharge samples EFF-01 (collected at the start of discharge/full tank) and EFF-02 (collected 15 minutes after start of discharge, tank approximately half full) from the Alar system holding tank. Sampling also included a field blank, field duplicate (from EFF-01), and MS/MSD. Each sample was collected from a PVC discharge pipe connected to the holding tank that directs discharge to the nearby catch basin. The samples were analyzed by Eurofins for the list of 40

PFAS compounds using the NYSDEC required EPA Method 1633. The wastewater sampling results are summarized in In-Text Table T2, below. As discussed in Section 2.2, all wastewater from Site operations is now recycled/reincorporated on-site, and is therefore considered a closed loop system.

**Table T2**
**Summary of PFAS Sampling Results – Wastewater Discharge**

| | | **Sampling Results (ng/L)** | | |
|---|---|---|---|---|
| **Date** | **Sampling Location** | **PFOA** | **PFOS** | **PFBS** |
| 5/31/2023 | EFF-1 – Wastewater Tank Discharge | 10.6 | 8.28 | 2,920 |
| 5/31/2023 | EFF-2 – Wastewater Tank Discharge | 5.11 | 7.81 | 2,920 |
| 5/31/2023 | Duplicate of EFF-1 | 7.68 | 7.81 | 576 |
| 5/31/2023 | Field Blank | ND | ND | 0.33 J |

J= The concentration is given an estimated value
ND = Not detected

In total, between 7 and 11 PFAS compounds were detected above laboratory reporting limits in the wastewater samples at concentrations ranging from 2 ng/L of PFNA to 2,920 ng/L for PFBS. Up to 27 additional PFAS compounds were detected at estimated concentrations below the laboratory reporting limit (identified by a "J" qualifier with the result). The results for sample EFF-2 were consistent with EFF-1, with a PFBS concentration of 2,920 ng/L for both samples.

The source of the water used for the Series brick production process, and therefore water that is treated and was previously discharged, is the on-site water system/private well. The water system sampling results documented in Section 5.2 show that PFBS ranged from 1,780 ng/L to 2,500 ng/L (using a different analytical method – EPA Method 537.1) during the August 2022 sampling event. The water system results are consistent with the wastewater discharge results and are not definitive in identifying a PFBS source location.

## 5.5 Conceptual Site Model

The conceptual site model (CSM) is still in a preliminary phase as the source location and release mechanism have yet to be confirmed. With the bedrock aquifer below the Site being an impacted sensitive receptor, the anticipated migration pathway includes a release or discharge to the ground surface or shallow soil on or near the Site. A spill or release would have direct contact with the shallow bedrock, which is in close proximity to the ground surface in the area (less than one foot at the Site), would infiltrate into any bedrock fractures within the release area, and would migrate with seasonal recharge through the bedrock fracture network into the network of saturated bedrock fractures, or bedrock aquifer.

The extracted groundwater from the supply well utilized for production purposes as part of Unilock's operations would result in negligible breakdown of PFAS compounds through the production process. A secondary release mechanism would be that any PFAS introduced from the water supply and any associated on-site water/wastewater discharged to the stormwater system would travel to on-site catch basins and eventually to the outfall in the northeastern portion of the Site, where it would then migrate from the wetland area adjacent to the outfall and infiltrate into the bedrock aquifer. However, it is noted that all production-related wastewater has been recycled on-site since July 2023.

This SCWP was designed to locate the source of PFAS in bedrock groundwater and provide further data to characterize the release area.

# 6.0 SITE CHARACTERIZATION SAMPLING PLAN

The Site Characterization (SC) field program is proposed to include the collection of soil, sediment, surface water, and groundwater samples, with a goal to locate the source of, and provide additional characterization data for, the PFBS contamination identified on-site. Additionally, the SC will include a preliminary evaluation of geologic and hydrogeologic conditions. The SC has been designed to fulfill the SC requirements of NYSDEC's Technical Guidance for Site Investigation and Remediation (DER-10), and the NYSDEC PFAS guidance document.

## 6.1 Field Program Summary

The field sampling scope of work consists of the collection of soil samples (where available above bedrock), bedrock aquifer groundwater samples, co-located wetland sediment and surface water samples, and the collection of additional water system and wastewater discharge samples. The soil samples will be collected by advancing soil borings at five (5) on-site locations, and four (4) off-site locations. The soil borings will be advanced to the bedrock interface, at which point a core barrel will be used to advance the soil boring into bedrock. Continuous overburden soil sampling will be completed to the bedrock interface, with the understanding that minimal overburden soil will limit the amount of soil samples, if any, that can be collected at each boring location. The proposed SC sample locations are shown on Figure 4.

The rationale for the proposed sample locations is described in In-Text Table T3.

**Table T3**
**Sampling Rationale for Site Characterization Investigation**

| Sample ID | Location/Product | Rationale/Description |
|---|---|---|
| SB-1/MW-1 | West-adjacent to building and within treated production water discharge area | Determine status of on-site shallow soil and shallow bedrock water quality |
| SB-2/MW-2 | South-adjacent to building near product storage and loading docks | Determine status of on-site shallow soil and shallow bedrock water quality |
| SB-3/MW-3 | East-adjacent to building and product storage, and near potable well | Determine status of on-site shallow soil and shallow bedrock water quality |
| SB-4/MW-4 | Northwest-adjacent to the office area, within product storage, and near wetland | Determine status of on-site shallow soil and shallow bedrock water quality |
| SB-5/MW-5 | North end of property within product storage area | Determine status of on-site shallow soil and shallow bedrock water quality |
| SB-6/MW-6 | Southeast of property | Determine status of off-site shallow soil and shallow bedrock water quality |
| SB-7/MW-7 | Adjacent property to the northeast | Determine status of off-site shallow soil and shallow bedrock water quality |
| SB-8/MW-8 | Adjacent property to the north | Determine status of off-site shallow soil and shallow bedrock water quality |
| SB-9/MW-9 | Further north of property | Determine status of off-site shallow soil and shallow bedrock water quality |
| SED-3/SW-3 | Western portion of wetland | Determine status of sediment and surface water in the central portion of the wetland |
| SED-4/SW-4 | Eastern portion of wetland | Determine status of sediment and surface water in northern portion of the wetland |
| SED-5/SW-5 | Northern portion of wetland | Determine status of sediment and surface water in northern portion of the wetland |
| SED-6/SW-6 | Northern portion of wetland | Determine status of sediment and surface water in northern portion of the wetland |
| SED-7/SW-7 | Northern portion of wetland | Determine status of sediment and surface |

| Sample ID | Location/Product | Rationale/Description |
|---|---|---|
| | | water in northern portion of the wetland |
| GW Prod Inlet | Utility room with water tank | Baseline input into production floor |
| Alar Pre-T | Production floor | Status of pre-treated production discharge water compared to water input |
| RM-1 | GB Permaphob EF | Additive for concrete mixtures (liquid) |
| RM-2 | CT Compound Umbriano 6599 | Top coating for Umbriano product (liquid) |
| RM-3 | Sure Bond SB-1300 Sealer | Liquid sealer |
| RM-4 | Sure Bond SB 8700 Wet Look Sealer | Liquid sealer |
| RM-5 | U9HP Efflorescence Control/Water Repellant | Liquid water repellant |
| RM-6 | Metal Oxide Pigment – Maize | Solid pigment |
| RM-7 | Metal Oxide Pigment – Black | Solid pigment |
| RM-8 | SB-10 Paver Bond Adhesive (solid). | Solid adhesive |

The HASP and CAMP will be implemented during all subsurface disturbance activities included in the field program performed at the Site and off-site. CAMP data will be provided to NYSDEC and NYSDOH on a weekly basis. Any exceedances of CAMP action levels, as well as correction measures taken, will be reported to the Departments immediately (within 24 hours). The HASP and CAMP are included as Appendix B.

## 6.2 Sample Handling and Laboratory Reporting

The procedures and guidelines for sample collection are included in the QAPP located in Appendix A. The sampling guidelines are consistent with and have been prepared to meet the NYSDEC PFAS guidance document, which is included in the QAPP for reference. Each sample slated for laboratory analysis will be labeled and placed in laboratory-supplied containers and shipped to Eurofins, a NYSDOH ELAP-certified laboratory, via courier with appropriate chain of custody documentation in accordance with appropriate EPA protocols. Each sample will be analyzed for PFAS using EPA Method 1633, 1,4-dioxane using EPA Method 8270 with Selected Ion Monitoring (SIM), and the organic and inorganic compounds listed in NYSDEC Part 375. Each laboratory report will be prepared using Category B deliverables with electronic data deliverables (EDDs) in the latest NYSDEC format. A standard turnaround time will be requested from the laboratory.

Aqueous and solid samples analyzed for 1,4-dioxane will have reporting limits no higher than 0.35 micrograms per liter (µg/L) and 0.1 milligrams per kilogram (mg/kg), respectively. Likewise, reporting limits for PFOA and PFOS in aqueous and solid samples will be no higher than 2 ng/L and 0.5 µg/kg, respectively.

## 6.3 Soil Sampling

A hollow stem auger drill rig will be used to advance the soil borings SB-1 through SB-9. Continuous overburden soil cores will be advanced from grade to the bedrock interface using a stainless-steel split spoon sampler. Soil samples will be inspected by AKRF field personnel for evidence of contamination (e.g., odors, staining), screened for the presence of volatile organics with a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp, and logged using the Unified Soil Classification System (USCS). AKRF field personnel will record and document subsurface conditions. The PID will be calibrated in accordance with manufacturer's recommendations prior to sampling.

For each boring, and where sufficient overburden is available, soil core samples retrieved from the surface (0"- 2"), near surface (2"- 12"), and deep (immediately above soil/bedrock interface) intervals will be placed in the specified containers for laboratory analysis. Each of these soil samples will be analyzed for emerging contaminants [1,4-dioxane using EPA Method 8270 Selective Ion Monitoring (SIM), and the standard list of 40 PFAS compounds by Draft EPA Method 1633]. One additional soil sample will be collected from each on-site soil boring from the interval that exhibits the most evidence of contamination (i.e., elevated PID readings, odors, staining). In the absence of contamination, the sample will be collected from the surface interval since a surface spill would be the likely on-site mechanism for release of any contamination. The additional sample will be analyzed for the NYSDEC Part 375 list for volatile organic compounds (VOCs) using EPA Method 8260, semivolatile organic compounds (SVOCs) using EPA Method 8270, polychlorinated biphenyls (PCBs) using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471.

Additional samples would be collected for laboratory analysis if field observations (e.g., odor, staining, and/or elevated PID readings) indicate it is warranted. It should be noted that during the PA, a maximum of 2 inches of overburden was observed on-site above bedrock. All sampling equipment (e.g., drilling rods and casing, macro core samplers and probe rods) will be either dedicated or decontaminated between sampling locations. After the soil boring drilling is complete, soil borings will be filled with hydrated bentonite and patched to match existing surface conditions. Each soil boring location will be surveyed by a licensed surveyor and incorporated into the existing Site map. All investigation derived waste (IDW) associated with drilling soil borings will be managed as described in Section 6.10.

### 6.4 Bedrock Monitoring Well Installation and Well Development

Unilock personnel reported that rock blasting was completed during the initial development to prepare the Site for construction of the current building, and the entire developed area was constructed on bedrock. Installation of overburden monitoring wells is not anticipated for on-site boring locations.

After encountering bedrock, the hollow stem auger tooling will be converted for rock coring. The bedrock coring process includes advancing a 4- to 8-inch-diameter steel casing at least 5 feet into competent bedrock. The bottom of the casing will be set using a slurry grout consisting of Type I Portland cement/bentonite or cement/sand mixture and left to cure for at least 24 hours. After the grout has cured, a boring will be advanced through the steel casing and continuous bedrock samples will be collected by spinning the coring barrel fitted with a custom cutting shoe into the bedrock at 5-foot intervals until the first water bearing fracture is encountered. The bedrock cores will be placed in a core box and logged for geology and fracture content. After completing the coring process, the boring for the bedrock well will be overdrilled using an approximately 3.9-inch-diameter roller bit to expand the boring diameter enough for well construction.

The bedrock wells will be constructed with 2-inch-diameter PVC, which will include 5 to 10 feet of 0.02-inch slotted well screen (length depending upon observed Site conditions) installed into the first water bearing zone in competent bedrock. The annular space around the well screen will be backfilled with a sand filter pack extending from the bottom of the borehole to 1 to 2 feet above the screen. The annular space around the well riser will be sealed with bentonite extending 1 to 2 feet above the sand filter pack and completed to ground surface and within the exterior casing with a non-shrinking cement mixture to grade.

In the event that off-site boring locations, especially SB-8 and SB-9 near the wetland, contain a vertical zone of saturated overburden sufficient for the collection of groundwater samples, then nested (co-located) off-site overburden wells will be installed. After completing the installation of the bedrock monitoring well, a second boring located adjacent to the bedrock well will be advanced with hollow stem augers down to bedrock. The overburden well will be installed with up to 10 feet of well screen up to a depth of approximately 7 feet into the water table. Morie sand will be backfill around each well screen to a depth of 2 feet above the screen. A bentonite seal will be placed above the sand pack for each well, and the remaining borehole will be filled with bentonite grout.

Each installed monitoring well will be completed using locking gate boxes, either flush with grade or stick-up, and will be developed by pumping until clear, if practicable. The location and elevation of each new monitoring well will be surveyed by a licensed surveyor.

### 6.5 Sediment/Surface Water Sampling

AKRF field personnel will conduct an inspection of the wetland that is northwest-adjacent to the Site to confirm physical characteristics and whether additional discharge pipes feed the wetland. Sediment from the bottom of the wetland and a co-located surface water samples will be collected from five additional locations (SED/SW-3, through SED/SW-7). The sediment samples will be collected with a stainless steel spoon, trowel, or hand auger, and the surface water samplings will be collected with a stainless steel cup. The specific sampling locations will be determined after conducting the field inspection, but will include a distribution that provides for full characterization of the wetland. The samples will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM and the standard list of 40 PFAS compounds by Draft EPA Method 1633), and the NYSDEC Part 375 list (VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471).

### 6.6 Groundwater Sampling

Groundwater samples will be collected from each of the newly installed monitoring wells. Prior to sampling, the depth to water will be measured in each existing on-site and off-site well with a multi-phase interface meter. Groundwater samples will be collected from each well using low-flow sampling techniques, and in accordance with the prevailing NYSDEC protocols. The QAPP included in Appendix A includes detailed sampling scope and protocols that will be followed for emerging contaminant sample collection, including acceptable materials for equipment and personal protective equipment.

The purge water will be monitored for turbidity and water quality indicators (i.e., pH, dissolved oxygen, oxidation-reduction potential, temperature, and specific conductivity) with measurements collected approximately every five minutes. The criteria for stabilization will be three successive readings within ±10% for pH, temperature, and specific conductivity. Each sample will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM, and the standard list of 40 PFAS compounds by Draft EPA Method 1633). Additional analysis will be conducted for groundwater samples collected from the on-site monitoring wells, which includes the NYSDEC Part 375 list (VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471).

### 6.7 Water System and Wastewater Discharge Sampling

A water system inlet sample and a pre-treatment process water (wash water for the Series bricks) sample will be collected on the same day during production of the Series bricks. The raw water sample will be collected from a sampling port in the utility room containing the water tank, and the pre-treatment process water will be collected from a sampling port prior to the Alar tank treatment vessel. The QAPP included in Appendix A includes detailed sampling scope and protocols that will be followed for emerging contaminant sample collection, including acceptable materials for equipment and personal protective equipment.

Each sample will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM, and the standard list of 40 PFAS compounds by Draft EPA Method 1633).

### 6.8 Raw Materials Sampling – Total Oxidizable Precursor (TOP) Assay

Laboratories were approached to determine if and how the raw materials samples could be analyzed, including the use of non-environmental methods, to determine whether PFAS compounds are present. Total Oxidizable Precursor (TOP) Assay analysis was considered due to the ability to identify specific compounds that are part of a raw material or commercial product containing a mix of materials. The TOP Assay includes two separate analyses where the sample is analyzed as received, and then analyzed a second time after the sample matrix has been oxidized. The results between the pre-oxidation and post-oxidation analysis are compared, and the results can identify the presence of compounds not detectable by traditional environmental analytical methods.

The raw material compounds identified as R-1 through R-8 in Table T3 would require a trial and error approach where the chemist has developed a work scope with specific non-standard protocols for the pre- and post-oxidation analysis. The analysis sequencing will include sample specific injection and extraction standards, and sample specific timing for compound mixing, heating, and mixture reconstitution.

The TOP Assay analysis includes the advantage of detecting PFAS precursors in production materials that can be oxidized during the production process and converted into target PFAS compounds of concern at a site..

### 6.9 Quality Assurance / Quality Control (QA/QC)

Additional analysis will be included for quality control measures, as required by the Category B sampling techniques. The QA/QC samples for soil and groundwater will include one MS/MSD, and one blind duplicate sample at a frequency of one sample per 20 field samples per media. Field blanks will be collected at a frequency of one field blank per day for each applicable matrix (surface water and groundwater). These samples will be obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into the laboratory-provided sample containers. A trip blank will be included for each transport cooler that includes samples being analyzed for VOCs.

QA/QC samples will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM, and the standard list of 40 PFAS compounds by draft EPA Method 1633) and the NYSDEC Part 375 list (VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471). The QAPP in Appendix A describes the QA/QC protocols and procedures that will be followed during implementation of the SCWP. The data will be reviewed by a third-party validator, and a Data Usability Summary Report (DUSR) will be prepared to document the usability and validity of the data.

The laboratory data compiled during the PA was produced using the Category B protocols described above. This data will be included in the DUSR in order to be included in the data set for Site characterization.

### 6.10 Decontamination Procedures

All non-dedicated sampling equipment (e.g., submersible/peristaltic pumps and oil/water interface probes) will be decontaminated between sampling locations using the following procedure:

1. Scrub equipment with a bristle brush using a perfluorochemical (PFC)-free water/Simple Green® solution.
2. Rinse with PFC-free water.
3. Scrub again with a bristle brush using a PFC-free water/Simple Green® solution.
4. Rinse with PFC-free water.
5. Rinse with distilled water.
6. Air-dry the equipment.

AKRF will provide documentation that the source of distilled water and the detergent (Simple Green® or alternate) being used for decontamination purposes are PFAS-free prior to the start of work.

### 6.11 Management of Investigation-Derived Waste (IDW)

Soil cuttings generated by the drilling of soil borings and purge water generated by well development and low-flow sampling will be containerized in properly labeled Department of Transportation (DOT)-approved 55-gallon drums for future off-site disposal at a permitted facility. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, decontamination fluids, or purge water), and the name of an AKRF point-of-contact. All drums will be labeled “pending analysis” until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state, and federal regulations. All boreholes will be filled with bentonite chips (hydrated) and restored to their original surface condition. Disposable sampling equipment, including spoons, gloves, bags, paper towels, etc. that come in contact with environmental media, will be double bagged and disposed of as municipal trash in a facility trash dumpster as non-hazardous refuse.

# 7.0 REPORTING REQUIREMENTS

## 7.1 Site Characterization Report (SCR)

Upon completion of all field work and receipt of laboratory analytical results, an SCR will be prepared that will: document field activities, present field and laboratory data, and discuss conclusions and recommendations drawn from the results of the investigation in accordance with DER-10. Soil boring logs, monitoring well construction logs, well development logs, and DUSRs will be included in the final report. EDDs will be submitted to the NYSDEC EQuIS™ database, and the laboratory reports will be included in the SCR.

### 7.1.1 Description of Field Activities

This section of the SCR will describe the field methods used to characterize the Site conditions, including sampling techniques, field screening equipment, drilling equipment, monitoring well installation procedures (if needed), and management of IDW.

### 7.1.2 Soil Boring Assessment

The SCR will include a section that presents the field and laboratory data for the soil results. The section will include a description of soil characteristics and figures will be provided that illustrate soil boring locations. Field and laboratory analytical results will be presented in the body of the report and summarized in tables and figures, and the detected concentrations will be compared to regulatory standards and/or guidance values. Soil boring logs and laboratory analytical reports will be provided as attachments.

### 7.1.3 Sediment and Surface Water Assessment

The SCR will include a section that presents field and laboratory data for the sediment and surface water samples. The section will include a description of sediment and surface water characteristics, and figures will be provided that illustrate their locations. Field and laboratory analytical results will be presented and compared with regulatory standards and/or guidance values, where applicable. Sediment and surface water laboratory analytical reports will be provided as attachments.

### 7.1.4 Groundwater Assessment

The SCR will include a section that presents field and laboratory data from the groundwater sampling. The section will include a description of groundwater characteristics, including water table elevation contours and an estimation of inferred groundwater flow direction, and figures will be provided that illustrate the monitoring well locations. Field and laboratory analytical results will be presented and compared with regulatory standards and/or guidance values. Low-flow groundwater sampling logs and laboratory analytical reports will be provided as attachments.

### 7.1.5 Water System/Discharge Water Assessment

The SCR will include a section that presents field and laboratory data from the water system inlet and wastewater discharge sampling. The section will include a description of the top wash and water treatment process, and will include an analysis regarding water quality changes from raw water intake to final discharge. Field and laboratory analytical results will be presented and compared with regulatory standards and/or guidance values.

# 8.0 SCHEDULE OF WORK

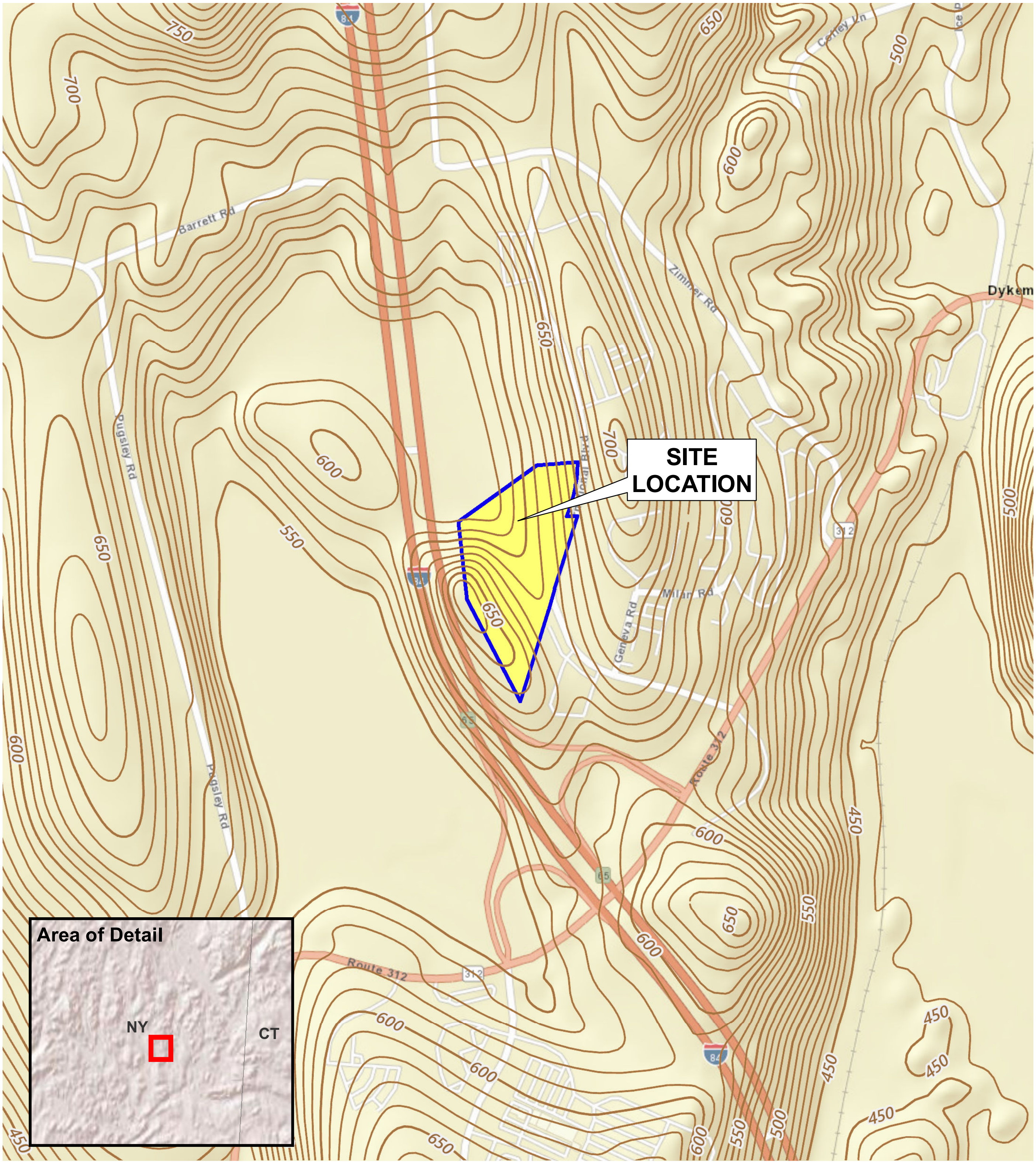
The following tentative schedule has been developed for the project.

| Activity | Time To Complete |
|---|---|
| Submittal of the SCWP | September 2023 |
| NYSDEC Review, and Submittal of the Final SCWP | November 2023 |
| Site Characterization Field Work is Initiated | December 2023 |
| Site Characterization Field Work is Completed | January 2024 |
| Receipt of all Laboratory Data | March 2024 |
| Data Validation | May 2024 |
| Draft SCR Submitted to NYSDEC | June 2024 |
| Final SCR Submitted to NYSDEC | July 2024 |

# 9.0 REFERENCES

1. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), Under NYSDEC's Part 375 Remedial Programs; New York State Department of Environmental Conservation; April 2023.
2. History and Use of PFAS; prepared by the Interstate Technology Regulatory Council; March 2018.
3. NYSDEC Mitigation and Remediation of Certain Solid Waste Sites and Drinking Water Contamination ECL Sec. 27-1205 *et seq*.; Order on Consent and Administrative Settlement; Unilock New York, Inc.; Site No. D340037; New York State Department of Environmental Conservation; December 4, 2019.
4. PFBS and Drinking Water, Michigan Department of Health, March 2022.

# FIGURES



Service Layer Credits: ESRI World Street Map 2022.

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SCALE IN FEET

©2023 AKRF Q:\Projects\220234 - UNILOCK NEW YORK\Technical\GIS and Graphics\SAR\220234 Fig 1 Site Location.mxd10/27/2022 2:08:23 PM mveilleux

AKRF

440 Park Avenue South, New York, NY 10016

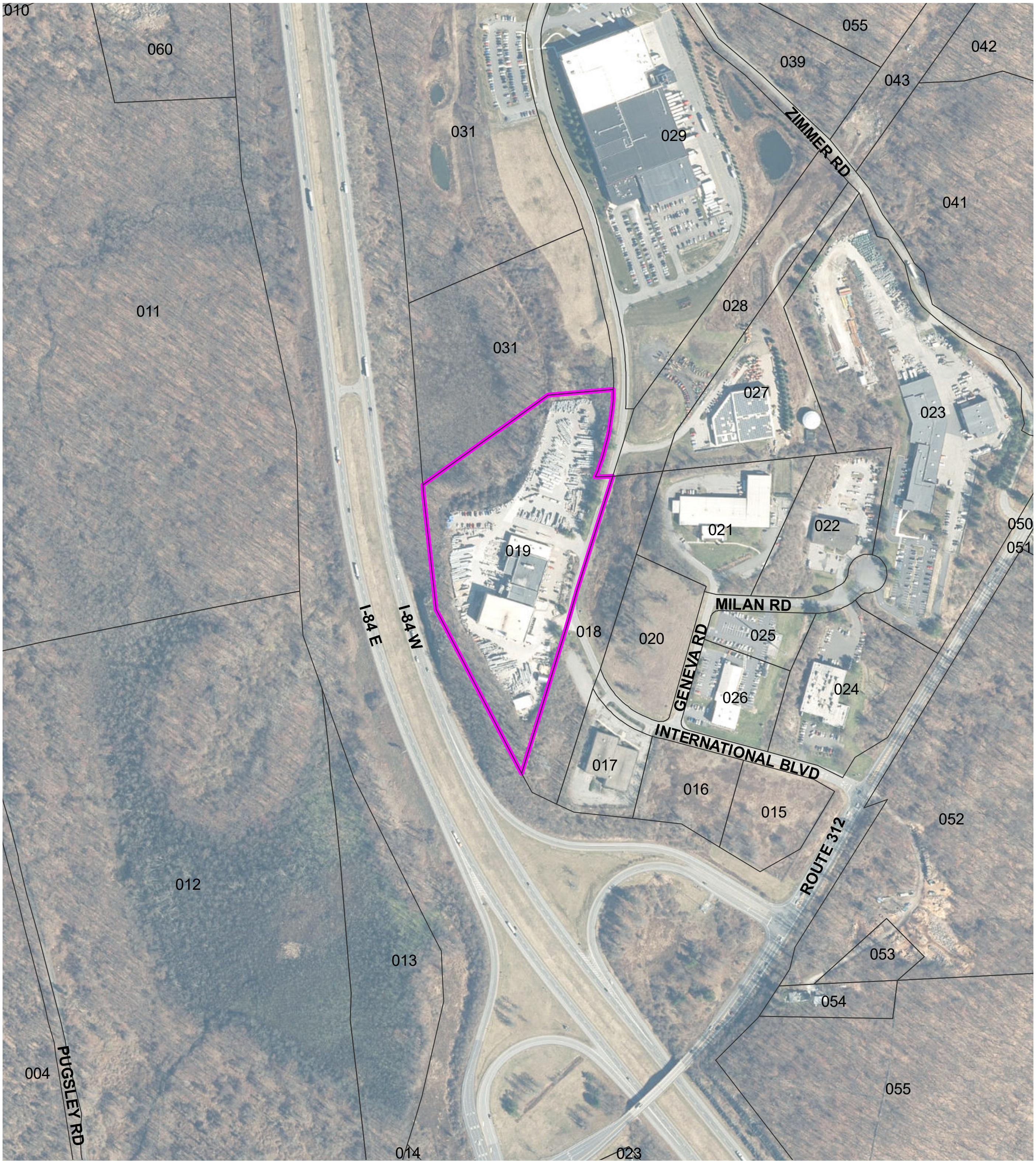
**Unilock Corporation**
**51 International Boulevard**
Brewster, New York

## SITE LOCATION

DATE
**8/25/2023**

PROJECT NO.
**220234**

FIGURE
**1**



Aerial Source:
ESRI World Imagery Dec 2021.

**LEGEND**

| | |
|---|---|
| 🟪 | PROJECT SITE BOUNDARY |
| 019 | LOT BOUNDARY AND TAX LOT NUMBER |

0 500 1,000

SCALE IN FEET

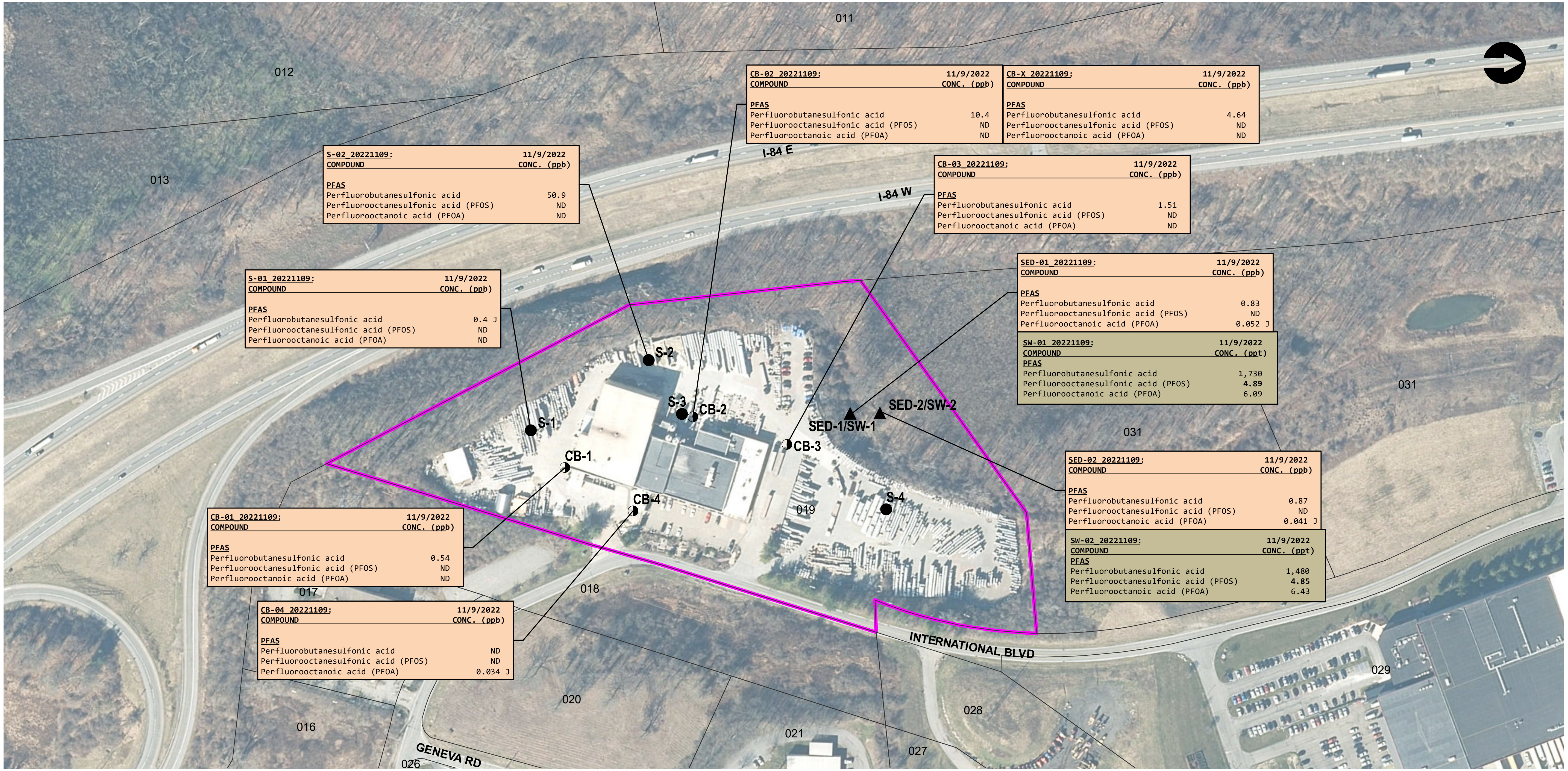
440 Park Avenue South, New York, NY 10016

**Unilock Corporation**
**51 International Boulevard**
Brewster, New York

**SITE AND SURROUNDING PROPERTIES**

| | |
|---|---|
| DATE | **8/25/2023** |
| PROJECT NO. | **220234** |
| FIGURE | **2** |

©2023 AKRF Q:\Projects\220234 - UNILOCK NEW YORK\Technical\GIS and Graphics\SAR\220234 Fig 2 Site and Surrounding Properties.mxd8/25/2023 2:41:32 PM mveilleux



| S-02_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 50.9 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| CB-02_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 10.4 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| CB-X_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 4.64 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| CB-03_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 1.51 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| S-01_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 0.4 J |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| SED-01_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 0.83 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | 0.052 J |

| SW-01_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppt) |
| PFAS | |
| Perfluorobutanesulfonic acid | 1,730 |
| Perfluorooctanesulfonic acid (PFOS) | **4.89** |
| Perfluorooctanoic acid (PFOA) | 6.09 |

| SED-02_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 0.87 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | 0.041 J |

| SW-02_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppt) |
| PFAS | |
| Perfluorobutanesulfonic acid | 1,480 |
| Perfluorooctanesulfonic acid (PFOS) | **4.85** |
| Perfluorooctanoic acid (PFOA) | 6.43 |

| CB-01_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | 0.54 |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | ND |

| CB-04_20221109: | 11/9/2022 |
|---|---|
| COMPOUND | CONC. (ppb) |
| PFAS | |
| Perfluorobutanesulfonic acid | ND |
| Perfluorooctanesulfonic acid (PFOS) | ND |
| Perfluorooctanoic acid (PFOA) | 0.034 J |

## LEGEND

| | |
|---|---|
| 🟪 | PROJECT SITE BOUNDARY |
| 019 | LOT BOUNDARY AND TAX LOT NUMBER |
| ● | SOIL SAMPLING LOCATION |
| ▲ | SURFACE WATER/SEDIMENT SAMPLING LOCATION |
| ◑ | CATCH BASIN SAMPLING LOCATION |

Sample ID → SED-01_20221109: — 11/9/2022 ← Sample Date
COMPOUND — CONC. (ppb)
PFAS
Analyte/Compound → Perfluorobutanesulfonic acid — 0.83 ← Concentration
Perfluorooctanesulfonic acid (PFOS) — ND
Perfluorooctanoic acid (PFOA) — 0.052 J

**Soil results compared to the guidance values included in the New York State Department of Environmental Conservation (NYSDEC) Sampling, Analysis and Assessment Of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued April 2023.**
**- PGWGVs - Part 375 Protection of Groundwater Guidance Value for soil**
**- CGVs - Part 375 Commercial Guidance Value for soil**

**Surface water results compared to the NYSDEC Technical and Operational Guidance Series (1.1.1): Class GA Ambient Water Quality Standards and Guidance Values (AWQSGVs) Raw Water Human Health Guidance Value.**

µg/kg:micrograms per kilogram = parts per billion (ppb)
ppt = parts per trillion (ppt)
J: The concentration given is an estimated value.
ND: Not Detected
NS: No Standard

| | NYSDEC Raw Water Human Health Parts Per Trillion (ppt) |
|---|---|
| **PFAS** | |
| Perfluorooctanesulfonic acid (PFOS) | 2.7 |
| Perfluorooctanoic acid (PFOA) | 6.7 |
| Perfluorobutanesulfonic acid | NS |

| | PGWGVs ppb | CGVs ppb |
|---|---|---|
| **PFAS** | | |
| Perfluorooctanesulfonic acid (PFOS) | 1 | 440 |
| Perfluorooctanoic acid (PFOA) | 0.8 | 500 |
| Perfluorobutanesulfonic acid | NS | NS |

Aerial Source:
ESRI World Imagery Dec 2021.

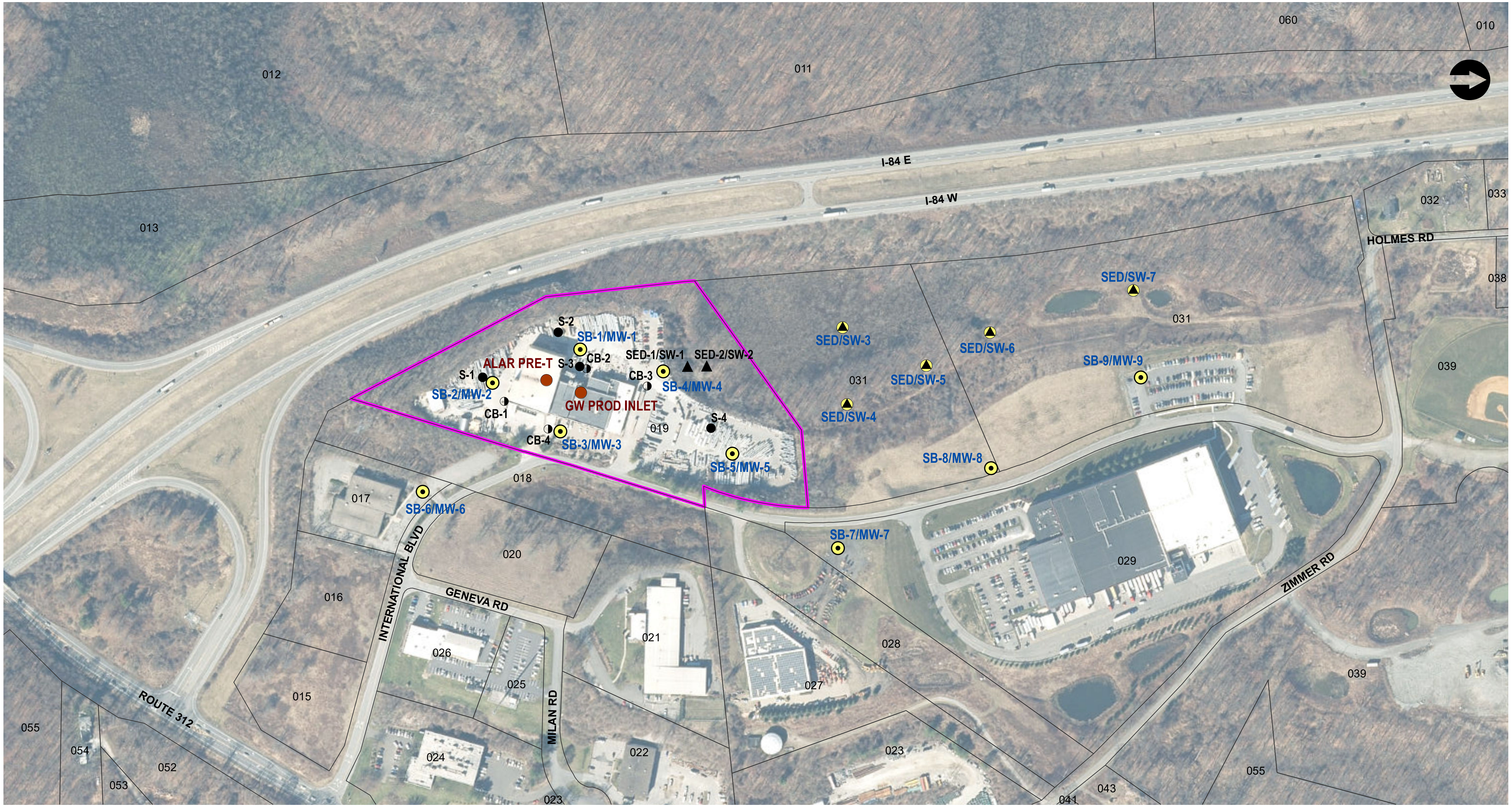
0 200 400
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

**Unilock Corporation**
**51 International Boulevard**
Brewster, New York

**SITE PLAN WITH PRELIMINARY ASSESSMENT RESULTS**

DATE
**8/29/2023**
PROJECT NO.
**220234**
FIGURE
**3**



**LEGEND**

▭ PROJECT SITE BOUNDARY

019 LOT BOUNDARY AND TAX LOT NUMBER

● SOIL SAMPLING LOCATION (NOVEMBER 2022)

◑ CATCH BASIN SAMPLING LOCATION (NOVEMBER 2022)

▲ SURFACE WATER/SEDIMENT SAMPLING LOCATION (NOVEMBER 2022)

⊙ PROPOSED SOIL BORING/BEDROCK MONITORING WELL LOCATION

▲ PROPOSED SEDIMENT/SURFACE WATER SAMPLING LOCATION

GW PROD INLET ● PROPOSED WATER SYSTEM INLET SAMPLING LOCATION

ALAR PRE-T ● PROPOSED WASTEWATER PRE-TREATMENT SAMPLING LOCATION

0 300 600
SCALE IN FEET

Aerial Source:
ESRI World Imagery Dec 2021.

©2023 AKRF Q:\Projects\220234 - UNILOCK NEW YORK\Technical\GIS and Graphics\SAR\220234 Fig 4 Proposed Sampling Locations.mxd11/8/2023 11:12:36 AM mveilleux

AKRF
440 Park Avenue South, New York, NY 10016

Unilock Corporation
51 International Boulevard
Brewster, New York

## PROPOSED SAMPLING LOCATIONS

DATE
11/8/2023

PROJECT NO.
220234

FIGURE
4

# TABLES

# Table 1
# Unilock Corporation
## 51 International Boulevard, Brewster, New York

Water System Sampling Results

*Per- and Polyfluoroalkyl Substances (PFAS)*

| | **AKRF Sample ID** | Inlet Pre-T 1 | Inlet Pre-T 1 | Inlet Pre-T 2 | Inlet Pre-T 2 |
|---|---|---|---|---|---|
| | **Laboratory Sample ID** | 460-264375-7 | 460-264375-7-DL | 460-264375-8 | 460-264375-8-DL |
| | **Date Sampled** | 08/24/2022 | 08/24/2022 | 08/24/2022 | 08/24/2022 |
| | **Dilution** | 1 | 100 | 1 | 100 |
| | **Units** | ng/L | ng/L | ng/L | ng/L |
| **Analyte** | **NYSDOH Finished Drinking Water MCLs** | CONC Q | CONC Q | CONC Q | CONC Q |
| Perfluorobutanesulfonic acid (PFBS) | NS | NR | 1,780 | NR | 2,240 |
| Perfluoroheptanoic acid (PFHpA) | NS | 15.6 | NR | 16.6 | NR |
| Perfluorohexanesulfonic acid (PFHxS) | NS | 0.95 J | NR | 1.01 J | NR |
| Perfluorononanoic acid (PFNA) | NS | 0.6 J | NR | 0.62 J | NR |
| Perfluorooctane sulfonate (PFOS) | 10 | 5.26 | NR | 5.06 | NR |
| Perfluorooctanoic acid (PFOA) | 10 | 6.12 | NR | 5.94 | NR |

# Table 1
# Unilock Corporation
## 51 International Boulevard, Brewster, New York
Water System Sampling Results

*Per- and Polyfluoroalkyl Substances (PFAS)*

| | **AKRF Sample ID** | Fixture POST-T 1 | Fixture POST-T 1 | Fixture POST-T 2 | Fixture POST-T 2 |
|---|---|---|---|---|---|
| | **Laboratory Sample ID** | 460-264375-9 | 460-264375-9-DL | 460-264375-10 | 460-264375-10 |
| | **Date Sampled** | 08/24/2022 | 08/24/2022 | 08/24/2022 | 08/24/2022 |
| | **Dilution** | 1 | 100 | 1 | 100 |
| | **Units** | ng/L | ng/L | ng/L | ng/L |
| **Analyte** | **NYSDOH Finished Drinking Water MCLs** | CONC Q | CONC Q | CONC Q | CONC Q |
| Perfluorobutanesulfonic acid (PFBS) | NS | NR | 2,000 | NR | 2,430 |
| Perfluoroheptanoic acid (PFHpA) | NS | 16 | NR | 15.6 | NR |
| Perfluorohexanesulfonic acid (PFHxS) | NS | 0.96 J | NR | 1 J | NR |
| Perfluorononanoic acid (PFNA) | NS | 0.64 J | NR | 0.64 J | NR |
| Perfluorooctane sulfonate (PFOS) | 10 | 4.81 | NR | 5.35 | NR |
| Perfluorooctanoic acid (PFOA) | 10 | 6.43 | NR | 6.1 | NR |

# Table 1
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Water System Sampling Results

*Per- and Polyfluoroalkyl Substances (PFAS)*

| | | | | |
|---|---|---|---|---|
| | **AKRF Sample ID** | Fixture POST-T 3 | Fixture POST-T 3 | Field Blank |
| | **Laboratory Sample ID** | 460-264375-11 | 460-264375-11 | 460-264375-12 |
| | **Date Sampled** | 08/24/2022 | 08/24/2022 | 08/24/2022 |
| | **Dilution** | 1 | 100 | 1 |
| | **Units** | ng/L | ng/L | ng/L |
| **Analyte** | **NYSDOH Finished Drinking Water MCLs** | CONC Q | CONC Q | CONC Q |
| Perfluorobutanesulfonic acid (PFBS) | NS | NR | 2,500 | 1.67 U |
| Perfluoroheptanoic acid (PFHpA) | NS | 16.1 | NR | 1.67 U |
| Perfluorohexanesulfonic acid (PFHxS) | NS | 0.97 J | NR | 1.67 U |
| Perfluorononanoic acid (PFNA) | NS | 0.64 J | NR | 1.67 U |
| Perfluorooctane sulfonate (PFOS) | 10 | 5.13 | NR | 1.67 U |
| Perfluorooctanoic acid (PFOA) | 10 | 6.33 | NR | 1.67 U |

# Table 2
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Soil, Sediment, and Solid Raw Materials Sampling Results

*PFAS*

| | | **AKRF Sample ID** | S-01_20221109 | S-02_20221109 | S-02_20221109 | S-03_20221109 | S-04_20221109 |
|---|---|---|---|---|---|---|---|
| | | **Laboratory Sample ID** | 460-269342-1 | 460-269342-2 | 460-269342-2-DL | 460-269342-3 | 460-269342-4 |
| | | **Date Sampled** | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 |
| | | **Dilution** | 1 | 1 | 10 | 1 | 1 |
| | | **Units** | µg/kg | µg/kg | µg/kg | µg/kg | µg/kg |
| **Analyte** | **NYSDEC CGV** | **NYSDEC PGWGV** | CONC Q | CONC Q | CONC Q | CONC Q | CONC Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | 0.22 U | 1.04 | NR | 0.21 U | 0.21 U |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| NEtFOSAA | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| NMeFOSAA | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorobutanesulfonic acid | NS | NS | 0.4 J | NR | 50.9 | 2.03 | 0.42 U |
| Perfluorobutanoic acid | NS | NS | 0.05 J | 7.76 | NR | 0.48 | 0.031 J |
| Perfluorodecanesulfonic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.099 J |
| Perfluorodecanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorododecanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluoroheptanesulfonic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluoroheptanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.027 J | 0.21 U |
| Perfluorohexanesulfonic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorohexanoic acid | NS | NS | 0.03 J | 0.42 | NR | 0.099 J | 0.21 U |
| Perfluorononanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorooctanesulfonamide | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorooctanesulfonic acid (PFOS) | 440 | 1 | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorooctanoic acid (PFOA) | 500 | 0.8 | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluoropentanoic acid | NS | NS | 0.22 U | 0.16 J | NR | 0.15 J | 0.21 U |
| Perfluorotetradecanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluorotridecanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |
| Perfluoroundecanoic acid | NS | NS | 0.22 U | 0.22 U | NR | 0.21 U | 0.21 U |

## Table 2
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Soil, Sediment, and Solid Raw Materials Sampling Results
*PFAS*

| | | **AKRF Sample ID** | CB-01_20221109 | | CB-02_20221109 | | CB-03_20221109 | | CB-04_20221109 | | SED-01_20221109 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Laboratory Sample ID** | 460-269342-5 | | 460-269342-6 | | 460-269342-7 | | 460-269342-8 | | 460-269342-9 | |
| | | **Date Sampled** | 11/09/2022 | | 11/09/2022 | | 11/09/2022 | | 11/09/2022 | | 11/09/2022 | |
| | | **Dilution** | 1 | | 1 | | 1 | | 1 | | 1 | |
| | | **Units** | µg/kg | | µg/kg | | µg/kg | | µg/kg | | µg/kg | |
| **Analyte** | **NYSDEC CGV** | **NYSDEC PGWGV** | CONC | Q | CONC | Q | CONC | Q | CONC | Q | CONC | Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | 0.13 | J | 21.1 | | 0.36 | U | 0.25 | U | 0.48 | |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | 0.25 | U | 0.051 | J | 0.36 | U | 0.25 | U | 0.027 | J |
| NEtFOSAA | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| NMeFOSAA | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorobutanesulfonic acid | NS | NS | 0.54 | | 10.4 | | 1.51 | | 0.49 | U | 0.83 | |
| Perfluorobutanoic acid | NS | NS | 0.23 | J | 6.24 | | 0.31 | J | 0.17 | J | 0.16 | J |
| Perfluorodecanesulfonic acid | NS | NS | 0.25 | U | 0.28 | U | 0.78 | | 0.25 | U | 0.15 | J |
| Perfluorodecanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorododecanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.045 | J | 0.031 | J |
| Perfluoroheptanesulfonic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluoroheptanoic acid | NS | NS | 0.25 | U | 0.16 | J | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorohexanesulfonic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorohexanoic acid | NS | NS | 0.029 | J | 0.99 | | 0.28 | J | 0.071 | J | 0.082 | J |
| Perfluorononanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorooctanesulfonamide | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorooctanesulfonic acid (PFOS) | 440 | 1 | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluorooctanoic acid (PFOA) | 500 | 0.8 | 0.25 | U | 0.28 | U | 0.36 | U | 0.034 | J | 0.052 | J |
| Perfluoropentanoic acid | NS | NS | 0.25 | U | 0.57 | | 0.11 | J | 0.037 | J | 0.045 | J |
| Perfluorotetradecanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.039 | J | 0.27 | U |
| Perfluorotridecanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |
| Perfluoroundecanoic acid | NS | NS | 0.25 | U | 0.28 | U | 0.36 | U | 0.25 | U | 0.27 | U |

## Table 2

## Unilock Corporation

### 51 International Boulevard, Brewster, New York

Soil, Sediment, and Solid Raw Materials Sampling Results

*PFAS*

| | | **AKRF Sample ID** | SED-02_20221109 | CB-X_20221109 | RM-06_20221109 | RM-07_20221109 | RM-08_20221109 | RM-08_20221109 |
|---|---|---|---|---|---|---|---|---|
| | | **Laboratory Sample ID** | 460-269342-10 | 460-269342-13 | 460-269342-19 | 460-269342-20 | 460-269342-21 | 460-269342-21-RE |
| | | **Date Sampled** | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 |
| | | **Dilution** | 1 | 1 | 1 | 1 | 1 | 1 |
| | | **Units** | µg/kg | µg/kg | µg/kg | µg/kg | µg/kg | µg/kg |
| **Analyte** | **NYSDEC CGV** | **NYSDEC PGWGV** | CONC Q | CONC Q | CONC Q | CONC Q | CONC Q | CONC Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | 0.27 U | 1.53 | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| NEtFOSAA | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| NMeFOSAA | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorobutanesulfonic acid | NS | NS | 0.87 | 4.64 | 0.4 U | 0.4 U | 0.65 U | 0.65 U H |
| Perfluorobutanoic acid | NS | NS | 0.24 J | 2.57 | 0.044 J | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorodecanesulfonic acid | NS | NS | 0.11 J | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorodecanoic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorododecanoic acid | NS | NS | 0.046 J | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluoroheptanesulfonic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluoroheptanoic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorohexanesulfonic acid | NS | NS | 0.27 U | 0.26 U | 0.027 J | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorohexanoic acid | NS | NS | 0.068 J | 0.13 J | 0.047 J | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorononanoic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorooctanesulfonamide | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorooctanesulfonic acid (PFOS) | 440 | 1 | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorooctanoic acid (PFOA) | 500 | 0.8 | 0.041 J | 0.26 U | 0.072 J | 0.2 U | 6.43 * | 4.35 H* |
| Perfluoropentanoic acid | NS | NS | 0.041 J | 0.16 J | 0.2 U | 0.2 U | 0.33 U | 0.056 J H |
| Perfluorotetradecanoic acid | NS | NS | 0.035 J | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluorotridecanoic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |
| Perfluoroundecanoic acid | NS | NS | 0.27 U | 0.26 U | 0.2 U | 0.2 U | 0.33 U | 0.33 U H |

# Table 3
# Unilock Corporation
## 51 International Boulevard, Brewster, New York
Surface Water and Liquid Raw Materials Results

*PFAS*

| | | | **AKRF Sample ID** | SW-01_20221109 | SW-01_20221109 | SW-02_20221109 | SW-02_20221109 |
|---|---|---|---|---|---|---|---|
| | | | **Laboratory Sample ID** | 460-269342-11 | 460-269342-11-DL | 460-269342-12 | 460-269342-12-DL |
| | | | **Date Sampled** | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 |
| | | | **Dilution** | 1 | 10 | 1 | 10 |
| | | | **Units** | ng/L | ng/L | ng/L | ng/L |
| | **NYSDEC Human Health Criteria** | **NYSDEC Aquatic Life Criteria** | | | | | |
| **Analyte** | | **Chronic** | **Acute** | CONC Q | CONC Q | CONC Q | CONC Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | NS | 8.49 | NR | 9.46 | NR |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | NS | 2.49 U | NR | 2.58 U | NR |
| NEtFOSAA | NS | NS | NS | 0.46 J | NR | 0.81 J | NR |
| NMeFOSAA | NS | NS | NS | 1.66 U | NR | 1.72 U | NR |
| Perfluorobutanesulfonic acid | NS | NS | NS | NR | 1,730 | NR | 1,480 |
| Perfluorobutanoic acid | NS | NS | NS | 141 | NR | 132 | NR |
| Perfluorodecanesulfonic acid | NS | NS | NS | 0.84 J | NR | 2.46 | NR |
| Perfluorodecanoic acid | NS | NS | NS | 0.59 J | NR | 0.63 J | NR |
| Perfluorododecanoic acid | NS | NS | NS | 1.66 U | NR | 0.76 J | NR |
| Perfluoroheptanesulfonic acid | NS | NS | NS | 1.66 U | NR | 1.72 U | NR |
| Perfluoroheptanoic acid | NS | NS | NS | 14.3 | NR | 12.4 | NR |
| Perfluorohexanesulfonic acid | NS | NS | NS | 0.81 J | NR | 0.62 J | NR |
| Perfluorohexanoic acid | NS | NS | NS | 45.5 | NR | 43.5 | NR |
| Perfluorononanoic acid | NS | NS | NS | 0.89 J | NR | 0.94 J | NR |
| Perfluorooctanesulfonamide | NS | NS | NS | 1.66 U | NR | 1.72 U | NR |
| Perfluorooctanesulfonic acid (PFOS) | **2.7** | 160 | 710 | **4.89** | NR | **4.85** | NR |
| Perfluorooctanoic acid (PFOA) | 6.7 | NS | NS | 6.09 | NR | 6.43 | NR |
| Perfluoropentanoic acid | NS | NS | NS | 64 | NR | 64.7 | NR |
| Perfluorotetradecanoic acid | NS | NS | NS | 1.63 J | NR | 1.72 U | NR |
| Perfluorotridecanoic acid | NS | NS | NS | 0.65 J | NR | 1.72 U | NR |
| Perfluoroundecanoic acid | NS | NS | NS | 1.66 U | NR | 1.72 U | NR |

# Table 3
# Unilock Corporation
## 51 International Boulevard, Brewster, New York
Surface Water and Liquid Raw Materials Results

*PFAS*

| AKRF Sample ID | | | | RM-01_20221109 | RM-02_20221109 | RM-03_20221109 | RM-04_20221109 |
|---|---|---|---|---|---|---|---|
| Laboratory Sample ID | | | | 460-269342-14 | 460-269342-15 | 460-269342-16 | 460-269342-17 |
| Date Sampled | | | | 11/09/2022 | 11/09/2022 | 11/09/2022 | 11/09/2022 |
| Dilution | | | | 1 | 1 | 1 | 1 |
| Units | | | | ng/L | ng/L | ng/L | ng/L |
| | **NYSDEC Human Health Criteria** | **NYSDEC Aquatic Life Criteria** | | | | | |
| **Analyte** | | **Chronic** | **Acute** | CONC Q | CONC Q | CONC Q | CONC Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | NS | 25,000 U | 25,000 U | 25,000 U | 25,000 U |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | NS | 15,000 U | 15,000 U | 15,000 U | 15,000 U |
| NEtFOSAA | NS | NS | NS | 15,000 U | 15,000 U | 15,000 U | 15,000 U |
| NMeFOSAA | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorobutanesulfonic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorobutanoic acid | NS | NS | NS | 25,000 U | 25,000 U | 25,000 U | 25,000 U |
| Perfluorodecanesulfonic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorodecanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorododecanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluoroheptanesulfonic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluoroheptanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorohexanesulfonic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorohexanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorononanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorooctanesulfonamide | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorooctanesulfonic acid (PFOS) | **2.7** | 160 | 710 | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorooctanoic acid (PFOA) | 6.7 | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluoropentanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorotetradecanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluorotridecanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |
| Perfluoroundecanoic acid | NS | NS | NS | 10,000 U | 10,000 U | 10,000 U | 10,000 U |

## Table 3
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Surface Water and Liquid Raw Materials Results

*PFAS*

| | | | **AKRF Sample ID** | RM-05_20221109 | FB-01_20221109 | EB-01_20221109 |
|---|---|---|---|---|---|---|
| | | | **Laboratory Sample ID** | 460-269342-18 | 460-269342-22 | 460-269342-23 |
| | | | **Date Sampled** | 11/09/2022 | 11/09/2022 | 11/09/2022 |
| | | | **Dilution** | 1 | 1 | 1 |
| | | | **Units** | ng/L | ng/L | ng/L |
| | **NYSDEC Human Health Criteria** | **NYSDEC Aquatic Life Criteria** | | | | |
| **Analyte** | | **Chronic** | **Acute** | CONC Q | CONC Q | CONC Q |
| 6:2 Fluorotelomer sulfonic acid | NS | NS | NS | 25,000 U | 4.39 U | 4.37 U |
| 8:2 Fluorotelomer sulfonic acid | NS | NS | NS | 15,000 U | 2.63 U | 2.62 U |
| NEtFOSAA | NS | NS | NS | 15,000 U | 2.63 U | 2.62 U |
| NMeFOSAA | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorobutanesulfonic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorobutanoic acid | NS | NS | NS | 25,000 U | 4.39 U | 4.37 U |
| Perfluorodecanesulfonic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorodecanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorododecanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluoroheptanesulfonic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluoroheptanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorohexanesulfonic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorohexanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorononanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorooctanesulfonamide | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorooctanesulfonic acid (PFOS) | **2.7** | 160 | 710 | 10,000 U | 1.75 U | 1.75 U |
| Perfluorooctanoic acid (PFOA) | 6.7 | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluoropentanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorotetradecanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluorotridecanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |
| Perfluoroundecanoic acid | NS | NS | NS | 10,000 U | 1.75 U | 1.75 U |

# Table 4
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Wastewater Discharge Sampling Results

*PFAS*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **AKRF Sample ID** | EFF-01_20230531 | EFF-01_20230531 | EFF-02_20230531 | EFF-02_20230531 | EFF-02_20230531 |
| | | **Laboratory Sample ID** | 460-281336-1 | 460-281336-1-DL | 460-281336-2 | 460-281336-2-DL | 460-281336-2-RA |
| | | **Date Sampled** | 05/31/2023 | 05/31/2023 | 05/31/2023 | 05/31/2023 | 05/31/2023 |
| | | **Dilution** | 1 | 10 | 1 | 10 | 1 |
| | | **Units** | ng/L | ng/L | ng/L | ng/L | ng/L |
| | **NYSDEC Aquatic Life Criteria** | | | | | | |
| **Analyte** | **Chronic** | **Acute** | CONC Q | CONC Q | CONC Q | CONC Q | CONC Q |
| 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid | NS | NS | 4.8 J | 73.5 U H | 7.72 U | 77.2 U H | 7.72 U H |
| 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2) | NS | NS | 2.67 J | 73.5 U H | 7.72 U | 77.2 U H | 7.72 U H |
| 1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2) | NS | NS | 4.03 J | 73.5 U H | 7.72 U | 77.2 U H | 7.72 U H |
| 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2) | NS | NS | 59.7 | 53.2 J H | 41.8 | 37.7 J H | 35.8 H |
| 2-(N-ethylperfluoro-1-octanesulfonamido) ethanol | NS | NS | 12.3 J | 184 U H | 19.3 U | 193 U H | 19.3 U H |
| 2-(N-methylperfluoro-1-octanesulfonamido) ethanol | NS | NS | 10.3 J | 184 U H | 19.3 U | 193 U H | 19.3 U H |
| 3:3 FTCA | NS | NS | 6.86 J | 91.9 U H | 9.65 U | 96.5 U H | 9.65 U H |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NS | NS | 3.51 J * | 73.5 U H * | 7.72 U * | 77.2 U H * | 7.72 U H * |
| 5:3 FTCA | NS | NS | 98.2 | 104 J H | 264 | 278 J H | 318 H |
| 7:3 FTCA | NS | NS | 45.8 J | 460 U H | 48.2 U | 482 U H | 48.2 U H |
| 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid | NS | NS | 3.7 J | 73.5 U H | 7.72 U | 77.2 U H | 7.72 U H |
| HFPO-DA | NS | NS | 4.53 J | 73.5 U H | 7.72 U | 77.2 U H | 7.72 U H |
| NEtFOSAA | NS | NS | 0.93 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| N-ethylperfluoro-1-octanesulfonamide | NS | NS | 1.3 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| NMeFOSA | NS | NS | 1.22 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| NMeFOSAA | NS | NS | 3.68 U | 36.8 U H | 3.86 U | 38.6 U H | 3.86 U H |
| Perfluoro(4-methoxybutanoic acid) | NS | NS | 1.92 J | 36.8 U H | 3.86 U | 38.6 U H | 3.86 U H |
| Perfluoro-3,6-dioxaheptanoic acid | NS | NS | 2.76 J | 36.8 U H | 3.86 U | 38.6 U H | 3.86 U H |
| Perfluoro-3-methoxypropanoic acid | NS | NS | 2.05 J | 36.8 U H | 3.86 U | 38.6 U H | 3.86 U H |
| Perfluorobutanesulfonic acid | NS | NS | 2,010 E | 2,920 H | 1,930 E | 2,920 H | 1,920 H E |
| Perfluorobutanoic acid | NS | NS | 604 | 536 H | 301 | 49.9 J H | 309 H |
| Perfluorodecanesulfonic acid | NS | NS | 0.83 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorodecanoic acid | NS | NS | 0.95 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorododecanesulfonic acid (PFDoS) | NS | NS | 1.24 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorododecanoic acid | NS | NS | 1.22 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluoroheptanesulfonic acid | NS | NS | 0.98 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluoroheptanoic acid | NS | NS | 24.1 | 23.1 H | 21.5 | 24.3 H | 21.4 H |
| Perfluorohexanesulfonic acid | NS | NS | 2.63 | 18.4 U H | 1.15 J | 19.3 U H | 1.11 J H |
| Perfluorohexanoic acid | NS | NS | 164 | 189 H | 305 | 396 H | 379 H |
| Perfluorononanesulfonic acid | NS | NS | 0.69 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorononanoic acid | NS | NS | 2 | 18.4 U H | 0.8 J | 19.3 U H | 1.04 J H |
| Perfluorooctanesulfonamide | NS | NS | 1.06 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorooctanesulfonic acid (PFOS) | 160 | 710 | 8.28 | 8.99 J H | 5.11 | 5.9 J H | 5.12 H |
| Perfluorooctanoic acid (PFOA) | NS | NS | 10.6 | 12.8 J H | 7.81 | 8.89 J H | 7.98 H |
| Perfluoropentanesulfonic acid | NS | NS | 1.17 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluoropentanoic acid | NS | NS | 154 | 166 H | 220 | 219 H | 215 H |
| Perfluorotetradecanoic acid | NS | NS | 2.08 | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluorotridecanoic acid | NS | NS | 1.64 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| Perfluoroundecanoic acid | NS | NS | 0.87 J | 18.4 U H | 1.93 U | 19.3 U H | 1.93 U H |
| PFEESA | NS | NS | 2.52 J | 36.8 U H | 0.56 J | 38.6 U H | 0.57 J H |

# Table 4
## Unilock Corporation
### 51 International Boulevard, Brewster, New York
Wastewater Discharge Sampling Results

*PFAS*

| AKRF Sample ID | | | FB-01_20230531 | Dup-01_20230531 | Dup-01_20230531 | Dup-01_20230531 |
|---|---|---|---|---|---|---|
| Laboratory Sample ID | | | 460-281336-3 | 460-281336-4 | 460-281336-4-DL | 460-281336-4-RA |
| Date Sampled | | | 05/31/2023 | 05/31/2023 | 05/31/2023 | 05/31/2023 |
| Dilution | | | 1 | 1 | 10 | 1 |
| Units | | | ng/L | ng/L | ng/L | ng/L |
| | NYSDEC Aquatic Life Criteria | | | | | |
| Analyte | Chronic | Acute | CONC Q | CONC Q | CONC Q | CONC Q |
| 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid | NS | NS | 6.79 U | 8.09 U | 80.9 U H | 8.09 U H |
| 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2) | NS | NS | 6.79 U | 8.09 U | 80.9 U H | 8.09 U H |
| 1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2) | NS | NS | 6.79 U | 8.09 U | 80.9 U H | 8.09 U H |
| 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2) | NS | NS | 6.79 U | 42.3 | 54.1 J H | 55.8 H |
| 2-(N-ethylperfluoro-1-octanesulfonamido) ethanol | NS | NS | 17 U | 20.2 U | 202 U H | 20.2 U H |
| 2-(N-methylperfluoro-1-octanesulfonamido) ethanol | NS | NS | 17 U | 20.2 U | 202 U H | 20.2 U H |
| 3:3 FTCA | NS | NS | 8.49 U | 10.1 U | 101 U H | 1.6 J H |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NS | NS | 6.79 U * | 8.09 U * | 80.9 U H * | 8.09 U H * |
| 5:3 FTCA | NS | NS | 42.4 U | 93.2 | 505 U H | 87 H |
| 7:3 FTCA | NS | NS | 42.4 U | 50.5 U | 505 U H | 50.5 U H |
| 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid | NS | NS | 6.79 U | 8.09 U | 80.9 U H | 8.09 U H |
| HFPO-DA | NS | NS | 6.79 U | 8.09 U | 80.9 U H | 8.09 U H |
| NEtFOSAA | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| N-ethylperfluoro-1-octanesulfonamide | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| NMeFOSA | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| NMeFOSAA | NS | NS | 3.39 U | 4.04 U | 40.4 U H | 4.04 U H |
| Perfluoro(4-methoxybutanoic acid) | NS | NS | 3.39 U | 4.04 U | 40.4 U H | 4.04 U H |
| Perfluoro-3,6-dioxaheptanoic acid | NS | NS | 3.39 U | 4.04 U | 40.4 U H | 4.04 U H |
| Perfluoro-3-methoxypropanoic acid | NS | NS | 3.39 U | 4.04 U | 40.4 U H | 4.04 U H |
| Perfluorobutanesulfonic acid | NS | NS | 0.33 J | 2,050 E | 2,840 H | 2,030 H E |
| Perfluorobutanoic acid | NS | NS | 6.79 U | 508 | 203 H | 544 H |
| Perfluorodecanesulfonic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorodecanoic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorododecanesulfonic acid (PFDoS) | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorododecanoic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluoroheptanesulfonic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluoroheptanoic acid | NS | NS | 1.7 U | 23.2 | 25.2 H | 21.3 H |
| Perfluorohexanesulfonic acid | NS | NS | 1.7 U | 1.47 J | 20.2 U H | 1.47 J H |
| Perfluorohexanoic acid | NS | NS | 1.7 U | 183 | 223 H | 189 H |
| Perfluorononanesulfonic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorononanoic acid | NS | NS | 1.7 U | 1.17 J | 20.2 U H | 1.2 J H |
| Perfluorooctanesulfonamide | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorooctanesulfonic acid (PFOS) | 160 | 710 | 1.7 U | 8.03 | 8.62 J H | 7.68 H |
| Perfluorooctanoic acid (PFOA) | NS | NS | 1.7 U | 9.41 | 9.47 J H | 10.1 H |
| Perfluoropentanesulfonic acid | NS | NS | 1.7 U | 0.61 J | 20.2 U H | 2.02 U H |
| Perfluoropentanoic acid | NS | NS | 3.39 U | 155 | 163 H | 159 H |
| Perfluorotetradecanoic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluorotridecanoic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| Perfluoroundecanoic acid | NS | NS | 1.7 U | 2.02 U | 20.2 U H | 2.02 U H |
| PFEESA | NS | NS | 3.39 U | 0.59 J | 40.4 U H | 0.58 J H |

# Tables 1-4
# Unilock Corporation
## 51 International Boulevard, Brewster, New York
Notes

## DEFINITIONS

| | |
|---|---|
| **E :** | Compound concentration exceeds the upper level of the calibration range of the instrument for that specific analysis. |
| **H :** | Sample was prepped or analyzed beyond the specified holding time. |
| **J :** | The concentration given is an estimated value. |
| **NR :** | Not reported. |
| **NS :** | No standard. |
| **U :** | The analyte was not detected at the indicated concentration. |
| *** :** | LCS or LCSD is outside acceptance limits. |
| **µg/kg :** | micrograms per kilogram |
| **ng/L :** | nanograms per liter |

## STANDARDS

| | | |
|---|---|---|
| **NYSDOH Finished Drinking Water MCLs** | **:** | New York State Department of Health (NYSDOH) Finished Drinking Water Maximum Contaminated Levels (MCLs). |

**Exceedances of the NYSDOH Finished Drinking Water MCLs are highlighted in bold font.**

| | | |
|---|---|---|
| **NYSDEC Part 375 PFAS Guidance Values** | **:** | New York State Department of Environmental Conservation (NYSDEC) Sampling, Analysis and Assessment Of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued April 2023. |

**Exceedances of NYSDEC PFAS Commercial Guidance Values (CGVs) are highlighted in bold font.**
**Exceedances of NYSDEC PFAS Protection of Groundwater Guidance Values (PGWGVs) are highlighted in gray shading.**

| | | |
|---|---|---|
| ***** | **;** | Raw material samples (labelled RM) were analysed at a solid, but are not compared to NYSDEC PFAS guidance values for soil. |
| **NYSDEC Class GA AWQSGVs** | **:** | New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (1.1.1): Class GA Ambient Water Quality Standards and Guidance Values (AWQSGVs). |

**Exceedances of the NYSDEC Human Health Criteria are highlighted in bold font.**
**Exceedances of the NYSDEC Aquatic Life Criteria - Chronic are highlighted in gray shading.**
**Exceedances of the NYSDEC Aquatic Life Criteria - Acute are highlighted with an underline.**

# APPENDIX A

# QUALITY ASSURANCE PROJECT PLAN (QAPP)

# UNILOCK CORPORATION

## 51 INTERNATIONAL BOULEVARD, BREWSTER, NEW YORK

# Quality Assurance Project Plan

**NYSDEC Site #: D340037**
**AKRF Project Number: 220234**

**Prepared for:**

Unilock Corporation
51 International Boulevard
Brewster, New York 10601

**Prepared by:**

AKRF, Inc.
34 South Broadway, Suite 401
White Plains, New York 10601

**NOVEMBER 2023**

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# ATTACHMENTS

# 1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of all environmental sampling, including under the Site Characterization Work Plan (SCWP) at the property located at 51 International Boulevard, Brewster, New York (the Site). The legal definition of the Site is Village of Brewster Tax Map/Parcel No. 45-1-19. The Site is approximately 11 acres, is mainly covered with paving bricks and a concrete building foundation (for the facility manufacturing a variety of paver bricks), with some wooded and wetland areas.

Potable and production water for the facility is supplied by a single private on-Site supply well. Water supply sampling, which is routinely conducted for well permitting purposes, has detected perfluoroalkyl and polyfluoroalkyl substances (PFAS) since 2021. Based upon the detections of PFAS compounds in Unilock's private water supply, particularly perfluorobutanesulfonic acid (PFBS), the New York State Department of Environmental Conservation (NYSDEC) issued correspondence on May 6, 2022 stating that the Site may be a potential Drinking Water Contamination Site (DWCS) and requested that Unilock enter into a Consent Order (CO) to investigate and potentially remediate the PFAS compounds detected at the Site. Prior to consideration of entering into a CO, NYSDEC agreed to a scope of work for a preliminary assessment and any recommended follow up sampling to first attempt to determine whether the PFAS compounds detected at the Site are attributable to Unilock's operations. The results of the assessment and sampling identified residual PFAS compounds in on-Site soil, sediment, drinking water, discharge water, and surface water, all of which are also detected in the private well water. However, the assessment was not conclusive with respect to confirming the source(s) for the PFAS compounds present at the Site. NYSDEC identified the site as a Drinking Water Contamination Site (DWCS) with a Site No. D340037. Notwithstanding, since a full site characterization investigation would be necessary to confirm if a PFAS source was present at the Site, Unilock agreed enter into a CO to allow for the Site Characterization (SC) to be conducted under oversight of the NYSDEC.

The scope of the project includes the drilling of soil borings, and the collection of soil, sediment, surface water, bedrock aquifer groundwater samples, and the additional water system and wastewater discharge samples. The goals of the project are to further define the nature and extend of the PFAS plume and determine whether a source of PFAS contamination is present at the Site, and if present, whether the waste poses a significant threat to public health or the environment. The SC is being conducted to satisfy the requirements of the above mentioned NYSDEC CO associated with the Site. The objective of this QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) while performing the investigation activities, and adherence to the QAPP will ensure that defensible data will be obtained during all environmental work at the Site. All activities identified in the QAPP will meet and be performed in accordance with DER-10.

# 2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel, and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

## 2.1 Project Director

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management, and field program decision-making. The project director will communicate regularly with all members of the AKRF project team and the

NYSDEC to ensure a smooth flow of information between involved parties. Marc Godick will serve as the project director for the SC. Mr. Godick's resume is included in Attachment A.

## 2.2 Quality Assurance/Quality Control (QA/QC) Officer

Ms. Rebecca Kinal will serve as the QA/QC officer and will be responsible for adherence to the QAPP. The QA/QC officer will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic Site visits to assess implementation of the procedures. The QA/QC officer will also be responsible for reviewing Data Usability Summary Reports (DUSRs) for soil analytical results. Ms. Kinal's resume is included in Attachment A.

## 2.3 Project Manager

The project manager will be responsible for directing and coordinating all elements of the SC. The project manager will prepare reports and participate in meetings with the Site owner, and/or the NYSDEC. Bryan Zieroff will serve as the project manager for the SC. Mr. Zieroff's resume is included in Attachment A.

## 2.4 Project Manager Alternate

The project manager alternate will be responsible for assisting the project manager. The project manager alternate will help prepare reports and will participate in meetings with the Site owner, and/or the NYSDEC. Mr. Stephen Schmid will serve as the project manager alternate for the SC. Mr. Schmid's resume is included in Attachment A.

## 2.5 Field Team Leader, Field Technician, And Site Safety Officer

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and Health and Safety Plan (HASP), included in Appendix B of the SCWP. The field team leader will also act as the field technician and Site safety officer (SSO), and will report to the project manager or project manager alternate on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified and responsible person able to act professionally and promptly during environmental work at the Site. Mr. Steve Schmid will act as the field team leader. Mr. Schmid's resume is included in Attachment A.

## 2.6 Laboratory Quality Assurance/Quality Control (QA/QC) Officer

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. The QA/QC officer will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued, and will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be Carl Ambruster of Eurofins TestAmerica Laboratories (TestAmerica), the New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory being employed for all environmental sampling at the Site. Mr. Ambruster's resume is included in Attachment A.

## 2.7 Laboratory Data Validator

The laboratory data validator will be responsible for third party data validation and preparation of Data Usability Summary Reports (DUSRs). The third-party laboratory data validator will be Lori Beyer of L.A.B. Validation Corp. Ms. Beyer's resume is included in Attachment A.

# 3.0 STANDARD OPERATING PROCEDURES (SOPS)

The following sections describe the SOPs for the investigation activities included in the SCWP. These procedures are consistent with the Guidelines for Sampling and Analysis of PFAS, which included in this document for reference as Attachment B. During these operations, safety monitoring will be performed as described in the HASP, included as Appendix B of the SCWP.

## 3.1 Equipment

Materials considered acceptable for collecting samples where PFAS is the contaminant of concern (COC) includes stainless steel, high density polyethylene (HDPE), silicone, acetate, and polypropylene. Sampling equipment should not come in contact with aluminum foil, low-density polyethylene (LDPE), glass, polytetrafluoroethylene (PTFE or Teflon™), including sample jars with a PTFE liner under the cap. Field personnel should avoid clothing that contains PTFE, including Gore-Tex®, and any PFAS-related materials used in waterproofing, bug spray, and sunscreen.

## 3.2 Soil Borings

Nine soil borings (SB-01 to SB-09) will be completed to characterize subsurface soils and collect soil samples for laboratory analysis. Figure 4 in the SCWP depicts the soil boring locations as well as the locations of existing structures present at the site.

A hollow stem auger drill rig will be used to advance the soil borings SB-01 through SB-09. Continuous overburden soil cores will be advanced from grade to the bedrock interface using a stainless-steel split spoon sampler, at which point a core barrel will be used to advance the soil boring into bedrock. Continuous overburden soil sampling will be completed to the bedrock interface, with the understanding that minimal overburden soil will limit the amount of soil samples, if any, that can be collected at each boring location. Soil samples will then be inspected and logged by AKRF field personnel, as described in Section 4.1.

After the inspection and soil logging, for each boring, and where sufficient overburden is available, soil core samples retrieved from the surface (0''- 2''), near surface (2''- 12''), and deep (immediately above soil/bedrock interface) intervals will be placed in the specified containers for laboratory analysis. Additional samples would be collected for laboratory analysis if field observations (odor and/or staining) and photoionization detector (PID) readings indicate it is necessary.

All sampling equipment (e.g., drilling rods and casing, split spoon samplers, and probe rods) will be either dedicated or decontaminated between sampling locations as indicated in Section 3.4 of this document.

After the soil boring drilling is complete, soil borings will be filled with hydrated bentonite and patched to match existing surface conditions. Each soil boring location will be surveyed by a licensed surveyor and incorporated into the existing site map. All investigation derived waste (IDW) associated with drilling soil borings will be managed as described in Section 3.5.

## 3.3 Monitoring Well Installation and Development

Unilock personnel reported that rock blasting was completed during the initial development to prepare the Site for construction of the current building, and the entire developed area was constructed on bedrock. Installation of overburden monitoring wells is not anticipated for on-site boring locations.

After encountering bedrock, the hollow stem auger tooling will be converted for rock coring for installation of the nine bedrock wells (MW-01 to MW-09). The bedrock coring process includes advancing a 4 to 8-inch diameter steel casing at least 5 feet into competent bedrock. The bottom of the casing will be set using a slurry grout consisting of Type I Portland cement/bentonite or cement/sand mixture and left to cure for at least 24 hours. After the grout has cured, a boring will be advanced through the steel casing and continuous bedrock samples will be collected by spinning the coring barrel fitted with a custom cutting shoe into the bedrock at 5-foot intervals until the first water bearing fracture is encountered. The bedrock cores will be placed in a core box and logged for geology and fracture content. After completing the coring process, the boring for the bedrock well will be over drilled using an approximately 3.9-inch diameter roller bit to expand the boring diameter enough for well construction.

The bedrock wells will be constructed with 2-inch diameter PVC, which will include 5 to 10 feet of 0.02 slotted well screen (length depending upon observed site conditions) installed into the first water bearing zone in competent bedrock. The annular space around the well screen will be backfilled with sand filter pack extending from the bottom of the borehole to 1 to 2 feet above the screen. The annular space around the well riser will be sealed with bentonite extending 1 to 2 feet above the sand filter pack and completed to ground surface and within the exterior casing with a non-shrinking cement mixture to grade.

In the event that off-site boring locations, especially SB-8 and SB-9 near the wetland, contain a vertical zone of saturated overburden sufficient for the collection of groundwater samples, then nested (co-located) off-site overburden wells will be installed. After completing the installation of the bedrock monitoring well, a second boring located adjacent to the bedrock well will be advanced with hollow stem augers down to bedrock. The overburden well will be installed with up to 10 feet of well screen up to a depth of approximately 7 feet into the water table. Morie sand will be backfill around each well screen to a depth of 2 feet above the screen. A bentonite seal will be placed above the sand pack for each well, and the remaining borehole will be filled with bentonite grout.

The screen interval for the overburden wells, if applicable will be determined according to the following procedure:

- Measure the depth to water in the open hole using a Solinst® Water Table Meter – Model 101 or equivalent.
- Based on the lithology encountered during sampling, select either a 0.01 or 0.02-slotted well screen.
- Place PVC riser with a 10-foot length of the selected screen size approximately 7 feet into the water table.

Each installed monitoring well will be completed using locking gate boxes, either flush with grade or stick-up, and will be developed by pumping until clear, if practicable. The location and elevation of each new monitoring well will be surveyed by a licensed surveyor. Well development will be completed according to the following procedure:

- Measure the depth to water using an oil/water interface probe and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using 0.163 volumes per foot of water column (gallons) as the conversion factors for a 2-inch diameter well.
- For the first 5 minutes of well development, develop the well using either a submersible or Waterra pump and re-circulate the water back into the well to create maximum agitation. This method is intended to remove fines from the sand pack, the adjacent formation and from the well.

- After the first 5 minutes of well development, develop the well using a submersible pump and discharge the water to five-gallon buckets. Transfer water from the buckets to 55-gallon drums designated for well development water.
- During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue developing the well until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized to within 10% for pH, temperature and specific conductivity for three successive readings, or until three well volumes have been purged from the well.
- If the well is low yielding and will not sustain a constant pumping rate, the well will be developed using a surge bock to remove fines from the sand filter pack, and the well will be pumped until dry. This process will be repeated a minimum of three times or until the well pumps clear.
- Document the volume of water removed and any other observations made during well development in the field logbook or on field data sheets.
- Decontaminate any non-dedicated equipment prior to and following development at each well location as described in Section 3.4 of this QAPP. All well development water, decontamination, and purge water will be containerized in 55-gallon drums and handled as described in the section 3.5 of this QAPP.

## 3.4 Decontamination of Sampling Equipment

All sampling equipment (augers, drilling rods, split spoon samplers, hand augers, spoons, probe rods, pumps, etc.) will be either dedicated or decontaminated between sampling locations. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. The decontamination procedure will be as follows:

1. Scrub equipment with a bristle brush using a PFC-free water/Alconox® solution.
2. Rinse with PFC-free water.
3. Scrub again with a bristle brush using a PFC-free water/Alconox® solution.
4. Rinse with PFC-free water.
5. Rinse with distilled water.
6. Air-dry the equipment.

AKRF will provide documentation that the source of distilled water and the detergent (Alconox® or alternate) being used for decontamination purposes are PFAS –free prior to the start of work.

## 3.5 Management of Investigation Derived Waste (IDW)

IDW will be containerized in New York State Department of Transportation (NYSDOT)-approved 55-gallon drums during the investigation activities. The drums will be sealed at the end of each work day and labeled with the date, the boring location(s), the type of waste (i.e., drill cuttings, purge water), and the name and phone number of an AKRF point-of-contact. All IDW collected into drums will be sampled and disposed of or treated according to applicable local, state, and federal regulations.

# 4.0 SAMPLING AND LABORATORY PROCEDURES

The sampling of various media as outlined in the SCWP and this Section will include the collection of samples for laboratory analysis of emerging contaminants [1,4-dioxane and perfluorinated compounds (PFCs)]. Whenever emerging contaminants are included in the sampling scope, all samples will be collected in accordance with NYSDEC's published protocols, including the acceptable/specific sampling materials, equipment, and QA/QC requirements. A copy of NYSDEC's protocol and guidance document is included in Appendix B.

## 4.1 Soil Sampling

The PID will be calibrated in accordance with manufacturer's recommendations prior to sampling.

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the Unified Soil Classification System (USCS).
- Describing any evidence of contamination (e.g., staining, sheens, odors)
- Field screen the sample for evidence of contamination (e.g., odors, staining,) using visual and olfactory methods and screen for volatile organic compounds (VOCs) using a PID calibrated each day in accordance with the manufacturer's instructions.
- Collect an aliquot of soil from each proposed sample location, place in laboratory-supplied glassware, label the sample in accordance with Section 4.8.1.1, Table 4 of this QAPP, and place in an ice-filled cooler for shipment to the laboratory.
- Complete the proper chain of custody paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, soil classification, etc.) in field logbook and boring log data sheet, if applicable.
- Decontaminate any non-dedicated soil sampling equipment between sample locations as described in Section 3.4 of this QAPP.

## 4.2 Sediment Sampling

Sediment samples from the northwest-adjacent wetland area will be collected by use of a hand trowel, an acetate sediment sampling tube, or Wildco hand core sediment sampler depending on the depth of the water at the sampling location. For sections, the core sampler allows for quantitative and qualitative sampling to a specified sediment depth with little disturbance of the sediment water interface. The sediment will be placed in the appropriate laboratory jars. The jars will be sealed and labeled as described in Section 4.8.1.1, Table 2 of this QAPP and place in an ice-filled cooler.

## 4.3 Surface Water, Water System and Wastewater Discharge Sampling

The surface water, water system, and wastewater discharge samples will be collected with a pre-cleaned cup comprised of materials approved by NYSEC for the collection of samples containing PFAS, including stainless steel, HPDE, PVC, silicone, acetate, or polypropylene. The cup will be rinsed with the site media at the sampling location prior to collecting a sample. The sample will then be collected and poured into the provided laboratory containers.

## 4.4 Monitoring Well Sampling

For any new monitoring well, groundwater samples will be collected at least one week following well development. Low flow sampling techniques will be used, as described in U.S. EPA's

Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001, May 2002]. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Slowly remove the locking cap and immediately measure the vapor concentrations in the well with a PID calibrated to the manufacturer's specifications.
- Measure the depth to water and total well depth, and check for the presence of non-aqueous phase liquid (NAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a well where the total depth is 20 feet, screened interval is 10 to 20 feet, and depth to water is 14 feet, the mid-point of the water column within the screened interval would be 17 feet.
- Connect dedicated tubing and/or suitable pump (i.e., bladder pump) that is PFAS-free such that the intake is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a YSI multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be approximately 0.5 liters and will be no greater than 3.8 liters/minute.
- Transfer discharged water from the 5-gallon buckets to an on-site 55-gallon drum, as described in Section 3.5.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

**Table 1**
**Stabilization Criteria**

| Parameter | Stabilization Criteria |
|---|---|
| PH | +/- 0.1 pH units |
| Specific Conductance | +/- 3% mS/cm |
| ORP/Eh | +/- 10mV |
| Turbidity | <50 NTU |
| Dissolved Oxygen | +/- 0.3 mg/l |

Notes:
mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephelometric turbidity units
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.6 of this QAPP. Label the containers as described in Section 4.8.1.1, Table 4 of this QAPP and place in a chilled cooler.
- Once sampling is complete, remove the pump and tubing from the well. Dispose of the sampling materials and PPE in a designated 55-gallon drum. The purge water will be managed as described in Section 3.5 of this QAPP.
- Decontaminate the pump (where necessary), oil/water interface probe, and flow-through cell, as described in Section 3.4 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume) and observations in the project logbook and field data sheet, if applicable.

## 4.5 Sample Handling

Samples slated for laboratory analysis will be labeled and placed in laboratory-supplied containers and shipped to the laboratory via courier with appropriate chain of custody documentation in accordance with appropriate EPA protocols to Eurofins TestAmerica in Edison, New Jersey or Eurofins TestAmerica in Burlington, Vermont, NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratories. All samples will be analyzed for PFAS using EPA Method 1633, 1,4-dioxane using EPA Method 8270 with Selected Ion Monitoring (SIM), and the organic and inorganic compounds listed in NYSDEC Part 375 as detailed below and documented in Section 4.6, Table 2

Surface (0’’- 2’’), near surface (2’’- 12’’), and deep (immediately above soil/bedrock interface) interval soil samples will be collected and analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM, and the standard list of 40 PFAS compounds by Draft EPA Method 1633). The near surface (2”-12”) samples will also be analyzed for the NYSDEC Part 375 list for VOCs using EPA Method 8260, semivolatile organic compounds (SVOCs) using EPA Method 8270, polychlorinated biphenyls (PCBs) using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471.

Sediment and co-located surface water samples will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM and the standard list of 40 PFAS compounds by Draft EPA Method 1633), and the NYSDEC Part 375 list (VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471).

Groundwater samples will be analyzed for emerging contaminants (1,4-dioxane using EPA Method 8270 SIM, and the standard list of 40 PFAS compounds by Draft EPA Method 1633). Additional analysis will be conducted for groundwater samples collected from the on-Site monitoring wells, which includes the NYSDEC Part 375 list (VOCs using EPA Method 8260, SVOCs using EPA Method 8270, PCBs using EPA Method 8082, pesticides using EPA Method 8081, and metals including mercury and cyanide using Methods 6010/7470/7471).

The laboratory report will be prepared using Category B deliverables and Electronic Data Deliverables (EDDs) in the latest NYSDEC format. A standard turnaround time will be requested from the laboratory.

## 4.6 Laboratory Methods

Table 1 summarizes the laboratory methods that will be used to analyze field samples and the sample container type, preservation, and applicable holding times. Eurofins TestAmerica of Edison, New Jersey or Eurofins TestAmerica in Burlington, Vermont, NYSDOH ELAP-certified laboratories subcontracted to AKRF, will be used for all chemical analyses in accordance with the Division of Environmental Remediation (DER)-10 2.1(b) and 2.1(f) with Category B Deliverables. For aqueous and solid samples analyzed for 1,4-dioxane the laboratories will achieve a minimum reporting limits no higher than 0.35 (micrograms per liter) ug/L and 0.1 milligrams per kilogram (mg/kg), respectively. Likewise, reporting limits for PFOA and PFOS in aqueous and solid samples will be no higher than 2 nanograms per liter (ng/L) and 0.5 micrograms per kilogram (ug/kg), respectively.

**Table 2**
**Laboratory Analytical Methods for Analysis Groups**

| Matrix | Analysis | EPA Method | Bottle Type | Preservative | Hold Time |
|---|---|---|---|---|---|
| Soil and Sediment | VOCs | 8260D | EnCore samplers (3) and 2 oz. plastic jar | ≤ 6 ºC | 48 hours to extract; 14 days to analyze |
| | SVOCs | 8270E | 8 oz. Glass Jar | ≤ 6 ºC | 14 days to extract; 40 days to analyze |
| | PCBs | 8082 | 8 oz. Glass Jar | ≤ 6 ºC | 14 days to extract; 40 days to analyze |
| | Pesticides | 8081 | 8 oz. Glass Jar | ≤ 6 ºC | 14 days to extract; 40 days to analyze |
| | Metals (including mercury and cyanide) | 6010/7470/7471 | 8 oz. Glass Jar | ≤ 6 ºC | 6 months (28 days for Hg) |
| | 1,4-Dioxane | 8270D - SIM* | 8 oz. Glass Jar | ≤ 6 ºC | 7 days to extract; 40 days to analyze |
| | PFAS | Draft 1633 | 8 oz. Glass Jar | ≤ 6 ºC | 14 days to extract; 40 days to analyze |
| Surface Water, Water System, and Wastewater Discharge | 1,4-Dioxane | 8270D – SIM* | 2 x 250 mL amber bottles | ≤ 6 ºC | 7 days to extract; 40 days to analyze |
| | PFAS | Draft 1633 | 2 x 250 mL plastic HDPE bottles (no Teflon) | ≤ 6 ºC, | 14 days to extract, 28 days to analyze |

| Matrix | Analysis | EPA Method | Bottle Type | Preservative | Hold Time |
|---|---|---|---|---|---|
| Groundwater | VOCs | 8260C | 3 40 mL Glass Vials | HCl to pH < 2 and ≤ 6 ºC | 48 hours to extract;<br>14 days to analyze |
| | SVOCs | 8270D | 2,000 mL Amber Jar | ≤ 6 ºC | 7 days to extract;<br>40 days to analyze |
| | PCBs | 8082A | 2,000 mL Amber Jar | ≤ 6 ºC | 7 days to extract; 40 days to analyze |
| | Pesticides | 8081B | 2,000 mL Amber Jar | ≤ 6 ºC | 7 days to extract; 40 days to analyze |
| | Metals (including mercury and cyanide) | 6010/7470/7471 | 2,000 mL Amber Jar | $HNO_3$ to pH <2 | 6 months for metals;<br>28 days for mercury |
| | 1,4-Dioxane | 8270D – SIM* | 2 x 250 mL amber bottles | ≤ 6 ºC | 7 days to extract;<br>40 days to analyze |
| | PFAS | Draft 1633 | 2 x 250 mL plastic HDPE bottles (no Teflon) | ≤ 6 ºC, | 14 days to extract,<br>28 days to analyze |

Notes:
EPA - Environmental Protection Agency
RCRA – Resource Conservation and Recovery Act
HDPE – High Density Poly Ethylene
* - SIM analysis only required if reporting limits are achieved.

### 4.7 Quality Control (QC) Sampling

In addition to the laboratory analysis of the samples, additional analysis will be included for QC measures, as required by the Category B sampling techniques. These samples will include a field duplicate, matrix spike/matrix spike duplicate (MS/MSD), equipment blank, and trip blank samples at a frequency of one per 20 field samples collected or per sample digestion group (SDG). QC samples will be analyzed for the same parameters as the accompanying samples, with the exception of any trip blanks, which will be analyzed for the VOC list only.

## Table 3
## Field Sample and QC Sample Quantities

| Sample Type | Parameters | EPA Method | Field Samples | QC Samples | | | |
|---|---|---|---|---|---|---|---|
| | | | | **Duplicate** | **MS/MSD** | **Equipment Blank*** | **Trip Blank** |
| Soil and Sediment | VOCs | EPA 8260 | 7 | 1 | 1 | | 1 |
| | TCL SVOCs | EPA 8270 | 7 | 1 | 1 | | |
| | TAL Metals (including mercury and cyanide) | EPA 6000/7000, EPA 7470/7471 | 7 | 1 | 1 | | |
| | Pesticides | EPA 8081 | 7 | 1 | 1 | | |
| | PCBs | EPA 8082 | 7 | 1 | 1 | | |
| | 1,4-Dioxane | EPA 8270 SIM | 32 | 3 | 3 | | |
| | PFAS | EPA Draft 1633 | 32 | 3 | 3 | | |
| Surface Water, Water System, and Wastewater Discharge | 1,4-Dioxane | EPA 8270 SIM | 5 | 1 | 1 | 1* | |
| | PFAS | EPA Draft 1633 | 5 | 1 | 1 | 1* | |
| Groundwater | VOCs | EPA 8260 | 5 | 1 | 1 | | 1 |
| | SVOCs | EPA 8270 | 5 | 1 | 1 | | |
| | TAL Metals (including mercury and cyanide) | EPA 6000/7000, EPA 7470/7471 | 5 | 1 | 1 | | |
| | Pesticides | EPA 8081 | 5 | 1 | 1 | | |
| | PCBs | EPA 8082 | 5 | 1 | 1 | | |
| | 1,4-Dioxane | EPA 8270 SIM | 9 | 1 | 1 | 3* | |
| | PFAS | EPA Draft 1633 | 9 | 1 | 1 | 3* | |

Notes:
MS/MSD - matrix spike/matrix spike duplicate
* - equipment blanks for 1,4-dioxane and PFAS will be collected at a minimum frequency of one per day for surface water/groundwater. The actual number of equipment blanks will vary, depending on the duration of the sampling program.

## 4.8 Sample Handling

### 4.8.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody (COC) documents, and laboratory reports. All samples will be amended with a collection date at the end of the sample same in a year, month, day (YYYYMMDD) format. Blind duplicate sample nomenclature will consist of the sample type, followed by an “X”; MS/MSD samples nomenclature will consist of the parent sample name, followed by “MS/MSD”; and trip and field blanks will consist of “TB-” and “FB-”, respectively, followed by a sequential number of the trip/field blanks collected within the sample digestion group (SDG). Special characters, including primes/apostrophes (’), will not be used for sample nomenclature.

### 4.8.2 Site Characterization (SC) Sample Identification

Soil, groundwater, sediment, water system, waste water discharge, and surface water samples collected during the SC will be identified with "SB-" for soil borings, "MW-" for overburden groundwater monitoring wells, "BR-" for bedrock monitoring wells, "SED-" for sediment sampling locations, "WS-" for water system samples, "WW-" for waste water discharge, and "SW-" for surface water sampling locations and the corresponding sampling identification number as outlined in Section 6.1 of the SCWP. Soil samples will also be amended with the sample collection depth interval in parentheses. Table 4 provides examples of the sampling identification scheme for samples collected during the site investigation.

**Table 4**
**SC Sample Nomenclature**

| Sample Description | Sample Designation |
|---|---|
| Groundwater sample collected from groundwater monitoring well MW-01 on December 1, 2023 | MW-01 20231201 |
| Blind duplicate sample of groundwater sample collected from bedrock groundwater monitoring well MW-01 on December 1, 2023 | MW-X 20231201 |
| Second field blank collected on December 1, 2023 | TB-2 20231201 |
| Soil sample collected from soil boring SB-02 between 1 and 2 feet below grade on December 1, 2023 | SB-02_1-2_20231201 |
| Blind duplicate sample of soil sample collected from soil boring SB-02 between 1 and 2 feet below grade on December 1, 2023 | SB-X_20231201 |
| Sediment sample collected from location SED-02 on December 1, 2023 | SED-02 20231201 |

### 4.8.3 Waste Classification

Any waste classification samples will be amended with "WC-" and the alphanumeric drum identification. Table 5 provides examples of the sampling identification scheme for proposed waste classification samples and any hotspot or tank excavation samples.

**Table 5**
**Waste Classification Sample Nomenclature**

| Sample Description | Sample Designation |
|---|---|
| Waste classification sample collected from Drum 1 on December 1, 2023 | WC-D1 20231201 |

*Sample Labeling and Shipping*

All sample containers will be provided with labels containing the following information:

- Project identification, including Site name, BCP Site number, Site address
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the cooler(s) as needed.

The samples will be prepared for shipment by placing each sample in laboratory-supplied glassware, then wrapping each container in bubble wrap to prevent breakage, and adding freezer packs and/or fresh ice in sealable plastic bags. The COC form will be properly completed by the sampler in ink, and all sample shipment transactions will be documented with signatures, and the date and time of custody transfer. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the samples remain under strict COC protocol.

*Sample Custody*

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

## 4.9 Field Instrumentation

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance, and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be equipped with a 10.6 electron volt (eV) lamp and will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas in accordance with the manufacturer's standards.

## 4.10 Quality Assurance (QA)

All soil, sediment, surface water, and groundwater laboratory analytical data will be reviewed by a third-party validator and a Data Usability Summary Report (DUSR) will be prepared to document the usability and validity of the data. The Site Characterization Report (SCR) will include a detailed description of the sampling activities, sampling logs, data summary tables, concentration maps showing sample locations and concentrations, DUSR, and laboratory reports.

# ATTACHMENT A
# RESUMES OF PROJECT DIRECTOR, PROJECT MANAGER, PROJECT MANAGER ALTERNATE, AND FIELD TEAM LEADER

# MARC S. GODICK, LEP

## SENIOR VICE PRESIDENT

Marc S. Godick, a Senior Vice President of the firm, has 20 years of experience in the environmental consulting industry. Mr. Godick's broad-based environmental experience includes expertise in remedial investigation, design and implementation of remedial measures, environmental/compliance assessment, litigation support, and storage tank management.

## RELEVANT EXPERIENCE

### Queens West Development Project, AvalonBay Communities, Queens, NY

Mr. Godick managed one of the largest remediation projects completed to date under the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP). The remedy for the site, which was contaminated by coal tar and petroleum, included the installation of a hydraulic barrier (sheet pile cut off wall), excavation of contaminated soil under a temporary structure to control odors during remediation, a vapor mitigation system below the buildings, and implementation of institution controls. The investigation, remediation design, remedy implementation, and final sign-off (issuance of Certificate of Completion) were completed in two years. Total remediation costs were in excess of $13 million.

### Williamsburg Waterfront Redevelopment, RD Management/L&M Equities/Toll Brothers, Brooklyn, NY

The project is one of the largest development projects in the Greenpoint/Williamsburg Rezoning Area, which includes the construction of nearly 1 million square feet of residential and retail space along the Williamsburg waterfront. The site had a variety of industrial uses, including a railyard, junk yard, and waste transfer station. As part of the City's rezoning, the site was assigned an E-designation for hazardous materials. Mr. Godick managed the preparation of the Phase I and II environmental site assessments, remedial action plan (RAP), and construction health and safety plan (CHASP). Mr. Godick obtained NYSDEC closure of an open spill associated with former underground storage tanks at the site. The NYCDEP-approved RAP and CHASP included provisions for reuse of the existing fill material, with the excess being disposed off-site, installation of a vapor barrier below the new buildings, installation of a site cap, and environmental monitoring during the construction activities. Mr. Godick is currently managing the environmental monitoring work that began in 2006. A Notice of Satisfaction has been issued by NYCDEP for the first phase of the development.

## BACKGROUND

### Education

M.E., Engineering Science/Environmental Engineering, Pennsylvania State University, 1998

B.S., Chemical Engineering, Carnegie Mellon University, 1989

### Licenses/Certifications

Licensed Environmental Professional (License # 396) – State of Connecticut – 2003

40 Hour HAZWOPER and Annual Refresher Training, 1990-2008

Supervisors of Hazardous Waste Operations (8 Hour), 1990

### Professional Memberships

Chair, Village of Larchmont/Town of Mamaroneck Coastal Zone Management Commission, 1997 - Present

Chair, Westchester County Soil and Water Conservation District, 2005 - Present

Member, NYSDEC Risk-Based Corrective Action (RBCA) Advisory Group for Petroleum-Impacted Sites, 1997

Community Leadership Alliance, Pace University School of Law, 2001

### Years of Experience

Year started in company: 2002

Year started in industry: 1990

## Landfill Closure & Compost Facility Application, White Plains, NY

Mr. Godick is currently managing the closure of a formal ash landfill, which is currently being utilized as a leaf and yard waste compost facility by the City of White Plains. The remedial investigation included on-site and off-site assessment of soil, groundwater, and soil gas to delineate the extent of methane and solvent contamination associated with the landfill. The landfill closure plan includes provisions for enhancing the existing cap, methane venting, and groundwater treatment for solvent contamination. Mr. Godick also managed the preparation of the compost facility permit application, which required modification to the facility's operations necessary to close the landfill and address other regulatory requirements.

## Landfill Redevelopment – RD Management, Orangeburg, NY

Mr. Godick is currently managing the remediation of the former Orangeburg Pipe site under the NYSDEC Voluntary Cleanup Program. The site contains widespread fill material, which has fragments of Orangeburg pipe that is impregnated with asbestos and coal tar. The site is being redeveloped for retail use. The site's closure plan provides for reuse of all fill material on-site and methane mitigation (vapor barrier and passive sub-slab ventilation system) for all new buildings. The fill management activities will include dust and sediment control measures and air monitoring to prevent airborne dust in accordance with a closure plan, stormwater pollution prevention plan (SWPPP), and CHASP. In pervious areas, the site cap will consist of 2 feet of clean fill and a liner in larger areas.

## National Grid – Halesite Manufactured Gas Plant Site, Town of Huntington, NY

Mr. Godick managed the remedial design and engineering work associated with remediation of National Grid's former manufactured gas plant (MGP) located in the Town of Huntington. The site is situated in a sensitive location along the waterfront, surrounded by commercial and residential properties, and half the property where the remediation was conducted is a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Mr. Godick was responsible for the development of the remedial work plans, design/construction documents, landscape architecture, confirmatory sampling, air monitoring, supervision, and preparation of close-out documentation in accordance with NYSDEC requirements.

## Site Investigation–7 World Trade Center Substation, Con Edison, New York, NY

Mr. Godick managed the site investigation at the former 7 World Trade Center Substation in an effort to delineate and recover approximately 140,000 gallons of transformer and feeder oil following the collapse of the building. The project involved coordination with several crews, Con Edison, and other site personnel.

## Site Investigation–Former Manufactured Gas Plant (MGP) Facilities, Con Edison, New York, NY

Mr. Godick managed site investigations at four former MGP facilities. The investigations at three of the four sites were completed at a Con Edison substation, flush pit facility, and service center, respectively. The details associated with the fourth site are confidential. Site characterizations at the substation and flush pit facility were conducted in preparation of expansion at these locations. The findings from these characterizations were used by Con Edison to make appropriate changes to the design specifications and to plan for appropriate handling of impacted materials and health and safety protocols during future construction activities.

## Verizon, Investigation & Remediation, Various Locations, NY, PA and DE

Mr. Godick managed over 50 geologic/hydrogeologic assessments and site remediation projects related to petroleum releases at various facilities. Responsibilities included annual budgeting, day-to-day project management, development and implementation of soil and ground water investigation workplans, ground water modeling, risk evaluation, remedial action work plans, remedial design, system installation, waste disposal, well abandonment, and operation and maintenance. Many of the assessment and remedial projects followed a risk-based approach. Remedial technologies implemented included air sparging, soil vapor extraction, bioremediation, pump and treat, soil excavation, and natural attenuation.

### Storage Tank Management, Verizon, Various Locations, NY, PA, DE, and MA

Mr. Godick managed the removal and replacement of underground and aboveground storage tank systems for Verizon in New York, Pennsylvania, Delaware, and Massachusetts. Responsibilities included the management of design, preparation of specifications, contractor bidding, construction oversight, project budget, and documentation. For selected AST sites, managed the development of Spill Control, Contingency and Countermeasures (SPCC) plans.

### Brownfield Opportunity Area (BOA) Grant Program Services for the Town of Babylon, Wyandanch, NY

AKRF was retained by the Town of Babylon to prepare a blight study, market study, NYS BOA Step 2 Nomination, an Urban Renewal Plan, and a Generic Environmental Impact Statement (GEIS) as part of a revitalization and redevelopment effort for downtown Wyandanch. Mr. Godick was responsible for overseeing the environmental data collection effort for the 226 brownfields identified in the 105-acre project area, and for identifying strategic sites for which site assessment funding should be sought. He also prepared the Hazardous Materials section of the Wyandanch Downtown Revitalization Plan (which incorporates the Nomination, Urban Renewal Plan, and GEIS), involving a summary of available environmental reports, a review of regulatory records, and limited street-level site inspections.

### Alexander Street Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, Yonkers, NY

AKRF was retained by the City of Yonkers to prepare an Urban Renewal Plan, Master Plan, Brownfield Opportunity Area Plan, and a Generic Environmental Impact Statement (GEIS) for a 153 acre industrial area along Alexander Street on the Yonkers Waterfront. Mr. Godick was responsible for the Hazardous Materials sections of the GEIS and Urban Renewal Plan. Mr. Godick managed the environmental data collection effort for the entire study area which involved review and summary of existing environmental reports, a review of regulatory records, and field inspections. The collected information was used to prioritize individual parcels for funding and remediation. The Master Plan for the area called for the development of a mixed-use neighborhood consisting of residential, neighborhood retail, and office space uses with substantial public open space, access to the Hudson River, and marina facilities.

## SEMINARS, LECTURES & PUBLICATIONS

"Let Nature Do the Work – Onsite Stormwater Management," Westchester County Department of Parks, Recreation and Conservation, Fall 2003

"Water Pollution Control and Site Assessments and Audits," Environmental Health and Safety Issues Course, Building Owners and Managers Institute (BOMI), 1997-1999

"Hydrogeologic and Geological Aspects of Tank Closures and Remedial Action," Underground Storage Tanks Course, Government Institutes, Summer 1996, Fall 1997

# REBECCA KINAL, P.E.

## VICE PRESIDENT

Rebecca Kinal has over 20 years of experience in the assessment and remediation of soil and groundwater contamination and other hazardous/non-hazardous waste problems. Ms. Kinal's experience includes environmental due diligence, soil and groundwater investigations, leaking underground storage tank studies, soil gas/vapor intrusion surveys, and oversight of small- and large-scale remediation programs, including design of groundwater remediation systems and vapor mitigation systems. She has directed numerous Phase I and Phase II investigations and remediation programs, many of them in conjunction with commercial/residential developers, law firms, lending institutions, and public agencies. She is experienced in the cleanup of contaminated properties under New York State Brownfield Cleanup Program (BCP) regulations and the New York City "E-designation" program. As a part of this work, her duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

## BACKGROUND

### Education

M.S., Hydrogeology, Rensselaer Polytechnic Institute, 1995

B.S., Civil Engineering, Lafayette College, 1992

### Licenses/Certifications

State of New York, P.E. Registration No. 082046, 2004

### Years of Experience

Year started in company: 2000

Year started in industry: 1996

## RELEVANT EXPERIENCE

### New York City School Construction Authority On-Call Contract for Environmental Consulting Services, Various Sites, NY

Ms. Kinal serves as the project manager for AKRF's on-call hazardous materials consulting contract with the New York City School Construction Authority for over 8 years. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments, (ESAs) and subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plan, contract specifications, and design drawings. The work has also included conducting indoor air quality testing, vapor intrusion assessments, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours.

### USTA National Tennis Center, Queens, NY

AKRF prepared an EIS for the New York City Departments of City Planning (DCP) and Environmental Protection (DEP) as co-lead agencies to analyze the expansion of the National Tennis Center, which includes multiple improvements and construction projects at the USTA campus over several years. As part of the EIS requirements, AKRF prepared a Remedial Action Plan for implementation during the proposed project's construction. In accordance with the RAP, vapor mitigation systems were incorporated into the design for several of the proposed structures at the facility, including two new stadiums, a new transportation center, and several practice court facilities. Ms. Kinal prepared the specifications and design drawings for the vapor mitigation and is providing on-going construction support to review contractor submittals and inspect the vapor barrier and sub-slab depressurization system installations.

**Montefiore Medical Center, Various Locations, NY**

Ms. Kinal provides due diligence assistance to Montefiore Medical Center (MMC) for the ongoing expansion of their facilities, primarily in the Bronx and Westchester County. She conducts and manages environmental due diligence tasks related to their property transactions, including Phase I Environmental Site Assessments (ESAs), Phase II investigations, and geophysical surveys. She also assists MMC in making decisions with respect to environmental risk issues.

**Queens West Development Project, Long Island City, NY**

For over 20 years, AKRF has played a key role in advancing the Queens West development, which promises to transform an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an Environmental Impact Statement that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of the project, AKRF also undertook the largest remediation ventures completed to date under the NYSDEC Brownfields Cleanup Program (BCP). Ms. Kinal helped prepare the Remedial Work Plan (RWP) and oversaw the remediation of Parcel 9, a 1.8-acre former industrial site. Remediation includes installation of a sheet pile containment wall, excavation of coal tar- and petroleum-contaminated soil under a temporary structure to control odors during remediation, vapor mitigation for the future buildings, and institutional controls. Upon completion of the remediation activities, Ms. Kinal managed the preparation of a Final Engineering Report (FER) to document the clean-up activities. The NYSDEC issued a Certificate of Completion (COC) for the Parcel 9 site in December 2006. Ms. Kinal continues to oversee post-remediation monitoring and site management activities to ensure that the remedy remains in-place and effective.

**Roosevelt Union Free School District, Roosevelt, NY**

Ms. Kinal is managing environmental investigation and remediation activities for the sites of three new elementary schools and a new middle school in Roosevelt, New York. Remediation activities include removal/closure of contaminated dry wells and underground petroleum storage tanks, and excavation and off-site disposal of petroleum- and pesticide-contaminated soil.

**Proposed NYC Public School Campus, Bronx, NY**

Ms. Kinal provided environmental consulting services to the selected environmental remediation contractor for this former manufactured gas plant in the Mott Haven neighborhood of the Bronx, which was remediated under the NYSDEC BCP. These services included: preparation of an in situ sampling plan and excavation plan for waste characterization and disposal; supervision of waste characterization sampling activities; development and implementation of a community air monitoring program during all remediation activities; and daily reporting to the NYC School Construction Authority.

**National Grid – Halesite Manufactured Gas Plant Site, Town of Huntington, NY**

Ms. Kinal served as the project manager for the remedial design and engineering work associated with remediation of National Grid's former manufactured gas plant (MGP) located in the Town of Huntington. The site is situated in a sensitive location along the waterfront, surround by commercial and residential properties, and half the property where the remediation was conducted is a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Ms. Kinal developed the remedial work plans, design/construction documents, and managed environmental oversight of the remedial work, including waste characterization and tracking, confirmatory endpoint sampling, air monitoring, and reporting to the NYSDEC. After the remediation work was completed, Ms. Kinal prepared appropriate close-out documentation in accordance with NYSDEC requirements.

**Shell Service Station, Millwood, NY**

Ms. Kinal planned and oversaw a Phase I Environmental Site Assessment and Phase II Subsurface Investigation of this active gasoline station in northern Westchester County. The Phase I/Phase II investigations were performed for the potential buyer of the property who wished to redevelop it with a more modern service station and convenience store. Ms. Kinal also prepared a conceptual remediation plan to address several areas of petroleum contamination identified during the Phase II. The plan, which was approved by NYSDEC, will be implemented in conjunction with the site redevelopment activities to achieve closure for several spills reported at the site.

**Pelham Plaza Shopping Center Site Investigation & Remediation, Pelham Manor, NY**

Ms. Kinal managed a Site Investigation at Pelham Plaza, an approximately ten-acre site that formerly contained a manufactured gas plant. The site was investigated under a voluntary clean-up agreement entered into with the NYSDEC by the site owner. The site investigation included advancing over 100 soil borings with continuous soil sampling to bedrock, installing monitoring and recovery wells, and conducting test pitting both indoor and outdoor locations to collect soil and groundwater samples and determine the extent of Non-Aqueous Phase Liquid (NAPL). The investigation also included: soil gas sampling to determine contaminant concentrations in the vapors beneath the foundation of an on-site retail store; sediment sampling in an adjacent creek to identify off-site impacts; and a tidal survey to determine tidal influence on groundwater levels at the site. Ms. Kinal also oversaw on-going interim remedial measures, which include biweekly pumping of recovery wells to remove dense NAPL (DNAPL) from the site subsurface.

**Shaws Supermarket Redevelopment Project, New Fairfield, CT**

Ms. Kinal managed the Remedial Investigation (RI) for an approximately nine-acre shopping center site that was contaminated by releases from former dry cleaning operations. The site was being redeveloped with a new supermarket and separate retail stores. The investigation included the installation of monitoring wells in the intermediate overburden aquifer and bedrock aquifer, sampling of existing and newly installed wells, geophysical logging in bedrock wells, and pump testing in intermediate and bedrock wells. Ms. Kinal prepared a Remedial Action Work Plan (RAWP) based on results from the RI, which included a groundwater pump and treat system to contain a plume of perchlorethylene (PCE)-contaminated groundwater, and excavation and disposal of contaminated soil in the presumed source area. Following CTDEP approval of the RAWP, Ms. Kinal prepared bid specifications for soil excavation and remediation system installation, and oversaw their implementation. Ms. Kinal also prepared NPDES permit applications for discharges from construction dewatering and the groundwater remediation system, and conducted associated discharge monitoring.

**Yankee Stadium, Bronx, NY**

Ms. Kinal performed the hazardous materials analysis for the Draft Environmental Impact Statement for the proposed new Yankee Stadium. The analysis included a Phase I Environmental Site Assessment of the entire project area and Subsurface (Phase II) Investigation in areas where environmental conditions were identified. The Phase II investigation included geophysical surveys to search for potential underground storage tanks; and soil, soil gas, and groundwater sampling at over 40 locations to determine potential environmental impacts during and after the proposed construction.

**Avalon on the Sound, New Rochelle, NY**

Ms. Kinal oversaw environmental investigation and soil remediation during the construction of two luxury high-rise apartment buildings and an associated parking garage. Investigation activities included an electromagnetic survey to search for possible underground storage tanks, and subsurface sampling to characterize soil and groundwater. Remediation activities included removing underground storage tanks, excavating and disposing of soil contaminated with volatile and semi-volatile organic compounds, and collecting end-of-excavation confirmation samples.

**Davids Island Environmental Audit, New Rochelle, NY**

Ms. Kinal managed the hazardous materials portion of the audit of this undeveloped island site, including a Phase I Environmental Site Assessment (ESA) and Subsurface (Phase II) Investigation in areas where environmental conditions were identified. The Phase II investigation included collecting soil samples from more than 100 locations and analyzing them for targeted compounds, including volatile organic compounds, semi-volatile compounds, metals, pesticides, and polychlorinated biphenyls (PCBs). Ms. Kinal also oversaw an electromagnetic (EM) survey conducted to identify the location of suspected underground storage tanks on the island. Based on soil sample results, Ms. Kinal estimated the volume of contaminated soil requiring remediation and prepared cost estimates for soil excavation and for transportation and disposal of contaminated soil and hazardous materials.

**Outlet City Site Investigation, Queens, NY**

Ms. Kinal prepared a work plan for remedial investigation of the Outlet City site, a property in Long Island City that was formerly occupied by a manufacturer of industrial cleaners and pharmaceuticals. The site is being investigated and remediated under the NYSDEC voluntary clean-up program. In preparing the work plan, Ms. Kinal evaluated results from several previous investigations and conducted a limited groundwater sampling program to determine future data needs for designing remediation of creosote-contaminated soil and groundwater. The work plan included additional soil and groundwater sampling, a tidal survey to determine tidal influence on groundwater levels, and pilot free product recovery testing. Ms. Kinal also helped design a venting system for an on-site basement and performed exposure calculations for the vented vapors.

**Yonkers Waterfront Redevelopment Project, Yonkers, NY**

For this redevelopment along Yonkers' Hudson River waterfront, Ms. Kinal supervised the remediation of Parcels H and I that were contaminated with hazardous soil. During the remediation process, she reviewed the subcontractor health and safety plans, delineated the areas of excavation, and oversaw field activities to ensure compliance with the specifications and appropriate regulations. This property was remediated under the NYSDEC Environmental Restoration Program (ERP).

**U.S. Post Office Main Vehicle Maintenance Facility, Washington, D.C.**

While with another firm, Ms. Kinal designed and supervised the installation of a remediation system to treat petroleum-contaminated groundwater. Ms. Kinal also established O&M and monitoring protocols to ensure efficient operation of the air sparging/soil vapor extraction system, and to monitor contaminant recovery/degradation rates.

**Aberdeen Proving Ground Building 4025 Site, Aberdeen, MD**

While with another firm, Ms. Kinal provided services for this leaking underground storage tank site, Ms. Kinal planned and oversaw investigation and pilot testing activities to delineate contamination and determine feasible in-situ remediation options. Investigation activities included soil and groundwater sampling using a direct-push (Geoprobe) rig and mobile laboratory. Pilot testing included in-situ respirometry testing, and field testing of bioremediation and free-product recovery technologies.

# BRYAN ZIEROFF, LEP

## SENIOR HYDROGEOLOGIST

Bryan Zieroff has 15 years of experience in the environmental consulting industry. Mr. Zieroff's experience includes the conceptual design, implementation and reporting of detailed field investigations including assessments of ground-water supplies for residential, municipal and industrial users, and evaluation, monitoring and remediation of soil and ground-water contamination for sites regulated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), Connecticut's Remediation Standard Regulations, and by the New York State Department of Environmental Conservation's (New York State Department of Environmental Conservation's (NYSDEC)) cleanup programs. These studies include investigations at sites impacted by petroleum products, chlorinated solvents, metals and landfill leachate. Mr. Zieroff's tasks often include characterization of the extent of contamination in soil, ground water, and soil vapor, evaluation of compliance with the established regulatory criteria, and operation and maintenance of remediation systems. Mr. Zieroff's familiarity with various field investigation techniques enhances his management skills.

## BACKGROUND

### Education

B.S., Geological Sciences, The Ohio State University, 1994

### Licenses/Certifications

Certified Professional Geologist-American Institute of Professional Geologists, License # CPG-11197

40 Hour HAZWOPER and Annual Refresher Training

Supervisors of Hazardous Waste Operations (8 Hour)

### Professional Memberships

American Institute of Professional Geologists

Association of Ground-Water Scientists and Engineers (National Ground Water Association)

Environmental Professionals' Organization of Connecticut (EPOC)

### Years of Experience

Year started in company: 2006

Year started in industry: 1995

## RELEVANT EXPERIENCE

### Gedney Way Leaf and Yard Waste Composting Facility, White Plains, NY

Mr. Zieroff is Project Manager for a remediation and landfill closure project at an existing composting facility. The project included documenting the entire disposal history and completing a site-wide investigation to confirm the extent of a solvent release and to provide data necessary to complete landfill closure. The investigation was required to satisfy the requirements in the NYSDEC DER-10 and 6NYCRR Part 360. After receiving state approval of the Site Investigation Report, the project has moved into the remediation and landfill closure design phase. The remedial design includes the testing and implementation of a chemical oxidation injection program, and landfill closure includes design, state approval, and construction of a landfill cap.

### New City Plaza, New City, NY

Mr. Zieroff is Project Manager for an investigation and remediation project at a former dry cleaning facility. Investigation and remediation at the site currently are being conducted under review of the NYSDEC Brownfield Cleanup Program. Tasks have included preparation and state approval of a Site Investigation Work Plan, Site Quality Assurance Project Plan, Health and Safety Plan, a Community Participation Plan, and completion of the investigation phase of the Brownfield's program. Interim Remedial activities include contamination source removal from soil and installation of a sub-slab depressurization system to address soil vapor. A feasibility study is currently being completed to determine the optimal remedial approach for site-wide remediation.

## Orangeburg Pipe Site, Orangeburg, NY

Mr. Zieroff completed a subsurface investigation to determine the extent of soil and groundwater contamination at the former Orangeburg Pipe facility. The investigation results were used to develop a Remedial Action Plan to address solid waste, petroleum contamination, worker safety during site development, and capping requirements to satisfy the NYSDEC Voluntary Remediation Program. The Remedial Action Plan included a Heath and Safety Plan, Community Air Monitoring Plan, and specifications for soil management, a vapor mitigation system and dewatering procedures during the construction of multiple commercial buildings.

## Magna Metals Facility, Cortlandt, NY

Mr. Zieroff managed a soil-gas investigation project at an existing commercial warehouse and office building. The project included installation of permanent soil gas sampling points and completion of a sampling program that met the requirements of the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Site activities included a pre-sampling investigation with the NYSDOH to document materials storage, air flow specifications, historical uses, site uses and areas of concern for sub-slab and ambient air sampling. The investigation work was being conducted to satisfy the NYSDEC consent order.

## Paragon Paint Company Facility, Long Island City, NY

Mr. Zieroff was Project Manager for an investigation and remediation project at a former paint manufacturing facility. The project has included a multiple subsurface investigations to determine the extent of solvent and petroleum contamination at the site. All phases of remediation at the site are being completed under review of the NYSDEC Brownfield Cleanup Program. Tasks include completion and state approval of a Site Investigation Work Plan, Quality Assurance Project Plan, Health and Safety Plan, Community Participation Plan, Remedial Action Plan, and Final Remediation Report.

## Pathmark Stores Site, Bronx, NY

Mr. Zieroff completed a Remedial Action Plan, Construction Health and Safety Plan and a Soil Management Plan for a former materials storage facility associated with Manhattan College. The plans were completed to provide worker safety and soil handling guidelines during the construction of a large retail facility and parking garage. Development activities at the site were conducted under oversight of the New York City Department of Environmental Protection (NYCDEP). A Notice of Satisfaction was received after project completion.

## Yale and Towne Site, Stamford, CT

Mr. Zieroff provided oversight services for a remediation project at a former industrial site. The site included over 35 buildings and 87 areas of environmental concern that required investigation and remediation. Tasks included providing technical support in understanding the Connecticut regulatory requirements, investigation and remediation costs, and confirmation of appropriate schedules to address the environmental issues during redevelopment of the project site.

## Aluminum Company of America (ALCOA) Facility, Guilford, CT

Mr. Zieroff managed a ground-water remediation project at an existing aluminum manufacturing facility. The project included soil, vapor and ground-water sampling to confirm the extent of a solvent release, determination of ground water and aquifer characteristics, operation and maintenance of a ground-water pump-and-treat system and compliance sampling in association with a Connecticut Department of Environmental Protections (CTDEP) consent order.

### Coats North America Facility, Watertown, CT

Mr. Zieroff was the Project Manager for site compliance work at an existing synthetic treads facility. The project included an evaluation of activities, chemical uses and waste handling practices to determine areas of environmental concern. Investigations to determine the status of these areas included installation of monitoring wells, soil and ground-water sampling, soil-vapor sampling, liquid storage tank removal and Resource Conservation and Recovery Act (RCRA) closure of waste storage areas. The project activities were completed in compliance with the CTDEP property transfer program.

### United Parcel Service, Storm Water Management, 9 Connecticut Facilities

Mr. Zieroff managed the design and implementation of a storm water pollution prevention project at nine United Parcel Service facilities. The project included analysis of drainage areas, determination of sheet flow characteristics and the collection of storm-water discharge samples and SMR reporting in accordance with the CTDEP General Permit for the Discharge of Storm Water.

### Meriden Enterprise Center, Meriden, CT

Mr. Zieroff developed and directed a subsurface investigation to determine the nature and extent of contamination related to releases from multiple underground storage tank farms, silverware plating, machining and furniture stripping operations. Project activities included ground-penetrating radar, drilling of test borings, installation of monitoring wells, developing a conceptual site model for the established releases and preparing a report detailing remedial alternatives for the property and owner requirements under the CTDEP Property Transfer Act.

### Development properties in Kent, Ridgefield, and Greenwich, CT and Mahopac and Brewster, NY

Mr. Zieroff directed an evaluation and testing program of bedrock water-supply wells to determine long-term yield, impact on local users, and water quality results. The project included compilation of data, construction of hydrographs, determination of aquifer characteristics and reporting.

### Bettsville Quarry, Bettsville, OH

Mr. Zieroff directed a pumping test of dewatering wells to determine yield requirements for dewatering a carbonate rock quarry. The dewatering program included a determination of offsite impacts to local ground-water users. Mr. Zieroff developed an offsite monitoring program to document and protect local users during the quarry dewatering process.

### Burning Tree Country Club, Greenwich, CT

Mr. Zieroff directed an in-situ percolation test to determine recharge rates for a proposed upgrade to the facility septic system. The project included compilation of slug test data and software analysis to determine K values.

# MARK JEPSEN

## ENVIRONMENTAL SCIENTIST

Mark Jepsen is an Environmental Scientist in AKRF's Hazardous Materials group. He has a great deal of experience in both environmental science and natural resources, including environmental remediation and consulting, groundwater quality and soil science, hydrology, and geology.

Since Joining AKRF at the beginning of 2014, Mr. Jepsen has overseen a wide variety of environmental investigations. He has performed oversight at large scale construction sites entailing complex remediation techniques. He has performed various Phase I site visits and reports. Additionally, Mr. Jepsen has followed up these Phase I investigations with performing Phase II remedial investigations including soil, groundwater, and soil vapor sampling. Also, Mr. Jepsen has a great deal of experience creating environmental reports discussing results found during the preliminary and supplemental investigations, Remedial Action Work Plans (RAWPs), Construction Health and Safety Plans (CHASP), Remedial Closure Reports, Environmental Bid Specifications and Design Coordination. Mr. Jepsen has a knowledgeable background in environmental issues and challenges pertaining to the New York metropolitan area and technical guidelines. Mr. Jepsen has a great deal of experience working on projects involved with multiple governmental regulators including NYSDEC, NJDEP, NYCDEP, and NYCOER.

Before joining AKRF, Mr. Jepsen worked for Bluestone Environmental Services in Somerset, New Jersey. He was responsible for performing a wide array of field work activities including groundwater sampling, monitoring well gauging, soil sampling, and more for Bluestone's various clients including: ExxonMobil, International-Matex Tank Terminals (IMTT) and various gas stations. He was responsible for maintaining an understanding of large and active remediation sites and dealing with an extensive groundwater monitoring well network, as well as acting as an on-site safety supervisor for all Bluestone employees and subcontractors.

## BACKGROUND

### Education
B.S., Environmental Science, The Ohio State University, 2012

### New Jersey Regulatory Seminars
Combined Sewer Outfalls (CSO) for LSRPs: Remediation Alternatives to Better Manage Storm Water

### Certifications
40 Hour OSHA HAZWOPER – annual refresher every year
10 Hour OSHA Construction Training
Gold Certified Brownfield Professional by New York City Office of Environmental Remediation
Transportation Worker Identification Credential (TWIC)
NYSDEC Erosion and Sediment Control Inspector
Boating license

### Years of Experience
Date started at AKRF: March 2014
Prior industry experience: Bluestone Environmental Services (NJ) – January 2013 to March 2014

## RELEVANT AKRF EXPERIENCE

**432 East 14th Street, Environmental Management Specifications, Design Coordination and Pre-Characterization of Soil for Off-site Disposal, New York, NY**

Mr. Jepsen supported AKRF's preparation of Environmental Management Specifications and Design Coordination, and collection and laboratory analysis of soil samples to pre-characterize soil beneath the Site for off-site disposal. Mr. Jepsen also performed the Phase II remedial investigation of this site which included soil, groundwater, and soil vapor sampling. Mr. Jepsen was also responsible for construction oversight during the foundation excavation for the proposed building. Following completion of excavation, Mr. Jepsen was responsible for inspecting the vapor barrier system installed as an engineering control for the proposed building. He has also been involved with creating the Remedial Closure Report.

**77 Commercial Street, Environmental Services, Greenpoint, NY**

Mr. Jepsen supported AKRF's environmental services, including Preparation of a Remedial Investigation (Phase II) Work Plan; Remedial Investigation (RI) and Report; Preparation of a Remedial Action Work Plan (RAWP) and Construction Health and Safety Plan (CHASP); Pre-Characterization of Soil for Off-site Disposal; Environmental Monitoring; Remedial Closure Report; and Environmental Bid Specifications and Design Coordination.

**Bronx Pro 2264-2272 Morris Avenue, Environmental Consulting Services, Bronx, NY**

Mr. Jepsen is supporting AKRF's environmental consulting services for this site including, Phase I Environmental Site Assessment (ESA) and update, Phase II remedial site investigations and subsurface sampling, ongoing construction oversight and vapor barrier inspections.

**Memorial Sloan Kettering Cancer Center Hospital 74th Street, Environmental Services, New York, NY**

Mr. Jepsen supported AKRF's environmental services, including construction oversight and air monitoring, groundwater sampling, and monitoring well decommissioning. Also, Mr. Jepsen has overseen large scale UST closure and removal at this site. Mr. Jepsen was responsible for the on-site implementation of AKRF's Remedial Action Work Plan (RAWP) and Construction Health and Safety Plan (CHASP). He has also been involved with creating the Remedial Closure Report.

**School Construction Authority, New York, NY**

Under an on-call contract, AKRF provides the New York City School Construction Authority (NYCSCA) with hazardous materials consulting services. Mr. Jepsen is involved with various due diligence and environmental assessment projects including Phase I Environmental Site Assessments (ESAs); Phase II (Subsurface) Environmental Site Investigations (soil, groundwater and soil vapor intrusion investigations); Indoor Air Quality (IAQ) Assessments; Underground Storage Tank (UST) and Aboveground Storage Tank (AST) inspections relating to boiler conversions; and peer review of other consultant's due diligence reports.

**Indoor Air Quality Monitoring, New York, NY**

Mr. Jepsen has performed a variety of indoor air quality investigations and surveys at sites including educational institutions and various residential buildings. Mr. Jepsen performed interviews pertaining to environmental site conditions and background with property owners and operators.

**11 Greene Street, Environmental Consulting Services, New York, NY**

Investigation and remediation of the Site is being conducted to satisfy NYC Office of Environmental Remediation (NYCOER) requirements under the Voluntary Clean-Up Program (VCP) and CEQR. Mr. Jepsen is supporting AKRF's environmental consulting services for this site including Waste Classification testing and delineation, preparation of a Remedial Investigation (Phase II) Work Plan; Remedial Investigation (RI) and Report; Preparation of a NYCDEP Dewatering Application and Permit; Preparation of a Remedial Action Work Plan (RAWP) and Construction Health and Safety Plan (CHASP); Pre-Characterization of Soil for Off-site Disposal; Environmental Monitoring; and Environmental Bid Specifications and Design Coordination.

**3200 Jerome Avenue, Environmental Consulting Services, Bronx, New York**

AKRF conducted a Phase I ESA and an Indoor Air Quality Survey of this property in the Bronx during due diligence investigations for the NYCSCA which identified levels of trichloroethene (TCE) in indoor air that exceeded the New York State Department of Health (NYSDOH) standards. NYCSCA subsequently terminated its lease of the site and discontinued its use as a school. Following the termination of NYCSCA's lease of the site, AKRF was retained by the owner to conduct an investigation and cleanup. Mr. Jepsen helped to conduct groundwater sampling requirements set by the NYSDEC as part of the Brownfield Cleanup Agreement for the project site. Mr. Jepsen is supporting the ongoing operations and maintenance of an active sub-slab depressurization system installed beneath the building. Mr. Jepsen has also overseen in-situ chemical oxidation (ISCO) groundwater treatment injection activities performed on-site.

**98-100 Franklin Street, Manhattan, NY**

AKRF completed a Phase I Environmental Site Assessment (ESA), Phase II ESI, prepared a Remedial Action Work Plan, a NYCDEP Dewatering Application and Permit, and performed soil waste classification sampling (which required the preparation of a NYC Transit Subsurface Investigation Permit to perform the associated soil borings) for the proposed redevelopment for a 29,564-square foot, eight-story mixed-use building with a cellar. As the assistant project manager, Mr. Jepsen coordinated with the client and contactors and performed oversight of on-site remediation activities.

**NYSDOT/NYSTA Tappan Zee Hudson River Crossing, Rockland and Westchester Counties, NY**

AKRF completed an EIS for this project on a fast-track schedule. Findings of the study were utilized to develop numerous documents prepared to guide the construction team, including a Remedial Action Plan and a Construction Health and Safety Plan for the five-year bridge replacement project. As part of the findings of the study, additional mitigation was required to ensure safety of endangered species inhabiting the Hudson River. Mr. Jepsen has been responsible for captaining and assisting in vessel-based monitoring of endangered species within and surrounding the marine construction zone of the new Tappan Zee Bridge located in Tarrytown and Nyack, NY on the Hudson River.

## Previous Experience

**International-Matex Tank Terminals (IMTT) and ExxonMobil, Environmental Consulting Services, Bayonne, NJ**

Mr. Jepsen was responsible for conducting operations and maintenance of an extensive groundwater monitoring well network at an active storage tank terminal located in Bayonne, NJ. Mr. Jepsen also conducted site investigation field activities; including soil, groundwater sampling, and monitoring well installation. Mr. Jepsen aided with the operation and maintenance of active remedial systems, including oil recovery skimming systems and water treatment and discharge systems. Mr. Jepsen was responsible for maintaining client relationships and acting as an on-site safety supervisor for all Bluestone employees and subcontractors. Mr. Jepsen assisted with relevant compliance reporting requirements, remedial work plans, and general work permitting

**Various Gas Stations, Environmental Consulting Services, Various Locations, NJ**

Mr. Jepsen conducted site investigation field activities, including groundwater sampling and monitoring well installation at various gas stations with open petroleum spills reported the NJDEP. Mr. Jepsen acted as an on-site safety supervisor for all Bluestone employees and subcontractors. Mr. Jepsen assisted with relevant compliance reporting requirements.

# STEPHEN SCHMID

## ENVIRONMENTAL SCIENTIST

Stephen Schmid is an Environmental Scientist in AKRF's Hazardous Materials Department with two years of experience. He has experience in Phase I and II site assessments and construction/remediation oversight which have included water, soil and air sampling. Mr. Schmid is a 2011 graduate from the University of New Hampshire, where he studied marine and freshwater biology, and environmental conservation. Prior to joining AKRF Mr. Schmid conducted fieldwork, water sampling and analysis in addition to assisting in a study of lakes in the North Eastern United States.

## BACKGROUND

### Education

BS Marine & Freshwater Biology, University of New Hampshire, Durham, NH

Minor: Environmental Conservation Studies, University of New Hampshire, Durham, NH

### Licenses/Certifications

40 Hour OSHA HAZWOPER

Asbestos Project Monitor, Air Technician and Inspector

### Years of Experience

Year started in company: 2012

Year started in industry: 2011

## RELEVANT EXPERIENCE

### New York City School Construction Authority (SCA), Environmental Consulting Hazardous Materials Services

AKRF has undertaken various assignments under two consecutive hazardous materials on-call contract, including environmental assessment, remedial design, and plumbing disinfection consulting tasks. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments (ESAs) and multi-media subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plans, design of sub-slab depressurization systems (SSDS) and contract specifications, and construction oversight. The work has also included conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours. Mr. Schmid has provided oversight during plumbing disinfections, storage tank removals and spill remediation.

**25 Broad Street, Manhattan, NY**

AKRF has been contracted by LCOR during the demolition of a residential building on a property which will eventually be redeveloped. AKRF has been responsible for creating and implementing a community air monitoring program during demolition activities. Mr. Schmid has been the on-site monitor responsible for calibrating equipment and monitoring levels of volatile organic compounds and particulate matter for the surrounding area and construction personnel. Reports of the daily activity including data collected throughout the day were prepared for submittal to the client.

**164 Kent Avenue, Brooklyn, NY (AKA Northside Piers and 1 North 4th Place)**

The project was a multi-phase development consisting of a large waterfront block in the Williamsburg Rezoning Area. The project site has been developed with a mixed-use residential-commercial high rise towers with an esplanade and a pier along the East River. AKRF provided acquisition and development support, including performing Phase I and II environmental site assessments, and preparation of Remedial Action Plans (RAPs) and Construction Health and Safety Plan (CHASPs) for approval by DEP and OER. Mr. Schmid provided assistance with construction oversight during soil handling activities and managing the Community Air Monitoring Plan (CAMP) activities. To date, closure reports have been prepared and occupancy achieved for three of the four buildings.

**The Home Depot, Rego Park, NY**

AKRF has designed, installed and performed upgrades to an air sparging and soil vapor extraction system being used to remediate tetrachloroethene contamination at this site under the NYSDEC Voluntary Cleanup Program. Mr. Schmid has performed low flow, indoor air and effluent sampling as part of ongoing monitoring activities to assess the progress of the cleanup.

**250 North 10th Street, LLC., Residential Redevelopment Site, Brooklyn, NY**

AKRF was retained to investigate and remediate this former industrial property in the Williamsburg section of Brooklyn, New York in connection with site redevelopment. The site is approximately 50,000 square feet, and redevelopment included a six story residential building and parking garage. The work was completed to satisfy the requirements of the NYC E-designation Program and NYC Voluntary Cleanup Program (NYC VCP). AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation included removal of underground storage tanks, more than 7,500 tons of contaminated soil, and installation of a vapor barrier and site cap across the entire property. The remediation was completed under oversight of the NYC Office of Environmental Remediation (OER), and in a manner that has rendered the Site protective of public health and the environment consistent with residential use of the property. Mr. Schmid conducted construction oversight and community air monitoring during the removal of contaminated soil.

**AP-Williamsburg, LLC, 50 North 5th Street Development, Brooklyn, NY**

AKRF directed the remedial program at a 55,000-square foot site located in the Williamsburg section of Brooklyn, New York. The site had an industrial and manufacturing history for over 100 years that included a barrel making factory, use of kilns, and a carpet and flooring materials warehouse. AKRF completed a Remedial Investigation (RI) to evaluate the nature and extent of site contamination, and developed a Remedial Action Work Plan (RAWP) to properly address site contamination during redevelopment. Remediation included removal of more than 5,000 tons of contaminated soil, and installation of a vapor barrier and sub-slab depressurization system (SSDS) beneath the site building. The remediation was completed in a manner that has rendered the Site protective of public health and the environment consistent with commercial and residential use of the property, and in accordance with the requirements of the NYC OER E-designation program. The site includes a seven story residential apartment building with street level retail space and a parking garage. Mr. Schmid provided oversight and community air monitoring during construction activities.

**Gedney Way Leaf and Yard Waste Composting Facility, White Plains, NY**

AKRF directed the remediation and landfill closure project at ths existing composting facility. The project included investigation to document disposal history, extent of landfill materials and a solvent plume, preparation of a landfill closure plan, and management of landfill closure and cap construction. The landfill investigation and closure activities were completed to satisfy the requirements of a New York State Department of Environmental Conservation's (NYSDEC) consent order, and were completed in compliance with NYSDEC DER-10 and 6NYCRR Part 360. Mr. Schmid performed construction oversight and low-flow groundwater sampling during construction activities.

**NYCEDC Office of Environmental Remediation (OER) On-Call Environmental Consulting Services**

- **Second Farms, Bronx, NY**

  AKRF, Inc. was contracted by OER to conduct a subsurface investigation of a 1.12-acre parcel in the Bronx, New York under the United States Environmental Protection Agency (USEPA) Brownfield Assessment Grant program. Mr. Schmid assisted in the investigation which included a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples.

- **Former Nelson Foundry, Long Island City, NY**

  AKRF, Inc. was contracted by OER to conduct a subsurface investigation around the perimeter of a former foundry property in Long Island City, New York under the USEPA Brownfield Assessment Grant program. The work included preparation of a rigorous investigation work plan, Quality Assurance Project Plan, and Health and Safety Plan. The investigation will include a geophysical survey and utility mark-outs and the collection and analysis of soil, groundwater, soil vapor, and ambient air samples. The project also requires careful coordination of investigation-derived waste due to lack of on-site storage and daily drum pick-ups. Mr. Schmid conducted low flow sampling for the analysis of groundwater.

*Personnel Resume*

**Carl Armbruster**
**QA Manager**

## Qualifications Summary

Mr. Armbruster has over 30 years of experience in the environmental laboratory and engineering industry that includes extensive technical, management/leadership experience in all aspects of the laboratory business. He is an action-oriented manager dedicated to ensuring the laboratory maintains a quality program that holds the highest credentials in PT scores, accreditations and customer satisfaction. His unique experience lends itself to working successfully with employees, managers and clients at all levels.

## Professional Experience

### Quality Assurance Manager – TestAmerica Edison - 2005 to Present

Mr. Armbruster is responsible for establishing and implementing the quality assurance program at the Edison facility; and for interfacing with the corporate Quality Assurance Director to ensure adherence with the overall Quality Management Plan. He is also responsible for monitoring implementation and compliance with NELAC and TestAmerica's QMP, conducting annual management system audits and data audits, as well as providing regulatory updates and technical support to the Laboratory Director, Operations Manager, Client Services and Sales department.

### Project Manager/Assistant Technical Director – STL Edison --2000 to 2005

### Laboratory Director − STL Whippany − 1998 to 2000

### Account Manager − Clean Harbors Environmental Services − 1997 to 1998

### Laboratory Manager − Waste Management Inc., and Chemical Waste Management Inc − 1988 to 1997

### Environmental Scientist − ICF Technology − 1987 to 1988

### Analytical Chemist − IT Corporation – 1985 to 1987

### Analytical Chemist − Hess Environmental Laboratories – 1983 to 1985

## Education

- MS in Biology – East Stroudsburg University, 1984
- BS in Environmental Studies - East Stroudsburg University, 1980

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

*Personnel Resume*

**Melissa Haas**
**Project Manager II**

## Qualifications Summary

Ms. Haas has over 20 years of experience in the environmental laboratory industry which includes project management, inorganic chemistry department management, LIMS implementation, human resources, and data reporting. She has a proven ability to handle multiple projects and tasks and a passion for the highest achievable level of quality and customer service.

## Professional Experience

### Project Manager – TestAmerica - 2012 to Present

Ms. Haas coordinates and manages clients' projects through all phases of the laboratory operations, ensuring fulfillment of TestAmerica's commitments to client requirements and on-time delivery. She maintains communications with clients and account executives and serves as a liaison between clients and laboratory operations to meet clients' needs. She reviews contractual documents and Quality Assurance Project Plans (QAPPs) to ensure certification and laboratory analytical requirements. Ms. Haas assists clients in identifying project requirements and manages project setup on behalf of the laboratory. She also develops business relationships with clients to further enhance client service and sales. She ensures accuracy and on-time delivery of client reports.

### Laboratory Information Management (LIMS) Implementor – TestAmerica − 2011 to 2012

Ms. Haas was responsible for method and reference data setup for laboratories that were scheduled to implement the TALS LIMs system. She communicated with laboratory personnel to acquire information about standard operating procedures to ensure that methods and reference data were set up to meet the needs of the laboratory. She also provided on-site support for laboratories during the Go-Live period of the implementation and was the primary lead for the newly developed Certification Module. She trained laboratory and corporate personnel on the specifications of the software. She also provided remote data review assistance for laboratories to aid in the validation of the methods and reference data setup as well as the accuracy of the analysts' review process.

### Metals Department Manager – TestAmerica – 2009-2011

Ms. Haas managed the operational activities of the metals department, including managing staff through clearly setting goals and providing performance reviews and feedback. She monitored the daily laboratory workload and ensured resources and staff were in place to complete projects on time. She prepared inorganic chemistry data packages and reviewed data for accuracy while prioritizing work to ensured timely delivery of quality data packages to clients. She oversaw the quality control of the department including demonstration of capabilities, method detection limit studies, SOP updates, audit responses, and performance evaluation responses.

### Human Resources Coordinator – TestAmerica – 2007-2009

Ms. Haas provided support to the laboratory and Corporate Human Resources by implementing and administering Human Resources programs and procedures. She advised managers on Human Resources-related issues and managed the interview process for laboratory hires.
She also served as a resource to the lab employees with HR-related issues and coordinated employee recognition programs and special events to promote employee satisfaction.

### Wet Chemistry Department Manager – TestAmerica – 2001-2007

Ms. Haas managed the operational activities of the wet chemistry department and supervised a staff of eight analysts. She was responsible for data review, training, and quality control for the department. She increased productivity levels by providing key contributions toward automation of laboratory.

### Wet Chemistry Analyst – Severn Trent Labs/AEN – 1997-2001

### Veterinary Technician− Mobile Veterinary Clinic − 1994-1997

### Campus Organizer –NJ Public Interest Research Group − 1990-1993

## Education

- Rutgers University, New Brunswick, NJ 1986-1990, Bachelor of Science, Animal Science

**L.A.B. Validation Corp., 14 West Point Drive, East Northport, New York 11731**

# Lori A. Beyer

**SUMMARY:** General Manager/Laboratory Director with a solid technical background combined with Management experience in environmental testing industry. Outstanding organizational, leadership, communication and technical skills. Customer focused, quality oriented professional with consistently high marks in customer/employee satisfaction.

## EXPERIENCE:

1998-Present L.A.B. Validation Corporation, 14 West Point Drive, East Northport, NY
**President**

- Perform Data Validation activities relating to laboratory generated Organic and Inorganic Environmental Data.

1998-Present American Analytical Laboratories, LLC. 56 Toledo Street, Farmingdale, NY
**Laboratory Director/Technical Director**

- Plan, direct and control the operation, development and implementation of programs for the entire laboratory in order to meet AAL's financial and operational performance standards.
- Ensures that all operations are in compliance with AAL's QA manual and other appropriate regulatory requirements.
- Actively maintains a safe and healthy working environmental that is demanded by local laws/regulations.
- Monitors and manages group's performance with respect to data quality, on time delivery, safety, analyst development/goal achievement and any other key performance indices.
- Reviews work for accuracy and completeness prior to release of results to customers.

1996-1998 Nytest Environmental, Inc. (NEI) Port Washington, New York
**General Manager**

- Responsible for controlling the operation of an 18,000 square foot facility to meet NEI's financial and operational performance standards.
- Management of 65 FTEs including Sales and Operations
- Ensure that all operations are in compliance with NEI's QA procedures
- Ensures that productivity indicators, staffing levels and other cost factors are held within established guidelines
- Maintains a quantified model of laboratory's capacity and uses this model as the basis for controlling the flow of work into and through the lab so as to ensure that customer requirements and lab's revenue and contribution targets are achieved.

1994-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
**Technical Project Manager**

- Responsible for the coordination and implementation of environmental testing programs requirements between NEI and their customers
- Supervise Customer Service Department
- Assist in the development of major proposals
- Complete management of all Federal and State Contracts and assigned commercial contracts
- Provide technical assistance to the customer, including data validation and interpretation
- Review and implement Project specific QAPP's.

1995-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
**Corporate QA/QC Officer**

- Responsible for the implementation of QA practices as required in the NJDEP and EPA Contracts
- Primary contact for NJDEP QA/QC issues including SOP preparation, review and approval
- Responsible for review, verification and adherence to the Contract requirements and NEI QA Plan

1992-1994 Nytest Environmental, Inc. (NEI) Port Washington, New York
**Data Review Manager**

- Responsible for the accurate compilation, review and delivery of analytical data to the company's customers. Directly and effectively supervised a department of 22 personnel.
- Managed activities of the data processing software including method development, form creation, and production
- Implement new protocol requirements for report and data management formats
- Maintained control of data storage/archival areas as EPA/CLP document control officer

1987-1991 Nytest Environmental, Inc. (NEI) Port Washington, New York
**Data Review Specialist**

- Responsible for the review of GC, GC/MS, Metals and Wet Chemistry data in accordance with regulatory requirements
- Proficient with USEPA, NYSDEC, NJDEP and NEESA requirements
- Review data generated in accordance with SW846, NYSDEC ASP, EPA/CLP and 40 CFR Methodologies

1986-1987 Nytest Environmental, Inc (NEI) Port Washington, New York
**GC/MS VOA Analyst**

## EDUCATION:

**1982-1985 State University of New York at Stony Brook, New York; BS Biology/Biochemistry**
**1981-1982 University of Delaware; Biology/Chemistry**
**5/91 Rutgers University; Mass Spectral Data Interpretation Course, GC/MS Training**
**8/92 Westchester Community College; Organic Data Validation Course**
**9/93 Westchester Community College; Inorganic Data Validation Course**

# Westchester Community College
## Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

ORGANIC DATA VALIDATION COURSE (35 HOURS)

Dr. John Samuelian

Date AUGUST 1992

Assistant Dean
Professional Development Center

President

The Professional
Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

# Westchester Community College
## Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

INORGANIC DATA VALIDATION

Instructor: Dale Boshart

Date MARCH 1993

Assistant Dean
Professional Development Center

President

The Professional
Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

**New York State Department of Environmental Conservation**
**50 Wolf Road, Albany, New York 12233**

**Thomas C. Jorling**
**Commissioner**

July 8, 1992

Ms. Elaine Sall
Program Coordinator
Westchester Community College
Valhalla, NY 10595-1698

Dear Elaine,

Thank you for your letter of June 29, 1992. I have reviewed the course outline for organic data validation, qualifications for teachers and qualifications for students. The course that you propose to offer would be deemed equivalent to that which is offered by EPA. The individuals who successfully complete the course and pass the final written exam would be acceptable to perform the task of organic data validation for the Department of Environmental Conservation, Division of Hazardous Waste Remediation.

As we have discussed in our conversation of July 7, 1992, you will forward to me prior to the August course deadline, the differences between the EPA SOW/90 and the NYSDEC ASP 12/91. You stated these differences will be compiled by Mr. John Samulian.

I strongly encourage you to offer an inorganic data validation course. I anticipate the same list of candidates would be interested in an inorganic validation course as well, since most of the data to be validated consists of both organic and inorganic data.

Thank you for you efforts and please contact me if I can be of any further assistance.

Sincerely,

Maureen P. Serafini

Maureen P. Serafini
Environmental Chemist II
Division of Hazardous Waste
Remediation

**The Professional Development Center**
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

October 2, 1992

Ms. Lori Beyer
3 sparkill Drive
East Northport, NY 11731

Dear Ms. Beyer:

Congratulations upon successful completion of the Organic Data Validation course held August 17 - 21, 1992, through Westchester Community College, Professional Development Center. This course has been deemed by New York State Department of Environmental Conservation as equivalent to EPA's Organic Data Validation Course.

Enclosed is your Certificate. Holders of this Certificate are deemed competent to perform organic data validation for the New York State DEC Division of Hazardous Waste Remediation.

The Professional Development Center at Westchester Community College plans to continue to offer courses and seminars which will be valuable to environmental engineers, chemists and related personnel. Current plans include a TCLP seminar on November 17th and a conference on Environmental Monitoring Regulations on November 18th.

We look forward to seeing you again soon at another environmental program or event. Again, congratulations.

Very truly yours,

Passing Grade is 70%
Your Grade is 99%

Elaine Sall
Program Coordinator

ES/bf

**The Professional Development Center**
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

June 21, 1993

Dear Ms. Beyer:

Enclosed is your graded final examination in the Inorganic Data Validation course you completed this past March. A score of 70% was required in order to receive a certificate of satisfactory completion. Persons holding this certificate are deemed acceptable to perform Inorganic Data Validation for the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.

I am also enclosing a course evaluation for you to complete if you have not already done so. The information you provide will greatly aid us in structuring further courses. We wish to make these course offerings as relevant, targeted and comprehensive as possible. Your evaluation is vital to that end.

Congratulations on your achievement. I look forward to seeing you again at another professional conference or course. We will be co-sponsoring an environmental monitoring conference on October 21, 1993 with the New York Water Pollution Control Association, Lower Hudson Chapter, at IBM's Yorktown Heights, NY site. Information regarding this event will be going out in August.

Very truly yours,

Elaine Sall

Elaine Sall
Program Coordinator

ES/bf

Enclosures

SUNY
**WESTCHESTER COMMUNITY COLLEGE**
**Valhalla, New York 10595**

# ATTACHMENT B
# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION SAMPLING, ANALYSIS, AND ASSESSMENT OF PFAS – APRIL 2023

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

## Under NYSDEC's Part 375 Remedial Programs

April 2023

www.dec.ny.gov

# Table of Contents

April 2023

## ERRATA SHEET for

## *SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs* Issued January 17, 2020

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Title of Appendix I, page 32 | Appendix H | Appendix I | 2/25/2020 |
| Document Cover, page 1 | Guidelines for Sampling and Analysis of PFAS | Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs | 9/15/2020 |
| Data Assessment and Application to Site Cleanup Page 3 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published | 3/28/2023 |
| Water Sample Results Page 3 | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. | NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below. | 3/28/2023 |
| Soil Sample Results Page 3 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values: | NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values: | 3/28/2023 |
| Protection of Groundwater Page 3 | PFOA (ppb) 1.1<br>PFOS (ppb) 3.7 | PFOA (ppb) 0.8<br>PFOS (ppb) 1.0 | 3/28/2023 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Footnote 2<br>Page 3 | The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 3/28/2023 |
| Testing for Imported Soil<br>Page 4 | If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. | If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable. | 3/28/2023 |
| Routine Analysis,<br>page 9 | "However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101." | "However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533." | 9/15/2020 |
| Additional Analysis, page 9, new paragraph regarding soil parameters | None | "In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils." | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Data Assessment and Application to Site Cleanup Page 10 | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC. | Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC. | 9/15/2020 |
| Water Sample Results Page 10 | PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…)<br>If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…)<br>If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Soil Sample Results, page 10 | "The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase." | "Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. "<br>[Interim SCO Table]<br>"PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.<br>As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. " | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Testing for Imported Soil Page 11 | Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs.<br>If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.<br><br>PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required. | 9/15/2020 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Footnotes | None | [1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.<br>[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf). | 9/15/2020 |
| Additional Analysis, page 9 | In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil… | In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil… | 1/8/2021 |
| Appendix A, General Guidelines, fourth bullet | List the ELAP-approved lab(s) to be used for analysis of samples | List the ELAP- certified lab(s) to be used for analysis of samples | 1/8/2021 |
| Appendix E, Laboratory Analysis and Containers | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101. | Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101 | 1/8/2021 |
| Water Sample Results Page 9 | “In addition, further assessment of water may be warranted if either of the following screening levels are met:<br>a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or<br>b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L” | Deleted | 6/15/2021 |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Routine Analysis, Page XX | Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). | Deleted | 5/31/2022 |
| Analysis and Reporting, Page XX | As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS. | Deleted | 5/31/2022 |
| Routine Analysis, Page XX | LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. | EPA Method 1633 is the procedure to use for environmental samples. | |
| Soil Sample Results, Page XX | Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6 | Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6 | |
| Appendix A | "Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1" | "Include in the text ….EPA Method 1633" | |
| Appendix A | "Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101" | Deleted | |
| Appendix B | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |

| Citation and Page Number | Current Text | Corrected Text | Date |
|---|---|---|---|
| Appendix C | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix D | "Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1" | "Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633" | |
| Appendix G | | Updated to include all forty PFAS analytes in EPA Method 533 | |
| Appendix H | | Deleted | |
| Appendix I | Appendix I | Appendix H | |
| Appendix H | "These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report." | "These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)." | |
| Appendix H | "The holding time is 14 days…" | "The holding time is 28 days…" | |
| Appendix H, Initial Calibration | "The initial calibration should contain a minimum of five standards for linear fit…" | "The initial calibration should contain a minimum of six standards for linear fit…" | |
| Appendix H, Initial Calibration | Linear fit calibration curves should have an $R^2$ value greater than 0.990. | Deleted | |
| Appendix H, Initial Calibration Verification | Initial Calibration Verification Section | Deleted | |
| Appendix H | secondary Ion Monitoring Section | Deleted | |
| Appendix H | Branched and Linear Isomers Section | Deleted | |

April 2023

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

## Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

## Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

## Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

## Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

### Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

### Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

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[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

## Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

### Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

### Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

| Guidance Values for Anticipated Site Use | PFOA (ppb) | PFOS (ppb) |
|---|---:|---:|
| Unrestricted | 0.66 | 0.88 |
| Residential | 6.6 | 8.8 |
| Restricted Residential | 33 | 44 |
| Commercial | 500 | 440 |
| Industrial | 600 | 440 |
| Protection of Groundwater[2] | 0.8 | 1.0 |

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

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[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

## Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

# Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

## General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

## Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- 
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

# Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

## General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix C - Sampling Protocols for PFAS in Monitoring Wells

## General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix D - Sampling Protocols for PFAS in Surface Water

## General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

## Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS.  Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

# Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

## General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

## Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

## Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

## Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

## Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

## Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

## Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

## Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

## Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

# Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

**Procedure Name:** General Fish Handling Procedures for Contaminant Analysis

**Number:** FW-005

**Purpose:** This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

**Organization:** Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

**Version:** 8

**Previous Version Date:** 21 March 2018

**Summary of Changes to this Version:** Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

**Originator or Revised by:** Wayne Richter, Jesse Becker

**Date:** 26 April 2019

**Quality Assurance Officer and Approval Date:** Jesse Becker, 26 April 2019

## NEW YORK STATE
## DEPARTMENT OF ENVIRONMENTAL CONSERVATION

## GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

1. Project and Site Name.

2. DEC Region.

3. All personnel (and affiliation) involved in the collection.

4. Method of collection (gill net, hook and line, etc.)

5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

3. Date collected.

4. Sample location (waterway and nearest prominent identifiable landmark).

5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **<u>The Bureau of Ecosystem Health will supply the larger bags</u>.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

    No materials containing Teflon.
    No Post-it notes.
    No ice packs; only water ice or dry ice.
    Any gloves worn must be powder free nitrile.
    No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
    No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
    Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
    Wash hands after handling any food containers or packages as these may contain PFCs. Keep pre-wrapped food containers and wrappers isolated from fish handling.
    Wear clothing washed at least six times since purchase.
    Wear clothing washed without fabric softener.
    Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

page ______ of ______

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
## DIVISION OF FISH AND WILDLIFE
## FISH COLLECTION RECORD

Project and Site Name ____________________________________________ DEC Region ____________

Collections made by (include all crew) ____________________________________________

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ____________________

Preservation Method: ☐Freezing ☐Other ______________________ Notes (SWFDB survey number): ______________________

| FOR LAB USE ONLY- LAB ENTRY NO. | COLLECTION OR TAG NO. | SPECIES | DATE TAKEN | LOCATION | AGE | SEX &/OR REPROD. CONDIT | LENGTH ( ) | WEIGHT ( ) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
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richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

# NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
# CHAIN OF CUSTODY

I, ______________________________, of _____________________________________________ collected the
(Print Name) (Print Business Address)

following on ____________________, 20____ from _______________________________________________
(Date) (Water Body)

in the vicinity of ____________________________________________________________________________
(Landmark, Village, Road, etc.)

Town of _______________________________________, in _________________________________ County.

Item(s) ________________________________________________________________________________

_______________________________________________________________________________________

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on ___________________________________, 20______.

_______________________________________________ ____________________________
Signature Date

I, __________________________________, received the above mentioned sample(s) on the date specified and assigned identification number(s) __________________________________________ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_______________________________________ ___________________
Signature Date

| | | |
|---|---|---|
| SECOND RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| THIRD RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| FOURTH RECIPIENT (Print Name) | TIME & DATE | PURPOSE OF TRANSFER |
| SIGNATURE | UNIT | |
| RECEIVED IN LABORATORY BY (Print Name) | TIME & DATE | REMARKS |
| SIGNATURE | UNIT | |
| LOGGED IN BY (Print Name) | TIME & DATE | ACCESSION NUMBERS |
| SIGNATURE | UNIT | |

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

## NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

## HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

## EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

# Appendix G – PFAS Analyte List

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluoroalkyl sulfonic acids | Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| | Perfluoropentanesulfonic acid | PFPeS | 2706-91-4 |
| | Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| | Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| | Perfluorooctanesulfonic acid | PFOS | 1763-23-1 |
| | Perfluorononanesulfonic acid | PFNS | 68259-12-1 |
| | Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| | Perfluorododecanesulfonic acid | PFDoS | 79780-39-5 |
| Perfluoroalkyl carboxylic acids | Perfluorobutanoic acid | PFBA | 375-22-4 |
| | Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| | Perfluorohexanoic acid | PFHxA | 307-24-4 |
| | Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| | Perfluorooctanoic acid | PFOA | 335-67-1 |
| | Perfluorononanoic acid | PFNA | 375-95-1 |
| | Perfluorodecanoic acid | PFDA | 335-76-2 |
| | Perfluoroundecanoic acid | PFUnA | 2058-94-8 |
| | Perfluorododecanoic acid | PFDoA | 307-55-1 |
| | Perfluorotridecanoic acid | PFTrDA | 72629-94-8 |
| | Perfluorotetradecanoic acid | PFTeDA | 376-06-7 |
| Per- and Polyfluoroether carboxylic acids | Hexafluoropropylene oxide dimer acid | HFPO-DA | 13252-13-6 |
| | 4,8-Dioxa-3H-perfluorononanoic acid | ADONA | 919005-14-4 |
| | Perfluoro-3-methoxypropanoic acid | PFMPA | 377-73-1 |
| | Perfluoro-4-methoxybutanoic acid | PFMBA | 863090-89-5 |
| | Nonafluoro-3,6-dioxaheptanoic acid | NFDHA | 151772-58-6 |
| Fluorotelomer sulfonic acids | 4:2 Fluorotelomer sulfonic acid | 4:2-FTS | 757124-72-4 |
| | 6:2 Fluorotelomer sulfonic acid | 6:2-FTS | 27619-97-2 |
| | 8:2 Fluorotelomer sulfonic acid | 8:2-FTS | 39108-34-4 |
| Fluorotelomer carboxylic acids | 3:3 Fluorotelomer carboxylic acid | 3:3 FTCA | 356-02-5 |
| | 5:3 Fluorotelomer carboxylic acid | 5:3 FTCA | 914637-49-3 |
| | 7:3 Fluorotelomer carboxylic acid | 7:3 FTCA | 812-70-4 |
| Perfluorooctane sulfonamides | Perfluorooctane sulfonamide | PFOSA | 754-91-6 |
| | N-methylperfluorooctane sulfonamide | NMeFOSA | 31506-32-8 |
| | N-ethylperfluorooctane sulfonamide | NEtFOSA | 4151-50-2 |
| Perfluorooctane sulfonamidoacetic acids | N-methylperfluorooctane sulfonamidoacetic acid | N-MeFOSAA | 2355-31-9 |
| | N-ethylperfluorooctane sulfonamidoacetic acid | N-EtFOSAA | 2991-50-6 |
| Perfluorooctane sulfonamide ethanols | N-methylperfluorooctane sulfonamidoethanol | MeFOSE | 24448-09-7 |
| | N-ethylperfluorooctane sulfonamidoethanol | EtFOSE | 1691-99-2 |

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Ether sulfonic acids | 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) | 9Cl-PF3ONS | 756426-58-1 |
|  | 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) | 11Cl-PF3OUdS | 763051-92-9 |
|  | Perfluoro(2-ethoxyethane) sulfonic acid | PFEESA | 113507-82-7 |

# Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

## General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

## Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

| | |
|---|---|
| Temperature greatly exceeds 6ºC upon arrival at the lab* | Use professional judgement to qualify detects and non-detects as estimated or rejected |
| Holding time exceeding 28 days to extraction | Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded |

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

## Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

| | |
|---|---|
| %RSD >20% | J flag detects and UJ non detects |

## Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

| | |
|---|---|
| CCV recovery <70 or >130% | J flag results |

## Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

| Blank Result | Sample Result | Qualification |
|---|---|---|
| Any detection | <Reporting limit | Qualify as ND at reporting limit |
| Any detection | >Reporting Limit and >10x the blank result | No qualification |
| >Reporting limit | >Reporting limit and <10x blank result | J+ biased high |

## Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

| | |
|---|---|
| RPD >30% | Apply J qualifier to parent sample |

## Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

| | |
|---|---|
| Recovery <70% or >130% (lab derived criteria can also be used) | Apply J qualifier to detects and UJ qualifier to non detects |

## Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

| | |
|---|---|
| Recovery <70% or >130% (lab derived criteria can also be used) | Apply J qualifier to detects and UJ qualifier to non detects of parent sample only |
| RPD >30% | Apply J qualifier to detects and UJ qualifier to non detects of parent sample only |

## Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

| | |
|---|---|
| Recovery <50% or >150% | Apply J qualifier |
| Recovery <25% or >150% for poor responding analytes | Apply J qualifier |
| Isotope Dilution Analyte (IDA) Recovery <10% | Reject results |

## Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

## Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

## Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

# APPENDIX B

# HEALTH AND SAFETY PLAN (HASP) AND COMMUNITY AIR MONITORING PLAN (CAMP)

# UNILOCK CORPORATION

## 51 INTERNATIONAL BOULEVARD, BREWSTER, NEW YORK

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## Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP)

**NYSDEC Site #: D340037**
**AKRF Project Number: 220234**

**Prepared for:**

Unilock Corporation
51 International Boulevard
Brewster, New York 10601

**Prepared by:**

**AKRF, Inc.**
34 South Broadway, Suite 401
White Plains, New York 10601

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**NOVEMBER 2023**

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# FIGURES

# APPENDICES

# 1.0 INTRODUCTION

The Unilock Corporation project site (Site) is located at 51 International Boulevard, Brewster, New York (the "Site"). The Site is approximately 11 acres, contains offices and a commercial production area (the facility), and is defined by the Village of Brewster as Tax Map/Parcel No. 45-1-19.

The subsurface investigation will include the drilling of soil borings installation of monitoring wells, and the collection of soil, sediment, and groundwater samples. This environmental Health and Safety Plan (HASP) has been developed for implementation during Site Characterization (SC) activities conducted by all personnel on-site, both AKRF employees and others. This HASP does not discuss routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

Unilock utilizes the Site for the manufacturing of a variety of paver bricks. Potable and production water for the facility is supplied by a single private on-Site supply well. Water supply sampling, which is routinely conducted for well permitting purposes, has detected perfluoroalkyl and polyfluoroalkyl substances (PFAS) since 2021. Based upon the detections of PFAS compounds in Unilock's private water supply, particularly perfluorobutanesulfonic acid (PFBS), the New York State Department of Environmental Conservation (NYSDEC) issued correspondence on May 6, 2022 stating that the Site may be a potential Drinking Water Contamination Site (DWCS) and requested that Unilock enter into a Consent Order (CO) to investigate and potentially remediate the PFAS compounds detected at the Site. Prior to consideration of entering into a CO, NYSDEC agreed to a scope of work for a preliminary assessment and any recommended follow up sampling to first attempt to determine whether the PFAS compounds detected at the Site are attributable to Unilock's operations. This HASP identifies the hazards of concern, the specific chemicals associated with the Site-specific hazards, and measures to provide protection from exposure to the hazards during the investigation work.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all OSHA applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

# 2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

## 2.1 Hazard Evaluation

### 2.1.1 Hazards of Concern

| **Check all that apply** | | |
|---|---|---|
| (**X**) Organic Chemicals | (**X**) Inorganic Chemicals | ( ) Radiological |
| (**X**) Biological | ( ) Explosive/Flammable | ( ) Oxygen Deficient Atm |
| (**X**) Heat Stress | (**X**) Cold Stress | ( ) Carbon Monoxide |
| (**X**) Per- and Polyfluoroalkyl Substances (PFAS) | | |
| Comments:<br>No personnel are permitted to enter permit confined spaces. | | |

### 2.1.2 Physical Characteristics

| **Check all that apply** | | |
|---|---|---|
| (**X**) Liquid | (**X**) Solid | ( ) Sludge |
| (**X**) Vapors | ( ) Unknown | ( ) Other |
| Comments: | | |

### 2.1.3 Hazardous Materials

| **Check all that apply** | | | | | |
|---|---|---|---|---|---|
| **Chemicals** | **Solids** | **Sludges** | **Solvents** | **Oils** | **Other** |
| ( ) Acids | ( ) Ash | ( ) Paints | ( ) Halogens | ( ) Transformer | ( ) Lab |
| ( ) Caustics | ( ) Asbestos | ( ) Metals | ( ) Petroleum | ( ) Other DF | ( ) Pharm |
| ( ) Pesticides | ( ) Tailings | ( ) POTW | ( ) Other | ( ) Motor or Hydraulic Oil | ( ) Hospital |
| (**X**) Petroleum | ( ) Other | ( ) Other | | (**X**) Gasoline | ( ) Rad |
| ( ) Inks | | | | (**X**) Fuel Oil | ( ) MGP |
| ( ) PCBs | | | | | ( ) Mold |
| ( ) Metals | | | | | ( ) Cyanide |
| (**X**) PFAS | | | | | |
| ( )Other: VOCs & SVOCs | | | | | |

### 2.1.4 Chemicals of Concern

| Chemicals | REL/PEL/STEL | Health Hazards |
|---|---|---|
| PFAS | None established at this time. | Initial studies are inconclusive, but there is indication that the liver is the most sensitive target, with some association to increased uric acid levels, blood cholesterol, and high blood pressure. |
| Benzene | REL = 0.1 ppm<br>PEL = 1 ppm<br>STEL = 5 ppm | Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen. |
| Toluene | REL = 100 ppm<br>PEL = 200 ppm<br>STEL = 300 ppm | Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia (skin tingling or numbness); dermatitis; liver, kidney damage. |
| Ethylbenzene | REL = 100 ppm<br>PEL = 100 ppm | Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma. |
| Xylenes | REL = 100 ppm<br>PEL = 100 ppm | Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, poor coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis. |
| Naphthalene | REL = 10 ppm<br>PEL = 10 ppm | Irritation eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage. |
| Polycyclic Aromatic Hydrocarbons (PAHs) | PEL = 5 $mg/m^3$ | Harmful effects to skin, bodily fluids, and ability to fight disease, reproductive problems; [potential occupational carcinogen] |
| Fuel Oil | REL = 350 $mg/m^3$<br>PEL = 400 ppm | Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen. |

Comments:
REL = NIOSH Recommended Exposure Limit
PEL = OSHA Permissible Exposure Limit
STEL = OSHA Short Term Exposure Limit
ppm = parts per million
$mg/m^3$ = milligrams per cubic meter

## 2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel are outlined in Section 2.3 of this HASP.

## 2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the Site. A site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the Site.

### 2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. The medical release shall consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

### 2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

| Task | Exclusion Zone | CRZ | Support Zone |
|---|---|---|---|
| Soil Borings/ Sampling Locations/ Monitoring Wells | 10 ft from Drilling Equipment, Sampling Locations or Well Location | 25 ft from Drilling Equipment, Sampling Locations, or Well Location | As Needed |
| Comments:<br>Control measures such as "caution tape" and/or traffic cones will be placed around the perimeter of the work area when work is being done in a public area. | | | |

### 2.6 Air Monitoring

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards associated with the documented soil and groundwater contamination. Results of the air monitoring will be used to determine the appropriate response action, if needed.

### 2.6.1 PFAS Compounds

Although there are currently no State or Federally-approved air monitoring procedures for PFAS compounds, ambient particulate methods are under development by the EPA. For the purpose of conducting this investigation, particulate monitoring in the work space will be conducted as a protective measure. An MIE 1000 Personal DataRam or equivalent will be used to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM10). The dust monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels.

### 2.6.2 Volatile Organic Compounds

A photoionization detector (PID) will be used to perform air monitoring during soil disturbance activities to determine airborne levels of total VOCs. The PID will be calibrated at the start of the work day with a 100 ppm isobutylene standard.

### 2.6.3 Work Zone Air Monitoring

Real time air monitoring will be performed with the MIE 1000 (or equivalent) and PID. Measurements will be taken prior to commencement of work and continuously during the work, as outlined in the following table. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

| Instrument | Action Level | Response Action |
|---|---|---|
| MIE 1000 | 100 µg/m$^3$ above background | Dust suppression measures |
| | 150 µg/m$^3$ above background | Stop work. Continue dust suppression and resume when readings are below 150 µg/m$^3$. |
| PID | Less than 5 ppm in breathing zone | Level D or D-Modified |
| | Between 5 ppm and 50 ppm | Level C |
| | More than 50 ppm | Stop work. Resume work when readings are less than 50 ppm. |
| Notes: ppm = parts per million, µg/m$^3$ = micrograms per cubic meter | | |

### 2.6.4 Community Air Monitoring Plan

The intrusive portion of the investigation consists of only shallow soil borings, monitoring well installation, and soil, groundwater, sediment, surface water, and water system and wastewater sampling, which has a low potential of generating significant vapors or contaminant-laden particulates and will be conducted primarily on the Unilock Corporation property and the surrounding wetlands, with select borings within the nearby public right-of-way that are a minimum of approximately 1,500 feet to the nearest residential property. The surrounding properties are used primarily for industrial purposes. Consequently, community air monitoring will be conducted based on the results of work zone monitoring. In the event that an Action Level is documented in the work zone, as listed in Section 2.6.3, community air monitoring will be conducted in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), which would include real-time air monitoring for particulates and volatile compounds at the perimeter of the exclusion zone, as described below. CAMP data will be provided to NYSDEC and NYSDOH on a weekly basis. Any exceedances of CAMP action levels as well as correction measures taken will be reported to the Departments immediately (within 24 hours).

*VOC Monitoring*

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of sediment, surface water, and groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, when purging a sampling point, and upon leaving the location.

Continuous monitoring for VOCs will be conducted during all ground intrusive activities, including drilling, soil sampling, and monitoring well installation activities. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a PID equipped with an 11.7 eV lamp capable of calculating 15-minute running average concentrations. The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the exclusion zone perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the exclusion zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the vapor source or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shutdown.

More frequent intervals of monitoring will be conducted if required as determined by the SSO. All PID readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

*Dust Monitoring*

Continuous monitoring for particulate will be conducted during all soil boring and soil sampling activities, which will involve the measurement of respirable dust. Community air monitoring for dust particulates will be conducted using a MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size ($PM_{10}$). The dust monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDOH and/or NYSDEC review. If the downwind particulate concentrations are greater than 100 micrograms per cubic meter (µg/$m^3$) above background (upwind concentrations), and no other obvious source is apparent, then it will be assumed that the elevated particulate concentrations are a result of site activities. In such instances, dust suppression measures will be implemented and monitoring will be continued. Work will be allowed to continue with dust suppression if downwind particulate levels do not exceed 150 µg/$m^3$ above the background (upwind concentration) and provided that no visible dust is migrating from the work area. If particulate levels persist at 150 µg/$m^3$ above the background, work must be stopped until dust suppression measures bring particulate levels to below 150 µg/$m^3$ above background.

*Major Vapor Emission Response Plan*

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work Site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 foot zone).

If either of the following criteria is exceeded in the 20 foot zone, then the Major Vapor Emission Response Plan shall automatically be implemented:

- Sustained organic vapor levels approaching 1 ppm above background for a period of more than 30 minutes; or
- Organic vapor levels greater than 5 ppm above background for any time period.

Upon activation, the following activities shall be undertaken as part of the Major Vapor Emission Response Plan:

- The NYSDEC, NYSDOH, and local police authorities will be immediately contacted by the SSO and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the SSO; and
- All emergency contacts will go into effect as appropriate.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

## 2.7 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, “General Description and Discussion of the Levels of Protection and Protective Gear.”

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in Section 2.6.

| **LEVEL OF PROTECTION & PPE** | | **Soil Boring/Water Sampling** |
|---|---|---|
| **Level D**<br>(**X**) Steel Toe Shoes<br>(**X**) Hard Hat (within 25 ft of drill rig)<br>(**X**) Work Gloves | (**X**) Safety Glasses<br>( ) Face Shield<br>(**X**) Ear Plugs (within 25 ft of drill rig)<br>(**X**) Nitrile Gloves<br>(**X**) Tyvek for drill operator if NAPL present | Yes |
| **Level C** ***(in addition to Level D)***<br>(**X**) Half-Face Respirator OR<br>(**X**) Full Face Respirator<br>( ) Full-Face PAPR | ( ) Particulate Cartridge<br>( ) Organic Cartridge<br>(**X**) Dual Organic/ Particulate Cartridge | If PID > 10 ppm (breathing zone) |
| Comments:<br>Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breathe or any odors detected). | | |

## 2.8 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the Site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the Site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

# 3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be taken to a hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

## 3.1 Hospital Directions

| | |
|---|---|
| **Hospital Name:** | Putnam Hospital |
| **Phone Number:** | (845) 279-5711 |
| **Address/Location:** | 670 Stoneleigh Avenue, Carmel Hamlet, NY 10512<br>The entrance to the Emergency Room is on the eastern side of Stoneleigh Avenue (aka Route 35) approximately 1000 feet south of its intersection with Drewville Road (aka Route 36) |
| **Directions:** | Exit site and turn RIGHT on International Boulevard<br>Turn RIGHT onto Dykeman Road (aka Route 312 W)<br>Turn RIGHT onto Carmel Avenue (aka Route 6 W)<br>Turn LEFT onto Old Route 6<br>CONTINUE onto Hughson Road<br>Turn LEFT onto Stoneleigh Avenue (aka Route 35)<br>Turn LEFT into the hospital entrance |

## 3.2 Emergency Contacts

| Company | Individual Name | Title | Contact Number |
|---|---|---|---|
| AKRF | Marc Godick | Project Director | 914-922-2356 |
| | Bryan Zieroff | Project Manager | 914-922-2382 (office)<br>203-246-1566 (cell) |
| | Stephen Schmid | Site Safety Officer (SSO) | 914-922-2386 (office)<br>914-400-9736 (cell) |
| | Brian Quinn | Alternate SSO | 646-388-9567 (office)<br>201-314-8032 (cell) |
| Unilock Corporation<br>Unilock New York, Inc. | Anita Picard (Primary) | Controller, East Coast Operations | 845-230-4522 (office)<br>845-208-1415 (cell) |
| | Brian Kallmeyer (Secondary) | General Manager | 845-230-4534 (office)<br>508-958-1799 (cell) |
| Ambulance, Fire Department & Police Department | - | - | 911 |
| NYSDEC Spill Hotline | - | - | 800-457-7362 |

# 4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

## APPROVAL

Signed: ______________________________ Date: ______________________________

AKRF Project Manager

Signed: ______________________________ Date: ______________________________

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the Site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

## AFFIDAVIT

I,_________________________(name), of_______________________________(company name), have read the Health and Safety Plan (HASP) for the Unilock Corporation site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the Site.

Signed: ____________________________ Company: _________________________ Date: __________
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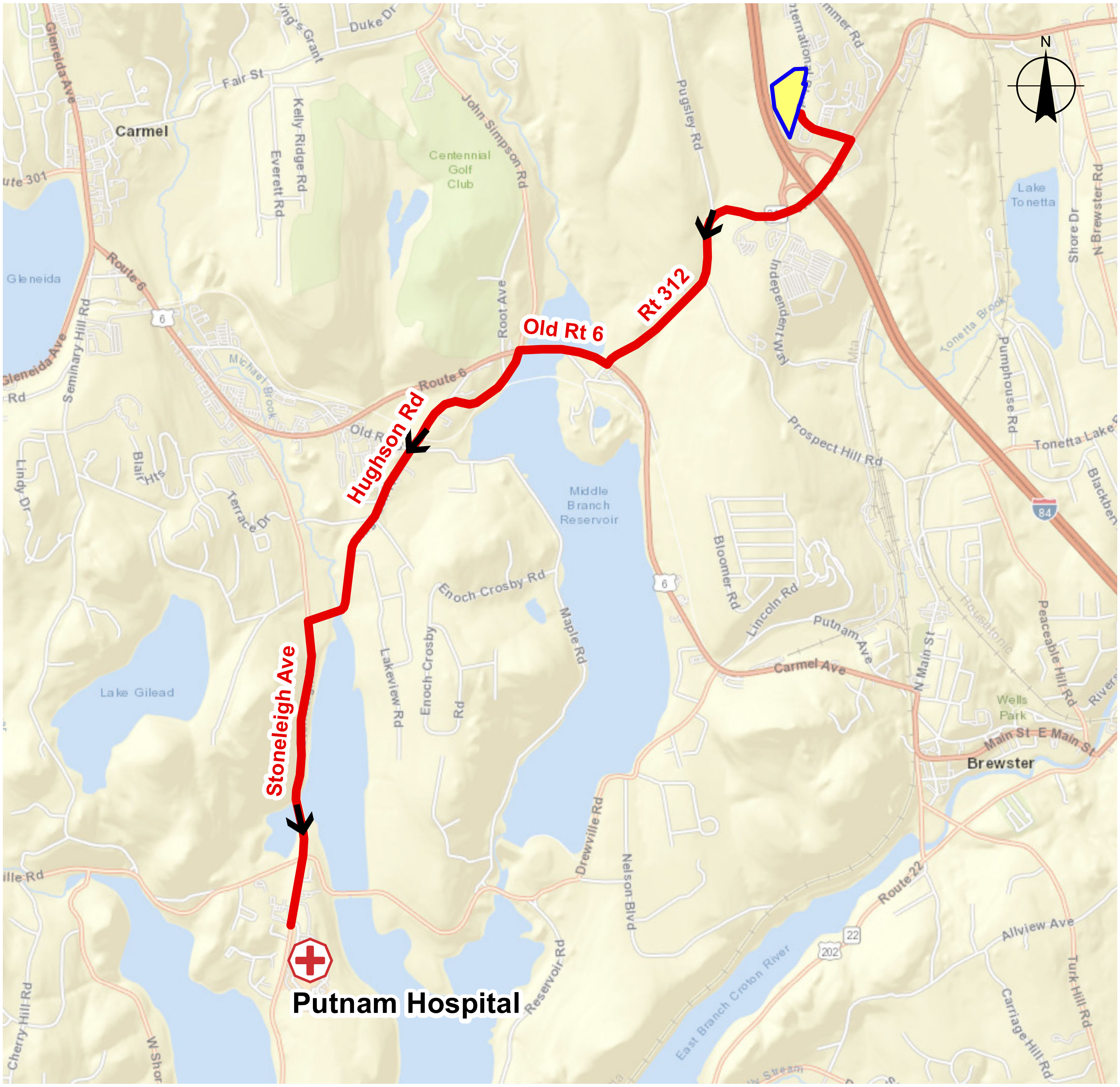
Signed: ____________________________ Company: _________________________ Date: __________

# FIGURE 1

# HOSPITAL ROUTE MAP



*Service Layer Credits: ESRI World Street Map 2021*

Putnam Hospital
670 Stoneleigh Avenue
Carmel Hamlet, NY 10512
(845) 279-5711

**LEGEND**

| | |
|---|---|
| 🟨 | PROJECT SITE BOUNDARY |
| ← | ROUTE TO HOSPITAL |
| ✚ | HOSPITAL LOCATION |

0 3,000 6,000
SCALE IN FEET

**AKRF**
440 Park Avenue South, New York, NY 10016

**Unilock Corporation**
**51 International Boulevard**
Brewster, New York

**HOSPITAL ROUTE MAP**

DATE
**9/7/2023**
PROJECT NO.
**220234**
FIGURE
**1**

©2023 AKRF Q:\Projects\220234 - UNILOCK NEW YORK\Technical\GIS and Graphics\SAR\220234 Fig 1 Hospital Route Map.mxd9/7/2023 3:56:44 PM mveilleux

# APPENDIX A

# POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

# Perfluoroalkyls - ToxFAQs™

This fact sheet answers the most frequently asked health questions (FAQs) about perfluoroalkyls. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS: Exposure can occur from ingesting contaminated food or drinking water or breathing contaminated air. Treated carpets can be an important source of exposure for children. Studies in humans suggest an association between increases in blood cholesterol and higher PFOA or PFOS blood levels. High blood levels of PFOA and PFOS may also be associated with increased uric acid levels and liver damage.**

## What are perfluoroalkyls?

Perfluoroalkyls are a family of human-made chemicals that do not occur naturally in the environment. The two perfluoroalkyls which were made in the largest amounts in the U.S. are perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS).

Perfluoroalkyls have been used in surface protection products such as carpet and clothing treatments and coating for paper and cardboard packaging. They have also been used in fire-fighting foams. Companies have stopped production or have begun changing manufacturing practices to reduce releases and the amounts of these chemicals in their products.

## What happens to perfluoroalkyls when they enters the environment?

- Perfluoroalkyls can be found in air, soil, and water after release from the manufacture, use, and disposal of products that contain these chemicals, and during the manufacturing process. They may also be formed in the environment when other related chemicals break down.
- They break down very slowly in air, but fall to the ground within days to weeks.
- They do not break down in water or soil and may be carried over great distances.

## How might I be exposed to perfluoroalkyls?

- Exposure to perfluoroalkyls is widespread. PFOA, PFOS, perfluorononanoic acid (PFNA), and perfluorohexane sulfonic acid (PFHxS) have been detected in 95-100% of samples of people's blood in 1999-2000 and 2003-2004. More recent monitoring data still show widespread exposure; however, the levels of these substances in people's blood appear to be declining.
- You may be exposed to perfluoroalkyls from the air, indoor dust, food, water, and various consumer products. Food is expected to be the most important source of exposure to perfluoroalkyls such as PFOA and PFOS. Human breastmilk may contribute to the exposure of infants since perfluoroalkyls have been detected in breast milk.
- Carpets treated with perfluoroalkyls can be an important source of exposure for children.
- Workers in facilities that make or use perfluoroalkyls can be exposed to higher amounts and have increased levels of these chemicals in their blood. Some communities near facilities where PFOA and PFOS were previously manufactured were exposed to high levels of these substances in drinking water.

## How can perfluoroalkyls affect my health?

A large number of human studies have examined possible relationships between levels of perfluoroalkyls in blood and adverse health effects. It is difficult to interpret these results because they are not consistent; some studies have found an effect and others have not found the same effect. Even though some studies have found associations between serum perfluoroalkyl levels and adverse health effects, it does not mean that perfluoroalkyls caused these effects; they may be due to other factors not considered by researchers. The available human studies suggest that increases in blood cholesterol levels are associated with higher PFOA or PFOS blood levels. There is also some indication that serum PFOA or PFOS may be associated with increased uric acid levels, which may be associated with an increased risk of high blood pressure. PFOA or PFOS exposure may also cause liver damage.

# Perfluoroalkyls

Humans and animals react differently to PFOA and PFOS and not all effects observed in rats and mice may occur in humans. The liver appears to be the most sensitive target in animals ingesting perfluoroalkyls. Studies in mice found that the immune system is a sensitive target of PFOA and PFOS.

## How likely are perfluoroalkyls to cause cancer?

There is no conclusive evidence that perfluoroalkyls cause cancer in humans. Some increases in prostate, kidney, and testicular cancers have been seen in individuals exposed to high levels. These results should be interpreted cautiously because the effects were not consistently found and most studies did not control for other potential factors such as smoking.

Rats that ingested PFOA and PFOS for a long time developed tumors. However, some scientists believe that based on the way this happens in rats and the differences between rats and humans, humans should not be expected to get cancer. Others believe that it is possible for perfluoroalkyls to cause cancer in humans.

The International Agency for Research on Cancer and the Department of Health and Human Services have not yet evaluated the carcinogenicity of perfluoroalkyls. The EPA has begun an evaluation.

## How can perfluoroalkyls affect children?

No associations between serum PFOA and birth defects were observed in children of mothers living in an area with high PFOA in the water. Some studies of the general population and people living near a PFOA manufacturing facility have found that higher levels of serum PFOA or PFOS are associated with lower infant birth weights. However, the decrease in birth weight is small and may not affect the infant's health. A study of children exposed to high levels of PFOA in drinking water found increases in blood cholesterol, which is similar to the findings in adults.

Birth defects, delayed development, and early deaths have been observed in mouse and rat pups exposed to PFOA or PFOS, but not in animals exposed to perfluorobutyric acid (PFBA) or PFHxS. Scientists believe that some of the effects observed in rats and mice exposed to PFOA or PFOS may not be relevant to humans.

## How can families reduce the risk of exposure to perfluoroalkyls?

- Families may choose to use consumer products that do not contain perfluoroalkyls.
- Families whose tap or well water that contains perfluoroalkyls may choose to drink or cook with bottled water or to install activated carbon water filters.

## Is there a medical test to show whether I've been exposed to perfluoroalkyls?

Perfluoroalkyls can be measured in blood, but this is not a routine test that can be performed in a doctor's office. Mean serum concentrations of 3.07 and 9.32 µg/L of PFOA and PFOS, respectively, were measured in blood samples from members of the U.S. general population in 2009-2010.

Members of a community whose drinking water was contaminated with PFOA from a nearby industrial facility had a mean serum PFOA concentration of 83.6 µg/L in 2005. Fluorochemical product workers had mean serum PFOA and PFOS levels of 1,760 and 1,320 µg/L, respectively.

The presence of perfluoroalkyls in your blood may indicate that you have been exposed to and absorbed these chemicals into your body. However, it does not necessarily mean that you will suffer adverse health effects.

## Has the federal government made recommendations to protect human health?

The EPA has established a provisional drinking water advisory for PFOA and PFOS of 0.4 and 0.2 µg/L, respectively.

## References

This ToxFAQs™ information is taken from the 2015 Toxicological Profile for Perfluoroalkyls (Draft for Public Comment) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

## Where can I get more information?

**For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.**

**Phone: 1-800-232-4636.**

**ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.**

**ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.**

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

# NAPHTHALENE
CAS # 91-20-3

# 1-METHYLNAPHTHALENE
CAS # 90-12-0

# 2-METHYLNAPHTHALENE
CAS # 91-57-6

**Division of Toxicology ToxFAQs™** **August 2005**

**This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Exposure to naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene happens mostly from breathing air contaminated from the burning of wood, tobacco, or fossil fuels, industrial discharges, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has caused cancer in animals. Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene have been found in at least 687, 36, and 412, respectively, of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).**

## What are naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Naphthalene is a white solid that evaporates easily. Fuels such as petroleum and coal contain naphthalene. It is also called white tar, and tar camphor, and has been used in mothballs and moth flakes. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell. The major commercial use of naphthalene is in the manufacture of polyvinyl chloride (PVC) plastics. Its major consumer use is in moth repellents and toilet deodorant blocks.

1-Methylnaphthalene and 2-methylnaphthalene are naphthalene-related compounds. 1-Methylnaphthalene is a clear liquid and 2-methylnaphthalene is a solid; both can be smelled in air and in water at very low concentrations.

1-Methylnaphthalene and 2-methylnaphthalene are used to make other chemicals such as dyes and resins. 2-Methylnaphthalene is also used to make vitamin K.

## What happens to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene when they enter the environment?

❑ Naphthalene enters the environment from industrial and domestic sources, and from accidental spills.

❑ Naphthalene can dissolve in water to a limited degree and may be present in drinking water from wells close to hazardous waste sites and landfills.

❑ Naphthalene can become weakly attached to soil or pass through soil into underground water.

❑ In air, moisture and sunlight break it down within 1 day. In water, bacteria break it down or it evaporates into the air.

❑ Naphthalene does not accumulate in the flesh of animals or fish that you might eat.

❑ 1-Methylnaphthalene and 2-methylnaphthalene are expected to act like naphthalene in air, water, or soil because they have similar chemical and physical properties.

## How might I be exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

❑ Breathing low levels in outdoor air.

❑ Breathing air contaminated from industrial discharges or smoke from burning wood, tobacco, or fossil fuels.

❑ Using or making moth repellents, coal tar products, dyes or inks could expose you to these chemicals in the air.

❑ Drinking water from contaminated wells.

❑ Touching fabrics that are treated with moth repellents containing naphthalene.

❑ Exposure to naphthalene, 1-methylnaphthalene and 2-methylnaphthalene from eating foods or drinking beverages is unlikely.

## How can naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. This condition is called hemolytic anemia. Some symptoms of hemolytic anemia are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin. Animals sometimes develop cloudiness in their eyes after swallowing high amounts of naphthalene. It is not clear whether this also develops in people. Rats and mice that breathed naphthalene vapors daily for a lifetime developed irritation and inflammation of their nose and lungs. It is unclear if naphthalene causes reproductive effects in animals; most evidence says it does not.

There are no studies of humans exposed to 1-methylnaphthalene or 2-methylnaphthalene.

Mice fed food containing 1-methylnaphthalene and 2-methylnaphthalene for most of their lives had part of their lungs filled with an abnormal material.

### How likely are naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene to cause cancer?

There is no direct evidence in humans that naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene cause cancer. However, cancer from naphthalene exposure has been seen in animal studies. Some female mice that breathed naphthalene vapors daily for a lifetime developed lung tumors. Some male and female rats exposed to naphthalene in a similar manner also developed nose tumors.

Based on the results from animal studies, the Department of Health and Humans Services (DHHS) concluded that naphthalene is reasonably anticipated to be a human carcinogen. The International Agency for Research on Cancer (IARC) concluded that naphthalene is possibly carcinogenic to humans. The EPA determined that naphthalene is a possible human carcinogen (Group C) and that the data are inadequate to assess the human carcinogenic potential of 2-methylnaphthalene.

### How can naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene affect children?

Hospitals have reported many cases of hemolytic anemia in children, including newborns and infants, who either ate naphthalene mothballs or deodorants cakes or who were in close contact with clothing or blankets stored in naphthalene mothballs. Naphthalene can move from a pregnant woman's blood to the unborn baby's blood. Naphthalene has been detected in some samples of breast milk from the general U.S. population, but not at levels that are expected to be of concern.

There is no information on whether naphthalene has affected development in humans. No developmental abnormalities were observed in the offspring from rats, mice, and rabbits fed naphthalene during pregnancy.

We do not have any information on possible health effects of 1-methylnaphthalene or 2-methylnaphthalene on children.

### How can families reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

❑ Families can reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by avoiding smoking tobacco, generating smoke during cooking, or using fireplaces or heating appliances in the their homes.

❑ If families use naphthalene-containing moth repellents, the material should be enclosed in containers that prevent vapors from escaping, and kept out of the reach from children.

❑ Blankets and clothing stored with naphthalene moth repellents should be aired outdoors to remove naphthalene odors and washed before they are used.

❑ Families should inform themselves of the contents of air deodorizers that are used in their homes and refrain from using deodorizers with naphthalene.

### Is there a medical test to determine whether I've been exposed to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene?

Tests are available that measure levels of these chemicals and their breakdown products in samples of urine, feces, blood, maternal milk, or body fat. These tests are not routinely available in a doctor's office because they require special equipment, but samples can be sent to special testing laboratories. These tests cannot determine exactly how much naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene you were exposed to or predict whether harmful effects will occur. If the samples are collected within a day or two of exposure, then the tests can show if you were exposed to a large or small amount of naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene.

### Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water with over 0.5 parts per million (0.5 ppm) naphthalene for more than 10 days or over 0.4 ppm for any longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime (70 years), the EPA suggests that it contain no more than 0.1 ppm naphthalene.

The Occupational Safety and Health Administration (OSHA) set a limit of 10 ppm for the level of naphthalene in workplace air during an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) considers more than 500 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to impair a worker's ability to leave a contaminate area and therefore, results in permanent health problems or death.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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# POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

**Agency for Toxic Substances and Disease Registry ToxFAQs** **September 1996**

**This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

## What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

## What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

## How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

☐ Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

## How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

## How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

## Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

## Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 $mg/m^3$). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 $mg/m^3$ averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 $mg/m^3$ for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

## Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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# FUEL OILS

## CAS # 8008-20-6, 70892-10-3, 68476-30-2, 68476-34-6, 68476-31-3

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

**This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**SUMMARY: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

### What are fuel oils?

(Pronounced fyo͞o′əl oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

### What happens to fuel oils when they enter the environment?

- Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.
- Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- Some of the chemicals found in fuel oils may build up significantly in plants and animals.

### How might I be exposed to fuel oils?

- Using a home kerosene heater or stove, or using fuel oils at work.
- Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- Touching soil contaminated with fuel oils.
- Using fuel oils to wash paint or grease from skin or equipment.

### How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

## How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

## Is there a medical test to show whether I've been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

## Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m$^3$) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

## Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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# BENZENE
## CAS # 71-43-2

**Agency for Toxic Substances and Disease Registry ToxFAQs** **September 1997**

**This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

### What is benzene?
(Pronounced bĕn′zēn′)

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

### What happens to benzene when it enters the environment?

- ☐ Industrial processes are the main source of benzene in the environment.
- ☐ Benzene can pass into the air from water and soil.
- ☐ It reacts with other chemicals in the air and breaks down within a few days.
- ☐ Benzene in the air can attach to rain or snow and be carried back down to the ground.
- ☐ It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- ☐ Benzene does not build up in plants or animals.

### How might I be exposed to benzene?

- ☐ Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- ☐ Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- ☐ Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- ☐ Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- ☐ People working in industries that make or use benzene may be exposed to the highest levels of it.
- ☐ A major source of benzene exposures is tobacco smoke.

### How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

## How likely is benzene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

## Is there a medical test to show whether I've been exposed to benzene?

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

## Has the federal government made recommendations to protect human health?

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mgL). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

## Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

## References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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# ETHYLBENZENE

## CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

**This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

### What is ethylbenzene?

(Pronounced ĕth′ əl bĕn′ zēn′)

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

### What happens to ethylbenzene when it enters the environment?

- ☐ Ethylbenzene moves easily into the air from water and soil.
- ☐ It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- ☐ Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- ☐ In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- ☐ In soil, it is broken down by soil bacteria.

### How might I be exposed to ethylbenzene?

- ☐ Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- ☐ Drinking contaminated tap water.
- ☐ Working in an industry where ethylbenzene is used or made.
- ☐ Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

### How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

### How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

### How can ethylbenzene affect children?

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

### How can families reduce the risk of exposure to ethylbenzene?

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

### Is there a medical test to show whether I've been exposed to ethylbenzene?

Ethylbenzene is found in the blood, urine, breath, and some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

### Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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# TOLUENE

## CAS # 108-88-3

**Division of Toxicology ToxFAQs™** **February 2001**

**This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency**

### What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

### What happens to toluene when it enters the environment?

❑ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

❑ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

❑ Toluene does not usually stay in the environment long.

❑ Toluene does not concentrate or buildup to high levels in animals.

### How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

❑ Working with gasoline, kerosene, heating oil, paints, and lacquers.

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

### How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

## How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

## How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults.
Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

## How can families reduce the risk of exposure to toluene?

❑ Use toluene-containing products in well-ventilated areas.

❑ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

## Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

## Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

# XYLENE

## CAS # 1330-20-7

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

**This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

### What is xylene?

(Pronounced zī′lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

### What happens to xylene when it enters the environment?

☐ Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.

☐ It evaporates quickly from the soil and surface water into the air.

☐ In the air, it is broken down by sunlight into other less harmful chemicals.

☐ It is broken down by microorganisms in soil and water.

☐ Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

### How might I be exposed to xylene?

☐ Breathing xylene in workplace air or in automobile exhaust.

☐ Breathing contaminated air.

☐ Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.

☐ Breathing cigarette smoke that has small amounts of xylene in it.

☐ Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.

☐ The amount of xylene in food is likely to be low.

### How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

## How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

## Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

## Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

## Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

# APPENDIX B

# REPORT FORMS

# WEEKLY SAFETY REPORT FORM

Week Ending: ________________ Project Name/Number: ________________________________

Report Date: ________________ Project Manager Name: ________________________________

Summary of any violations of procedures occurring that week:

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Summary of any job related injuries, illnesses, or near misses that week:

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Comments:

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Name: ____________________________ Company: ________________________________

Signature: ____________________________ Title: ________________________________

# INCIDENT REPORT FORM

Date of Report: ______________________________

Injured: ______________________________

Employer: ______________________________

Site: ____________________ Site Location: ____________________

Report Prepared By: ____________________ ____________________
Signature Title

**ACCIDENT/INCIDENT CATEGORY** (check all that applies)

___Injury
__ Property Damage
__ On-site Equipment
__ Mechanical
___ Illness
___ Fire
___ Motor Vehicle
___ Spill
___ Near Miss
___ Chemical Exposure
___ Electrical
___ Other

**DATE AND TIME OF ACCIDENT/INCIDENT:** Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

______________________________

**WITNESS TO ACCIDENT/INCIDENT:**

| | | | |
|---|---|---|---|
| Name: | ____________ | Company: | ____________ |
| Address: | ____________ | Address: | ____________ |
| Phone No.: | ____________ | Phone No.: | ____________ |
| Name: | ____________ | Company: | ____________ |
| Address: | ____________ | Address: | ____________ |
| Phone No.: | ____________ | Phone No.: | ____________ |

**INJURED - ILL:**

Name: ____________________ SSN: ____________________

Address: ____________________ Age: ____________________

Length of Service: ____________________ Time on Present Job: ____________________

Time/Classification: ____________________

**SEVERITY OF INJURY OR ILLNESS**:

____ Disabling
____ Medical Treatment
___ Non-disabling
___ First Aid Only
___ Fatality

**ESTIMATED NUMBER OF DAYS AWAY FROM JOB:** ____________________

**NATURE OF INJURY OR ILLNESS:** ____________________

____________________

____________________

____________________

**CLASSIFICATION OF INJURY:**

__ Abrasions
__ Bites
__ Blisters
__ Bruises
__ Chemical Burns
__ Cold Exposure
__ Concussion
__ Lacerations
_____ Dislocations
_____ Faint/Dizziness
_____ Fractures
_____ Frostbite
_____ Heat Burns
_____ Heat Exhaustion
_____ Heat Stroke
____ Punctures
____ Radiation Burns
____ Respiratory Allergy
____ Sprains
____ Toxic Resp. Exposure
____ Toxic Ingestion
____ Dermal Allergy

Part of Body Affected: ____________________

Degree of Disability: ____________________

Date Medical Care was Received: ____________________

Where Medical Care was Received: ____________________

Address (if off-site): ____________________

(If two or more injuries, record on separate sheets)

**PROPERTY DAMAGE:**

Description of Damage: ____________________

____________________

Cost of Damage: $ ____________________

**ACCIDENT/INCIDENT LOCATION:** ____________________

**ACCIDENT/INCIDENT ANALYSIS:** Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

____________________

____________________

____________________

____________________

Was weather a factor?:____________________

____________________

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

____________________

____________________

____________________

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

____________________

____________________

**ON-SITE ACCIDENTS/INCIDENTS:**

Level of personal protection equipment required in Site Safety Plan:

____________________

____________________

Modifications:

____________________

Was injured using required equipment?:

____________________

____________________

If not, how did actual equipment use differ from plan?:

____________________

____________________

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

**ACCIDENT/INCIDENT REPORT REVIEWED BY:**

SSO Name Printed

SSO Signature

**OTHERS PARTICIPATING IN INVESTIGATION:**

Signature

Title

Signature

Title

Signature

Title

**ACCIDENT/INCIDENT FOLLOW-UP**: Date:

Outcome of accident/incident:

Physician's recommendations:

Date injured returned to work:

Follow-up performed by:

Signature

Title

**ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM**

# APPENDIX C

# EMERGENCY HAND SIGNALS

# EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

## EMERGENCY HAND SIGNALS

| | |
|---|---|
| **OUT OF AIR, CAN'T BREATHE!** |  **Hand gripping throat** |
| **LEAVE AREA IMMEDIATELY, NO DEBATE!** | **(No Picture) Grip partner's wrist or place both hands around waist** |
| **NEED ASSISTANCE!** |  **Hands on top of head** |
| **OKAY! – I'M ALL RIGHT!**<br>**- I UNDERSTAND!** |  **Thumbs up** |
| **NO! - NEGATIVE!** |  **Thumbs down** |

# APPENDIX C

# RAW MATERIAL SAFETY DATA SHEETS

Material Safety Datasheet
EG-Nr. 1907/2006 (REACH)

# CT Compound UMBRIANO 6599

**Print Date: 26.03.2014** **Reviewed : 28.02.2014**

---

## 1 Material-/Product Identification and Company Name

### 1.1 Trade name

CleanTop (CT) Compound UMBRIANO 6599

### 1.2 Use

Aqueous one-component primer for absorptive grounds

### 1.3 Manufacturer/Supplier details

Metten Stein+Design GmbH&Co. KG
Hammermühle
51491 Overath
Germany
Tel.: +49 2206 603 – 0

**Respondent department:** Laboratory

## 2 Potential Health Effects

### 2.1 Particular dangers for man and environment

Irritating to eyes and skin. Inhalation, ingestion and skin contact have adverse health effects. Inhalation of decomposition products can cause shortness of breath (pulmonary oedema). Inhalation of aerosols or atomized spray can cause severe breathing problems.

## 3 Composition/Information of Ingredients

### 3.1 Chemical characterization

Preparation of aqueous synthetic dispersions and auxiliary products

### 3.2 Hazardous contents

| *Chemical indentification* | *CAS number.* | *EG number* | *classification* | *Concentration* |
|---|---|---|---|---|
| acrylic polymer | undisclosed | | | < 50,0 % |
| n-(y-butoxyethoxy)ethanol | 112-34-5 | 203-961-6 | R36 | < 10,0 % |
| n-butoxyethanol | 111-76-2 | 203-905-0 | Xi; R36/38 | < 10,0 % |
| acetone | 67-64-1 | 200-662-2 | F; R11<br>Xi; R36<br>Xi; R66/67 | < 1,0 % |
| Emulgator | 150413-26-6 | | Xi; R36-R38 | < 0,1 % |
| ammonia (aqueous) | 1336-21-6 | 215-647-6 | C,N; R34/50 | < 0,1 % |
| n-dimethyl-m-dioxan-4-ylacetat | 828-00-2 | 212-579-9 | Xn; R20-R22;<br>Xi; R36-R38; R43 | < 0,05 % |
| residual monomer | undisclosed | | | < 0,05 % |

## 4 First Aid Measures

| | |
|---|---|
| General advice: | Soiled clothes must be removed instantaneously. In case of symptoms or indisposition, always seek medical treatment. |
| Inhalation: | Ensure of fresh air. If the product has been inhaled over a longer period of time and in large quantities, seek medical advice. |
| Skin: | In case of skin contact wash affected area with soap and plenty of water. Soiled clothes must be removed and washed before being worn again. In the event of persistent skin irritation, seek medical advice. |
| Eyes: | Remove contact lenses. Rinse immediately with a lot of (clean) water for at least fifteen minutes whilst keeping the eyelids open. Seek medical treatment immediately. |
| Ingestion: | If the casualty is conscious, rinse mouth with water and drink copious amounts of water. Do not induce vomiting. Get medical attention immediately. |

## 5 Fire-fighting Measures

### 5.1 Suitable extinguishing media

Choose extinguishing means according to the environment. Water (spray), carbon dioxide ($CO_2$), dry powder, foam.

### 5.2 Extinguishing means which may not be used for safety reasons

None

### 5.3 Special exposure hazards caused by the substance or preparation, such as combustion products or released gasses.

Dry product is flammable. Carbon monoxide/carbon dioxide. Pyrolysis can release acrylic monomers. According to the respective combustion conditions, the generation of harmful compounds cannot be ruled out.

### 5.4 Special protective fire-fighting equipment

Wear positive-pressure self-contained breathing apparatus and full turn-out gear.

## 6 Accidental Release Measures

### 6.1 For personal protection

Use appropriate personal protective equipment. Ventilate enclosed areas. Change soiled clothes. Avoid eye and skin contact. Substance can create slippery conditions.

### 6.2 Environmental protection measures

Avoid release to underground water or ground water. In the event of accidental release, follow official regulations.

### 6.3 Cleaning procedures

Pump off larger quantities. Contain spill and collect with absorbent material and transfer into suitable containers. Furthermore see values and measures as stated in chapter 8 (containment of exposure, personal protection measures). Dispose of in compliance with the considerations stated in chapter 13.

## 7 Handling and Storage

### 7.1 Handling

Avoid generation of respirable particles. Do not inhale vapours and atomized spray. Avoid eye and skin contact. Abide by security regulations and instructions on the label.

### 7.2 Fire and explosion protection

Avoid flames and other sources of ignition. Take measures against electrical discharge.

### 7.3 Storage

Store in stainless steel containers or polyethylene containers. Keep containers tightly closed. Store in a cool (<40°C), dry and well-ventilated place. Risk of coagulation below 5° C. Protect from exposure to air and oxygen. Stir well before use.

## 8 Exposure Control and Personal Protection

### 8.1 Additional information concerning the design of technical installations

Devices in contact with the product made of stainless steel.

### 8.2 Components with workplace-related limits to be monitored

| *Chemical identification* | *CAS-number* | *EG-number* | *MAK* | *BAT* |
|---|---|---|---|---|
| n-(y-butoxyethoxy)ethanol | 112-34-5 | 203-961-6 | 100 mg/m$^3$ | - |
| n-butoxyethanol | 111-76-2 | 203-905-0 | 98 mg/m$^3$<br>Y, H | butoxy acetic acid<br>100 mg/l urine |
| acetone | 67-64-1 | 200-662-2 | 1200 mg/m$^3$ | - |
| ammonia (queous) | 1336-21-6 | 215-647-6 | 50 ppm | - |

### 8.2.1 Technical protective measures

Use only in rooms with appropriate suction devices. Exhaust system or another technical equipment intend which prevents the aerosol education or education of fine spray.

### 8.2.2 Personal protective equipment

#### 8.2.2.1 Respiratory protection

In case of insufficient ventilation and and generation of aerosols, wear respirator mask. Respirator filter A, brown, organic gasses and vapours for which boiling point > 65°C.

#### 8.2.2.2 Hand protection

Chemical protective gloves. Glove material must be impermeable and resistant against the preparation. Use gloves made of butyl rubber > 0.5 mm material thickness, fluor rubber > 0.4 mm material thickness or neoprene gloves. Ask manufacturer for suitable materials. Gloves made of leather or thick fabric are not suitable. Check protective gloves for potential damage before use. Preventive skin protection is recommended.

#### 8.2.2.3 Eye protection

Tightly fitting safety goggles.

#### 8.2.2.4 Body protection

Working clothes. Do not eat, drink or smoke during work. Wash hands thoroughly after work and before breaks. Pay heed to general regulations concerning the handling of chemical products.

## 9 Physical and Chemical Properties

### 9.1 General information

| | |
|---|---|
| Appearance: | milky white |
| Odour | slightly aminic |

### 9.2 Important health safety and environmental information

| | |
|---|---|
| Ph | 8,0 – 10,0 |
| Boiling point/boiling range | ca. 100℃ |
| Flammability | not available |
| Explosive properties | the product is not explosive, however, generation of explosive vapour/air mixture is possible. |
| Lower explosivity limit | 0,7 vol% 2-(2-butoxyethoxy)ethanol |
| Upper explosivity limit | 5,9 vol% 2-(2-butoxyethoxy)ethanol |
| Oxidizing properties | not available |
| Vapour pressure | not available |
| Specific gravity | 1.04 g/cm³ |
| Solubility | |
| Water solubility: | yes |
| Partition coefficient: | not available |
| Viscosity | 23 - 28 sec. 3,0mm DIN-flow cup DIN ISO 2431 |
| Vapour density | not available |
| Evaporation rate | not available |
| VOM | 75 g/Ltr. (220 g/Ltr. minus water and exempt solvent) |

### 9.3 Other Information

none

## 10 Stability and Reactivity

### 10.1 Conditions to avoid

In order to avoid prolysis, avoid overheating.

### 10.2 Materials to avoid

Light metals, aluminium, oxidants, steel.

### 10.3 Hazardous reactions

Generation of peroxide possible. Reacts with oxidants. Reacts with light metals, generating hydrogen. Generation of flammable mixtures with air when heated above flashpoint and/or atomized or sprayed.

### 10.4 Hazardous decomposition products

When heated above 300℃ or in case of fire, product releases carbon monoxide and carbon dioxid. In case of fire, other hazardous products can be generated.

## 11 Toxicological information

### 11.1 Acute toxicity

### 11.1.1 Acute oral toxicity

| | | |
|---|---|---|
| acrylate dispersion | LD50/rat | 5 000 mg/kg |
| n-(y-butoxyethoxy)ethanol | LD50/rat | 5 660 mg/kg |
| n-butoxyethanol | LD50/rat | 470 mg/kg |

### 11.1.2 Acute inhalative toxicity

| | | |
|---|---|---|
| n-butoxyethanol | LC50/4h/rat | 2,2 mg/l |
| acetone | LC50/4h/rat | |

### 11.1.3 Acute dermal toxicity

| | | |
|---|---|---|
| acrylate dispersion | LD50/rabbit | 5 000 mg/kg |
| n-(y-butoxyethoxy)ethanol | LD50/rabbit | 4 120 mg/kg |
| n-butoxyethanol | LD50/rabbit | 220 mg/kg |

### 11.2 Primary irritation

| | |
|---|---|
| Skin: | possible after prolonged exposure |
| Eyes: | slightly irritating |

### 11.3 Sensitization

No known sensitizing effect.

## 12 Ecological Information

### 12.1 Ecotoxicity

### 12.1.1 Fish toxicity

| | | |
|---|---|---|
| acrylate dispersion | LC50/96h/ | no data available |
| n-(y-butoxyethoxy)ethanol | LC50/96h | 1 300 mg/l |
| n-butoxyethanol | LC50/96h | 1 490 mg/l |
| ammonia solution | LC50/24h | 0,097 mg/l |

### 12.1.2 Algae toxicity

| | | |
|---|---|---|
| n-(y-butoxyethoxy)ethanol | EC50/96h/alga | > 100 mg/l |
| n-butoxyethanol | EC50/24h/alga | 1 698 – 1 940 mg/l |

### 12.1.3 Water toxicity

| | | |
|---|---|---|
| n-(y-butoxyethoxy)ethanol | ED50/48h/daphnia | > 100 mg/l |
| n-methoxy-y-propanol | ED50/48h/daphnia | 23 300 mg/l |

### 12.1.4 Bacteria toxicity

| | | |
|---|---|---|
| n-butoxyethanol | EC0/16h | 700 mg/l |

### 12.2 Mobility

No data available

### 12.3 Persistence and degradability

No data available

### 12.4 Bioaccummulative potential

No data available

### 12.5 Other adverse effects

Water hazard classification 1 according to the German Ordinance pertaining to Substances Hazardous to Water (VwVwS)

## 13 Disposal Considerations

### 13.1 Product

*Recommendation*

Must not be disposed of together with domestic waste. Do not release into sewage system. Dispose of in accordance with national, regional and local provisions that may be in force.

| | |
|---|---|
| *Waste key number:* 070100 | Waste from production, preparation, distribution and use of organic essential chemicals |

### 13.2 Dirty packaging

Clean packaging with water. Dispose of wastewater according to national, regional and local provisions that may be in force. Cleaned containers are fit for re-use.

## 14 Transport Information

**14.1 Roads and Railways** **ADR, RID**
not applicable

**14.2 Inland navigation vessel** **ADN, ADNR**
no data available

**14.3 See** **IMDG-Code**
not applicable

**14.4 Air** **COA,PAX**
not applicable

Transport regulations are quoted in accordance with national regulation and applicability. Potential deviations from regulations in other countries have not been considered.

## 15 Regulatory Information

Identification according to EEC-directive: Xn harmful to health

Safety classified components:

| | |
|---|---|
| R20/21/22 | Harmful by inhalation, in contact with skin and if swallowed. |
| R36/37/38 | Irritating to eyes, to respiratory system and to skin |
| R43 | May cause sensitisation by skin contact |
| R66 | Repeated exposure may cause skin dryness or cracking. |
| R67 | Vapours may cause drowsiness and dizziness. |
| | |
| S24/S25 | Avoid contact with skin and eyes. |
| S36/S37S39 | Wear suitable protective clothing, gloves and eye/face protection. |

| | |
|---|---|
| Special identification particular preparations: | not applicable |
| Information on employment restriction: | observe employment restriction according to §22 German Young Persons Employment Act (JarbSchG) and §§4 and 5 German Maternity Protection Ordinance (MuSchRiV) |
| Hazardous incidendtV: | not applicable |
| Classification according to VbF: | not applicable |
| Technical instruction on air quality control: | no data available |
| Water hazard classification (WGK): | WGK 1 (low hazardous to water)) |
| volatile organic compounds (VOM) | 75 g/Ltr. |
| volatile organic compounds (VOM) without water and exempt solvent: | 220g/Ltr. |

## 16 Other Information

The information and recommendations as stated in this MSDS are presented in good faith and according to our knowledge at the time of review of this document. We are supplying this information to give you advice on the safe handling of the product presented herein with regard to storage, use, transport and disposal. The information as stated herein is not transferable to other products. If the product described in this MSDS is blended, mixed or processed with other materials, or if the product is made subject to a process, the information given in this document cannot be automatically transferred.

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH)

Printed 19.11.2013
revision 17.01.2012 (GB) Version 1.2

**GB - PERMAPHOB EF**
307 - 0302

## ! SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

| | |
|---|---|
| **Name of product** | GB - PERMAPHOB EF<br>QM-Nr.: 307 - 0302 |

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Recommended intended purpose(s)**
Additive for earth-moist concrete-mixtures

### 1.3. Details of the supplier of the safety data sheet

| | |
|---|---|
| **Manufacturer/distributor** | BETRA Beton- und Baustoffverfahrenstechnik GmbH<br>Otto-Lilienthal-Str. 21, D-33181 Bad Wünnenberg/Haaren<br>Phone +49 (0) 2957-984011, Fax +49 (0) 2957-984098<br>E-Mail fritz.toellner@betra.com<br>Internet www.betra.com |
| **Advice** | Abteilung: REACH<br>Phone +49 (0) 2957-984011<br>Fax +49 (0) 2957-984098 |

### 1.4. Emergency telephone number

| | |
|---|---|
| **Emergency advice** | Phone 0049 - 29 57/98 40 11<br>This number is only available at office times. |

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

No information available.

### 2.2. Label elements

**Labelling according to 1999/45/EC**

**Remarks for labelling**
The product does not require a hazard warning label in accordance with EC directives.
Does not require a hazard warning label, but the normal safety precautions for handling chemicals must be observed.

### 2.3. Other hazards

PBT - and vPvB judgement, currently no information are available

**Information pertaining to special dangers for human and environment**
The formulation is according to guideline 1999/45/EG and their alterations not as dangerous classified.

## SECTION 3: Composition/ information on ingredients

### 3.1. Substances

not applicable

### 3.2. Mixtures

**Hazardous ingredients**

| CAS No | EC No | Name | [% weight] | Classification according to 67/548/EEC |
|---|---|---|---|---|
| 1310-58-3 | 215-181-3 | potassium-hydroxide | < 0,2 | Xn R22; C R35 |

| CAS No | EC No | Name | [% weight] | Classification according to Regulation (EC) No 1272/2008 [CLP/ GHS] |
|---|---|---|---|---|
| 1310-58-3 | 215-181-3 | potassium-hydroxide | < 0,2 | Acute Tox. 4, H302 / Skin Corr. 1A, H314 |

**Description**
watery modification

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

**General information**
Remove contaminated soaked clothing immediately.

**In case of inhalation**
Ensure of fresh air.
In the event of symptoms refer for medical treatment.

**In case of skin contact**
In case of contact with skin wash off immediately with soap and water.

**In case of eye contact**
In case of contact with eyes rinse thoroughly with plenty of water and seek medical advice.

**In case of ingestion**
Do not induce vomiting.
Seek medical advice immediately.
Rinse out mouth thoroughly with water.

### 4.2. Most important symptoms and effects, both acute and delayed

No information available.

### 4.3. Indication of any immediate medical attention and special treatment needed

No information available.

## ! SECTION 5: Firefighting measures

### 5.1. Extinguishing media

**Suitable extinguishing media**
Fire-extinguishing activities according to surrounding.
Alcohol-resistant foam
Carbon dioxide
Water spray jet

**Unsuitable extinguishing media**
Full water jet

### 5.2. Special hazards arising from the substance or mixture
No information available.

### 5.3. Advice for firefighters
**Special protective equipment for fire-fighters**
Use breathing apparatus with independent air supply.
Wear full protective clothing.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures
Use personal protective clothing.
Eye- and skin contact as well as inhalation avoid
Forms slippery surfaces with water.

### 6.2. Environmental precautions
Do not discharge into the drains or bodies of water..
Do not discharge into surface waters/groundwater.
Prevent spread over a wide area (e.g. by containment or oil barriers).

### 6.3. Methods and material for containment and cleaning up
Take up with absorbent material (e.g. sand, sawdust).
**Additional Information**
Informations for disposal see chapter 13.

### 6.4. Reference to other sections
No information available.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling
**Advice on safe handling**
Care for suitable extraction / ventilation at processing machines.
Ocular contact and skin contact as well as inhalation avoid.
Take the usual precautions when handling with chemicals.

**General protective measures**
Avoid contact with eyes and skin

**Hygiene measures**
Wash soiled clothing immediately.
The general hygiene measures in dealing with chemicals are to be applied.
Keep separated from food and feed.
Wash hands before breaks and after work.

**Advice on protection against fire and explosion**
Keep away from sources of ignition
Pay attention to general rules of internal fire prevention.

### 7.2. Conditions for safe storage, including any incompatibilities
**Requirements for storage rooms and vessels**
Keep in closed original container.

**Further information on storage conditions**
Protect from frost.
Protect from direct solar radiation.
Recommended storage temperature: room temperature.

**Information on storage stability**
Storage time less than 6 months.

**Storage group** No storage classification.

### 7.3. Specific end use(s)

No information available.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No information available.

### 8.2. Exposure controls

**Respiratory protection**
Properly conformist, air-cleaning or aerial-fed oxygen mask corresponding to an approved norm if the risk assessment this requires.

**Hand protection**
chemical-resistant gloves (EN 374)

**Eye protection**
safety goggles / face protection (EN 166)

**Skin protection**
protective clothing

**Additional advice on system design**
Withdrawal system or another technical equipment intend which prevents the aerosol education or education of fine spray.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| **Form** | **Colour** | **Odour** |
|---|---|---|
| liquid | white | characteristic |

**Important health, safety and environmental information**

| | Value | Temperature | at | Method | Remark |
|---|---|---|---|---|---|
| **pH value in delivery state** | ca. 11 - 13 | 20 °C | | | |
| **Relative density** | ca. 1,02 g/cm3 | 20 °C | | | |
| **Solubility in water** | | | | | miscible |
| **Viscosity** | ca. 155 cSt | 20 °C | | VF 2021-077 | |

### 9.2. Other information

No information available.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No information available.

### 10.2. Chemical stability

No information available.

### 10.3. Possibility of hazardous reactions

No information available.

### 10.4. Conditions to avoid

No information available.

### 10.5. Incompatible materials

**Materials to avoid**

Reactions with strong acids.
Reactions with strong oxidising agents.

### 10.6. Hazardous decomposition products

No hazardous decomposition products known.

**Additional information**

Under normal storage and use terms the product is stable

## ! SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

**Acute toxicity/Irritability/Sensitization**

| | Value/Validation | Species | Method | Remark |
|---|---|---|---|---|
| **LD50 acute oral** | | | | not available |
| **LD50 acute dermal** | | | | not available |
| **LC50 acute inhalation** | | | | not available |
| **Irritability skin** | Frequent or longer continual skin contact can degrease and dry out the skin which can lead to skin complaints and skin inflammations (dermatitis). | | | |
| **Irritability eye** | low irritant - no labeling duty | | | |
| **Skin sensitization** | not available | | | |

| | Value/Validation | Species | Method | Remark |
|---|---|---|---|---|
| **Sensitization respiratory system** | not available | | | |

**Additional information**
Due to the low free alkalinity (< 0,046 %), the product in spite of the pH-value from > 11,5 is not classified as "corrosive" or "irritant".

## SECTION 12: Ecological information

### 12.1. Toxicity
No information available.

### 12.2. Persistence and degradability
No information available.

### 12.3. Bioaccumulative potential
No information available.

### 12.4. Mobility in soil
No information available.

### 12.5. Results of PBT and vPvB assessment
No information available.

### 12.6. Other adverse effects

**General regulation**
PBT - and vPvB judgement, currently no information are available
Product is not allowed to be discharged into aquatic environment, drains or sewage treatment plants.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods
**Recommendations for the product**
Remove in accordance with local official regulations.

**Recommendations for packaging**
Totally emptied packaging may be taken for recycling.

**Recommended cleansing agent**
Water

**General information**
Waste keys are recommendations on account of ese of the product. On account of the special use and disposal circumstances other waste keys can be also assigned possibly. (2001-118+119+573 / the EC)

## SECTION 14: Transport information

**Transport/further information**
No dangerous goods as defined by the transport regulations - ADR/RID, IMDG, ICAO/IATA-DGR.

**Special precautions for user**
No information available.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**
No information available.

## SECTION 15: Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

**National regulations**

**Restriction of occupation**
Observe employment restrictions for young people.

| | | |
|---|---|---|
| **Water hazard class** | 1 | self-classification<br>low hazardous to waters |

### 15.2. Chemical Safety Assessment

No information available.

## SECTION 16: Other information

**Recommended uses and restrictions**
National and local regulations concerning chemicals shall be observed.

**Further information**
working-medical regulations follow
The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

**Sources of key data used**
A final statement of the suitability of the single materials is incumbent only upon the responsibility of the user.
After our state of knowlege the information contained here is correct. The manufacturer does not assume any liability with regard to corectness or completeness of the indicated information.

**Wording of the R/H-phrases specified in chapter 3 (not the classification of the mixture!)**

R 22 Harmful if swallowed.
R 35 Causes severe burns.

| | |
|---|---|
| H302 | Harmful if swallowed. |
| H314 | Causes severe skin burns and eye damage. |

**SUREBOND**

## SAFETY DATA SHEET

# SB-10 PAVER BOND

Revision Date:11/14/2017

## SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

| | | |
|---|---|---|
| **Product Name:** | **SB-10 Paver Bond Adhesive** | |
| **Company Name:** | **SEK/SUREBOND**<br>3925 Stern Ave., St. Charles, IL 60174 | Phone: (800) 932-3343 |
| **Emergency Phone (24 hour):** | **CHEMTREC** | 800-424-9300 |
| **Chemtrec (outside USA):** | (703) 527-3887 | |

## SECTION 2 - HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW**

**DANGER:** ABRASION COULD RELEASE RESPIRABLE PARTICLES OF SILICA QUARTZ, A CANCER HAZARD BY INHALATION. NORMAL USE OF THIS PRODUCT CAUSES NO SUCH RELEASE.

HIGHLY FLAMMABLE LIQUID AND VAPOR.
CAUSES SKIN IRRITATION.
CAUSES SERIOUS EYE IRRITATION.

| **HAZARD CLASS:** | **HAZARD CATEGORY** |
|---|---|
| Flammable Liquid | 2 |
| Skin Irritation | 2 |
| Eye Irritation | 2A |

4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

**PICTOGRAMS**

**PRECAUTIONARY STATEMENTS:**

**Prevention:** Keep away from heat, sparks, open flames, hot surfaces - no smoking. Keep container tightly closed. No release into water. Use explosion-proof equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. Wear protective gloves, eye protection, and face protection.

**Response:** If on skin (or hair): Take off immediately all contaminated clothing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to remove. Continue rinsing. If skin irritation occurs: Get medical attention. If eye irritation persists: Get medical attention. Take off contaminated clothing. In case of fire: Use foam, dry chemical or carbon dioxide to extinguish.

**Storage:** Store in a well-ventilated place. Keep cool.

**Disposal:** Dispose of contents and/or container according to Federal, State/Provincial and local governmental regulations.

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910. 1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

See Section 11 for additional toxicological information.

## SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

| Chemical Name | CAS # | % |
|---|---|---|
| Limestone | 1317-65-3 | 10 - 30 |
| Kaolin | 1332-58-7 | 10 - 30 |
| Acetone | 67-64-1 | 10 - 30 |
|  | Unknown | 5 - 10 |

| Chemical Name | CAS # | % |
|---|---|---|
| Pentaerythritol ester of rosin | Proprietary | 1 - 5 |
| Methyl Acetate | 79-20-9 | 1 - 5 |
|  | Unknown | 1 - 5 |
| Quartz (SiO2) | 14808-60-7 | 0.1 - 1 |

## SECTION 4 - FIRST AID MEASURES

**Inhalation:** If inhaled, immediately remove the affected person to fresh air. If breathing is difficult, give oxygen. If symptoms develop and persist, get medical attention.

**Skin Contact:** Immediately wash skin thoroughly with soap and water. If symptoms develop and persist, get medical attention.

**Eye Contact:** In case of contact with the eyes, rinse immediately with plenty of water for 15 minutes, and seek immediate medical attention.

**Ingestion:** Do not induce vomiting, seek medical advice immediately.

**Symptoms:** See Section 11.

**Notes to Physician:** Treat symptomatically and supportively.

## SECTION 5 - FIRE FIGHTING MEASURES

**Extinguishing media:** Water spray (fog), foam, dry chemical or carbon dioxide. In case of fire, keep containers cool with water spray.

**Special firefighting procedures:** Wear a self-contained breathing apparatus with a full face piece operated in pressure-demand or other positive pressure mode. Wear full protective clothing.

**Unusual fire or explosion hazards:** Closed containers may explode when exposed to extreme heat. Vapors may form explosive mixtures with air. Vapors are heavier than air and may travel along floor to an ignition source.

**Hazardous combustion products:** Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

## SECTION 6 - ACCIDENTAL RELEASE MEASURES

**Use personal protection recommended in Section 8, isolate the hazard area and deny entry to unnecessary and unprotected personnel.**

**Environmental Precautions:** Eliminate all sources of ignition or flammables that may come into contact with a spill of this material. Do not allow to enter sewer or waterways.

**Clean-up Methods:** Use noncombustible absorbent material such as sand. Use non-sparking tools for clean-up. Absorb spill with inert material. Shovel material into appropriate container for disposal. Wear suitable protective clothing, gloves and eye/face protection. Dispose of according to Federal, State and local governmental regulations.

# SB-10 PAVER BOND

## SECTION 7 - HANDLING AND STORAGE

| | |
|---|---|
| **Handling:** | Do not pressurize, cut, heat or weld containers. Empty product containers may contain product residue. Do not reuse empty containers. Use only in well-ventilated areas. Keep out of the reach of children. |
| **Storage:** | For safe storage, store between -20°C (-4°F) and 50°C (122°F). Keep away from heat, spark and flame. Keep containers closed when not in use. |

For information on product shelf life, please review labels on container or check the Technical Data Sheet.

## SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

**Employers should complete an assessment of all workplaces to determine the need for, and selection of, proper exposure controls and protective equipment for each task performed.**

| Hazardous component(s) | ACGIH TLV | OSHA PEL | AIHA WEEL | OTHER |
|---|---|---|---|---|
| Limestone | 10 mg/m3 TWA<br>Total dust. | 5 mg/m3 PEL. Respirable fraction<br>15 mg/m3 PEL. Total dust. | None | None |
| Kaolin | 2 mg/m3 TWA<br>Respirable fraction | 15 mg/m3 PEL. Total dust.<br>5 mg/m3 PEL. Respirable fraction | None | None |
| Acetone | 500 ppm TWA<br>750 ppm STEL | 1,000 ppm (2,400 mg/m3) TWA | None | None |
| Pentaerythritol Ester of Rosin | None | None | None | None |
| Methyl Acetate | 200 ppm TWA<br>250 ppm STEL | 220 ppm (610 mg/m3) PEL | None | None |
| Quartz ($SiO_2$) | 0.025 mg/m3 TWA<br>Respirable fraction. | 2.4 MPPCF TWA. Respirable.<br>0.1 mg/m3 TWA. Respirable.<br>0.3 mg/m3 TWA. Total dust. | None | None |

| | |
|---|---|
| **Engineering Controls:** | Local exhaust ventilation is recommended when general ventilation is not sufficient to control airborne contamination below occupational exposure limits. |
| **Respiratory Protection:** | Use a NIOSH approved air-purifying respirator if the potential to exceed established exposure limits exists. When workplace hazards warrant the use of a respirator, appropriate respirators must be used, and a program that follows 29 CFR 1910.134 must be followed. |
| **Eye/Face Protection:** | Safety goggles or safety glasses with side shields. |
| **Skin Protection:** | Chemical resistant, impermeable gloves. |

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Physical State:** | Liquid or paste |
| **Color:** | Light tan |
| **Odor:** | Acetone |
| **Odor threshold:** | Not available |
| **pH:** | 7 |
| **Vapor Pressure (mmHg):** | Not available |
| **Boiling point/range:** | 56 - 57°C (132.8 - 134.6°F) |
| **Melting point/range:** | <0°C (<32°F) |
| **Specific gravity:** | 1.39 |
| **Vapor Density (air = 1):** | 2.0 |

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES (CONTINUED)

| | |
|---|---|
| **Flash point:** | -17°C (1.4°F) |
| **Flammable/Explosive limits - lower:** | Not available |
| **Flammable/Explosive limits - upper:** | Not available |
| **Autoignition temperature:** | Not available |
| **Evaporation rate:** | 14.4 |
| **Solubility in water:** | Slightly soluble |
| **Partition coefficient (n-octanol/water):** | Not available |
| **VOC content:** | .25 %; 7.5 f/l (by weight, calculated using CARB method; g/L less water, less exempts calculated using SCAQMD method) |
| **Viscosity:** | 375,000 mPa.s |
| **Decomposition temperature:** | Not available |

## SECTION 10 - STABILITY AND REACTIVITY

| | |
|---|---|
| **Stability:** | Stable under normal conditions of storage and use. |
| **Hazardous reactions:** | Will not occur. |
| **Hazardous decomposition products:** | Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons. |
| **Incompatible materials:** | Strong oxidizing agents. |
| **Reactivity:** | Not available. |
| **Conditions to avoid:** | Heat, flames, sparks and other sources of ignition. |

## SECTION 11 - TOXICOLOGICAL INFORMATION

| | |
|---|---|
| **Relevant routes of exposure:** | Inhalation, skin contact. |

**Potential Health Effects/Symptoms**

| | |
|---|---|
| **Inhalation:** | Irritates the nose, throat and respiratory system. Exposure to high doses may cause central nervous system depression. Such doses may also cause adverse effects in the liver, kidneys and lungs. Abrasion of cured material such as by sanding or grinding could release respirable particles of silica quartz, a cancer hazard by inhalation. Normal use of this product causes no such release. Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. |
| **Skin contact:** | May cause irritation. |
| **Eye contact:** | Contact with eyes can cause eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. |
| **Ingestion:** | Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. |

## SECTION 11 - TOXICOLOGICAL INFORMATION

| Hazardous component(s) | LD50s and LC50s | Immediate and Delayed Health Effects |
|---|---|---|
| Limestone | None | Nuisance dust |
| Kaolin | Oral LD50 (RAT) = > 5,000 mg/kg<br>Dermal LD50 (RAT) = >5,000 mg/kg | Nuisance dust |
| Acetone | Oral LD50 (RABBIT) = 5,340 mg/kg<br>Oral LD50 (RAT) = 5,800 mg/kg<br>Oral LD50 (RAT) = 9,800 mg/kg<br>Dermal LD50 (RABBIT) = 20,000 mg/kg<br>Inhalation LC50 (RAT, 8 h) = 50.1 mg/l<br>Inhalation LC50 (RAT, 4 h) = 76 mg/l | Blood, central nervous system, irritant, reproductive |
| Pentaerythritol ester of rosin | None | No data |
| Methyl acetate | Oral LD50 (RABBIT) = 3.7 g/kg | Blood, central nervous system, eyes, irritant |
| Quartz (SiO2) | None | Immune system, lung, some evidence of carcinogenicity |

| Hazardous components | NTP Carcinogen | IARC Carcinogen | OSHA Carcinogen (Specifically Regulated) |
|---|---|---|---|
| Limestone | No | No | No |
| Kaolin | No | No | No |
| Acetone | No | No | No |
| Pentaerythritol ester of rosin | No | No | No |
| Methyl Acetate | No | No | No |
| Quartz (SiO2) | Known to be human carcinogen | Group 1 | No |

## SECTION 12 - ECOLOGICAL INFORMATION

**Ecological Information:** Not available

## SECTION 13 - DISPOSAL CONSIDERATIONS

**Recommended method of disposal:** Dispose of according to Federal, State and local governmental regulations.

**Hazardous waste number:** It is the responsibility of the user to determine if an item is hazardous as defined in the Resource Conservation and Recovery Act (RCRA) at the time of disposal. Product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics of the Toxicity Characteristics Leading Procedure (TCLP) 40 CFR 261.20-24. If discarded, this product is considered a RCRA ignitable waste, D001.

## SECTION 14 - TRANSPORT INFORMATION

**Ground Transport (DOT) - Domestic**

Units less than 5 L (1.3 gallons liquid) i.e. 10 oz., 28 oz., 1 gal.

| | |
|---|---|
| Proper Shipping Name: | CONSUMER COMMODITY |
| Classification: | ORM-D |
| DOT Label Required: | ORM-D |
| Shipping Document: | CONSUMER COMMODITY, ORM-D |
| ERG Code: | 171 |

## SECTION 15 - REGULATORY INFORMATION

**United States Regulatory Information:**

| | |
|---|---|
| **TSCA 8 (b) Inventory Status:** | All components are listed or are exempt from listing on the Toxic Substances Control Act Inventory. |
| **TSCA 12 (b) Export Notification:** | None above reporting de minimus |
| **CERCLA/SARA Section 302 EHS:** | None above reporting de minimus |
| **CERCLA/SARA Section 311/312:** | Fire, Immediate Health |
| **CERCLA/SARA 313:** | None above reporting de minimus |
| **California Proposition 65:** | This product contains a chemical known in the State of California to cause cancer. This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. |

**Canada Regulatory Information:**

| | |
|---|---|
| **CEPA DSL/NDSL Status:** | All components are listed on or are exempt from listing on the Canadian Domestic Substances List. |

## SECTION 16 - OTHER INFORMATION

| | |
|---|---|
| **Issue date:** | 11/14/2017 |

**Notice:** The data contained herein are furnished for information only and are believed to be reliable. However, Surebond and its affiliates does not assume responsibility for any results obtained by persons over whose methods Surebond has no control. It is the user's responsibility to determine the suitability of this product or any production methods mentioned herein for a particular purpose, and to adopt such precautions as may be advisable for the protection of property and persons against any hazards that may be involved in the handling and use of any Surebond's products. In light of the foregoing, Surebond specifically disclaims all warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, arising from sale or use of Surebond's products. Surebond further disclaims any liability for consequential or incidental damages of any kind, including lost profits.

# SAFETY DATA SHEET

## Section 1. Identification

| | |
|---|---|
| **Product Name:** | **SB-1300** |
| **Chemical Name:** | Mixture |
| **Synonyms:** | **Joint Stabilizing Sealer – Natural Look Matte Finish** |
| **Supplier's Details:** | SEK-Surebond Corporation<br>3925 Stern Avenue<br>St. Charles, IL 60174<br>(800) 932-3343<br>www.sek.us.com |
| **Emergency Telephone Number:** | CHEMTREC (800) 424-9300 (United States Only) |
| **Chemtrec (outside USA):** | (703) 527-3887 |

## Section 2. Hazards Identification

OSHA/HCS Status:

This product contains one or more chemicals considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Physical Hazards:

NA

Health Hazards:

SKIN IRRITATION - Category 3
INHALATION - Category 5

**GHS Label Elements:**

Hazard Pictograms: None

Signal Word: Warning

Hazard Statements:

H316 Causes mild skin irritation.
H333 May be harmful if inhaled.

**Precautionary Statements:**

Prevention:

Keep out of reach of children. Use only outdoors in a well-ventilated area. Wear protective gloves, clothing, face and eye protection. Wash thoroughly after handling.

Response:

**If swallowed:** Call a POISON CENTER or physician if you feel unwell.

**If on skin:** Wash with plenty of soap and water. Get medical attention if irritation occurs. Take off contaminated clothing and wash before reuse.

**If in eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if eye irritation persists.

**If inhaled:** Call a POSION CENTER or physician if you feel unwell.

**In case of fire:** Use water, water fog, dry chemical $CO_2$ or alcohol resistant foam to extinguish.

Storage:

Keep in a cool place. Do not allow to freeze.

Disposal:

Dispose of contents and container to appropriate waste site or reclaimer in accordance with all applicable laws, regulations, and product characteristics at time of disposal.

Hazards not otherwise classified:

None known.

## Section 3. Composition/Information on Ingredients

| | |
|---|---|
| **Substance/Mixtures** | Mixture |
| **Chemical Name:** | NA |
| **Other Means of Identification:** | SB-1300 Joint Stabilizing Sealer – Natural Look Matte Finish |

**CAS number/other identifiers:**

CAS Number: Mixture

| Chemical Name | Concentration | Additional Identification | Notes |
|---|---|---|---|
| 2-butoxyethanol | <2.5% | CAS-No.: 111-76-2 | % by weight |

**This substance has workplace exposure limit(s). See Section 8.**

## Section 4. First Aid Measures

**Description of Necessary First Aid Measures:**

Inhalation:

Move to fresh air. If breathing stops, provide artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Eye Contact:

Immediately flush with plenty of water for at least 15 minutes. Remove contact lenses if easy to do and present. Get medical attention if irritation persists.

Skin Contact:

Wash thoroughly after handling. Remove contaminated clothing and shoes. Get medical attention if irritation persists. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Ingestion:

Call a physician or poison control center if you feel unwell. Only induce vomiting at the instruction of medical personnel. Never give anything by mouth to an unconscious person.

**Most Important Symptoms/Effects (both acute and delayed):**

May irritate and cause redness and pain.

**Indication of immediate medical attention and special treatment needed (if necessary):**

| | |
|---|---|
| Hazards: | Glycol Ethers: Some glycol ethers cause adverse effects in animals that include the reproductive system, offspring, blood, kidney and liver. |
| Treatment: | Treat symptomatically. |

## Section 5. Firefighting Measures

| | |
|---|---|
| **General Fire Hazards:** | Not applicable. |

**Extinguishing Media:**

| | |
|---|---|
| Suitable Extinguishing Media: | Water. Water fog. Dry chemical. Carbon Dioxide. Alcohol resistant foam. |
| Unsuitable Extinguishing Media: | None known. |
| Hazardous Thermal Decomposition: | None known. |

**Special hazards arising from the substance or mixture:** None known.

**Advice for Firefighters:**

Special firefighting procedures:

Use water spray to keep fire-exposed containers cool.

Special Protective Equipment for Firefighters:

Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

## Section 6. Accidental Release Measures

**Personal Precautions, Protective Equipment and Emergency Procedures:**

Wear appropriate personal protective equipment.

**Environmental Precautions:**

Avoid release to the environment.

**Methods and Materials for Containment and Cleaning Up:**

Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Large spillages: Flush spill area with water spray. Prevent runoff from entering drains, sewers or streams. Dike for later disposal.

Notification Procedures:

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

## Section 7. Handling and Storage

**Precautions for Safe Handling:**

Avoid breathing mist or vapors. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Minimize exposure to air. After opening, purge container with nitrogen before reclosing. Periodically test for peroxide formation on long-term storage. Do not allow to evaporate to near dryness. Do not distill to near dryness. Addition of water or appropriate reducing materials will lessen peroxide formation.

**Conditions for Safe Storage, Including any Incompatibilities:**

Keep container tightly closed and in a well-ventilated place. Store away from heat. Do not allow to freeze.

**Storage stability:**

Shelf life, use within: 24 months

## Section 8. Exposure Controls/Personal Protection

**Control Parameters:**

**Occupational Exposure Limits:**

Country specific exposure limits have not been established or are not applicable unless listed below.

| Chemical Name | Type | Exposure Limit Values | Source |
|---|---|---|---|
| *2-butoxyethanol; ethylene glycol monobutyl ether; butyl cellosolve* | TWA | 20 ppm | US. ACGIH Threshold Limit Values (01 2010) |
| | PEL | 50 PPM 240 mg/m3 | US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006) |

**Biological Limit Values:**

| Chemical Name | Exposure Limit Values | Source |
|---|---|---|
| *2-butoxyethanol; ethylene glycol monobutyl ether; butyl cellosolve* | 20 mg/g (Creatinine in urine) | ACGIH BEL (01 2010) |

## Exposure Controls:

### Appropriate Engineering Controls:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

## Individual Protection Measures, Such As Personal Protective Equipment:

### General Information:

Eye bath. Washing facilities. Safety shower.

## Eye/Face Protection:

Wear safety glasses with side shields (or goggles) and a face shield. Wear a full-face respirator, if needed.

## Skin Protection:

### Hand Protection:

Wear chemical-resistant gloves, footwear and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.

### Other:

No data available.

## Respiratory Protection:

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

## Hygiene Measures:

Observe good industrial hygiene practices.

**Environmental Controls:**

No data available.

## Section 9. Physical and Chemical Properties

**Information on Basic Physical and Chemical Properties:**

| | |
|---|---|
| Appearance: | |
| Physical State: | Liquid |
| Form: | Liquid |
| Color: | White milky liquid |
| Odor: | Mild |
| Odor Threshold: | ND |
| pH: | 7-9 |
| Freezing Point: | 0° C |
| Boiling Point: | 100° C |
| Flash Point: | NA |
| Evaporation Rate: | NA |
| Flammability (solid, gas): | NA |
| Flammability – Upper (%)-: | NA |
| Flammability – Lower (%)-: | NA |
| Vapor Pressure: | 17mm@ 68°F (20°C) estimated |
| Vapor Density (air=1): | No data available |
| Specific Gravity: | 1.0 – 1.05 (20°C) |
| Solubility: | |
| Solubility in Water: | Miscible |
| Solubility (other): | No data available |
| Partition coefficient (n-octanol/water): | No data available |
| Auto-ignition Temperature: | No data available |
| Decomposition Temperature: | No data available |
| Dynamic Viscosity: | No data available |
| Kinematic Viscosity: | No data available |
| Explosive Properties: | No data available |
| Oxidizing Properties: | Not classified |

## Section 10. Stability and Reactivity

| | |
|---|---|
| Reactivity: | None known |
| Chemical Stability: | Stable |
| Possibility of Hazardous Reactions: | None known |
| Conditions to Avoid: | Heat, sparks, flames |
| Incompatible Materials: | Strong oxidizing agents |
| Hazardous Decomposition Products: | Carbon Dioxide<br>Carbon Monoxide |

## Section 11. Toxicological Information

### Information on Likely Routes of Exposure:

| | |
|---|---|
| Inhalation: | May be harmful if inhaled. |
| Ingestion: | May be harmful if swallowed. |
| Skin Contact: | May cause skin irritation. |
| Eye Contact: | May cause eye irritation. |

### Information on Toxicological Effects:

### Acute Toxicity:

**Oral**

| | |
|---|---|
| Product: | Oral LD-50: (Rat): 1,300 mg/kg *(2-butoxoxyethanol)*<br>Oral LD-50: (Guinea Pig): 1,400 mg/kg *(2-butoxoxyethanol)* |

**Dermal**

| | |
|---|---|
| Product: | Dermal LD-50: (Rat): > 2,000 mg/kg *(2-butoxoxyethanol)*<br>Dermal LD-50: (Guinea Pig): > 2,000 mg/kg *(2-butoxoxyethanol)* |

**Inhalation**

| | |
|---|---|
| Product: | Vapour: LC50 (Rat, 3 h): > 4.9 mg/l *(2-butoxoxyethanol)*<br>Vapour: LC0 (Guinea Pig, 1 h): > 3.4 mg/l *(2-butoxoxyethanol)* |

**Repeated Dose Toxicity**

| | |
|---|---|
| Product: | LOAEL (Rat, Oral Study): 69 mg/kg (Target Organ(s): Liver) *(2-butoxoxyethanol)*<br>NOAEL (Rat, Dermal Study): 150 mg/kg *(2-butoxoxyethanol)*<br>LOAEC (Rat, Inhalation Study): 152 mg/m$^3$ (Target Organ(s): Blood) *(2-butoxoxyethanol)* |

**Skin Corrosion/Irritation**

| | |
|---|---|
| Product: | (Rabbit, 24 h): moderate *(2-butoxoxyethanol)* |

**Serious Eye Damage/Eye Irritation**

**Product:** (Rabbit, 24 h): moderate *(2-butoxoxyethanol)*

### Respiratory or Skin Sensitization

**Product:** Skin Sensitization: (Guinea Pig) – Not a skin sensitizer.

### Mutagenicity:

### In Vitro

**Product:** Salmonella typhimurium assay (Ames test): negative +/- activation.

### In Vivo

**Product:** Chromosomal aberration intraperitoneal injection (Mouse, Male): Negative.

### Carcinogenicity

**Product:** Based on available data the classification criteria are not met. Not classified as hazardous.

### Reproductive Toxicity

**Product:** Based on available data the classification criteria are not met. Not classified as hazardous.

### Specific Target Organ Toxicity – Single Exposure

**Product:** Not classified.

### Specific Target Organ Toxicity – Repeated Exposure

**Product:** Not classified.

### Aspiration Hazard

**Product:** Droplets of the product aspirated into the lungs through ingestion or vomiting may be harmful.

### Other Adverse Effects

No data available.

## Section 12. Ecological Information

### Toxicity:

### Acute Toxicity:

### Fish

**Product:** LC-50 (Oncorhynchus mykiss, 96h): 1,474 mg/l *(2-butoxoxyethanol)*

### Aquatic Invertebrates

**Product:** EC-50 (Water Flea, 48 h): 1,550 mg/l *(2-butoxoxyethanol)*

## Chronic Toxicity:

### Fish

**Product:** NOEC (Zebra Fish, 21 d): > 100 mg/l *(2-butoxoxyethanol)*

### Aquatic Invertebrates

**Product:** NOEC (daphnid, 21 d): 100 mg/l *(2-butoxoxyethanol)*

### Toxicity to Aquatic Plants

**Product:** EC-50 (Algae (Pseudokirchneriella subcapitata, 72 h): 1,840 mg/l *(2-butoxoxyethanol)*

## Persistence and Degradability:

### Biodegradation

**Product:** Material is expected to be readily biodegradable.

### Biological Oxygen Demand

| | |
|---|---|
| Product: | No data available. |
| Specified Substance(s) | |
| 2-butoxyethanol; ethylene glycol monobutyl ether; butyl cellosolve | No data available. |

### Chemical Oxygen Demand

| | |
|---|---|
| Product: | No data available. |
| Specified Substance(s) | |
| 2-butoxyethanol; ethylene glycol monobutyl ether butyl cellosolve | No data available. |

### BOD/COD Ratio

| | |
|---|---|
| Product: | No data available. |
| Specified Substance(s) | |
| 2-butoxyethanol; ethylene glycol monobutyl ether; butyl cellosolve | No data available. |

### Bio accumulative Potential

| | |
|---|---|
| Product: | Potential to bio accumulate low. |

| | |
|---|---|
| **Mobility in Soil:** | Expected to partition to water. |
| **Results of PBT and vPvB Assessment:** | Not fulfilling PBT (persistent/bio accumulative/toxic) criteria. Not fulfilling vPvB (very persistent, very bio accumulative) criteria. |

## Section 13. Disposal Considerations

**Waste Treatment Methods:**

| | |
|---|---|
| General Information: | No data available. |
| Disposal Methods: | Dispose of waste and residues in accordance with local authority requirements. Incinerate. Since emptied containers retain product residue, follow label warnings even after container is emptied. |

## Section 14. Transport Information

*Important Note: Shipping descriptions may vary based on mode of transport, quantities, package size, and/or origin and description. Consult your company's Hazardous Materials/Dangerous Goods expert for information specific to your situation.*

**DOT:**

Not regulated.

Possible Shipping Description(s):

Not regulated.

**IMDG-International Maritime Dangerous Goods Code:**

Class not regulated.

Possible Shipping Description(s):

Not regulated.

**IATA:**

Class not regulated.

Possible Shipping Description(s):
Not regulated.

## Section 15. Regulatory Information

**Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture:**

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and MSDS contains all the information required by the Controlled Products Regulations.

**WHMIS (Canada) Status**: Controlled

**SARA 311/312 Hazard Classifications:**

Immediate (acute) health hazard.
Delayed (chronic) health hazard.

**US EPCRA (SARA Title III) Section 313 – Toxic Chemical List:**
2-BUTOXYETHANOL (ETHYLENE GLYCOL MONOBUTYL ETHER) (GLYCOL ETHER CATEGORY)

**California Proposition 65:**
Warning: This product can expose you to propylene oxide, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

**OSHA:** Hazardous

**Components of this product are reported in the following inventories:**

**TCSA (US toxic Substances Control Act** All components of this product are listed or otherwise comply.

**AICS/NICNAS (Australian Inventory of Chemical Substances and National Industrial Chemicals Notification and Assessment Scheme):** All components of this product are listed or otherwise comply.

**DSL (Canadian Domestic Substances List) and CEPA (Canadian Environmental Protection Act):** All components of this product are listed or otherwise comply.

**AICS/NICNAS (Australian Inventory of Chemical Substances and National Industrial Chemicals Notification and Assessment Scheme:** All components of this product are listed or otherwise comply.

**MITI (Japanese Handbook of Existing and New Chemical Substances:** All components of this product are listed or otherwise comply.

**ECL (Korean Toxic Substances Control Act):** All components of this product are listed or otherwise comply.

**Philippines Inventory (PICCS):** All components of this product are listed or otherwise comply.

**Inventory of Existing Chemical Substances in China:** All components of this product are listed or otherwise comply.

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## Section 16. Other Information

| | |
|---|---|
| **Revision Information:** | Not relevant. |
| **Key Literature References and Sources for Data:** | No data available. |
| **Training Information:** | No data available. |
| **Date of Issue/Date of Revision:** | 8/14/2018 |

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# SAFETY DATA SHEET

## Section 1. Identification

**Product Name:** **SB-8700**
**Chemical Name:** Mixture
**Synonyms:** **Wet Look Joint Stabilizing Sealer with Antifungal**

**Supplier's Details:** SEK-Surebond Corporation
3925 Stern Avenue
St. Charles, IL 60174
(800) 932-3343
www.sek.us.com

**Emergency Telephone Number:** CHEMTREC (800) 424-9300 (United States Only)
**Chemtrec (outside USA):** (703) 527-3887

## Section 2. Hazards Identification

**Hazard Classification:**

**OSHA/HCS Status:**

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Physical Hazards:

- FLAMMABLE LIQUIDS – Category 2

Health Hazards:

- ASPIRATION HAZARD - Category 1
- ACUTE TOXICITY: SKIN – Category 4
- ACUTE TOXICITY: INHALATION – Category 4
- SKIN IRRITATION – Category 2
- EYE IRRITATION – Category 2A
- CARCINOGENICITY: INHALATION – Category 2
- SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation] – Category 3
- SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE); INHALATION– Category 2

**GHS Label Elements:**

Hazard Pictograms:

Signal Word: Danger

Hazard Statements:

Highly flammable liquid and vapor
Harmful in contact with skin or if inhaled
Causes serious eye irritation
Causes skin irritation
Suspected of causing cancer if inhaled
May be fatal if swallowed and enters airways
May cause respiratory irritation
May cause damage to organs through prolonged or repeated exposure if inhaled

**Precautionary Statements:**

Prevention:

Keep out of reach of children. Read label and obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink, or smoke when using this product. Wash thoroughly after handling. Use only outdoors in a well-ventilated area. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Ground and bond container and receiving equipment. Use explosion-proof equipment and only non-sparking tools. Take action to prevent static discharge. Wear protective gloves, clothing, face and eye protection. Keep container tightly closed. Do not breathe vapors, spray or mist.

Response:

Get medical attention if exposed and feel unwell or are concerned.

**IF INHALED:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if feel unwell.

**IF SWALLOWED:** Immediately call a POISON CENTER or physician. Do NOT induce vomiting.

**IF ON SKIN (or hair):** Immediately take off all contaminated clothing and wash before resue. Rinse skin with plenty of water or shower. Call a POISON CENTER or physician if you feel unwell.

**IF IN EYES:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if eye irritation occurs.

**IN CASE OF FIRE:** Use $CO_2$, dry chemical, or alcohol resistant foam to extinguish.

Storage:

Store locked up in original packaging in a cool, well-ventilated place. Do not allow to freeze.

Disposal:

Dispose of contents and container in accordance with all local, regional national and international regulations.

Hazards not otherwise classified:

Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

## Section 3. Composition/Information on Ingredients

**Substance/Mixture:** Mixture
**Chemical Name:** NA
**Other Means of Identification:** SB-8700 Wet Look Joint Stabilizing Sealer with Antifungal

**CAS number/other identifiers:**
CAS Number: Mixture

| Ingredient Name | % | CAS Number |
|---|---|---|
| Xylenes, mixed isomers | 5 - 10 | 1330-20-7 |
| Ethylbenzene | 1 - 3 | 100-41-4 |
| Carbonic Acid, dimethyl ester | 70 – 80 | 616-38-6 |
| Proprietary Polymer blend (non-hazardous) | 15 - 30 | *** |

*= Various **= Mixture ***= Proprietary

Any concentration shown as a range is to protect confidentiality or is due to the process of variation.

**Occupation exposure limits, if available, are listed in Section 8.**

## Section 4. First Aid Measures

**Description of Necessary First Aid Measures:**

Eye Contact:

Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 15 minutes. Get medical attention.

Inhalation:

Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If victim is not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. **Get medical attention.** If necessary, call a poison control center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin Contact:

Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 15 minutes. Get medical attention. If necessary, call a poison control center or physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion:

Get medical attention immediately. Call a poison control center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

## Most Important Symptoms/Effects, Acute:

### Potential acute health effects:

| | |
|---|---|
| Eye Contact: | Causes serious eye irritation. |
| Inhalation: | Harmful if inhaled. May cause respiratory irritation. |
| Skin Contact: | Harmful in contact with skin. Causes skin irritation. |
| Ingestion: | May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach. |

### Over-Exposure Signs/Symptoms:

| | |
|---|---|
| Eye Contact: | **Adverse symptoms may include the following:**<br>Pain or irritation<br>Watering<br>Redness |
| Inhalation: | **Adverse symptoms may include the following:**<br>Respiratory tract irritation<br>Coughing |
| Skin Contact: | **Adverse symptoms may include the following:**<br>Irritation<br>Redness |
| Ingestion: | **Adverse symptoms may include the following:**<br>Nausea or vomiting |

## Indication of immediate medical attention and special treatment needed (if necessary):

Notes to Physician:

If ingested, this material presents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is NOT recommended. Consider activated charcoal and/or gastric lavage. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

Specific Treatments:

Treat symptomatically and supportively.

Protection of First-Aiders:

No action shall be taken involving any personal risk or without suitable training. If it is suspected that gas or vapor is still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

**See Toxicological Information (Section 11)**

## Section 5. Firefighting Measures

**Specific Hazards Arising From the Chemical:**

Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

**Extinguishing Media:**

| | |
|---|---|
| Suitable Extinguishing Media: | Use $CO_2$, dry chemical, or alcohol resistant foam to extinguish. |
| Unsuitable Extinguishing Media: | Do not use water jet. |
| Hazardous Thermal Decomposition Products: | Decomposition products may include the following materials:<br>Carbon dioxide<br>Carbon monoxide |

Special Protective Actions for Firefighters:

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special Protective Equipment for Firefighters:

Firefighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental Release Measures

**Personal Precautions, Protective Equipment and Emergency Procedures:**

For Non-Emergency Personnel:

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For Emergency Responders:

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For Non-Emergency Personnel".

Environmental Precautions:

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

**Methods and Materials for Containment and Cleaning Up:**

Small Spill:

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment.  Absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large Spill:

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7.  Handling and Storage

**Precautions for Safe Handling:**

Protective Measures:

Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on General Occupational Hygiene:

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for Safe Storage, Including any Incompatibilities:

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

**Storage stability:**

Shelf life, use within: 24 months

## Section 8. Exposure Controls/Personal Protection

**Control Parameters:**

**Occupational Exposure Limits:**

| **Ingredient Name** | **Exposure Limits** |
|---|---|
| Xylenes, mixed isomers | **ACGIH TLV (United States, 4/2014).** |
| | TWA: 100 ppm 8 hours. |
| | TWA: 434 mg/$m^3$ 8 hours. |
| | STEL: 150 ppm 15 minutes. |
| | STEL: 651 mg/$m^3$ 15 minutes. |
| | **OSHA PEL (United States, 2/2013).** |
| | TWA: 100 ppm 8 hours. |
| | TWA: 435 mg/$m^3$ 8 hours. |
| Ethylbenzene | **ACGIH TLV (United States, 4/2014).** |
| | TWA: 20 ppm 8 hours. |
| | **OSHA PEL (United States, 2/2013).** |
| | TWA: 100 ppm 8 hours. |
| | TWA: 435 mg/$m^3$ 8 hours. |

Appropriate Engineering Controls:

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental Exposure Controls:

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, vapor controls, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual Protection Measures:

**Hygiene Measures:**

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/Face Protection:**

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Splash goggles. Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. Chemical splash goggles. If inhalation hazards exist, a full-face respirator may be required instead.

**Skin Protection:**

Hand Protection:

Chemical-resistant gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.

Body Protection:

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other Skin Protection:

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory Protection:**

Use a properly fitted, air-purifying or supplied-air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and Chemical Properties

| | |
|---|---|
| Physical State: | Liquid |
| Color: | Transparent, colorless. |

| | |
|---|---|
| Odor: | Sweet, pungent aromatic hydrocarbon |
| pH: | Not available. |
| Melting Point: | 4°C (40°F) (Carbonic acid, dimethyl ester) |
| Boiling Point/Boiling Range: | 90°C (194°F) (Carbonic acid, dimethyl ester) |
| Flash Point: | est. Closed cup: 16°C (61°F) (Carbonic acid, dimethyl ester) |
| Evaporation Rate: | 0.8 (n-butyl acetate. = 1) (Carbonic acid, dimethyl ester) |
| Lower and Upper Explosive (Flammable) Limits: | Lower: 1% (Xylene)<br>Upper: 13% (Xylene) |
| Vapor Pressure: | 24 hPa (18 mm Hg) [70F] (Carbonic acid, dimethyl ester) |
| Vapor Density: | 3.20 [NBuAc=1] (Carbonic acid, dimethyl ester) |
| Relative Density: | 1.05 |
| Density lbs/gal: | 8.73 lbs/gal |
| Gravity, °API | ND |
| Solubility: | ND |
| Auto-ignition Temperature: | est. 432°C (809.6°F) (Xylene) |

## Section 10. Stability and Reactivity

Reactivity:

Not expected to be Explosive, Self-Reactive, Self-Heating, or an Organic Peroxide under US GHS Definition(s).

Chemical Stability:

The product is stable.

Possibility of Hazardous Reactions:

Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to Avoid:

Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible Materials:

Reactive or incompatible with the following materials: oxidizing materials

Hazardous Decomposition Products:

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## Section 11. Toxicological Information

### Information on Toxicological Effects:

**Acute Toxicity:**

| Product/Ingredient Name | Result | Species | Dose | Exposure |
|---|---|---|---|---|
| Xylenes, mixed isomers | LC50 Inhalation Gas. | Cat | 9500 ppm | 2 hours |

| | | | | |
|---|---|---|---|---|
| | LC50 Inhalation Gas. | Rat | 5000 ppm | 4 hours |
| | LC50 Inhalation Gas. | Rat | 6700 ppm | 4 hours |
| | LC50 Inhalation Gas. | Rat | 6670 ppm | 4 hours |
| | LD50 Oral | Mouse | 2119 mg/kg | - |
| | LD50 Oral | Rat | 4300 mg/kg | - |
| | LD50 Oral | Rat | 4300 mg/kg | - |
| Ethylbenzene | LD50 Dermal | Rabbit | >5000 mg/kg | - |
| | LD50 Oral | Rat | 3500 mg/kg | - |
| Carbonic acid, dimethyl ester | LC50 | Rat | >5.36 mg/l | |
| | ATE Dermal | | 2000 mg/kg | |

Conclusion/Summary:

**Xylenes, mixed isomers:** Effects from Acute Exposure:
ORAL ($LD_{50}$), Acute: 4,300 mg/kg [Rat].
INHALATION ($LD_{50}$), Acute: 4,550 ppm for four hours [Rat].
DERMAL ($LD_{50}$), Acute: 14,100 uL/kg [Rabbit].

Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, CNS damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross over-exposure.

**Ethylbenzene:** Effects from Acute Exposure:
ORAL ($LD_{50}$), Acute: 3,500 mg/kg [Rat].
DERMAL ($LD_{50}$), Acute: 17,800 uL/kg [Rabbit].
INTRAPERITONEAL ($LD_{50}$), Acute: 2,624 mg/kg [Rat].

**Effects from Prolonged or Repeated Exposure:**

Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). Also, the incidence of tumors was elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as “possibly carcinogenic to humans” (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

## Irritation/Corrosion:

| Product/Ingredient Name | Result | Species | Score | Exposure | Observation |
|---|---|---|---|---|---|
| Xylenes, mixed isomers | Skin-Mild Irritant | Rat | - | 8 hours 60 microliters | - |
| | Skin-Moderate Irritant | Rabbit | - | 24 hours 500 milligrams | - |
| | Skin – Moderate | Rabbit | - | 100 percent | - |

| | | | | | |
|---|---|---|---|---|---|
| | Irritant | | | | |
| Ethylbenzene | Skin – Mild Irritant | Rabbit | - | 24 hours 15 milligrams | - |

| | |
|---|---|
| Skin: | No additional information. |
| Eyes: | When splashed in the eyes, may cause burning pain, conjunctivitis, corneal vacuolation, and keratitis. |
| Respiratory: | No additional information. |

**Sensitization:**

| | |
|---|---|
| Skin: | No additional information. |
| Respiratory: | No additional information. |

**Mutagenicity:**

Conclusion/Summary: No additional information.

**Carcinogenicity:**

Conclusion/Summary: No additional information.

**Classification:**

| Product/Ingredient Name | OSHA | IARC | NTP |
|---|---|---|---|
| Xylenes, mixed isomers | - | 3 | - |
| Ethylbenzene | - | 2B | - |

**Reproductive Toxicity:**

Conclusion/Summary: No additional information.

**Teratogenicity:**

Conclusion/Summary: No additional information.

**Specific Target Organ Toxicity (Single Exposure):**

| Name | Category | Route Of Exposure | Target Organs |
|---|---|---|---|
| Ethylbenzene | Category 3 | Not Applicable. | Respiratory Tract Irritation |

**Specific Target Organ Toxicity (Repeated Exposure):**

| Name | Category | Route of Exposure | Target Organs |
|---|---|---|---|
| Ethylbenzene | Category 2 | Inhalation | Ears |

**Aspiration Hazard:**

| Name | Result |
|---|---|
| Ethylbenzene | ASPIRATION HAZARD – Category 1 |

Information on the Likely Routes of Exposure:

Routes of entry anticipated: Dermal, Inhalation.

### Potential Acute Health Effects:

| | |
|---|---|
| Eye Contact: | Causes serious eye irritation. |
| Inhalation: | Harmful if inhaled. May cause respiratory irritation. |
| Skin Contact: | Harmful in contact with skin. Causes skin irritation. |
| Ingestion: | May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach. |

### Symptoms Related to the Physical, Chemical and Toxicological Characteristics:

| | |
|---|---|
| Eye Contact: | **Adverse symptoms may include the following:**<br>Pain or Irritation<br>Watering<br>Redness |
| Inhalation: | **Adverse symptoms may include the following:**<br>Respiratory Tract Irritation<br>Coughing |
| Skin Contact: | **Adverse symptoms may include the following:**<br>Irritation<br>Redness |
| Ingestion: | **Adverse symptoms may include the following:**<br>Nausea or Vomiting |

### Potential Chronic Health Effects:

| | |
|---|---|
| General: | May cause damage to organs through prolonged or repeated exposure if inhaled. |
| Carcinogenicity: | Suspected of causing cancer if inhaled. Risk of cancer depends on duration and level of exposure. |
| Mutagenicity: | No significant effects or critical hazards. |
| Teratogenicity: | No significant effects or critical hazards. |
| Developmental Effects: | No significant effects or critical hazards. |
| Fertility Effects: | No significant effects or critical hazards. |

## Section 12. Ecological Information

### Toxicity:

| Product/Ingredient Name | Result | Species | Exposure |
|---|---|---|---|
| Xylene, mixed isomers | Acute EC50 90mg/l Fresh Water | Crustaceans-Cypris Subglobosa | 48 hours |
| | Acute LC50 8.5 ppm Marine Water | Crustaceans-Palaemonetes Pugio-Adult | 48 hours |

| | | | |
|---|---|---|---|
| | Acute LC50 8500 µg/l Marine Water | Crustaceasns-Palaemonetes Pugio | 48 hours |
| | Acute LC50 15700 µg/l Fresh water | Fish - Lepomis macrochirus - Juvenile (Fledgling, Hatchling, Weanling) | 96 hours |
| | Acute LC50 19000 µg/l Fresh water | Fish - Lepomis macrochirus | 96 hours |
| | Acute LC50 13400 µg/l Fresh water | Fish - Pimephales promelas | 96 hours |
| | Acute LC50 16940 µg/l Fresh water | Fish - Carassius auratus | 96 hours |
| Ethylbenzene | Acute EC50 4600 µg/l Fresh water | Algae - Pseudokirchneriella subcapitata | 72 hours |
| | Acute EC50 3600 µg/l Fresh water | Algae - Pseudokirchneriella subcapitata | 96 hours |
| | Acute EC50 2930 µg/l Fresh water | Daphnia - Daphnia magna - Neonate | 48 hours |
| | Acute LC50 5200 µg/l Marine water | Crustaceans - Americamysis bahia | 48 hours |
| | Acute LC50 4200 µg/l Fresh water | Fish - Oncorhynchus mykiss | 96 hours |
| | Chronic NOEC 1000 µg/l Fresh water | Algae - Pseudokirchneriella subcapitata | 96 hours |

Conclusion/Summary: Not available.

**Persistence and Degradability:**

Conclusion/Summary: Not available.

**Bioaccumulative Potential:**

| Product/Ingredient Name | LogP$_{ow}$ | BCF | Potential |
|---|---|---|---|
| Xylenes, Mixed Isomers | 3.12 | 8.12 to 25.9 | low |
| Ethylbenzene | 3.6 | - | low |

**Mobility in Soil:**

Soil/Water Partition Coefficient (K$_{OC}$): Not available.

Other Adverse Effects: No known significant effects or critical hazards.

## Section 13. Disposal Considerations

Disposal Methods:

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA Classification: D001, D018

**United States – RCRA Toxic Hazardous Waste "U" List:**

| Ingredient | CAS # | Status | Reference Number |
|---|---|---|---|
| Xylene | 1330-20-7 | Listed | U239 |

## Section 14. Transport Information

| | DOT Classification | IMDG | IATA |
|---|---|---|---|
| UN Number | UN1866 | UN1866 | UN1866 |
| UN Proper Shipping Name | Resin Solution | Resin Solution | Resin Solution |
| Transport Hazard Class | 3<br> | 3<br> | 3<br> |
| Packing Group | II | II | II |
| Environmental Hazards | No. | No. | No. |
| Additional Information | **Reportable Quantity:**<br>100 lbs / 45 kg (Carbonic acid, dimethyl ester) Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. | - | - |

Special Precautions for User:

**Transport within User's Premises:** Always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

## Section 15. Regulatory Information

**U.S. Federal Regulations:**

**United States Inventory (TSCA 8b):** All components are listed or exempted.
**Clean Water Act (CWA) 307:** Ethylbenzene
**Clean Water act (CWA) 311:** Xylene
This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800)424-8802.

**SARA 302/204:**
**Composition/Information on Ingredients**
SARA 304 RQ: Not applicable
**SARA 311/312:**
Classification: Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

**Composition/Information on Ingredients:**

| Name | Fire Hazard | Sudden Release of Pressure | Reactive | Immediate (acute) Health Hazard | Delayed (chronic) Health Hazard |
|---|---|---|---|---|---|
| Xylenes, mixed isomers | Yes. | No. | No. | Yes. | Yes. |
| Ethylbenzene | Yes. | No. | No. | Yes. | Yes. |

**SARA 313:**

| | Product Name | CAS Number | % |
|---|---|---|---|
| Form R-Reporting Requirements | Xylenes, mixed isomers<br>Ethylbenzene | 1330-20-7<br>100-41-4 | <9.0<br><3.0 |
| Supplier Notification | Xylenes, mixed isomers<br>Ethylbenzene | 13330-20-7<br>100-41-4 | <9.0<br><3.0 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

**State Regulations:**
Massachusetts: The following components are listed: XYLENE
New York: The following components are listed: Xylene (mixed)

| | |
|---|---|
| New Jersey: | The following components are listed: XYLENES |
| Pennsylvania: | The following components are listed: Dimethyl benzene(s) |

California PROP 65:

WARNING: This product can expose you to chemicals including ethyl benzene, which is known to the State of California to cause cancer, and toluene, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

| Ingredient Name | % | Cancer | Reproductive | No Significant Risk Level | Maximum Acceptable Dosage Level |
|---|---|---|---|---|---|
| Ethylbenzene | <0.3 | Yes. | No. | 41 µg/day (ingestion)<br>54 µg/day (inhalation) | No. |

**International Regulations:**

International Lists:

**Australia Inventory (AICS):** All components are listed or exempted.
**China inventory (IECSC)**: All components are listed or exempted.
**Japan inventory**: All components are listed or exempted.
**Korea inventory:** All components are listed or exempted.
**Malaysia Inventory (EHS Register**): All components are listed or exempted.
**New Zealand Inventory of Chemicals (NZIoC):** All components are listed or exempted.
**Philippines inventory (PICCS):** All components are listed or exempted.
**Taiwan inventory (CSNN):** All components are listed or exempted.
**Canada Inventory:** All components are listed or exempted.
**EU Inventory:** All components are listed or exempted.
**WHMIS (Canada):** Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

## Section 16. Other Information

**HMIS Hazard Ratings**

| | |
|---|---|
| HEALTH | 3* |
| FIRE | 4 |
| REACTIVITY | 0 |
| Personal Protective Equipment: | K: hood, gloves, protective suit & boots |

**NFPA Rating**

| | |
|---|---|
| HEALTH | 2 |
| FLAMMABILITY | 4 |
| REACTIVITY | 0 |

| | |
|---|---|
| Date of Issue/Date of Revision: | 1.19.22 |

Key to Abbreviations:

ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labeling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

## Notice to Reader

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SEK-Surebond is a registered trademark of SEK-Surebond Corporation.

# Tan Limestone
## Safety Data Sheet

## SECTION 1 : PRODUCT AND COMPANY IDENTIFICATION

Manufacturer Name: Coloured Aggregates Inc.

Address:
158 Don Hillock Drive
Unit 12 & 13
Aurora, Ontario
Canada, L4G 0G9

Telephone: 1.416.491.0230

Fax: 1.416.494.1014

Product Name: Tan Limestone

Synonyms: Limestone, Manufactured Sand

Restrictions on Use: For Industrial Use

## SECTION 2 : HAZARDS IDENTIFICATION

**Emergency Overview**
Appearance: Granules

Odor: Characteristic of sand or powder

Hazard Summary: No Information Available

**GHS Classification**

Carcinogenicity: Category 1A

Specific Target Organ: Category 2 (Lungs), Systematic toxicity – repeated

**GHS Label Element**

Hazard Pictogram

Signal Word: **DANGER**

Hazard Statements:

H350 May cause cancer.

H373 May cause damage to organs (Lungs) through prolonged or repeated exposure if inhaled.

Precautionary Statements:

**Prevention:**
P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.

P284 [In case of inadequate ventilation] wear respiratory protection.

**Response:**
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

**Storage:**
P402 Store in a dry place.

**Disposal:**
P501 Dispose of contents/ container to an approved waste disposal plant.

**Potential Health Effects**

**Carcinogenicity:**

| | |
|---|---|
| IARC | Group 1: Carcinogenic to Humans<br>Quartz 14808-60-7 |
| NTP | The NTP's report on Carcinogens lists crystalline silica (respirable size) as a known human carcinogen |

## SECTION 3 : COMPOSITION / INFORMATION ON INGREDIENTS

| **Chemical Name** | **CAS No.** | **Typical Composition** |
|---|---|---|
| Limestone | 1317-65-3 | Not Available |
| Silica, Quartz | 14808-60-7 | >0.1% |

## SECTION 4: FIRST AID MEASURES

| | |
|---|---|
| If Inhaled: | Move to fresh air in case of accidental inhalation of dust.<br>If symptoms persist, call a physician. |
| In case of skin contact: | Wash with water.<br>Apply common skin moisturizers to relieve dryness |
| In case of eye contact: | Flush eyes with water as a precaution.<br>Remove contact lenses.<br>Protect unharmed eye.<br>Keep eye wide open while rinsing. |
| If swallowed | Clean mouth with water and drink afterwards plenty of water.<br>Do not give milk or alcoholic beverages.<br>Never give anything by mouth to an unconscious person. |

## SECTION 5 : FIRE-FIGHTING MEASURES

| | |
|---|---|
| Suitable Extinguishing Media: | Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |

| | |
|---|---|
| Hazardous combustion products | No hazardous combustion products are known |
| Further information | The product itself is not flammable |
| Special protective equipment for fire-fighters | Fire-Fighters should wear appropriate protective equipment to fight the surrounding fire |

## SECTION 6 : ACCIDENTAL RELEASE MEASURES

| | |
|---|---|
| Personal precautions, protective equipment and emergency procedures: | Avoid dust formation.<br>Wear suitable protective equipment. |
| Environmental Precautions: | No special environmental precautions required.<br>Avoid dispersal of spilled material |
| Methods and materials for containment and cleaning up | Sweep up and Shovel.<br>Avoid creating dusty conditions.<br>Prevent wind dispersal. |

## SECTION 7 : HANDLING AND STORAGE

| | |
|---|---|
| Advice on protection against fire and Explosion. | The material is non-flammable |
| Advice on safe handling | Good housekeeping and environmental controls are important to prevent accumulation of dust in the work area. Avoid generating dust. The use of compressed air for cleaning clothing and equipment is not recommended. Handle open containers with care. |
| Conditions for safe storage: | Store in a dry place. |
| Materials to avoid: | Do not store near acids. |

## SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

| **Ingredients** | **CAS-No.** | **Value Type (Form of Exposure)** | **Control Parameters / Permissible Concentration** |
|---|---|---|---|
| Limestone | 1317-65-3 | TWA (Total Dust) | 10 mg/m$^3$ inhalable (PNOS) |
| | | TWA (Respirable Dust) | 3 mg/m$^3$ repireable (PNOS) |
| Silica, Quartz | 14808-60-7 | TWA (Total Dust) | 30 mg/m$^3$ / % $SiO_2$+2 |
| | | TWA (Respirable Dust) | 10 mg/m$^3$ / % $SiO_2$+2 |
| | | TWA (Respirable Dust) | 250 mppcf / % $SiO_2$+5 |

**Personal Protective Equipment**

| | |
|---|---|
| Respiratory protection: | Particulate mask suitable for exposures in working environment. |
| Hand protection: | Gloves can be worn if dryness is a problem, but are not required. |
| Skin protection: | Gloves or protective clothing can be worn if dryness is a problem, but are not required. |
| Eye protection: | Safety Glasses if user operation generates excessive dust. |

| | |
|---|---|
| Hygiene measures: | General Industrial Hygiene. |

## SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance: | Sand, Powder |
| Colour: | Tan |
| Odor: | None. |
| Boiling Point | Not Applicable. |
| Flash Point: | Does not Flash. |
| Flammability (Solid, Gas): | The Product is not flammable. |
| Lower Explosion Limit: | No data available |
| Vapor Pressure: | Not Applicable. |
| Density: | 2.5 – 2.8 g/cm$^3$ |
| Decomposition Temperature: | >800˚C |
| Explosive Properties: | Not Explosive. |
| Freezing Point: | No data available |
| pH | No data available |

## SECTION 10 : STABILITY AND REACTIVITY

| | |
|---|---|
| Reactivity: | Stable under recommended storage conditions. |
| Chemical Stability: | No decomposition if stored under normal conditions. |
| Possibilities of Hazardous Reactions: | Reacts with acids. It forms carbon dioxide (CO2). This displaces oxygen in the air in closed spaces. (Danger of suffocation). |
| Conditions to Avoid: | No data available. |

## SECTION 11 : TOXICOLOGICAL INFORMATION

| | |
|---|---|
| Acute toxicity | Not Classified |
| Skin corrosion / irritation | Not Classified |
| Serious eye damage / irritation | Not Classified |
| Respiratory or skin sensitization | Not Classified |
| Germ cell mutagenicity | Not Classified |

| | |
|---|---|
| Carcinogenicity | May cause cancer (inhalation) |
| **Quartz (14808-60-7)** | |
| IARC group | 1 Carcinogenic to Humans |
| Reproductive toxicity (single exposure) | Not Classified |
| Specific target organ toxicity (repeated exposure) | Not Classified |
| Aspiration hazard | Not Classified |
| Symptoms/injuries after inhalation | May cause irritation to the respiratory tract |
| Symptoms/injuries after skin contact | Repeated and/or prolonged skin contact may cause irritation or dryness |
| Symptoms/injuries after eye contact | May cause eye irritation |

## SECTION 12 : ECOLOGICAL INFORMATION

**Toxicity**

| | |
|---|---|
| Ecology - General | The product is not considered harmful to aquatic organisms or to cause long-term adverse effects to the environment. |
| Persistence and Degradability: | No additional information available |
| Bio accumulative potential: | No bioaccumulation. |
| Mobility in Soil: | No data available. |
| Effects on ozone layer: | No data available. |
| Effects on global warming | No known ecological damage caused by this product. |

## SECTION 13 : DISPOSAL CONSIDERATIONS

| | |
|---|---|
| Waste disposal recommendations | Dispose in a safe manner in accordance with local/national regulations. |

## SECTION 14 : TRANSPORT INFORMATION

| | |
|---|---|
| NAERG | Not Applicable |
| UN / IMDG / IATA / DOT / TDG | Not Regulated |

## SECTION 15 : REGULATORY INFORMATION

| | |
|---|---|
| Domestic Substances List | Limestone as well as its impurities are “substances occurring in nature” and considered to be on the Canadian Domestic Substances List. |
| Toxic Substances Control Act. | Limestone CAS# 1317-65-3 is listed on the U.S. EPA TSCA inventory. |
| OSHA Hazards. | Carcinogen. |

## SECTION 16 : OTHER INFORMATION

| | |
|---|---|
| Hazardous Material Information System (USA) | HMIS Rating |

| | |
|---|---|
| HEALTH | 1* |
| FIRE HAZARD | 0 |
| PHYSICAL HAZARD | 0 |
| PERSONAL PROTECTION | E |

This material safety datasheet only contains information relating to safety and does not replace any product information or product specification.

To the best of our knowledge, the information contained herein is accurate. However, neither Coloured Aggregates Inc. nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

| | |
|---|---|
| Author | Coloured Aggregates Inc. |
| Date of Issue | 2021 |
| Version | 002 |

**ROCKWOOD PIGMENTS**
*Colors • Systems • Solutions*

# MATERIAL SAFETY DATA SHEET

MSDS CODE: GF4

Date Revised: 07/17/2009
Prepared By: Nick Paris Reason for Revision: See Section 16

## 1. CHEMICAL, PRODUCT AND COMPANY IDENTIFICATION:

| | |
|---|---|
| Product Code(s): | **G8030** |
| Product Name: | Granufin® Onyx |
| Chemical Family: | Inorganic Metal Oxide |
| Synonyms: | Synthetic Iron Oxide, Iron Oxide Black |
| C.A.S. Number: | 1317-61-9 |
| Color Index Name: | Pigment Black 11 |
| Color Index Number: | 77499 |

Supplier's Name/Address:
Rockwood Pigments/Davis Colors, 7011 Muirkirk Road, Beltsville, Maryland, USA 20705
Business Tel: (301) 210-7800 9a-5p (0900-1700) EST M-F
Rockwood Pigments/Davis Colors, 3700 East Olympic Boulevard, Los Angeles, California, USA 90023
Business Tel: (323) 269-7311 9am-5pm (0900-1700) PST M-F

24 Hour Emergency (Chemtrec): 800-424-9300

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA Hazardous Ingredients (29CFR1910.1200):

| | | | Exposure Limits (8 Hrs.TWA) | |
|---|---|---|---|---|
| Components: | C.A.S. | % | OSHA PEL | ACGIH TLV |
| Silicon Dioxide-Amorphous ($SiO_2$) | 7631-86-9 | (1-3) | 6 mg/$m^3$ | 10 mg/$m^3$ |

Non-Hazardous Ingredients:

| | | | Exposure Limits (8 Hrs.TWA) | |
|---|---|---|---|---|
| Components: | C.A.S. | % | OSHA PEL | ACGIH TLV |
| Iron Oxide (Black) | 1317-61-9 | (93-98) | Not established. | Not established. |
| Anionic Dispersant | | (1-3) | Not established. | Not established. |
| Water | 7732-18-5 | (0.5-1.5) | Not established. | Not established. |

## 3. HAZARDS IDENTIFICATION

*********************************** EMERGENCY OVERVIEW ***********************************

Dry, black granular low-dust powder with little or no odor. Will not burn or react, but may auto-oxidize if exposed to heat in excess of 176F (80C) causing additional heat which may be sufficient to cause packaging to smoulder or ignite. Long-term inhalation can cause lung irritation or siderosis. Packaging material can burn or melt in fire, producing toxic smoke and fumes.

**************************************************************************************************************

HMIS Codes: H=0, F=0, R=1, P=0 (0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe)

Potential Health Effects:

| | |
|---|---|
| Eyes: | Non-irritating to the eyes. Excessive exposure to airborne dust may reduce visibility and/or cause unpleasant deposits. |
| Skin: | Will not irritate skin and is not likely to cause allergic skin reaction. Irritation to skin or mucous membranes can occur by direct mechanical action or by rigorous skin cleaning necessary for removal of dust. |
| Ingestion: | Small amount (less than one ounce/30 grams) swallowed is not likely to cause injury. If large amount ingested, may cause gastric irritation, nausea and diarrhea. Seek medical attention. |
| Inhalation: | Not a hazard in normal industrial use. Wear respirator and avoid breathing dust. As with all dusty materials, inhalation may cause respiratory irritation, sneezing, coughing, and runny nose. |

Human Effects and symptoms of overexposure:

| | |
|---|---|
| Acute: | To date, adverse health effects from exposure have not been reported among workers using this pigment. On the basis of Animal Toxicity Data (see Section 11), we would expect this product to be non-irritating to the eyes and skin and essentially non-toxic by ingestion. However, excessive exposure to airborne dust may reduce visibility and/or cause unpleasant deposits in the eyes, ears and nose. Irritation to skin or mucous membranes can occur by |

direct mechanical action or by rigorous skin cleaning necessary for removal of dust.

Chronic: Prolonged inhalation of amorphous silica may produce x-ray changes in the lungs without disability.

Other Effects: No chronic effects are known from repeated exposure to iron oxide PIGMENT. Prolonged inhalation (6 to 10 years) of iron oxide FUME has been reported to produce changes in lung x-rays of exposed individuals. This condition, siderosis, is considered to be benign pneumoconiosis that exhibits no adverse health effects. Siderosis has been observed among occupations such as arc-welders where iron oxide FUMES are present. To the best of our knowledge, this condition has not been observed after prolonged exposure to iron oxide pigment. There is no Iron Oxide FUME contained in this product and none should be generated under normal use.

Medical Conditions Aggravated by Exposure: None known

Carcinogenicity: IARC: Not Listed NTP: Not Listed OSHA: Not regulated

Other: IARC and NTP both contain listings for underground hematite mining. These listings are for the occupational exposures associated with the mining process which include radon, a known lung carcinogen. NIOSH in the Registry of Toxic Effects of Chemical Substances (RTECS) lists Iron Oxide as a suspect human carcinogen. However, the IARC reference to underground hematite mining is the source for this classification. Based on information currently available, this product is not considered a carcinogen.

## 4. FIRST AID MEASURES

Eyes: Flush eyes with water, lifting eyelids periodically. Remove contact lenses. Continue flushing for 15 minutes or until eyes return to normal. Get medical attention if irritation develops or persists.

Skin: Wash with soap and water. Get medical attention if irritation develops or persists. Wash clothing before re-use.

Ingestion: Swallowing less than an ounce (less than 30 grams) will not cause harm. For larger amounts, do not induce vomiting, but give one or two glasses of water to drink and Contact medical personnel or poison control center immediately. Do not give anything by mouth to an unconscious person.

Inhalation: Move from dusty area to fresh air and get medical attention for any breathing difficulty. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get immediate medical attention.

## 5. FIRE FIGHTING MEASURES

Flammable Properties: Not Flammable.
Flash Point: Will not flash.
Upper Explosive Limit (UEL): Will not explode.
Lower Explosive Limit (LEL): Will not explode.
Auto-ignition Temperature: Exposure to excessive heat greater than 176 F (80 C) can cause the portion of Iron Oxide Black contained in this product to slowly auto-oxidize, which generates additional heat. Under certain conditions, this heat may be sufficient to cause the bag or combustible materials stored nearby to ignite.
Extinguishing Media: This product is not combustible or flammable. Use extinguishing agents that are suitable for the surrounding fire: water spray, dry chemical, foam, or $CO_2$.
Fire fighting Instructions: Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes and smoke inhalation.

## 6. ACCIDENTAL RELEASE MEASURES

Small Spill: If dust is generated, use appropriate respiratory protection. Vacuum or scoop material into an appropriately marked container for re-use or disposal. Avoid excessive generation of dust.

Large Spill: Use recommended protective clothing and respiratory protection. Use shovel to reclaim material. Vacuum or scoop material into an appropriately marked container for re-use or disposal. Avoid excessive generation of dust. Spill area can be washed with water. Collect wash water for approved disposal. Prevent runoff from entering storm sewers and ditches which lead to natural waterways.

## 7. HANDLING AND STORAGE

| | |
|---|---|
| Storage: | Store dry at ambient temperature away from food and beverages, excessive heat or flame sources (furnace, kilns, boilers etc.). Avoid breathing dust. Avoid contact with eyes and skin. Wash thoroughly after handling. |
| Handling: | Avoid breathing dust. Avoid getting in eyes or on skin. Wash thoroughly after handling. Avoid contact with moisture. Re-seal bag immediately after use. Pallets are wrapped in polyethylene plastic. Removal may cause an electrostatic spark; therefore removal of the wrap should not be in the presence of flammable vapors. |

| | | |
|---|---|---|
| Storage Temperature (Min/Max) | : | Ambient/50°C (122°F) |
| Shelf Life | : | Unlimited in closed container |
| Special Sensitivity | : | Excessive Heat |
| Other Precautions | : | None |

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

| | |
|---|---|
| Engineering Controls: | Maintain air levels below the recommended exposure limit using exhaust ventilation if necessary. In typical applications and well-ventilated work areas, no respirator is required because this is a low-dust product. |
| Eyes: | Safety Glasses. |
| Skin: | Body-covering clothing. Rubber, Plastic, Leather or cloth gloves are suggested to facilitate personal hygiene. |
| Respiratory Protection: | Workplace ambient dust concentrations should be monitored and if the recommended exposure limit is exceeded, a NIOSH/MSHA approved respirator with dust prefilter should be worn. In typical applications and well-ventilated work areas, no respirator is required because this is a low-dust product. |
| Other: | Emergency showers and eye wash stations should be available. Educate and train employees in the safe use and handling of hazardous chemicals. |
| Work/Hygiene Practices: | Employees should wash their hands and face before eating, drinking or using tobacco products. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| Appearance | : | Solid Black Powder |
| Odor | : | Odorless |
| Physical State | : | Dry, micro-granulated powder |
| pH | : | 7 - 9 in 50 gr/l $H_2O$ aqueous suspension; DIN 787/9 |
| Vapor Pressure | : | Not a vapor |
| Vapor Density | : | Not a vapor |
| Boiling Point | : | Not applicable |
| Freezing Point | : | Not applicable |
| Melting Point | : | Greater than 1000°C (1832°F) |
| Solubility in Water | : | Insoluble |
| Specific Gravity (g/ml) | : | 5.0 @ 20°C (68°F); DIN 787/10 |
| Bulk Density (kg/$m^3$) | : | 1100 @ 20°C (68°F) |
| Particle Size (microns) | : | 0.3-0.6 |
| Volatile Organic Compounds (VOC) | : | None |
| Chemical Formula | : | $Fe_3O_4$ |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| Chemical Stability (Conditions to Avoid): | Stable. Keep away from flames and heat. Exposure to excessive heat greater than 176°F (80°C) can cause this product to slowly auto-oxidize, which generates additional heat. Under certain conditions, this heat may be sufficient to cause the bag or combustible materials stored nearby to ignite. |

| | |
|---|---|
| Incompatibility (materials to avoid): | No known material incompatibilities |
| Decomposition Temperature Cº (Fº): | Greater than 176°F (80°C) |
| Hazardous Decomposition Products: | None |
| Hazardous Polymerization: | Will not occur |

## 11. TOXICOLOGICAL INFORMATION

| | |
|---|---|
| Eyes: | Not irritating to rabbit eyes |
| Skin: | Not irritating to rabbit skin Dermal, LD 50 not established for product |
| Ingestion: | Non irritating. The oral, LD50 for rats is greater than 5000 mg/l |
| Inhalation: | Non irritating. LC 50 not established for product |
| Subchronic: | Data not established for product |
| Chronic/Carcinogenicity: | Data not established for product |
| Other (Mutagenic, Teratogenic, Reproductive Tests): | The IARC monograph on underground hematite mining (1972) states, "No carcinogenic effects were observed in mice, hamsters, or guinea pigs given ferric oxide intratracheally." |

## 12. ECOLOGICAL INFORMATION

| | | |
|---|---|---|
| Ecotoxicological Information: | Fish toxicity: | Golden Orfe (Leuciscus idus) LCo greater than 1000 mg/l |
| Chemical Fate Information: | No appreciable bioconcentration is expected in the environment. | |

## 13. DISPOSAL CONSIDERATIONS

Material which cannot be re-used should be disposed in accordance with federal, state and local environmental control regulations at an authorized site. This product when discarded as sold is not a RCRA hazardous waste. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40CFR 261.20-24)

## 14. TRANSPORT INFORMATION

| | |
|---|---|
| DOT Shipping Name | None |
| Technical Shipping Name | Inorganic Black Iron Oxide |
| DOT Hazardous Classification | Non-Regulated |
| DOT Hazard Class | Non-Regulated |
| DOT Identification Number | None |
| DOT Labels required | None |
| DOT Placards required | None |
| UN Class | None |
| UN/NA Number | None |
| Freight Class | Iron Oxide,NOI (Inorganic Oxide) |

## 15. REGULATORY INFORMATION

********************************** U.S. Federal Regulations **********************************

| | |
|---|---|
| OSHA: | This product is considered Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200) due to potential to auto-oxidize (self-heat). See section 5. |
| CERCLA/SUPERFUND: | (40 CFR 117,302) Reportable Quantity (RQ):<br>Not Reportable, however, we recommend you contact local authorities to verify requirements for your site. |

Superfund Amendments and Reauthorization Act (SARA), Title III:

| | |
|---|---|
| Section 302 (Extremely Hazardous Substances): | None |
| Section 311/312 (Hazard Categories): | Delayed Health Hazard |

Section 313 (Reportable Toxic Ingredients):

| Chemical Name: | C.A.S. | Concentration |
|---|---|---|
| None Reportable | | |

T.S.C.A.: This product is listed on TSCA Inventory.

*********************************** International Regulations ***********************************

| | |
|---|---|
| Canadian WHMIS: | Not restricted/non-hazardous |
| Canadian Environmental Protection Act (CEPA): | All components of this product are on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA. |
| EINECS: | All components of this product are on the European Inventory of Existing Commercial Chemical Substances (EINECS). |

*********************************** State Regulations ***********************************

| | |
|---|---|
| California Proposition 65 Warning: | This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. |

CA = California Safe Drinking Water and Toxic Enforce Act (Proposition 65)
MA = Massachusetts Hazardous Substance List
NJ4 = New Jersey Other- included in 5 predominant ingredients >1%
PA3 = Pennsylvania Non-hazardous present at 3% or greater

| Chemical Name: | C.A.S. | Concentration | State Code |
|---|---|---|---|
| Black Iron Oxide | 1317-61-9 | 93-98% | PA3,NJ4 |
| Silicon Dioxide-Amorphous ($SiO_2$) | 7631-86-9 | 1-3% | PA3,NJ4 |
| Lead | 7439-92-1 | <100 ppm | CA,MA |
| Cadmium | 7440-43-9 | <5 ppm | CA,MA |
| Arsenic | 7440-38-2 | <50 ppm | CA,MA |
| Copper | 7440-50-8 | <800 ppm | CA,MA |
| Manganese | 7439-96-5 | <2000 ppm | CA,MA |
| Mercury | 7429-97-6 | <1 ppm | CA |
| Nickel | 7440-02-0 | <400 ppm | CA,MA |

Note: This information based on random sample analyses. Actual content may vary from batch to batch.

## 16. OTHER INFORMATION

| | | |
|---|---|---|
| Reason for revision: | 7/18/2003 | - Remove aniline from trace content table because it is not contained in product. |
| | 1/11/2006 | - Update review date. |
| | 7/17/2009 | - Update review date. |

HMIS Codes: H=0, F=0, R=1, P=0 (0=Minimal, 1=Slight, 2=Moderate, 3=Serious, 4=Severe)

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of the Manufacturer. The data on this sheet relates only to the specific material designated herein. It may not be valid for this material if used in combination with any other materials or process. It is the users responsibility to verify suitability and completeness of this information for their own particular use. The Manufacturer assumes no legal responsibility for use or reliance upon these data.

UNILOCK®

# U9HP

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations And According To The Hazardous Products Regulation (February 11, 2015).

Revision Date: 11/11/2019 Date of Issue: 02/21/2017 Supersedes Date: 06/21/2017 Version: 2.0

## SECTION 1: IDENTIFICATION

### 1.1. Product Identifier

**Product Form:** Mixture

**Product Name:** U9HP

### 1.2. Intended Use of the Product

Efflorescence Control/Water Repellant. For professional use only.

### 1.3. Name, Address, and Telephone of the Responsible Party

**Company**

Unilock
301 East Sullivan Rd.
Aurora, IL 60505 - United States
T 1-800-UNILOCK
www.unilock.com

### 1.4. Emergency Telephone Number

**Emergency Number** : Chemtel
Domestic: 1-800-255-3924
International: +1-813-248-0585
Australia: 1-300-954-583
Brazil: 0-800-591-6042
China: 400-120-0751
India: 000-800-100-4086
Mexico: 800-099-0731

## SECTION 2: HAZARDS IDENTIFICATION

### 2.1. Classification of the Substance or Mixture

**GHS-US/CA Classification**

| | |
|---|---|
| Skin Irrit. 2 | H315 |
| Skin Sens. 1 | H317 |
| STOT RE 1 | H372 |

Full text of hazard classes and H-statements : see section 16

### 2.2. Label Elements

**GHS-US/CA Labeling**

**Hazard Pictograms (GHS-US/CA)** :

GHS07

GHS08

**Signal Word (GHS-US/CA)** : Danger

**Hazard Statements (GHS-US/CA)** : H315 - Causes skin irritation.
H317 - May cause an allergic skin reaction.
H372 - Causes damage to organs (lungs, skin) through prolonged or repeated exposure.

**Precautionary Statements (GHS-US/CA)** : P260 - Do not breathe vapors, mist, or spray.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P272 - Contaminated work clothing should not be allowed out of the workplace.
P280 - Wear protective gloves, protective clothing, and eye protection.
P302+P352 - IF ON SKIN: Wash with plenty of water.
P314 - Get medical advice/attention if you feel unwell.
P321 - Specific treatment (see section 4 on this SDS).
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P362+P364 - Take off contaminated clothing and wash it before reuse.

P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

### 2.3. Other Hazards

Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

### 2.4. Unknown Acute Toxicity (GHS-US/CA)

No data available

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substance

Not applicable

### 3.2. Mixture

| Name | Synonyms | Product Identifier | % * | GHS Ingredient Classification |
|---|---|---|---|---|
| Silblock WMS* | | (CAS-No.) CBI | 66.4 | Skin Irrit. 2, H315<br>Skin Sens. 1, H317<br>STOT RE 1, H372 |
| Water | AQUA / Aqua | (CAS-No.) 7732-18-5 | <= 28.44 | Not classified |
| Sodium thiocyanate | Thiocyanate, sodium / Thiocyanic acid, sodium salt / Thiocyanic acid, sodium salt (1:1) / SODIUM THIOCYANATE / Sodium rhodanide / Thiocyanate sodium / Sodium isothiocyanate | (CAS-No.) 540-72-7 | 3.4 | Acute Tox. 4 (Oral), H302<br>Acute Tox. 4 (Dermal), H312<br>Acute Tox. 4 (Inhalation), H332<br>Eye Irrit. 2A, H319<br>Aquatic Acute 3, H402<br>Aquatic Chronic 3, H412 |
| Triethanolamine | Ethanol, 2,2',2''-nitrilotri- / Ethanol, 2,2',2''-nitrilotris- / 2,2',2''-Nitrilotriethanol / TEA / Tris(2-hydroxyethyl)amine / TRIETHANOLAMINE / Tris(hydroxyethyl)amine / Trolamine / Tri(2-hydroxyethyl)amine | (CAS-No.) 102-71-6 | 1.791 | Not classified |
| Dipropylene glycol | Oxydipropanol / Propanol, oxybis- / Dipropylene glycol (isomer unspecified) | (CAS-No.) 25265-71-8 | <= 0.04 | Not classified |
| Diethanolamine | Bis(2-hydroxyethyl)amine / DEA / Di(2-hydroxyethyl)amine / 2,2'-Dihydroxydiethylamine / Ethanol, 2,2'-iminobis- / Ethanol, 2,2'-iminodi- / 2-(2-Hydroxyethylamino)ethanol / 2,2'-Iminodiethanol / Diolamine / N,N-Diethanolamine | (CAS-No.) 111-42-2 | 0.009 | Acute Tox. 4 (Oral), H302<br>Eye Irrit. 2, H319<br>Carc. 2, H351<br>STOT RE 2, H373<br>Aquatic Acute 2, H401<br>Aquatic Chronic 3, H412 |
| 1,2-Benzisothiazol-3(2H)-one | 1,2-Benzisothiazolin-3-one / Benzisothiazolinone / 1,2-Benzisothiazolone / 1,2-Benzisothiazol-3-one / Benzisothiazolin-3-one, 1,2- / BENZISOTHIAZOLINONE | (CAS-No.) 2634-33-5 | 0.0076 | Acute Tox. 4 (Oral), H302<br>Skin Irrit. 2, H315<br>Eye Dam. 1, H318<br>Skin Sens. 1, H317<br>Aquatic Acute 1, H400<br>Aquatic Chronic 1, H410<br>Comb. Dust |
| Sodium hydroxide | Caustic soda / Sodium hydroxide (Na(OH)) / SODIUM HYDROXIDE / LYE | (CAS-No.) 1310-73-2 | 0.002 | Met. Corr. 1, H290<br>Acute Tox. 4 (Oral), H302<br>Skin Corr. 1A, H314<br>Eye Dam. 1, H318<br>STOT SE 3, H335<br>Aquatic Acute 3, H402<br>Aquatic Chronic 3, H412 |

Full text of H-phrases: see section 16

*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).
The specific chemical identity and/or exact percentage of composition have been withheld as a trade secret [29 CFR 1910.1200].
An exemption has been granted from the Hazardous Materials Information Review Act (HMIRA) for the components indicated above as Trade Secret. See below for registry number(s) and their corresponding date(s) that exemption(s) were granted :
Silblock WMS - 9828; 02/05/2016

## SECTION 4: FIRST AID MEASURES

### 4.1. Description of First-aid Measures

**General:** Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

**Inhalation:** When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

**Skin Contact:** Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation develops or persists.

**Eye Contact:** Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention.

**Ingestion:** Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

### 4.2. Most Important Symptoms and Effects Both Acute and Delayed

**General:** Causes skin irritation. Skin sensitization. Causes damage to organs through prolonged or repeated exposure.

**Inhalation:** Prolonged exposure may cause irritation.

**Skin Contact:** Redness, pain, swelling, itching, burning, dryness, and dermatitis. May cause an allergic skin reaction.

**Eye Contact:** May cause slight irritation to eyes.

**Ingestion:** Ingestion may cause adverse effects.

**Chronic Symptoms:** Causes damage to organs (lungs, skin) through prolonged or repeated exposure.

### 4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

## SECTION 5: FIRE-FIGHTING MEASURES

### 5.1. Extinguishing Media

**Suitable Extinguishing Media:** Water spray, dry chemical, foam, carbon dioxide.

**Unsuitable Extinguishing Media:** Do not use a heavy water stream. Use of heavy stream of water may spread fire.

### 5.2. Special Hazards Arising From the Substance or Mixture

**Fire Hazard:** Not considered flammable but may burn at high temperatures.

**Explosion Hazard:** Product is not explosive.

**Reactivity:** Hazardous reactions will not occur under normal conditions.

### 5.3. Advice for Firefighters

**Precautionary Measures Fire:** Exercise caution when fighting any chemical fire.

**Firefighting Instructions:** Use water spray or fog for cooling exposed containers.

**Protection During Firefighting:** Do not enter fire area without proper protective equipment, including respiratory protection.

**Hazardous Combustion Products**: Carbon oxides (CO, $CO_2$). Nitrogen oxides. Sulfur oxides. Carbon disulfide. Carbonyl sulfide.

### 5.4. Reference to Other Sections

Refer to Section 9 for flammability properties.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

**General Measures:** Do not get in eyes, on skin, or on clothing. Do not breathe vapor, mist or spray.

#### 6.1.1. For Non-Emergency Personnel

**Protective Equipment:** Use appropriate personal protective equipment (PPE).

**Emergency Procedures:** Evacuate unnecessary personnel.

#### 6.1.2. For Emergency Personnel

**Protective Equipment:** Equip cleanup crew with proper protection.

**Emergency Procedures:** Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit. Ventilate area.

### 6.2. Environmental Precautions

Prevent entry to sewers and public waters.

### 6.3. Methods and Materials for Containment and Cleaning Up

**For Containment:** Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.

**Methods for Cleaning Up:** Clean up spills immediately and dispose of waste safely. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill.

### 6.4. Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

**Precautions for Safe Handling:** Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not breathe vapors, mist, spray. Avoid contact with eyes, skin and clothing.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures.

### 7.2. Conditions for Safe Storage, Including Any Incompatibilities

**Technical Measures:** Comply with applicable regulations.

**Storage Conditions:** Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials.

**Incompatible Materials:** Strong acids, strong bases, strong oxidizers.

### 7.3. Specific End Use(s)

Efflorescence Control/Water Repellant. For professional use only.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control Parameters

For substances listed in section 3 that are not listed here, there are no established exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), or Canadian provincial governments.

| **Sodium hydroxide (1310-73-2)** | | |
|---|---|---|
| **USA ACGIH** | ACGIH Ceiling (mg/m³) | 2 mg/m³ |
| **USA OSHA** | OSHA PEL (TWA) (mg/m³) | 2 mg/m³ |
| **USA NIOSH** | NIOSH REL (ceiling) (mg/m³) | 2 mg/m³ |
| **USA IDLH** | US IDLH (mg/m³) | 10 mg/m³ |
| **Alberta** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **British Columbia** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Manitoba** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **New Brunswick** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Newfoundland & Labrador** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Nova Scotia** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Nunavut** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Northwest Territories** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Ontario** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Prince Edward Island** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Québec** | PLAFOND (mg/m³) | 2 mg/m³ |
| **Saskatchewan** | OEL Ceiling (mg/m³) | 2 mg/m³ |
| **Yukon** | OEL Ceiling (mg/m³) | 2 mg/m³ |

| **Triethanolamine (102-71-6)** | | |
|---|---|---|
| **USA ACGIH** | ACGIH TWA (mg/m³) | 5 mg/m³ |
| **Alberta** | OEL TWA (mg/m³) | 5 mg/m³ |
| **British Columbia** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Manitoba** | OEL TWA (mg/m³) | 5 mg/m³ |

| | | |
|---|---|---|
| **New Brunswick** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Newfoundland & Labrador** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Nova Scotia** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Nunavut** | OEL STEL (mg/m³) | 10 mg/m³ |
| **Nunavut** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Northwest Territories** | OEL STEL (mg/m³) | 10 mg/m³ |
| **Northwest Territories** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Ontario** | OEL TWA (mg/m³) | 3.1 mg/m³ |
| **Ontario** | OEL TWA (ppm) | 0.5 ppm |
| **Prince Edward Island** | OEL TWA (mg/m³) | 5 mg/m³ |
| **Québec** | VEMP (mg/m³) | 5 mg/m³ |
| **Saskatchewan** | OEL STEL (mg/m³) | 10 mg/m³ |
| **Saskatchewan** | OEL TWA (mg/m³) | 5 mg/m³ |

| **Diethanolamine (111-42-2)** | | |
|---|---|---|
| **USA ACGIH** | ACGIH TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **USA ACGIH** | ACGIH chemical category | Skin - potential significant contribution to overall exposure by the cutaneous route,Confirmed Animal Carcinogen with Unknown Relevance to Humans |
| **USA NIOSH** | NIOSH REL (TWA) (mg/m³) | 15 mg/m³ |
| **USA NIOSH** | NIOSH REL (TWA) (ppm) | 3 ppm |
| **Alberta** | OEL TWA (mg/m³) | 2 mg/m³ |
| **British Columbia** | OEL TWA (mg/m³) | 2 mg/m³ |
| **Manitoba** | OEL TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **New Brunswick** | OEL TWA (mg/m³) | 2 mg/m³ |
| **New Brunswick** | OEL TWA (ppm) | 0.46 ppm |
| **Newfoundland & Labrador** | OEL TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **Nova Scotia** | OEL TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **Nunavut** | OEL STEL (mg/m³) | 4 mg/m³ |
| **Nunavut** | OEL TWA (mg/m³) | 2 mg/m³ |
| **Northwest Territories** | OEL STEL (mg/m³) | 4 mg/m³ |
| **Northwest Territories** | OEL TWA (mg/m³) | 2 mg/m³ |
| **Ontario** | OEL TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **Prince Edward Island** | OEL TWA (mg/m³) | 1 mg/m³ (inhalable fraction and vapor) |
| **Québec** | VEMP (mg/m³) | 13 mg/m³ |
| **Québec** | VEMP (ppm) | 3 ppm |
| **Saskatchewan** | OEL STEL (mg/m³) | 4 mg/m³ |
| **Saskatchewan** | OEL TWA (mg/m³) | 2 mg/m³ |

## 8.2. Exposure Controls

**Appropriate Engineering Controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.

**Personal Protective Equipment:** Gloves. Protective clothing. Protective goggles.

**Materials for Protective Clothing:** Chemically resistant materials and fabrics.

**Hand Protection:** Wear protective gloves.

**Eye and Face Protection:** Chemical safety goggles.

**Skin and Body Protection:** Wear suitable protective clothing.

**Respiratory Protection:** If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.

**Other Information:** When using, do not eat, drink or smoke.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on Basic Physical and Chemical Properties

| | | |
|---|---|---|
| **Physical State** | : | Liquid |
| **Appearance** | : | White |
| **Odor** | : | Faint |
| **Odor Threshold** | : | Not available |
| **pH** | : | 9.5 - 10.5 |
| **Evaporation Rate** | : | Not available |
| **Melting Point** | : | Not available |
| **Freezing Point** | : | 0 °C (32 °F) |
| **Boiling Point** | : | 100 °C (212 °F) |
| **Flash Point** | : | Does not flash |
| **Auto-ignition Temperature** | : | Does not auto ignite |
| **Decomposition Temperature** | : | Not available |
| **Flammability (solid, gas)** | : | Not flammable |
| **Lower Flammable Limit** | : | Not available |
| **Upper Flammable Limit** | : | Not available |
| **Vapor Pressure** | : | Not available |
| **Relative Vapor Density at 20°C** | : | Not available |
| **Relative Density** | : | Not available |
| **Specific Gravity** | : | 0.96 - 1.0 |
| **Solubility** | : | Water: Fully soluble |
| **Partition Coefficient: N-Octanol/Water** | : | Not available |
| **Viscosity** | : | Not available |

## SECTION 10: STABILITY AND REACTIVITY

**10.1. Reactivity:** Hazardous reactions will not occur under normal conditions.

**10.2. Chemical Stability:** Stable under recommended handling and storage conditions (see section 7).

**10.3. Possibility of Hazardous Reactions:** Hazardous polymerization will not occur.

**10.4. Conditions to Avoid:** Direct sunlight, extremely high or low temperatures, and incompatible materials.

**10.5. Incompatible Materials:** Strong acids, strong bases, strong oxidizers.

**10.6. Hazardous Decomposition Products:** None expected under normal conditions of use.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on Toxicological Effects - Product

**Acute Toxicity (Oral):** Not classified
**Acute Toxicity (Dermal):** Not classified
**Acute Toxicity (Inhalation):** Not classified

**LD50 and LC50 Data:** Not available

**Skin Corrosion/Irritation:** Causes skin irritation.
**pH:** 9.5 - 10.5

**Eye Damage/Irritation:** Not classified
**pH:** 9.5 - 10.5

**Respiratory or Skin Sensitization:** May cause an allergic skin reaction.

**Germ Cell Mutagenicity:** Not classified

**Carcinogenicity:** Not classified

**Specific Target Organ Toxicity (Repeated Exposure):** Causes damage to organs (lungs, skin) through prolonged or repeated exposure.

**Reproductive Toxicity:** Not classified

**Specific Target Organ Toxicity (Single Exposure):** Not classified

**Aspiration Hazard:** Not classified

**Symptoms/Injuries After Inhalation:** Prolonged exposure may cause irritation.

**Symptoms/Injuries After Skin Contact:** Redness, pain, swelling, itching, burning, dryness, and dermatitis. May cause an allergic skin reaction.

**Symptoms/Injuries After Eye Contact:** May cause slight irritation to eyes.

**Symptoms/Injuries After Ingestion:** Ingestion may cause adverse effects.

**Chronic Symptoms:** Causes damage to organs (lungs, skin) through prolonged or repeated exposure.

### 11.2. Information on Toxicological Effects - Ingredient(s)

**LD50 and LC50 Data:**

| **Sodium thiocyanate (540-72-7)** | |
|---|---|
| **LD50 Oral Rat** | 764 mg/kg |
| **ATE US/CA (dermal)** | 1,100.00 mg/kg body weight |
| **ATE US/CA (gas)** | 4,500.00 ppmV/4h |
| **ATE US/CA (vapors)** | 11.00 mg/l/4h |
| **ATE US/CA (dust, mist)** | 1.50 mg/l/4h |

| **Dipropylene glycol (25265-71-8)** | |
|---|---|
| **LD50 Oral Rat** | 14850 mg/kg |
| **LD50 Dermal Rabbit** | > 20 ml/kg |

| **1,2-Benzisothiazol-3(2H)-one (2634-33-5)** | |
|---|---|
| **LD50 Oral Rat** | 1020 mg/kg |

| **Sodium hydroxide (1310-73-2)** | |
|---|---|
| **LD50 Oral Rat** | 325 mg/kg |

| **Triethanolamine (102-71-6)** | |
|---|---|
| **LD50 Oral Rat** | 6400 mg/kg |
| **LD50 Dermal Rabbit** | > 2000 mg/kg |

| **Diethanolamine (111-42-2)** | |
|---|---|
| **LD50 Oral Rat** | 1820 mg/kg |
| **LD50 Dermal Rabbit** | 11.9 ml/kg |

| **Triethanolamine (102-71-6)** | |
|---|---|
| **IARC Group** | 3 |

| **Diethanolamine (111-42-2)** | |
|---|---|
| **IARC Group** | 2B |
| **OSHA Hazard Communication Carcinogen List** | In OSHA Hazard Communication Carcinogen list. |

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Toxicity

**Ecology - General:** Not classified.

| **Sodium thiocyanate (540-72-7)** | |
|---|---|
| **LC50 Fish 1** | 83 mg/l |

| **Dipropylene glycol (25265-71-8)** | |
|---|---|
| **EC50 Daphnia 1** | > 100 mg/l (Exposure Time: 48 h - Species: Daphnia magna) |
| **ErC50 (algae)** | > 100 mg/l (Exposure Time: 72 h - Species: Desmodesmus subspicatus) |
| **NOEC Chronic Algae** | > 100 mg/l (Exposure Time: 72 h - Species: Desmodesmus subspicatus) |

| **1,2-Benzisothiazol-3(2H)-one (2634-33-5)** | |
|---|---|
| **EC50 Daphnia 1** | 0.99 mg/l |

| **Sodium hydroxide (1310-73-2)** | |
|---|---|
| **LC50 Fish 1** | 45.4 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static]) |
| **EC50 Daphnia 1** | 40 mg/l |

| **Triethanolamine (102-71-6)** | |
|---|---|
| **LC50 Fish 1** | 10600 (10600 - 13000) mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through]) |
| **EC50 Daphnia 1** | 1386 mg/l |
| **LC50 Fish 2** | 1000 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static]) |
| **ErC50 (algae)** | 169 mg/l |
| **NOEC Chronic Crustacea** | 16 mg/l |

| **Diethanolamine (111-42-2)** | |
|---|---|
| **LC50 Fish 1** | 4460 (4460 - 4980) mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through]) |
| **EC50 Daphnia 1** | 55 mg/l (Exposure time: 48 h - Species: Daphnia magna) |
| **LC50 Fish 2** | 1200 (1200 - 1580) mg/l (Exposure time: 96 h - Species: Pimephales promelas [static]) |
| **EC50 Other Aquatic Organisms 2** | 2.1 (2.1 - 2.3) mg/l (Exposure time: 96 h - Species: Pseudokirchneriella subcapitata) |
| **ErC50 (algae)** | 2.2 mg/l (Exposure time: 96 h - Species: Pseudokirchnerella subcapitata [Static]) |
| **NOEC Chronic Crustacea** | 0.78 mg/l |

### 12.2. Persistence and Degradability

| **U9HP** | |
|---|---|
| **Persistence and Degradability** | Not established. |

### 12.3. Bioaccumulative Potential

| **U9HP** | |
|---|---|
| **Bioaccumulative Potential** | Not established. |

| **Dipropylene glycol (25265-71-8)** | |
|---|---|
| **BCF Fish 1** | 0.3 (0.3 - 1.4) |

| **1,2-Benzisothiazol-3(2H)-one (2634-33-5)** | |
|---|---|
| **Log Pow** | 1.3 (at 25 °C) |

| **Triethanolamine (102-71-6)** | |
|---|---|
| **BCF Fish 1** | 3.9 |
| **Log Pow** | -2.53 |

| **Diethanolamine (111-42-2)** | |
|---|---|
| **BCF Fish 1** | (no significant bioconcentration) |
| **Log Pow** | -2.18 (at 25 °C) |

### 12.4. Mobility in Soil

Not available

### 12.5. Other Adverse Effects

**Other Information:** Avoid release to the environment.

## SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

**Waste Disposal Recommendations:** Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

**Additional Information:** Container may remain hazardous when empty. Continue to observe all precautions.

**Ecology - Waste Materials:** Avoid release to the environment.

## SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

### 14.1. In Accordance with DOT

Not regulated for transport

### 14.2. In Accordance with IMDG

Not regulated for transport

### 14.3. In Accordance with IATA

Not regulated for transport

### 14.4. In Accordance with TDG

Not regulated for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. US Federal Regulations

| **U9HP** | |
|---|---|
| **SARA Section 311/312 Hazard Classes** | Health hazard - Respiratory or skin sensitization<br>Health hazard - Skin corrosion or Irritation<br>Health hazard - Specific target organ toxicity (single or repeated exposure) |

| **Sodium thiocyanate (540-72-7)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

| **Dipropylene glycol (25265-71-8)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

| **Water (7732-18-5)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

| **1,2-Benzisothiazol-3(2H)-one (2634-33-5)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

| **Sodium hydroxide (1310-73-2)** | |
|---|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory | |
| **CERCLA RQ** | 1000 lb |

| **Triethanolamine (102-71-6)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

| **Diethanolamine (111-42-2)** | |
|---|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 | |
| **CERCLA RQ** | 100 lb |
| **SARA Section 313 - Emission Reporting** | 1 % |

### 15.2. US State Regulations

**California Proposition 65**

⚠ **WARNING:** This product can expose you to Silblock WMS, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

| **Chemical Name (CAS No.)** | **Carcinogenicity** | **Developmental Toxicity** | **Female Reproductive Toxicity** | **Male Reproductive Toxicity** |
|---|---|---|---|---|
| Silblock WMS | X | | | |
| Diethanolamine (111-42-2) | X | | | |

| **Dipropylene glycol (25265-71-8)** |
|---|
| U.S. - Pennsylvania - RTK (Right to Know) List |

| **Sodium hydroxide (1310-73-2)** |
|---|
| U.S. - Massachusetts - Right To Know List<br>U.S. - New Jersey - Right to Know Hazardous Substance List<br>U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List<br>U.S. - Pennsylvania - RTK (Right to Know) List |

| **Triethanolamine (102-71-6)** |
|---|
| U.S. - Massachusetts - Right To Know List<br>U.S. - New Jersey - Right to Know Hazardous Substance List<br>U.S. - Pennsylvania - RTK (Right to Know) List |

| **Diethanolamine (111-42-2)** |
|---|
| U.S. - Massachusetts - Right To Know List<br>U.S. - New Jersey - Right to Know Hazardous Substance List<br>U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List<br>U.S. - Pennsylvania - RTK (Right to Know) List |

### 15.3. Canadian Regulations

| **Sodium thiocyanate (540-72-7)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Dipropylene glycol (25265-71-8)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Water (7732-18-5)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **1,2-Benzisothiazol-3(2H)-one (2634-33-5)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Sodium hydroxide (1310-73-2)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Triethanolamine (102-71-6)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

| **Diethanolamine (111-42-2)** |
|---|
| Listed on the Canadian DSL (Domestic Substances List) |

## SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

**Date of Preparation or Latest Revision** : 11/11/2019

**Other Information** : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada's Hazardous Products Regulations (HPR) SOR/2015-17.

**GHS Full Text Phrases:**

| | |
|---|---|
| Acute Tox. 4 (Dermal) | Acute toxicity (dermal) Category 4 |
| Acute Tox. 4 (Inhalation) | Acute toxicity (inhalation) Category 4 |
| Acute Tox. 4 (Oral) | Acute toxicity (oral) Category 4 |
| Aquatic Acute 1 | Hazardous to the aquatic environment - Acute Hazard Category 1 |
| Aquatic Acute 2 | Hazardous to the aquatic environment - Acute Hazard Category 2 |
| Aquatic Acute 3 | Hazardous to the aquatic environment - Acute Hazard Category 3 |
| Aquatic Chronic 1 | Hazardous to the aquatic environment - Chronic Hazard Category 1 |
| Aquatic Chronic 3 | Hazardous to the aquatic environment - Chronic Hazard Category 3 |
| Carc. 2 | Carcinogenicity Category 2 |
| Comb. Dust | Combustible Dust |
| Eye Dam. 1 | Serious eye damage/eye irritation Category 1 |
| Eye Irrit. 2 | Serious eye damage/eye irritation Category 2 |
| Eye Irrit. 2A | Serious eye damage/eye irritation Category 2A |
| Met. Corr. 1 | Corrosive to metals Category 1 |
| Skin Corr. 1A | Skin corrosion/irritation Category 1A |
| Skin Irrit. 2 | Skin corrosion/irritation Category 2 |
| Skin Sens. 1 | Skin sensitization, Category 1 |
| STOT RE 1 | Specific target organ toxicity (repeated exposure) Category 1 |
| STOT RE 2 | Specific target organ toxicity (repeated exposure) Category 2 |
| STOT SE 3 | Specific target organ toxicity (single exposure) Category 3 |
| H290 | May be corrosive to metals |
| H302 | Harmful if swallowed |
| H312 | Harmful in contact with skin |
| H314 | Causes severe skin burns and eye damage |
| H315 | Causes skin irritation |
| H317 | May cause an allergic skin reaction |

| | |
|---|---|
| H318 | Causes serious eye damage |
| H319 | Causes serious eye irritation |
| H332 | Harmful if inhaled |
| H335 | May cause respiratory irritation |
| H351 | Suspected of causing cancer |
| H372 | Causes damage to organs through prolonged or repeated exposure |
| H373 | May cause damage to organs through prolonged or repeated exposure |
| H400 | Very toxic to aquatic life |
| H401 | Toxic to aquatic life |
| H402 | Harmful to aquatic life |
| H410 | Very toxic to aquatic life with long lasting effects |
| H412 | Harmful to aquatic life with long lasting effects |

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*

NA GHS SDS 2015 (Can, US)