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REMEDIAL ACTION WORKPLAN

NYSDEC BCP Number: C360252

Prepared For:

Franklin Courts Coal Storage Site
1-99 Franklin Courts
Tarrytown, New York
NYSDEC BCP Site # C360252

Prepared for:

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Date:
June 22, 2026

CERTIFICATION STATEMENT

"I, Fuad Dahan, PE, certify that I am currently a NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Report 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications."

NYS Professional Engineer (# 090531)	Date	Signature

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LIST OF ACRONYMS

Acronym	Definition
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMPs	Best Management Practices
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
COC	Certificate of Completion
CPP	Citizen Participation Plan
CSM	Conceptual Site Model
CVA	Climate Vulnerability Assessment (
CVOC	Chlorinated Volatile Organic Compound
cy	Cubic yard
DER	Division of Environmental Remediation
DER-10	NYSDEC Technical Guidance for Site Investigation & Remediation
DMM	Division of Materials Management
ECs	Engineering Controls
EE	Environmental Easement
ESCP	Erosion and Sediment Control Plan
FER	Final Engineering Report
ft-bgs	feet below ground surface
GHGs	Greenhouse Gases
GPR	Ground-Penetrating Radar
GSR	Green Sustainable Remediation
HASP	Health and Safety Plan
ICs	Institutional Controls
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbons
PFAS	Per and Polyfluoroalkyl Substances
PGWSCO	Protection of Groundwater Soil Cleanup Objectives
PHC	Petroleum Hydrocarbon Compound
PPE	Personal Protective Equipment

Acronym	Definition
PRR	Periodic Review Report
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RSCO	Residential Soil Cleanup Objective
RRSCO	Restricted Residential Soil Cleanup Objectives
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objectives
SESI	SESI Consulting Engineers, DPC
SMP	Site Management Plan
SoMP	Soil/Materials Management Plan
SSDS	Sub-slab Depressurization System
SVE	Soil Vapor Evaluation
SVI	Soil Vapor Intrusion
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TOGS	Technical and Operations Guidance Series
UUSCO	Unrestricted Use Soil Cleanup Objectives
UST	Underground Storage Tank
VI	Vapor Intrusion
VOCs	Volatile Organic Compounds
WCDOH	Westchester County Department of Health

1.0 INTRODUCTION

Franklin Courts JV Partners L.P. entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in December 2024, to investigate and remediate a 6.751-acre property located at 1-99 Franklin Courts, Tarrytown, Westchester County New York. Franklin Courts JV Partners L.P. is a Volunteer in the Brownfield Cleanup Program. Restricted Residential use is proposed for the property. When completed, the Site will contain two 12-unit attached, garden style apartment buildings and two 33-unit multi-family buildings. A stormwater management area will be constructed in the western portion of the Site, including a walking trail, exercise equipment and landscaping for residents. The remainder of the Site will be developed as an open space lawn for all residents. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

SESI Consulting Engineers (SESI) has prepared this Remedial Action Work Plan (RAWP) on behalf of the Volunteer. This RAWP summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between January and February 2026. It provides an evaluation of a Track 4 Restricted Residential cleanup and other applicable Remedial Action alternatives and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10, DER-31, and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. A significant-threat determination to human health and the environment has not yet been made. Upon determination, notice will be provided for public review.

The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of Westchester, Tarrytown, New York and is identified as Block 29, Lot 32 on the Tarrytown Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (**Figure 1.1**) shows the Site location. The Site is situated on an approximately 6.751-acre area bounded to the north by a multi-family residential apartment building at 50 White

Street, to the east by Riverview Avenue and residential developments beyond, to the south by residential development along MacArthur Avenue, and to the west by Warehouses, railroad tracks and self-storage buildings. A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 6.751-acre property is fully described in the metes and bounds provided as **Appendix A**, which includes a global positioning system coordinate for the starting point.

The project site currently contains 70 townhomes in 14 buildings, plus one (1) small community building, all of which are believed to have been constructed between 1951 and 1952. Existing residential buildings remained partially occupied throughout the remedial investigation, but several of the units were vacant. A Site Plan is shown on **Figure 1.2**.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action (RA) to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. However, the RA contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The planned development will be rebuilt under the HUD RAD/Section 18 Program as a 90-unit 4% LIHC rental property, consisting of two (2) 12-unit attached, garden style apartment buildings, two (3) 33-unit multi-family buildings, and one (1) clubhouse. A closed system stormwater management area will be constructed in the western portion of the Site, which will also include a walking trail, exercise equipment and landscaping. The remainder of the Site will be developed as an open space lawn for all residents. **Figure 1.3** depicts the proposed redevelopment footprint. The stormwater management area will include a solid bottom and will not affect underlying soils or groundwater. The Stormwater Pollution Prevention Plan is included as **Appendix B**.

Construction and remediation work will proceed in phases, as outlined in the phasing plans provided in **Appendix C** and **Figure 1.4** and discussed further in **Section 4.5**. Phase 1 will include the temporary relocation of 25 families from existing buildings 1 through 4, building 14, and the recreational building to a pre-determined offsite location. Approximately 50 families will remain

on-site within the Phase 2 area, which includes existing buildings 5 through 13. Upon completion of remediation and building work in Phase 1, the residents currently residing in the Phase 2 area will relocate to the completed Phase 1 area, allowing remediation activities to begin in the Phase 2 area.

1.3 DESCRIPTION OF SURROUNDING PROPERTIES

The property located at 1–99 Franklin Court in Tarrytown is zoned for residential use and situated within a predominantly residential neighborhood characterized by multi-family apartment complexes and single-family homes with limited commercial development along nearby transportation corridors, such as South Broadway. The subject property is bounded to the north by a multi-family residential apartment building at 50 White Street, to the east by Riverview Avenue and residential developments beyond, to the south by residential development along MacArthur Avenue, and to the west by warehouses, railroad tracks and self-storage buildings. No significant heavy industrial operations are in the immediate vicinity.

Sensitive receptors in the surrounding area include Washington Irving Intermediate School, located approximately 550 feet east of the Site; however, the school is situated upgradient and, therefore, is not expected to be impacted by Site-related contaminants. Additional sensitive receptors include the surrounding residential population. Construction dust will be monitored throughout the remedial work and CAMP results will be reported daily, as described in Section 4.4.1.

There are no surface water bodies or streams on or directly adjacent to the Site. SESI did not observe any areas suspected to be wetlands on the Site. Stormwater drainage patterns are generally consistent with the surrounding topography and primarily flow to the west. Natural environmental features in the vicinity include the Hudson River, located west of the Site.

Based on the surrounding land use and environmental setting, the primary sensitive receptors associated with the Site are nearby residents.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved RI Work Plan dated January 2026. The investigation was conducted between January and February 2026. The RI was submitted to NYSDEC on March 16, 2026.

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

Between January 20 and February 16, 2026, SESI oversaw the installation of soil borings, permanent monitoring wells, temporary exterior soil vapor points and temporary interior sub-slab soil vapor points. All soil borings and monitoring wells were advanced within the exterior portions of the Site. Collocated sub-slab soil vapor and indoor air samples were collected from within the existing residual units onsite. RI sample locations are depicted in **Figure 2.1**.

2.1.1 BORINGS AND WELLS

Sixteen (16) soil borings (i.e., RI-SB-01 through RI-SB-16) were installed to approximately 20.0 ft bgs to investigate the Areas of Concern that were identified in the Phase I Environmental Site Assessment (ESA); to determine the nature and extent of contamination in the Site soils; and to investigate the soils in the proposed stormwater management area in the western portion of the Site. Specifically, two (2) borings (RI-SB-02 and RI-SB-09) were installed within the proposed footprint of the stormwater management area to investigate potential soil impacts and protection of groundwater.

Eight (8) monitoring wells (i.e., RI-MW-1 through RI-MW-8) were installed to investigate groundwater across the Site. Monitoring well RI-MW-01 was installed in the upgradient (eastern) area of the Site, and wells RI-MW-05 through RI-MW-08 were installed near the downgradient (western) Site boundary. Based on the known presence of groundwater in the shallow overburden soils, the installation of bedrock wells was not necessary.

Seven (7) soil vapor samples (i.e., RI-SV-1 through RI-SV-7) from seven (7) exterior soil vapor locations across the Site were installed to evaluate the Site-wide soil vapor. The soil vapor samples were installed outside the building footprints. Nine (9) interior sub-slab soil vapor (i.e., RI-SSSV-B5 through RI-SSSV-B13) samples and nine (9) collocated indoor air samples (i.e., RI-IA-B5 through RI-IA-B13) were collected in the buildings that will be occupied during Phase 1 of

the remediation and development, including buildings 5 through 13. Phasing plans are included in **Appendix C** and **Figure 1.4**. The soil vapor samples were installed inside the building footprints.

2.1.2 SAMPLES COLLECTED

A total of 101 soil samples including QA/QC samples were collected from sixteen (16) soil borings. Six (6) soil samples were collected from each soil boring at the following intervals: 0.0 to 0.5 feet below ground surface (ft-bgs), 1.5 to 2.0 ft-bgs, 2 to 5 ft-bgs, 5.0 to 10.0 ft-bgs, 10.0 to 15.0 ft-bgs and 15.0 to 20.0 ft-bgs. In addition, five (5) duplicate and five (5) matrix spike/matrix spike duplicate samples were collected.

Three (3) rounds of groundwater samples were collected from the eight (8) permanent groundwater monitoring wells. During each of the sampling events conducted in January, February, and April 2026, nine (9) groundwater samples were collected, including one (1) groundwater sample from each of the eight (8) monitoring wells in addition to one (1) duplicate sample per event.

A total of seven (7) soil vapor samples were collected from seven (7) exterior soil vapor locations across the Site. The soil vapor samples were collected at approximately 1.5 to 3.5 ft bgs, as Site groundwater was observed at approximately 2 to 4.75 ft bgs. Nine (9) interior sub-slab soil vapor samples and nine (9) collocated indoor air samples were collected at approximately two (2) ft-bgs. In addition, two (2) ambient air samples were collected.

2.1.3 CHEMICAL ANALYTICAL WORK PERFORMED

The soil and groundwater samples collected were analyzed for Target Compound List/Target Analyte List (TCL/TAL)+30. In addition, select soil and groundwater samples were analyzed for the emerging contaminants per and polyfluoroalkyl substances (PFAS) and 1,4-dioxane in accordance with EPA Method 1633A and SW846 8270E, respectively. During the third round of groundwater sampling in April 2026, samples were additionally analyzed for dissolved metals bia lab filtration. Four (4) duplicate soil samples, four (4) matrix spike duplicate samples and two (2) duplicate groundwater samples were also collected for TCL/TAL + 30, PFAS, and/or 1,4-dioxane analyses. The vapor samples were analyzed for volatile organic compounds (VOCs) in

accordance with EPA Method TO-15. Two (2) ambient air samples were also collected during soil vapor sampling.

2.1.4 BEST MANAGEMENT PRACTICES (BMPs)

During the Remedial Investigation field activities, SESI considered NYSDEC DER-31 "Green Remediation" implementation objectives. The NYSDEC DER's approach to remediating sites in the context of the larger environment is a concept known as "Green Remediation". Green Remediation is defined in NYSDEC DER-31 as "the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions." The approach is intended to improve the overall sustainability of the remediation by promoting the use of more sustainable practices and technologies. Green Remediation practices and technologies are less disruptive to the environment, generate less waste, increase reuse and recycling, and emit fewer pollutants, including greenhouse gases, to the atmosphere. Green Remediation concepts and techniques considered during the remedial investigation included:

- Eliminating idling vehicles and equipment when possible to reduce emission of CO_2, N_2O, CH_4, and other greenhouse gases contributing to climate change:
- Operation of particulate detectors to monitor and minimize dust export of contaminants:
- Operation of VOC detectors to monitor and minimize VOC exposures: and
- Conducting sampling events simultaneously to maximize the level of efforts while traveling to/from the Site (economy of scale implementing multiple sampling events); and
- Using mass transit to travel to the Site.

2.2 PHASE II GROUND-PENETRATING RADAR (GPR) SURVEY

SESI mobilized to the Site in November 2024 to perform a GPR scan around the existing residential structures. During the scan, approximately 58 anomalies were identified, which are suspected to be active heating oil underground storage tanks (USTs). The identified USTs are residential heating oil tanks which will be removed and closed per DER-10 Section 5.5 after the residences are evacuated and before the remedial construction starts on the Site. A discussion on the specific UST removal methods is provided in Section 3.1 of this report. The November 2024 GPR report is included as **Appendix D**. A figure depicting the approximate UST locations is provided as **Figure 2.2**.

2.3 SIGNIFICANT THREAT

A negative significant threat determination to human health and the environment has been made by the NYSDEC and New York State Department of Health (NYSDOH).

2.4 SITE HISTORY

Based on available historical sources reviewed as part of the 2021 AEI Phase I Environmental Site Assessment (ESA), the Site was submerged by the Hudson River from approximately 1897 through 1931. Between 1932 and 1950, the Site was largely undeveloped. Historical records indicate that the Site was associated with the Benedict estates by 1945.

The 1950 Sanborn Fire Insurance Map depicts development on the northern portion of the Site consisting of a coal yard operation with three (3) sheds, one (1) office structure, and one (1) single-story automobile garage. The remainder of the Site was depicted as undeveloped land. Historical sources do not identify the specific operator of the coal yard, the date when coal yard operations ceased, or the exact date when the associated structures were removed.

Historical mapping and aerial photography indicate that the Site was subsequently redeveloped by 1954 with the construction of the Franklin Court Apartments complex. Redevelopment included fourteen (14) residential buildings and one (1) recreational building. As the coal yard structures shown on the 1950 Sanborn Map are not depicted on subsequent mapping and were replaced by the apartment complex, the former coal yard buildings were removed prior to or during redevelopment of the Site.

2.5 GEOLOGICAL AND HYDROGEOLOGICAL CONDITIONS

According to the United States Geological Survey White Plains, NY 2013 7.5-minute Series topographic map, the Site's average topographic elevation is approximately 17' above mean sea level (msl). The topographic map indicates that the topographic gradient at the Site slopes downward from east to west.

There are no surface water bodies or streams on or directly adjacent to the Site. SESI did not observe any areas suspected to be wetlands on the Site. Stormwater drainage patterns are

generally consistent with the surrounding topography and primarily flow to the west toward the Hudson River.

Soil borings conducted during previous Phase II investigations identified a historic fill layer below the surface in all borings to depths ranging from 1 to 18 ft-bgs. The fill layer appears to be characterized by gray/brown sand with varying amounts of silt, clay, gravel, brick, glass and organics. Beneath the existing fill are the natural soil deposits consisting primarily of a gray/brown silty clay with some medium to fine sand (glacial till) followed by bedrock. The depth to bedrock at the Site appears to be greater than 25 ft-bgs.

During the 2026 RI, historic fill material (e.g., brick and other non-native materials) was identified in only one (1) soil boring (RI-SB-05) from grade to approximately 3.0 ft-bgs. Brown to gray coarse to fine sand, silt, and gravel at depths were observed at depths ranging from grade to approximately 9.5 to 20.0 ft-bgs in the northern portion of the Site and 12.0 to 16.5 ft-bgs in the central and southern portions of the Site. A black to gray clay layer was observed at depths ranging from approximately 9.5 to 20.0 ft-bgs in the northern portion of the Site, 12.5 to 20.0 ft-bgs in the central portion of the Site and 12.5 to 15.0 ft-bgs in the southern portion of the Site. Bedrock and/or refusal were not encountered in soil borings advanced up to 20.0 ft-bgs during the 2026 RI.

During the prior investigation in 2023, groundwater was generally encountered during the drilling at depths ranging from approximately 4.0± to 8.0± ft-bgs. During the January, February and April 2026 monitoring well sampling events, discussed further below, groundwater was observed at depths ranging from approximately 2.0± to 6.53± ft-bgs. This fluctuation is likely due to the proximity of the Hudson River. Based on the January, February and April 2026 groundwater gauging events, groundwater flows in the west direction toward the Hudson River.

2.6 CONTAMINATION CONDITIONS

2.6.1 CONCEPTUAL MODEL OF SITE CONTAMINATION

The following subsections present the conceptual site model for the Site and discuss the potential sources of contamination, types of contaminants and affected media, potential contaminant pathways and actual/potential human and environmental receptors.

The suspected sources of discharge at the Site are related to historical Site operations and historic fill material. The Site's former use as a coal storage yard and automotive garage are possible sources of contaminants at the Site. Finally, residential heating oil underground storage tanks (USTs) on the Site also represent a potential source of contamination.

A ground penetrating radar scan around the existing residential structures identified approximately 58 anomalies which are suspected of being active heating oil USTs. These will be removed and closed per DER-10 Section 5.5, after the residences are evacuated and before the remedial construction starts on the Site. The locations of the identified UST anomalies are depicted in **Figure 2.2.**

VOCs, semi-volatile organic compounds (SVOCs), pesticides and metals were detected in the Site soils at concentrations exceeding soil cleanup objectives (SCOs). The overall depth of Unrestricted Use Soil Cleanup Objectives (UUSCO) and Protection of Groundwater Soil Cleanup Objectives (PGWSCO) impacted soils ranged from grade to approximately 20 ft-bgs. Restricted Residential Soil Cleanup Objectives (RRSCO) impacted soils ranged from grade to approximately 19.0 ft-bgs as described below.

Polycyclic aromatic hydrocarbons (PAHs, specifically Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h) anthracene) were detected at concentrations at least two (2) times their respective RRSCOs in RI-SB-02(0-0.5) collected from 0.0 to 0.5 ft-bgs.

Metals (copper and mercury) were detected at concentrations at least two times the RRSCO in the following samples collected from grade to 19.0 ft-bgs: RI-SB-02 (5–10), collected from 6.5 to 7.0 ft-bgs; RI-SB-04 (1.5–2), RI-SB-04 (5–10), and RI-SB-04 (10–15), collected from 1.5 to 2.0, 8.5 to 9.0, and 13.0 to 13.5 ft-bgs, respectively; RI-SB-09 (10–15), collected from 12.0 to 12.5 ft-bgs; RI-SB-14 (10–15) and RI-SB-14 (15–20), collected from 12.5 to 13.0 and 17.5 to 18.0 ft-bgs, respectively; RI-SB-15 (0–0.5) and RI-SB-15 (1.5–2), collected from 0.0 to 0.5 and 1.5 to 2.0 ft-bgs, respectively; and RI-SB-16 (15–20), collected from 18.5 to 19.0 ft-bgs.

Notably, mercury was detected at concentrations more than 140 times the RRSCO in samples RI-SB-15 (0–0.5) and RI-SB-15 (1.5–2) within the area proposed for redevelopment in Phase 2. Mercury detected at these levels represents a potential exposure pathway due to their relatively

shallow depth and will require targeted hot-spot excavation to ensure continued protection of human health and the environment. These RRSCO exceedances also represent a potential source of groundwater contamination as discussed below.

During the January, February and April 2026 monitoring well sampling events, groundwater was observed at depths ranging from approximately 2.0± to 6.53± ft-bgs. PAHs (benzo(a)anthracene, benzo(b)fluoranthene, and chrysene) and PFOS were detected at concentrations exceeding their respective PGWSCO in one or more samples collected from 0.0 to 8.5 ft-bgs.

The Site's groundwater has been impacted with SVOCs, metals, pesticides and PFAS compounds above NYSDEC TOGS Ambient Water Quality Standards (AWQS) groundwater standards. All wells on Site were found to be impacted with a mix of compounds above the AWQS. Based on the 2026 gauging data, the Site groundwater table ranges between approximately 2.0 ft-bgs and 6.53 ft-bgs and is expected to flow towards the Hudson River to the west of the Site.

SESI performed a 0.5-mile water well search using the NYSDEC Water Well Search Application for the Town of Greenburgh in Westchester County. Based on the search results, one (1) domestic water well is located approximately 1,100-feet (0.2-miles) northeast of the Site. This well is located cross gradient and is not expected to be impacted by the Site. No other wells are present within 0.5-miles of the Site. Because groundwater in this area of Tarrytown is not used for potable water, the pathway of the contaminated groundwater to human receptors is limited to the ingestion of the groundwater or direct exposure through excavation work. Further, because the nearest surface water is approximately 650 feet to the west (Hudson River), impacted Site groundwater is not expected to have a pathway to an ecological receptor.

Finally, the petroleum hydrocarbon compound (PHC) VOCs and chlorinated volatile organic compounds (CVOCs) detected in soil vapor form a possible risk of soil vapor intrusion into the future on-Site buildings. To address the potential for this pathway to human receptors, a vapor intrusion evaluation will be conducted in the future on-Site buildings, prior to occupancy. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating season after occupancy.

2.6.2 DESCRIPTION OF AREAS OF CONCERN

The Site's former use as a coal storage yard and automotive garage and historic fill material are suspected sources of contaminants in media at the Site. Residential heating oil USTs on the Site also represent a potential source of contamination. AOC locations are depicted in **Figure 2.2**.

2.6.3 SOIL/FILL CONTAMINATION

2.6.3.1 SUMMARY OF SOIL/FILL DATA

VOCs, SVOCs, pesticides and metals were detected at concentrations exceeding SCOs. The overall depth of UUSCO and PGWSCO impacted soils ranged from grade to approximately 20 ft-bgs. RRSCO impacted soils ranged from grade to approximately 19.0 ft-bgs as described below.

2.6.3.2 COMPARISON OF SOIL/FILL WITH SCGs

PAHs and metals were detected at concentrations exceeding their respective RRSCOs in samples collected from grade to 19.0 ft-bgs. Notably, mercury was detected at concentrations more than 140 times the RRSCO in samples RI-SB-15 (0–0.5) and RI-SB-15 (1.5–2) within the area proposed for redevelopment in Phase 2. Mercury detected at these levels represents a potential exposure pathway and will require targeted hot-spot excavation to ensure continued protection of human health and the environment. Soil exceedances identified in the RI are included in **Table 2.1**. A spider map that indicates the locations of and summarizes exceedances of SCOs prior to the remedy is shown in **Figure 2.3**.

During the January, February and April 2026 monitoring well sampling events, groundwater was observed at depths ranging from approximately 2.0± to 6.53± ft-bgs. PAHs (benzo(a)anthracene, benzo(b)fluoranthene, and chrysene) and PFOS were detected at concentrations exceeding their respective PGWSCO in one or more samples collected from 0.0 to 8.5 ft-bgs.

Acetone was detected in 73 of the 101 soil samples submitted for full metals analysis (from 16 boring locations). Detected concentrations were generally consistent and were observed in both shallow (0 to 3 ft-bgs) and deeper intervals (greater than 3 feet ft-bgs) without any discernible spatial or vertical pattern indicative of a localized discharge. Acetone concentrations exceeded applicable SCOs in 30 of 101 samples, including 3 exceedances within the upper 3 feet, where concentrations ranged from 0.0048 to 0.0739 ppm (average 0.0190 ppm), while deeper samples

ranged from 0.003 to 0.243 ppm (average 0.0437 ppm). Acetone can be present in the environment at low concentrations due to natural biological and chemical processes. It is produced naturally by plants, trees, and microorganisms as part of metabolic activities, and can also form during the breakdown of organic matter in soils. In addition, acetone is a common component of atmospheric air, generated through natural photochemical reactions and released from vegetation, and can be deposited onto soil via precipitation. However, low-level detections of acetone are most commonly attributed to laboratory or sampling artifacts (e.g., from solvents used in equipment decontamination, sample containers, or analytical processes), rather than representing a true environmental condition.

Chromium was detected in all 101 soil samples submitted for full metals analysis (from 16 boring locations), indicating its ubiquitous presence across the Site and suggesting naturally occurring background conditions. Detected concentrations were generally consistent and were observed in both shallow (0 to 3 ft-bgs) and deeper intervals (greater than 3 ft-bgs) without any discernible spatial or vertical pattern indicative of a localized discharge. Chromium can occur naturally in soil as a result of the weathering of parent bedrock and minerals, particularly those derived from mafic and ultramafic geologic materials. It is a common trace element in many soils and is typically present in the trivalent form (Cr(III)), which is relatively immobile and consistent with background conditions. Natural processes such as soil formation, mineral dissolution, and geochemical cycling can result in measurable chromium concentrations that vary with depth but remain relatively uniform across a site. Accordingly, widespread, low-to-moderate chromium concentrations without a defined source area or gradient are generally indicative of naturally occurring background rather than a release. In addition, review of the DER-10 Appendix D: Concentrations of Selected Analytes in Rural New York State Surface Soils: A Summary Report on the Sitewide Rural Surface Soil Survey, dated August 2005 reported distribution-free percentiles for chromium as follows: median 11 mg/Kg; 95th 20 mg/Kg; 98th 22 mg/Kg; max 36 mg/Kg. The study supports that chromium is naturally occurring, with some notable outliers, which are typical for the majority of observed metal exceedances at the Site are within the observed ranges for background concentrations of surficial soils in rural areas of New York State.

Mercury was detected in 69 of 101 soil samples submitted for full metals analysis (from 16 boring locations), indicating its reoccurring presence across the Site and suggesting naturally occurring background conditions. Detected concentrations were generally consistent and were observed in

both shallow (0 to 3 ft-bgs) and deeper intervals (greater than 3 ft-bgs) without any discernible spatial or vertical pattern indicative of a localized discharge, with the exception of concentrations in RI-SB-15 which will be remediated through excavation. Disregarding the two potential exposure pathways which will be remediated through excavation, concentrations within the upper 3 feet ranged from 0.037 to 0.77 ppm (average 0.214 ppm), while deeper samples ranged from 0.034 to 1.7 ppm (average 0.292 ppm). The overall distribution and consistency of concentrations across the Site do not indicate an anthropogenic source; therefore, chromium is interpreted to represent naturally occurring background conditions with the exception of RI-SB-15.

The RI determined that remedial action needs to be implemented to remediate the mercury contaminated soil at the RI-SB-15 hot spot.

2.6.4 ON-SITE GROUNDWATER CONTAMINATION

2.6.4.1 SUMMARY OF GROUNDWATER DATA

The Site's groundwater has been impacted with SVOCs, metals, pesticides and PFAS compounds above NYSDEC TOGS AWQS groundwater standards. All wells on Site were found to be impacted with a mix of compounds above the AWQS.

2.6.4.2 COMPARISON OF GROUNDWATER WITH SCGs

The RI determined that remedial action needs to be implemented to remediate the contaminated groundwater. A table that indicates exceedances of Class GA AWQS in monitoring wells prior to the remedy is shown in **Table 2.2**. A spider map that indicates the locations of and summarizes exceedances of AWQS prior to the remedy is shown in **Figure 2.4**. Groundwater contour maps from the January, February and April 2026 sampling events are provided as **Figures 2.5A through 2.5C**, respectively.

2.6.5 ON-SITE SOIL VAPOR CONTAMINATION

The PHC VOCs and CVOCs detected in soil vapor can result in soil vapor intrusion into the future on-Site buildings. To address the potential for this pathway to human receptors, a vapor intrusion evaluation will be conducted in the future on-Site buildings under the Site Management Plan but before occupancy. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating

season after occupancy. A summary of all sub-slab soil vapor, indoor air and ambient air detections in the RI is provided on **Figure 2.6**.

2.7 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.7.1 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

This exposure assessment discusses potential migration routes by which chemicals in the environment may be able to reach human receptors in accordance with NYSDEC DER-10 sections 3.14(c)17, 3.3(c)4 and Appendix 3B. This discussion is based on current and hypothetical future Site conditions and addresses the following four (4) points:

- identifies areas of concern and chemicals of concern;
- evaluates actual or potential exposure pathways;
- characterizes the potentially exposed receptors (residents, workers, recreational users, etc.), and
- identifies how any unacceptable exposures might be eliminated/mitigated.

2.7.2 AREAS OF CONCERN AND CHEMICALS OF CONCERN

Findings from the remedial investigation at the Site indicate:

- Approximately 58 anomalies were identified adjacent to the building footprints which are suspected to be active heating oil USTs;
- Sitewide Soil
    - UUSCO impacted soils ranged from grade to approximately 20 ft-bgs.
    - RRSCO impacted soils ranged from grade to approximately 19.0 ft-bgs.
    - PAHs (Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h)anthracene) were detected at concentrations at least two (2) times their respective RRSCOs in RI-SB-02(0-0.5) collected from 0.0 to 0.5 ft-bgs.
    - Metals (copper and mercury) were detected at concentrations at least two (2) times their respective RRSCOs in the several samples collected from grade to 19.0 ft-bgs.
    - Notably, mercury was detected in samples RI-SB-15 (0–0.5) and RI-SB-15 (1.5–2) at concentrations which will require targeted excavation to ensure continued protection of human health and the environment.

  - PGWSCO impacted soils ranged from grade to approximately 20.0 ft-bgs. Site groundwater was observed in monitoring wells at depths ranging from 2.0 to 4.75 ft-bgs during the February 2026 sampling event. Therefore, only soil samples collected above the water table (i.e., less than 4.75 ft-bgs) have the potential to impact Site groundwater.
  - PAHs (Benzo(a)anthracene and Chrysene) were detected at concentrations at least two (2) times their respective PGWSCO in R1-SB-02(0-0.5) collected from 0.0 to 0.5 ft-bgs.
- Stormwater Management Area
  - Soil collected within the extent of the proposed detention basin (RI-SB-02 and RI-SB-09) exhibited UUSCO, RRSCO and/or PGWSCO exceedances of PAHs, metals and one (1) VOC (acetone) to depths ranging from grade to 19.0 ft-bgs.
  - PAHs were detected at concentrations exceeding RRSCOs and PGWSCOs from grade to 8.5 ft-bgs. Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h)anthracene were detected at concentrations at least 2 times their respective RRSCOs in RI-SB-02(0-0.5) collected from 0.0 to 0.5 ft-bgs.
  - Benzo(a)anthracene and Chrysene were detected at concentrations at least two (2) times their respective PGWSCO in R1-SB-02(0-0.5) collected from 0.0 to 0.5 ft-bgs.
  - Metals (copper and mercury) were detected at concentrations at least 2 times their respective RRSCOs in the several samples collected from grade to 19.0 ft-bgs.
- Site groundwater has been impacted with SVOCs, pesticides, metals and PFAS compounds. All wells on the Site were found to be impacted with a mix of compounds above the AWQS.
- PHC VOCs and CVOCs have been detected in exterior soil vapor. Though these results were not directly compared to the NYSDOH Decision Matrices A-F, concentrations of ethylbenzene, m&p-xylenes and o-xylenes are present at levels that would trigger an assessment using the NYSDOH Decision Matrices A though F lower thresholds in RI-SV-01 and RI-SV-05 and upper thresholds in RI-SV-04.
- PHC VOCs and CVOCs have been detected in collocated sub-slab soil vapor and indoor air samples within the existing residential buildings 5 through 13; however, concentrations were not detected at levels exceeding the NYSDOH Decision Matrices A-F.

2.7.3 ACTUAL AND POTENTIAL EXPOSURE PATHWAYS AND RECEPTORS

The five (5) elements that comprise an exposure pathway include:

1. A description of the contaminant source. If the original source is unknown, then a description of the contaminated environmental medium at the point of exposure;
2. An explanation of the transport mechanism;
3. An identification of all potential exposure points;
4. A description of the exposure route at the contact point; and
5. A receptor population.

As noted in the Conceptual Site Model (CSM) above, the contaminant source is historical Site operations, historic fill material, and residential heating oil USTs. Transport mechanisms, exposure routes and contact points, and potential receptors for each medium are discussed below.

Soil

Impacted soils can potentially be transported from the Site through dust, surface water and sediment runoff. Contaminants in soil can potentially be transported from the Site by leaching to the groundwater. Dust and direct contact create potential exposure points to human receptors through inhalation, ingestion and dermal contact during demolition and construction activities as well as unauthorized access to the Site. Soil and sediment runoff create potential exposure to surface water and other ecological receptors, and leaching to groundwater creates a pathway to potential users of groundwater. It should be noted that there is a potential exposure concern to the surface soil on the Phase 2 area that will be occupied during the remediation and construction of Phase 1.

Groundwater

Contamination in groundwater can be transported via groundwater flow or inhalation of vapors. Because the area is serviced by public water, the exposure to groundwater does not exist for Site residents and the surrounding community. However, exposure points for human receptors to impacted groundwater are direct ingestion or absorption during excavation work in the remedial action phase. Migration of groundwater to surface water, wetlands or other ecological receptors also represents an exposure point.

Surface Water and Sediment

Surface water is not present on the Site. Thus, this exposure pathway may be eliminated from further evaluation.

Soil Vapor and Indoor Air

The potential for vapor contamination to migrate exists whenever near contaminants volatize, and this is enhanced during intrusive activities such as demolition and excavation. The exposure route for soil vapor is through the inhalation of the contaminated soil vapor during intrusive construction activities or when vapors intrude into the enclosed spaces of any planned Site development. After the Site is redeveloped, the potential for vapors to accumulate in enclosed areas of the proposed building, such as basements, crawl spaces, first floors, etc. create potential exposure points.

2.7.4 ELIMINATION / MITIGATION OF UNACCEPTABLE EXPOSURES

The following sections note the mitigation of potential risks of exposure for each medium as well as the remedies to be employed to reduce / eliminate the exposure risks.

Soil

The Site has been occupied by residential units for several decades. As the property operates as an affordable housing complex, efforts will be made to minimize potential displacement or relocation of residents to the extent practicable. During the RI, the Site remained fully occupied, and appropriate protective measures were implemented to safeguard residents, including the use of Community Air Monitoring Plan (CAMP) procedures. CAMP monitoring conducted during RI activities did not identify dust or VOC exceedances. Additionally, no complaints related to RI activities were reported by residents.

During future construction activities, specifically disturbance of soils, the potential for exposures to soils would increase for on-Site workers, utility workers, visitors and trespassers, as well as disturbed soils migrating offsite. These risks will be mitigated by employing the proper personal protective equipment (PPE), implementing the Health and Safety Plan (HASP) and CAMP, preventing dust generation, implementing Site security to restrict access, and managing soil runoff by implementing stormwater control measures. Future exposure to soil contamination will be

mitigated/eliminated by the implementation of protective measures, including engineered composite covers (concrete, asphalt, or clean soil) over residual soil/fill, as well as institutional controls, including a Site Management Plan (SMP).

Areas identified in the RI as containing surface soils (0.0 to 2.0 ft-bgs) exceeding the applicable RRSCOs will be temporarily restricted in the Phase 2 area during Phase 1 of construction. These areas will be restricted from resident contact through the placement of a minimum 6-inch-thick layer of clean gravel in the proposed construction laydown areas and/or installation of temporary fencing until the Phase 2 area is vacated and construction is complete.

Groundwater

To mitigate exposure risks during remediation and construction, the proper PPE will be employed and groundwater that is encountered during excavations will be dewatered and managed to minimize direct contact. The groundwater removed from the excavation will be treated and disposed of properly off-Site either in the Village of Tarrytown sewer after treatment or shipped to an off-Site facility, effectively remediating contaminated groundwater and mitigating potential groundwater exposure pathways.

SESI performed a water well search using the NYSDEC Water Well Search Application for the Village of Tarrytown in Westchester County. Based on the search results, no water wells are present in the immediate vicinity of the Site. Additionally, pursuant to Chapter 873, Article VII of the Westchester County local ordinance, the use of groundwater in Westchester County is prohibited. Therefore, the potential for exposure to impacted groundwater is further mitigated by the fact that groundwater in Tarrytown is not utilized for potable purposes.

It is also anticipated that once the Site is redeveloped, residual groundwater contamination, to the extent remaining, will naturally attenuate with time, reducing the risk of human heath exposure. Finally, further impacts to groundwater due to contact with soil contamination will be eliminated when the remediation is conducted, and the impacted soil is removed.

Soil Vapor and Indoor Air

As with soil and groundwater, potential exposure to soil vapor during construction will be minimized through the use of proper PPE and continuous air monitoring to ensure acceptable levels of airborne contaminants and dust per the Health and Safety Plan (HASP) and Community

Air Monitoring Plan (CAMP) provided in **Appendix E** and **Appendix F**, respectively. The planned soil excavation is expected to address future exposure risk to soil vapor and indoor air; however, a Soil Vapor Intrusion Evaluation, including indoor air sampling, will be conducted post-construction, prior to occupancy to ensure there are no vapor intrusion issues in the future structures on the Site. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating season after occupancy.

To minimize potential impacts to surrounding properties and the public right-of-way, the project will implement comprehensive dust and odor mitigation measures consistent with NYS RIWP requirements and applicable NYSDEC guidance. Dust control will include routine watering of exposed soils and stockpiles, use of tarps or covers during material transport, stabilization of disturbed areas as soon as practicable, installation of wind screens where necessary, and regular sweeping to prevent off-site migration.

Odor mitigation will include prompt removal or proper covering of odor-generating materials, limiting the size and duration of exposed excavations, use of odor-suppressing foam or neutralizing agents as needed, and continuous monitoring by site personnel to identify and address conditions in real time.

2.7.5 FISH AND WILDLIFE IMPACT ANALYSIS

As stated in the March 2026 RIR, Fish & Wildlife assessment is not necessary for this Site due to its urban location and distance from surface water bodies and wildlife areas.

2.8 INTERIM REMEDIAL ACTION

No interim remedial actions have been performed at the Site.

2.9 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.9.1 GROUNDWATER

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

2.9.2 SOIL

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatilizing from soil

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in (include all appropriate media: groundwater, surface water, or sediment) contamination.

2.9.3 SOIL VAPOR

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

2.10 CLIMATE CHANGE VULNERABILITY ASSESSMENT

The Climate Change Vulnerability Assessment considers the Site remedies climate resiliency and considers the proposed remedy's vulnerability to climate change. The first step is to conduct a climate screening.

- The climate screening is a high-level desktop review of the site and potential changes in climate hazards. If the screening identifies potential exposure to climate hazards, a Climate Vulnerability Assessment (CVA) will need to be conducted. A CVA will identify adaptation measures to account for projected climate hazard exposures.
- For sites susceptible to climate change, require a Climate Adaptation Plan, which will incorporate findings and recommendations from the Climate Vulnerability Assessment.

- Consideration of the Site Elevation, Clim AID Region, Remedial Stage/site classification, Contamination, Proposed/Current Remedy, proximity to any sensitive receptors, whether the Site is in a disadvantaged community or potential environmental justice area and remediation timeframe; and
- The relevance to the Site and the Remedy of Precipitation, Extreme Heat or Cold, Sea Level Rise, Flooding, Storm Surge, Wildfire, Drought, Storm Severity, Landslides and other hazards.

If potential impacts from climate hazards are identified, a climate vulnerability assessment must be conducted. This Climate Change Vulnerability Assessment should consider the reliability of energy, potential for flooding/droughts, increased erosion potential, proximity to water bodies, and any other environmental factors subject to change. If already completed in a previous phase, the Climate Change Vulnerability Assessment should be updated as necessary throughout the environmental cleanup. Because the Site is not located within a designated floodplain, climate-related vulnerabilities are anticipated to be minimal.

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The objective of the remedy is to achieve a cleanup that is the most protective of human health and the environment and that does not rely on engineering controls (ECs) or institutional controls (ICs). This objective will most likely be accomplished by a Track 4 remedy eliminating the source material and installing a Site-wide cover system.

Track 1

A remedy pursuant to this track must achieve compliance with the UUSCOs set forth in 6 NYCRR Table 375-6.8(a).

In a Track 1 remedy, no institutional and engineering controls are allowed after the issuance of the COC. This alternative would involve the complete removal and/or remediation of the soil with exceedances of the UUSCOs, which were encountered during the RI to 20.0 ft-bgs across the Site. A remedial technology that may be used to implement this alternative involves the excavation of the contaminated soil to an average of 15.8 ft-bgs and transportation to an approved off-Site facility for disposal. This average was calculated using the deepest point of contamination in each boring plus 1 foot. Post-excavation samples will be collected at the target excavation depth. If the confirmation samples result in exceedances of UUSCOs, the excavation will continue in that location until UUSCOs are achieved or until bedrock is encountered, whichever is encountered first. Soil analytical results exceeding UUSCOs are provided in **Table 2.1.**

As shown in **Table 3.1**, the estimated soil quantity to be removed as part of a Track 1 remedy is 204,749 cubic yards, including a 20% contingency with the expectation that these excavation areas are expected to increase further based on the possible exceedances of the post excavation samples. This estimate was calculated using the average deepest exceedance across all soil borings collected as part of this RI.

The extent and depth of excavation render the Track 1 UUSCO remedy for soil impractical. In addition, extensive dewatering and support of excavation will be required to achieve the soil UUSCOs. The RIWP was designed for a Track 4 cleanup, additional soil investigation would be required to accurately determine the exceedances to UUSCOs across the Site.

Track 2

Cleanups pursuant to this track may consider the intended future use in determining the appropriate cleanup levels for soil. This track requires the Volunteer implement a cleanup that achieves the Track 2 restricted residential soil SCOs from tables in 6 NYCRR 375-6.8(b), which is consistent with the intended Site use for the top 15 feet of soil (or bedrock if less than 15 feet). The Site remediation pursuant to Track 2 Restricted Residential (Track 2 RR) would involve excavation and disposal of the contaminated soils to meet the RRSCOs. Institutional and engineering controls that limit Site use and on-Site groundwater use can be used without regard to duration.

This alternative would involve the removal and/or remediation of the soil with exceedances of the RRSCOs, which were encountered during the RI to 19.0 ft-bgs across the Site. A feasible remedial technology that may be used to implement this alternative involves the 50' x 50' excavation of the contaminated soil to approximately 20.0 ft-bgs, which is the depth of contamination plus 1 foot, and transportation to an approved off-Site facility for disposal. Post-excavation samples will be collected at the target excavation depth. If the confirmation samples result in exceedances of RRSCOs, the excavation will continue in that location until RRSCOs are achieved or until bedrock is encountered, whichever is encountered first. Track 2 soil analytical results exceeding RRSCOs are provided in **Table 3.2.**

The excavation of soil to achieve the RRSCO would require extensive support of excavation and dewatering because of the site geology with deep bedrock in certain areas and the shallow groundwater. This makes the excavation of RRSCOs exceedances, which is up to approximately 20.0 ft bgs, impractical and economically prohibitive and rules out the Track 2 remedy option. **Figure 3.1** and **Table 3.3** show the extent and depth of excavation to remove the soils exceeding RRSCO based on the data collected from the RI. As shown in **Table 3.3**, the estimated soil quantity to be removed as part of a Track 2 remedy is 13,833 cubic yards, including a 20% contingency with the expectation that these excavation areas are expected to increase further based on the possible exceedances of the post excavation samples. The extent and depth of excavation will render the Track 2 RRSCO remedy for soil impractical because of the anticipated extensive dewatering and support of excavation required to achieve the soil RRSCO.

Track 4

A Track 4 remedy for restricted residential should meet the RRSCO in the top 2.0 feet or establish a site cover. The soil below the 2.0 feet or the soil cover does not have to meet a soil cleanup objective and PGWSCOs should be addressed. Track 4 soil analytical results exceeding RRSCOs are provided in **Table 3.4.**

Under this Track, the soil remediation will consist of remediation of hot spots (RI-SB-15), as provided in **Figure 3.2** and **Table 3.5**. The soil impact on the Site groundwater is discussed in Section 5.1. Soil remediation will include the treatment or excavation of hot spot soils as identified in the RI work; and the implementation of a cap as an EC. The soil cap will consist of structures such as buildings, sidewalks, pavement, or two (2) feet of soil that meets the RRSCOs in the landscaped areas. As shown in **Table 3.5**, the estimated soil quantity to be removed as part of a Track 4 hot spot excavation remedy is 53 cubic yards, including a 20% contingency with the expectation that these excavation areas are expected to increase further based on the possible exceedances of the post excavation samples. Approximately 9,300 cubic yards of soil will be excavated as part of the planned construction activities and to establish a minimum 2.0-foot clean fill cap across the Site. In total, approximately 9,353 cubic yards of soil are expected to be removed from the Site.

Several soil samples contained concentrations of PAHs and PFOS exceeding the applicable PGWSCOs; however, groundwater data indicates that remediation of these soils is not warranted. PAHs were detected at low concentrations in Site groundwater and are expected to naturally attenuate over time in soil and groundwater. While PFOS was detected in both upgradient and downgradient monitoring wells, only minor increases were observed in downgradient wells. This suggests that onsite soils are not a significant source of PFOS to groundwater. Based on the limited groundwater impacts, expected natural attenuation of PAHs, and the apparent regional contribution to PFOS concentrations, excavation of soils exceeding PGWSCOs is not warranted. In addition, the installation of a sitewide cap will limit impacts to groundwater.

Based on the results of the three (3) rounds of groundwater sampling during the RI, SVOCs, pesticides, metals and PFAS have been identified in groundwater above the AWQS. The remediation for groundwater is expected to be long-term monitoring of the natural attenuation

under the Track 4 RR. The monitoring will continue until the levels are below the AWQS or reach asymptotic levels that are accepted by the NYSDEC and do not require remediation or long-term monitoring.

Elevated levels of VOCs were detected in the soil vapor samples collected during the RI. The remedy will include the installation of the elements of a sub-slab depressurization system (SSDS) underneath the building if the sub slab of the proposed buildings is not under the water table during the seasonal low. The design for the proposed building has not been completed as of the time of writing this RAWP. Once the building design is completed, the designs for the SSDS piping and the vapor barrier will be developed and will be submitted for NYSDEC and NYSDOH approval. A soil vapor intrusion evaluation will be completed once the proposed building is built, prior to occupancy and if an SSDS is determined to not be needed, then the elements of SSDS will not be considered an EC. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating season after occupancy. If the evaluation determines that an SSDS is needed, then an air blower will be designed and added to the elements of the SSDS, which will become an EC. The VOC concentrations in the sub slab and indoor air will be monitored unit the levels drop to below the mitigation threshold requirements, at which point, a recommendation will be submitted to NYSDEC and NYSDOH for their review and approval to shut down the active SSDS. If the recommendation is approved, then the SSDS will be shut down.

The remedy will also include the closure and removal of the 58 active and inactive USTs identified during the November 2024 geophysical investigation in accordance with applicable NYSDEC requirements and regulatory standards. The USTs will be registered with the Westchester County Department of Health (WCDOH) prior to closure. UST closure activities will include tank cleaning, inerting, removal, inspection, transportation, and disposal, as appropriate. UST removal will be conducted during either Phase 1 or Phase 2 remedial activities based on tank location, site access constraints, and coordination with other remedial construction activities. Following removal, excavation sidewalls and floors will be visually inspected for evidence of petroleum impacts, including staining, odors, sheens, or other indicators of a release. Samples of residual product, sediment, and surrounding soils will be collected, as warranted, to evaluate the presence and extent of contamination associated with the former UST systems. Sampling and analysis will be performed in accordance with NYSDEC DER-10 requirements and applicable guidance, with

analytical testing per CP-51 to support assessment of potential source areas and determination of any additional remedial actions.

A Track 4 remedy would also include the preparation of a SMP and the recording of an Environmental Easement (EE) as institutional controls (IC). The SMP will ensure that engineering controls are maintained, and that and future material removed from the site (post remedial action) is managed properly. The SMP would include periodic (annual) monitoring and reporting of the cover system, the groundwater wells, and the soil vapor evaluation to ensure continued protection of human health and the environment.

The EE will cover the entire Site for maintenance of the cap, groundwater monitoring and the soil vapor intrusion evaluation. The EE will continue in perpetuity under a Track 4 for the soil cap.

No Action Alternative

The no action alternative would leave existing sources of contamination in soil and groundwater and soil vapor. The no action alternative is thus unacceptable and has not been compared to the factors below.

Protection of human health and the environment:

All three cleanup tracks would be protective of human health and the environment. A Track 1 remedy would provide the highest degree of protection by removing or remediating all soils exceeding UUSCOs, thereby eliminating the need for long-term institutional or engineering controls following issuance of the COC. A Track 2 remedy would also be protective by removing soils exceeding RRSCOs and implementing institutional and engineering controls, as necessary, to manage any remaining contamination. A Track 4 remedy would be protective of human health and the environment provided that the proper long-term engineering controls (e.g., site cover system and vapor mitigation measures) and institutional controls (e.g., Environmental Easement and SMP) are properly implemented, maintained, and monitored over the long term.

Compliance with standards, criteria, and guidelines (SCGs):

All cleanup tracks will achieve applicable cleanup standards and regulatory requirements. A Track 1 remedy would achieve UUSCOs throughout the Site and therefore satisfy the most stringent cleanup criteria. A Track 2 remedy would achieve the applicable RRSCOs consistent with the

intended restricted residential redevelopment of the Site. A Track 4 remedy is not driven by standards but rather by source removal and SMP ECs and ICs to manage the remaining contamination in place to enable the safe reuse of the site for restricted residential purposes.

Short-term effectiveness and impacts:

A Track 1 remedy would involve excavation of approximately 204,749 cubic yards of soil and would therefore result in the greatest short-term impacts, including increased truck traffic, noise, dust generation, greenhouse gas emissions, dewatering requirements, support of excavation, and potential disruption to the surrounding community. A Track 2 remedy would involve excavation of approximately 13,833 cubic yards of contaminated soil and would also require extensive dewatering and support of excavation to depths approaching 20 feet below ground surface (ft-bgs), resulting in significant but less substantial short-term impacts than Track 1. A Track 4 remedy reduces the risk of construction worker exposure by reducing the volume of contaminated soil being managed and has less potential to cause dust and traffic issues. The limited excavation may result in greater potential for migration of impacts from the open excavation (e.g. wind erosion, stormwater intrusion, etc.); however, implementation of the HASP, CAMP monitoring, and dust, odor, erosion and sediment controls will be implemented to minimize and control any migration.

Long-term Effectiveness and Performance:

A Track 1 remedy would provide the greatest long-term effectiveness because contaminated soils exceeding UUSCOs would be removed or remediated, eliminating the need for long-term engineering or institutional controls. A Track 2 remedy would provide a high level of long-term effectiveness through removal of soils exceeding RRSCOs, although long-term management of any remaining contamination and applicable controls may still be required. A Track 4 remedy would provide long-term effectiveness through the implementation of a site cover system, groundwater monitoring, soil vapor mitigation measures, an SMP, and an Environmental Easement. Although contaminants are left on Site, a properly maintained cover system is effective at eliminating the risk of dermal exposure and the planned soil vapor mitigation measures will also help to ensure lack of exposure to any remaining on-Site vapors.

Reduction of toxicity, mobility, or volume of contaminated material:

A Track 1 remedy would provide the greatest reduction in contaminant toxicity, mobility, and volume by removing the largest quantity of contaminated soil from the Site. A Track 2 remedy would also significantly reduce contaminant volume and mobility through targeted excavation of soils exceeding RRSCOs. While a Track 4 remedy provides a relatively smaller reduction in volume than the other tracks, it relies primarily on the decrease of contaminant mobility and closure of exposure pathways through hotspot removal, source control measures, and installation of a site-wide cap.

Constructability:

A Track 1 remedy is considered impractical and difficult to construct because excavation to achieve UUSCOs would extend to up to a depth ranging from 1.5 to 21.0 ft-bgs with an average depth of approximately 15.8 ft-bgs across the Site and some areas requiring excavation to bedrock. The extensive excavation volume, significant dewatering requirements, deep bedrock variations, and support of excavation needs make the constructability of this alternative highly challenging. A Track 2 remedy is also considered impractical due to the depth and extent of excavation required to achieve RRSCOs, extensive dewatering requirements, and support of excavation necessary to reach depths approaching 20 ft-bgs. A Track 4 remedy is implementable given the location and the planned use for the Site. While there are short-term potential impacts, the Site is located in the middle of an urban area, and therefore disposal of the contaminated soil and truck access will not be a problem. Moreover, these short-term impacts will be avoided through implementation of the CAMP and HASP, which will employ truck washing and odor and dust control measures. Therefore, the Track 4 remedy is implementable for this Site.

Cost Effectiveness:

A Track 1 remedy would be the least cost-effective alternative due to the extensive excavation, transportation, disposal, dewatering, and backfilling requirements associated with removing approximately 204,749 cubic yards of soil. A Track 2 remedy would be less costly than Track 1 but would still involve substantial excavation, dewatering, support of excavation, and off-site disposal costs. A Track 4 remedy is the most cost-effective alternative because it focuses on targeted hotspot remediation, source control, and management of remaining contamination through engineering and institutional controls while still achieving protection of human health and the environment for the intended Site use.

Community Acceptance:

A community outreach program has been and will continue to be incorporated into all remedial alternatives, per NYSDEC Brownfield Program law and regulations, and through the continued implementation of the Citizen Participation Plan (CPP). Community acceptance is anticipated to be highest for alternatives that minimize construction duration, truck traffic, noise, and disruption. Consequently, Track 4 is expected to have fewer community impacts than Tracks 1 and 2 because of the substantially reduced volume of excavation and material transport.

Land use:

All three cleanup tracks would support the planned restricted residential redevelopment of the Site. Track 1 would permit unrestricted future land use without the need for long-term controls. Track 2 would support restricted residential use consistent with the proposed redevelopment while allowing long-term controls as necessary. Track 4 would support the planned residential redevelopment through implementation of a cover system, SMP, and Environmental Easement that manage remaining contamination.

Zoning:

Implementation of any of the proposed remedial alternatives would facilitate the Site to be utilized for a proposed residential development, which is consistent with applicable zoning laws and anticipated future use of the Site.

Applicable comprehensive community master plans or land use plans:

Implementation of any track (with institutional controls) remedy will facilitate the proposed residential development, which is consistent with the current local land use plan. Tracks 2 and 4 would require long-term controls consistent with the intended restricted residential use, while Track 1 would allow unrestricted future use.

Surrounding property uses:

Any cleanup approach taken is not expected to significantly impact land use of the surrounding properties as this is an occupied Site that already generates vehicle trips and the truck traffic and access will be on public roads. A Track 1 or Track 2 remedy, however, would generate significantly more truck traffic because of the increased volume of excavated material to be

transported from, and backfill material to, the Site. Track 4 would minimize these impacts due to the reduced excavation requirements.

Citizen Participation:

Citizen Participation during implementation of a remedial program will proceed in accordance with the CPP included as **Appendix G** and, as noted above, will have minimal community impact. While all alternatives can be implemented with minimal long-term community impact, the greater excavation volumes associated with Tracks 1 and 2 would likely result in increased public concern regarding traffic, noise, and construction duration. Any short-term impacts will be addressed by the CAMP and the HASP.

Environmental justice concerns:

There are no known environmental justice concerns associated with this project. This is an existing and future affordable housing project.

Land use designations:

A Track 1 remedy would not require long-term land use restrictions following achievement of UUSCOs and issuance of the COC. Track 2 and Track 4 remedies would require institutional controls and engineering controls to manage remaining contamination and ensure continued protectiveness for the intended restricted residential use. A Track 4 remedy will have restrictions that will need to be managed in the SMP and EE in perpetuity.

Population growth patterns:

Any of the proposed remedies will not impact reasonably anticipated population growth patterns in the area other than to better accommodate growth by providing for additional affordable housing.

Accessibility to existing infrastructure:

Some on-Site old utility infrastructure will likely have to be demolished and removed as part of the remediation. Tracks 1 and 2 may require additional utility relocation and reconstruction because of the extensive excavation required. However, new infrastructure will be installed subsequent to the remediation as part of the redevelopment.

Proximity to natural resources:

There are no surface water bodies or streams on or directly adjacent to the Site. SESI did not observe any areas suspected to be wetlands on the Site. Stormwater drainage patterns are generally consistent with the surrounding topography and primarily flow to the west toward the Hudson River. Although Tracks 1 and 2 involve substantially greater excavation and dewatering activities, implementation of erosion and sediment controls would minimize potential impacts to natural resources under all alternatives.

Geography and geology of the Site:

As discussed in Section 2.4, the Site is characterized by variable bedrock depths and shallow groundwater conditions. These geologic conditions significantly affect the feasibility of Tracks 1 and 2 because extensive excavation, dewatering, and support of excavation would be required to achieve the applicable cleanup objectives. Track 4 is more compatible with the Site's geologic conditions because it minimizes deep excavation and relies on engineering and institutional controls.

Current Institutional Controls:

There are no current institutional controls associated with the Site. A Track 1 remedy would not require institutional or engineering controls following issuance of the COC. A Track 2 remedy may require institutional and engineering controls to manage remaining contamination and ensure restricted residential use. A Track 4 remedy would require implementation of an Environmental Easement, SMP, groundwater monitoring, maintenance of the site cover system, and evaluation and maintenance of vapor mitigation measures, as applicable.

Based on the above criteria and the site conditions, a RRSCO Tack 4 remedy is the most feasible remedy to protect human health and the environment and achieve the planned use of the Site.

3.2 SELECTION OF THE PREFERRED REMEDY

A summary of the selected Track 4 remedial actions to address the impacts identified are discussed below:

1. Closure and removal of all active and inactive USTs identified at the Site in accordance with applicable NYSDEC requirements, including tank closure, cleaning, inerting, removal,

inspection, and disposal procedures. The USTs will be registered with the WCDOH as needed. UST removal will be completed during either Phase 1 or Phase 2 remedial activities, depending on tank location and site access constraints. Following removal, surrounding soils will be inspected for evidence of petroleum releases, and any contaminated materials encountered will be characterized, managed, and disposed of in accordance with applicable NYSDEC regulations.

2. Excavation of soil/fill, including soil within the RI-SB-15 hot spot, as shown in **Tables 3.3 and 3.4,** as well as portions of surficial soils within proposed landscape areas;
3. The installation of 2-feet of clean fill across the Site in the proposed landscape areas: this may include excavation or fill depending on the proposed final site grades. An earthwork model depicting the cut and fill proposed for the Site is included as **Appendix H** as well as **Figure 3.3**;
4. Import of fill that meets the RRSCO as needed for top 2-feet cover in the landscape areas and to raise the grade in select areas of the Site. An earthwork model depicting the cut and fill proposed for the Site is included as **Appendix H** as well as **Figure 3.3**;
5. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
6. Collection and analysis of end-point samples to evaluate the performance of the remedy;
7. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
8. Import of materials to be used for backfill and cover in compliance with all Federal, State and local rules and regulations for handling and transport of material;
9. A soil vapor evaluation (SVE) will be conducted for the completed building under the SMP post COC. The SVE will include collection of collocated sub-slab and indoor samples per the NYSDOH VI guidance during the heating season once the building is completed. The following precautionary measures will be installed during the construction of the proposed building with enclosed spaces:
    a. Prior to construction of the building slab, install a vapor barrier to mitigate against the potential for soil vapor intrusion into the future Site buildings.
    b. Installation of the elements of an SSDS underneath the building foundation if the sub-slab of the proposed building is not under the water table during the seasonal low. A SVE will be conducted, when the construction of the proposed building is completed after the COC, prior to occupancy, to determine if the soil vapor (SV)

levels constitute a vapor intrusion (VI) risk. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating season after occupancy. The elements of the SSDS will be turned into an (EC) as an active SSDS if the soil vapor evaluation determines that vapor mitigation is needed.

10. Construction and maintenance of a site cover consisting of building foundations, asphalt, concrete surfaces or 2.0-feet of soil that meet the RRSCO in the landscaped areas to prevent human exposure to residual contaminated soil/fill remaining under the Site;
11. Repair and replacement as needed of monitoring wells for future groundwater monitoring (the current monitoring well network is shown on **Figure 2.1**). The monitoring well network will be considered an engineering control as long as the Department requires groundwater monitoring under the SMP. A typical well construction diagram is provided as **Appendix I**;
12. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site;
13. Publication of a SMP for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;
14. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations and overseen and certified by the SESI Remedial Engineer of Record.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the Final Engineering Report (FER).

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENTS

This RAWP is governed by applicable federal, state, and local SCGs that establish the requirements for site investigation, remedial design, implementation, and site management to ensure protection of public health and the environment. These include NYSDEC regulations and guidance (e.g., DER-10, DER-31, and 6 NYCRR Part 375), NYSDOH guidance, OSHA safety requirements, and relevant USEPA directives. Key supporting plans developed for this project include the HASP, Quality Assurance Project Plan (QAPP), Soil/Materials Management Plan (SoMP), Erosion and Sediment Control Plan (ESCP), and CAMP, as well as a CPP to support public communication. These documents provide the framework for implementing the remedial program, with additional detail provided in subsequent sections and full copies included in the designated appendices.

4.1.1 STANDARDS, CRITERIA AND GUIDANCE (SCGs)

The following standards and criteria typically will apply to Site Characterizations, Remedial Investigations, remedy selection, underground storage tank closures, remedial actions and Site management activities:

- DER-10 / Technical Guidance for Site Investigation and Remediation
- DER-13 / Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York State Department of Environmental Conservation
- 6 NYCRR Part 257 - Air Quality Standards
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations (1998, Addenda 2000, 2004, 2023)
- Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Final October 2006; amended May 2017; February 2024)
- 6 NYCRR Part 375 - Regulations Subparts 1, 3 and 6 applicable to the Brownfield Cleanup Program (Amended December 31, 2025)
- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)

- USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures (September 1993)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.048FS Presumptive Remedies
- Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils (September 1993)
- 6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)
- 6 NYCRR Part 614 - Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil (November 1998)
- 6 NYCRR 375 Table 375-6.8(a) and Table 375-6.8(b) (Amended December 31, 2025)
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
- SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994)
- Spill Response Guidance Manual
- Permanent Closure of Petroleum Storage Tanks (July 1988)
- NYSDOH Environmental Health Manual CSFP-530 - “Individual Water Supplies - Activated Carbon Treatment Systems”
- 10 NYCRR Part 67 – Lead
- 12 NYCRR Part 56 - Industrial Code Rule 56 (Asbestos)
- 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)

- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Subpart 374-3 - Standards for Universal Waste (November 1998)
- TAGM 4013 - Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)
- TAGM 4059 - Making Changes to Selected Remedies (May 1998)
- TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
- CP-43: Groundwater Monitoring Well Decommissioning Policy (November 2009)
- CP-51 / Soil Cleanup Guidance (October 2010)
- NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances Guidance Document (April 2023).
- Green and Sustainable Remediation Guidance and DER 31: Green Remediation
- 6 NYCRR PART 375 - Environmental Remediation Programs (Effective December 31, 2025)

4.1.1.1 GREEN AND SUSTAINABLE REMEDIATION AND CLIMATE RESILIENCY

During the remedial action field activities, SESI will consider NYSDEC DER-31 “Green Remediation” implementation objectives, which provide the framework for DER's approach to remediating sites in the context of the larger environment, a concept known as “Green Remediation”. Green Remediation can be defined as “the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions.” It is intended to be a holistic approach that improves the overall sustainability of remedial cleanups by promoting the use of more sustainable practices and technologies which are less disruptive to the environment, generate less waste, increase reuse and recycling, and emit fewer pollutants, including greenhouse gases, to the atmosphere. The approach also recognizes the potential for positive economic and social benefits of site reuse and supports coordination of site reuse and remediation to affect the most beneficial and sustainable reuse of the site. Please note that end use is dictated by local zoning codes. NYSDEC’s role is to ensure that the remedy is protective of the intended end use.

Green Remediation concepts and practices that may be implemented during Phases 1 and 2 of the remedial activities include:

- Conserving natural resources, including energy, water, raw materials, topsoil, paper, and landfill capacity;
- Utilizing sustainable construction and project management practices, including the use of native vegetation for site restoration where practicable;
- Minimizing vehicle and equipment idling, where feasible, to reduce emissions of greenhouse gases and other air pollutants;
- Reducing waste generation and maximizing the reuse and recycling of materials whenever practicable;
- Employing real-time particulate monitoring equipment to evaluate and minimize off-site migration of dust and associated contaminants;
- Utilizing real-time VOC monitoring equipment to evaluate and minimize potential VOC exposures during remedial activities;
- Coordinating field activities and sampling events to maximize operational efficiency and minimize travel to and from the Site, thereby reducing fuel consumption and associated emissions;
- Reusing excavated soil and aggregate materials on-site, where appropriate and in accordance with regulatory requirements, to reduce the need for off-site disposal and import of fill materials;
- Selecting local or regional material suppliers, where practicable, to reduce transportation-related fuel consumption and emissions;
- Maintaining construction equipment in accordance with manufacturer specifications to maximize fuel efficiency and minimize emissions;
- Implementing erosion and sediment control measures to preserve soil resources and prevent sediment migration from disturbed areas;
- Minimizing disturbance of existing vegetation and preserving mature trees where feasible during remedial construction activities;
- Utilizing electronic data management, reporting, and document review processes to reduce paper consumption;
- Consolidating material deliveries and waste shipments, where practicable, to reduce vehicle trips and associated emissions;

- Incorporating low-maintenance and drought-tolerant landscaping features into site restoration activities, where appropriate;
- Evaluating opportunities to use fuel-efficient, hybrid, electric, or alternative-fuel construction equipment and vehicles, where available and practicable; and
- Optimizing excavation, transportation, and material handling activities to reduce fuel consumption, equipment operating time, and overall project-related emissions.

4.1.2 SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP)

A copy of the SESI HASP is included as **Appendix E**. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate HASP and for the appropriate performance of work according to that plan and applicable laws.

The HASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at the Site until the issuance of a COC.

A resume for the Site Safety Coordinator will be provided to NYSDEC prior to the start of remedial construction.

Confined space entry, if needed, will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gases.

4.1.3 QUALITY ASSURANCE PROJECT PLAN (QAPP)

A copy of SESI QAPP is included as **Appendix J**. All field sampling procedures and analytical methods will be implemented in accordance with this QAPP.

4.1.4 SOIL/MATERIALS MANAGEMENT PLAN (SoMP)

The SoMP is included as Section 5.4 and includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport and disposal. It also includes all of the controls that will be applied to these efforts to ensure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations.

4.1.5 EROSION AND SEDIMENT CONTROL PLAN (ESCP)

A soil erosion and sediment control plan will be prepared prior to start of remediation or construction work. The ESCP will address requirements of the New York State Stormwater Management Regulations, including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water.

4.1.6 COMMUNITY AIR MONITORING PLAN

A Community Air Monitoring Plan for the RAWP at the Site will be implemented in accordance with the requirements of DER-10 Appendix 1A. The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise during all ground intrusive activities, and potentially contaminated soil and material handling and staging. In addition, the CAMP is intended to ensure that dust and contaminants are not leaving the work zone. Special CAMP requirements may apply due to the proximity of the Site to adjacent properties within 20 feet of potentially exposed individual structures as specified in the CAMP.

Four (4) CAMP stations will be active and monitored during all ground intrusive activities and soil handling activities at the Site. The CAMP data will be submitted to NYSDEC and NYSDOH on a weekly basis, at a minimum, while ground intrusive and soil handling are taking place. In addition, the NYSDEC and NYSDOH will be notified as soon as possible and within one (1) business day of monitoring results which exceed the action levels, including the duration and actions taken in response to exceedances. A copy of the CAMP for the Site is included as **Appendix F**.

4.1.7 CONTRACTORS SITE OPERATIONS PLAN (SOP)

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they

comply with this RAWP. The Remedial Engineer is responsible for ensuring that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, comply with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 CITIZEN PARTICPATION PLAN

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing. The CPP is included as **Appendix G**.

Document repositories have been established at the following locations and contain all applicable project documents:

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Warner Library
121 North Broadway
Tarrytown, NY 10591
Hours:
Mon-Wed 10a-6p
Thursday 1p-9p
Fri-Sat 10a-5p
Sunday 1p-5p

In addition, an electronic repository can be accessed via DECInfo Locator at the following link: Index of /data/DecDocs/C360252

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 PROJECT ORGANIZATION

Franklin Courts JV Partners L.P. is the BCP Volunteer and developer of the Site. SESI is the environmental consultant for the Volunteer. A table summarizing the various personnel associated with the project is included as **Table 4.1** below.

Table 4.1 – Project Personnel

Name	Company	Project Position	Address	Phone Number
Gibson Craig	Franklin Courts JV Partners L.P.	Volunteer Contacts	840 Bedford Road, Chappaqua, NY 10514	(914) 610-3637
MaryKate Chorazak	SESI Consulting Engineers, P.C.	Environmental Consultant's Project Manager	959 Rt 46 East, Parsippany, NJ 07054	(973) 808-9050
Fuad Dahan, PE	SESI Consulting Engineers, P.C.	Remedial Engineer	959 Rt 46 East, Parsippany, NJ 07054	(973) 808-9050
Michaela Cochran	NYSDEC	Project Manager	625 Broadway, Albany, NY 12233	(518) 402-9669

4.2.2 REMEDIAL ENGINEER

The Remedial Engineer for this project will be Fuad Dahan, PE. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Franklin Courts Coal Storage Site (BCP No. C360252). The Remedial Engineer will certify in the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the RAWP and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill

material, and management of waste transport and disposal. The Remedial Engineer will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the FER.

The Remedial Engineer will provide the certifications listed in the FER.

4.2.3 REMEDIAL ACTION CONSTRUCTION SCHEDULE

A remedial action schedule is included as **Table 4.2** below. The schedule includes estimates of time required to complete the activities associated with the remedial action. It is based on elapsed time from receipt of NYSDEC approval. Once NYSDEC approves this RAWP, an updated schedule showing actual dates will be provided to the NYSDEC as an addendum to this plan.

Table 4.2 – Remedial Action Schedule

Activity	Date
RIR submission	March 2026
RAWP submission	April 2026
Start of RAWP Public Comment period	June 2026
NYSDEC approves RAWP and issues decision document	August 2026
Site Prep and Remediation	September 2026 – October 2027
Submission of Environmental Easement	July 2027
Submission of SMP	August 2027
Submission of FER	October 2027
Certificate of Completion	December 2027

4.2.4 WORK HOURS

The hours for operation of remedial construction will conform to the Village of Tarrytown construction code requirements or according to specific variances issued by that agency. NYSDEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 SITE SECURITY

Upon commencement of construction the site will be divided into two halves (Phase 1 and Phase 2) each with its own ingress and egress. The active phase of construction will be restricted utilizing construction and silt fencing.

4.2.6 TRAFFIC CONTROL

Traffic control shall be the responsibility of the Volunteer's contractors. Traffic control must comply with all local, state, and federal regulations, including but not limited to those of the Village of Tarrytown and the Manual on Uniform Traffic Control Devices.

4.2.7 WORKER TRAINING AND MONITORING

All on-Site project personnel who work in areas where they may be exposed to Site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in the HASP prior to initiating site activities. In addition, all SESI personnel will attend an initial hazard briefing prior to beginning work at the Site.

All subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating Site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the Site. Additionally, on-Site subcontractor personnel must conduct daily Site safety meetings.

4.2.8 AGENCY APPROVALS

The Volunteer has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction. The planned end use for the Site is in conformance with the current zoning for the property as determined by the Village of Tarrytown Planning & Zoning Department. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all federal, state and local governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be obtained and

provided in the FER. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the FER.

All planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Natural Resources to ensure that it meets the requirements for substantive compliance with those regulations prior to the start of construction. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

4.2.9 NYSDEC BCP SIGNAGE

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager.

4.2.10 PRE-CONSTRUCTION MEETING WITH NYSDEC

A pre-construction meeting will be held with NYSDEC prior to the start of major remedial construction activities.

4.2.11 EMERGENCY CONTACT INFORMATION

An emergency contact sheet with names and phone numbers is included in **Table 4.3** below. That document will define the specific project contacts for use by NYSDEC and NYSDOH in case of a day or night emergency.

Table 4.3 - Emergency and Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3-day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362
Fuad Dahan – Remedial Engineer (SESI Consulting Engineers)	(973) 808-9050
Director of Construction	TBD

* Note: Contact numbers subject to change and will be updated as necessary

4.2.12 REMEDIAL ACTION COSTS

An itemized and detailed summary of costs for all remedial activity will be based on actual costs and submitted as an Appendix to the FER.

4.3 SITE PREPARATION

4.3.1 MOBILIZATION

Mobilization tasks will include:

- Asbestos remediation and demolition of existing buildings;
- Construction of temporary facilities and utilities;
- Set-up of construction equipment and facilities;
- Construction of fencing and barriers;
- Construction of erosion control measures; and
- Construction of decontamination and materials staging areas.

4.3.2 MONITORING WELL DECOMMISIONNING

Existing groundwater monitoring wells (RI-MW-01 through RI-MW0-08) will either be protected during remediation and development for use in post-remedial monitoring or will be properly decommissioned in accordance with NYSDEC Commissioners Policy CP-43. Monitoring wells RI-MW-01, RI-MW-03, and RI-MW-04 will be properly decommissioned prior to the start of

remedial work in Phase 1 and reinstalled following remediation and development. The remaining existing monitoring wells will be protected during remediation and development for use in post-remedial monitoring.

4.3.3 UTILITY MARKER AND EASEMENTS LAYOUT

The Volunteer and its contractors will be solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors will obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

4.3.4 SHEETING AND SHORING

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities, including excavation, is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this RAWP. Further, the Volunteer and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved RAWP.

4.3.5 EQUIPMENT AND MATERIAL STAGING

Equipment and material staging areas are expected to be relocated throughout the Site during remedial construction.

4.3.6 DECONTAMINATION AREA

A tracking pad will be required for any vehicles going off-site that have come in contact with on-Site soils. The decontamination area construction and operational requirements are provided in the HASP. All vehicle tires must be washed before exiting the Site.

4.3.7 SITE FENCING

A construction safety fence will be installed around the entire perimeter of the Site. Access through gates will be provided at various points as required by the Volunteer and its contractors. These gates will be locked during non-construction hours.

4.3.8 DEMOBILIZATION

Demobilization will include the following:

- Restoration of areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], and access area);
- Removal of temporary access areas (whether on-Site or off-Site) and restoration of disturbed access areas to pre-remediation conditions;
- Removal of sediment and erosion control measures and disposal of materials in accordance with acceptable rules and regulations;
- Equipment decontamination; and
- General refuse disposal.

4.4 REPORTING

All daily and monthly Reports will be included in the FER.

4.4.1 DAILY REPORTS

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by noon of each day following the reporting period and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;

- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- Photographs of site activities;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.
Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of CAMP results, odor and dust excursions and corrective actions, and all complaints received from the public.

The NYSDEC assigned project number will appear on all reports.

4.4.2 MONTHLY REPORTS

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of each month following the reporting period and will include:

- Activities relativeed to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (e.g., tons/cubic yards of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable;
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays; and

- Tracking of Green Sustainable Remediation (GSR) metrics determined during the design process.

4.4.3 OTHER REPORTING

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the FER.

Any exceedance of the CAMP levels will be reported to NYSDEC and NYSDOH within 24 hours of its occurrence.

Progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the FER, including a comparison to the goals established during the remedial program. Regular updates to the metrics used (SEFA, SiteWise™ or otherwise approved method) should be included.

The Climate Screening process and results will be documented in the form of a completed checklist and brief letter report. If the Climate Screening results indicate that a CVA is necessary, a complete CVA Report will be developed. The CVA Report will be included as an Appendix or Attachment in relevant documents and/or submitted as a standalone report.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 COMPLAINT MANAGEMENT PLAN

A public information board will be constructed at the perimeter of the Site. This information board will contain the phone number of the Volunteer where complaints may be directed. General information notices to the public will also be posted on this board for their benefit.

4.4.5 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

If there are any deviations from the RAWP, the following steps will be taken:

- Reasons for deviating from the approved RAWP will be identified and communicated directly to the NYSDEC Project Manager;
- All deviations will be communicated verbally and in writing (by letter or email) to the NYSDEC Project Manager;
- The deviations will be implemented based on verbal or written approval of the NYSDEC Project Manager. All verbal approvals will be followed-up in writing.
- The effect of the deviations on the overall remedy will be described/addressed in the FER.

4.5 REMEDIAL CONSTRUCTION PHASING PLANS

Remedial construction and redevelopment activities will be implemented in two (2) phases (Phase 1 and Phase 2). Upon commencement of construction, the Site will be divided into two (2) distinct work areas, each with separate ingress and egress routes to maintain safe access for construction personnel, emergency vehicles, and residents remaining onsite. The active work areas will be secured using construction fencing and appropriate erosion and sediment control measures, including silt fencing, as necessary.

Phase 1 will include the temporary relocation of approximately 25 families residing in Buildings 1 through 4, Building 14, and the recreational building to a predetermined offsite location. Approximately 50 families will remain onsite within the Phase 2 area, consisting of Buildings 5 through 13. Following completion of remedial and redevelopment activities within Phase 1, residents remaining in the Phase 2 area will be relocated to the completed Phase 1 area, allowing remedial activities to commence within Phase 2.

To protect residents remaining onsite during Phase 1 activities, temporary access roads and parking areas will be constructed using clean imported material within designated portions of the Phase 2 area. These temporary improvements will serve as an interim cover system over areas of impacted soil, minimizing the potential for direct contact with contaminated media and reducing the generation of fugitive dust during remedial construction activities. All intrusive remedial activities, excavation, and earthwork operations will be conducted in accordance with the

approved CAMP to minimize the potential for off-site migration of dust and vapors. Existing indoor air sampling data collected from occupied residential buildings indicate that site-related soil vapor intrusion is not occurring within residential living spaces.

Phasing plans are provided in **Appendix C** and **Figure 1.4**. A tentative schedule of phasing plans is included in **Table 4.4** below.

Table 4.4 – Schedule of Phasing Plans

Phase	Task Name	Start	Duration
1	Erosion Control, Fencing, Mobilization	October 2026	1 month
1	Abatement	November 2026	1 month
1	Demolition	November 2026	1 month
1	Site Remediation	December 2026	8 weeks
1	SOE, Retaining Walls, Foundations	February 2027	4 months
1	Building 2 Modular Fabrication	March 2027	3 months
1	Building 2 Set	June 2027	3 months
1	Building 1 Modular Fabrication	July 2027	3 months
1	Building 2 Field Work	September 2027	4 months
1	Building 1 Set	September 2027	3 months
1	Building 1 Field Work	December 2027	4 months
1	Site Finish and Punch	April 2028	3 months
2	Phase Change	June 2028	2 months
2	Abatement	August 2028	2 months
2	Demolition	September 2028	1.5 months
2	Site Remediation	October 2028	2 months
2	Foundations	November 2028	6 weeks
2	Phase 2 Modular Fab	October 2028	3 months
2	Phase 2 Modular Set	December 2028	3 months
2	Phase 2 Field Work	January 2029	4 months
2	Site Finish and Punch	May 2029	2 months

5.0 REMEDIAL ACTION: MATERIAL REMOVAL AND IMPORT

The remedial action will consist of the removal of surficial soils to a maximum depth of 2.0 ft-bgs or import of clean fill to varying elevations across the Site to address near-surface contamination and facilitate attainment of Track 4 SCOs. An earthwork model depicting the proposed cut and fill is included as **Appendix H** and **Figure 3.3**. In addition, two (2) discrete areas identified during

the Remedial Investigation will be excavated to pre-determined depths, as necessary, to remove soil exhibiting contaminant concentrations of mercury exceeding ten (10) times the RRSCOs.

5.1 SOIL CLEANUP OBJECTIVES

Table 5.1 presents the constituents detected in site soils at concentrations exceeding the applicable RRSCOs. The table also includes constituents detected in filtered groundwater at concentrations exceeding the AWQS, for which the PGWSCOs are applicable to the evaluation of soil impacts.

Table 5.1 – Applicable Soil Cleanup Objectives

Parameter	Max Soil Concentration (mg/kg)	RRSCO (mg/kg)	PGWSCO (mg/kg)
Benzo(a)anthracene	3.08	1.4	1
Benzo(a)pyrene	2.49	1	22
Benzo(b)fluoranthene	2.91	1.4	2.1
Chrysene	2.61	4.9	1
Dibenzo(a,h)anthracene	0.506	0.33	N/A
Copper	1430	280	N/A
Lead	478	400	N/A
Mercury	48.9	0.3	N/A
PFOS	3.33	44	1

N/A = Not Applicable. Groundwater did not exceed the applicable AWQS for these compounds.

The soil cap is expected to positively impact the observed levels of the contaminants exceeding the PGWSCOs listed in **Table 5.1** in groundwater. The groundwater exceedances of these compounds are limited to the Site groundwater based on the results of downgradient wells RIMW-05, RI-MW06, RI-MW07 and RI-MW-08, which showed inconsistent levels of contaminants. Therefore, the soil remedy related to PGWSCO will be long term monitoring for groundwater.

The excavation of the Site soil will include soils that are considered a hot spot for mercury as noted in the RIR. **Table 3.4** summarizes soil samples that are considered mercury hot spots, which are proposed for excavation in this RA. The soil exceedance locations and extent of excavation for Track 4 is shown in **Figure 3.2.**

Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil/Materials Management Plan as described below.

5.2 CLOSURE OF UNDERGROUND STORAGE TANKS

The identified USTs (See **Figure 2.2**) or any uncovered UST will be closed effort by removal in accordance with section 5.5 of the DER-10. The USTS will be registered with Westchester County Department of Health (WCDOH). The petroleum bulk storage (PBS) modification form will be filed and provided as required by 6 NYCRR 612.2(d).

A certified local contractor will be engaged for the removal of the USTs. Prior to UST removal the local fire department will be notified. The tanks and their ancillary systems will be de-activated in preparation for the closure. If any liquids have accumulated in the tanks, it will be pumped and disposed of accordingly. The disposal of the liquids will be manifested. The tanks will be cleaned for appropriate scrap metal disposal.

During the UST removal effort, the following field observations will be made and documented:

- A description and photographic documentation of tank and pipeline condition (e.g., pitting, holes or leak points)
- The excavation floor and sidewalls will be:
    - examined for any physical evidence of soil or groundwater contamination;
    - field screened with a calibrated PID at transects spaced no more than five feet apart, so that sampling may be biased to the suspected location of greatest contamination.

If there is no evidence of a discharge in the existing UST excavations, confirmation soil samples will be collected to demonstrate that the remaining soils meet RRSCOs immediately after tank removal. If no groundwater is present in the excavation, discrete center line soil samples from the bottom of the excavation will be collected at a frequency equal to the total length of the tank in feet divided by five (minimum of one sample) and one sample will be added for the fraction thereof. The samples will be spaced equidistantly, and the outermost samples will be obtained at greater than 2.5 feet from each end of the tank.

If groundwater is present in the excavation, because the UST content is heating oil, which has a density less than water, soil samples will be collected as follows: One sample biased based upon field screening results will be taken near or above the water table from each excavation sidewall for every 30 linear feet of sidewall (minimum of one sample per sidewall). Where seasonal

fluctuations in the water table elevation can submerge and smear product over a range of several feet, additional samples will be collected in the smear zone.

If there is evidence of a discharge, excavation will continue until all contaminated soils, as determined in the field screening, are removed or until further excavation is no longer feasible. Once excavation is complete and if no groundwater is encountered, confirmation soil samples will be collected to demonstrate that contamination has been removed. A minimum of 5 soil samples will be taken, consisting of 4 sidewall and 1 bottom sample for each 15 linear feet of trench. The samples will be biased based upon field screening toward the suspected location of greatest contamination. If groundwater is encountered, the excavation water will be pumped and treated as contaminated water for off-site disposal. Additional groundwater wells will be added, as needed to investigate any impact to groundwater.

All soil and groundwater samples will be sent to an ELAP certified laboratory for the CP-51 fuel oil analysis list.

5.3 REMEDIAL PERFORMANCE EVALUATION

5.3.1 SOIL REMEDIATION END-POINT SAMPLING FREQUENCY

For all excavations, post-excavation soil samples will be collected in accordance with Section 5.4 of DER-10 for analysis of mercury. All impacted Site soils within pre-determined potential exposure pathways will be removed down to depths listed in **Table 3.5**. Endpoint verification sampling will be implemented on an approximately 30 x 30 foot grid, or every 900 square feet (SF) at the base of the excavation and documented by field personnel. Proposed end point sampling locations are presented as **Figure 5.1**.

End-point samples will be collected manually from the top six (6) inches of soil at the bottom of the excavation. In addition to each end-point sample, two (2) additional samples will be collected from 1.0-1.5 and 2.0-2.5 feet below the initial sample and will be placed on hold. If the initial end-point sample is considered a hot spot for mercury, then the contingent samples will be analyzed to achieve compliance. The soil will then be excavated to the required depth determined by the contingency samples. If the results of the contingent samples exceed the designated SCO standards, the process will continue until the analytical results are compliant or bedrock is

encountered, whichever occurs first. Regardless of the depth of the excavation, confirmation samples will be collected for every one (1) foot of additional excavation depth. Confirmatory sampling locations will be surveyed and the location and elevation will also be recorded and presented on the final soil removal maps. Documentation will be presented in the FER.

5.3.2 GROUNDWATER REMEDIATION PERFORMANCE SAMPLING

The groundwater impact is limited to the Site boundaries and the results of the three (3) rounds of groundwater in the RI have shown inconsistencies, which could be the results of the natural conditions such as rain or melting snow. There are no ecological receptors on the site and the groundwater will not be used for drinking source because the proposed buildings will be serviced by municipal water. Accordingly, the groundwater remedy consists of monitoring the natural attenuation of groundwater post soil remediation. The performance of the remedy will be monitored with long-term monitoring of the groundwater under the SMP using lab-filtered samples.

5.3.3 SOIL VAPOR REMEDIATION PERFORMANCE

A soil vapor evaluation will be conducted when the construction of the building is complete and prior to occupancy. The soil vapor evaluation will consist of collecting collocated sub slab soil vapor and indoor air samples. The sampling results will be evaluated to determine if the SSDS is needed as an EC for the building. The SVE may be conducted post COC under the SMP for the Phase 2 buildings. If the SVE determines that the SSDS is needed as an EC for VI mitigation, then another sampling event will be conducted post the installation of the blower on the SSDS to check the performance of the SV remedy.

5.3.4 METHODOLOGY

Soil samples will be collected in accordance with the QAPP using disposable gloves/trowels or dedicated, decontaminated stainless-steel spoons. Groundwater samples will be collected in accordance with the QAPP using the low-flow purging and sampling method and associated decontamination and quality control procedures.

5.3.5 REPORTING OF RESULTS

The samples will be submitted to a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory. The results will be reported in accordance with NYSDEC requirements for Category B data deliverables (as outlined in DER-10). In addition, all data collected during the remedial action will be submitted in the NYSDEC approved Electronic Data Deliverable format using the NYSDEC's Environmental Information Management System database software application EQuIS™.

5.3.6 QA/QC

Collection of quality assurance/quality control (QA/QC) samples to evaluate potential cross-contamination from sampling equipment and during shipment of samples and repeatability of laboratory analytical practices will be in accordance with the QAPP included as **Appendix J**. Field blanks, trip blanks and duplicate samples associated with daily sampling activities will be collected as a part of the QA/QC practices.

5.3.7 DATA USABILITY SUMMARY REPORT (DUSR) AND EDDs

To ensure that the field sampling and laboratory analytical practices are acceptable, the data associated with all the samples will be validated by a third party (in accordance with requirements of DER-10). The validation approach and results will be presented in a DUSR to be included in the FER.

5.3.8 REPORTING OF DATA IN FER

The FER will include a table of final soil sample data with highlights or a summary of exceedances of the Track 4 SCOs.

The FER will include a table of end point data with highlights or a summary of exceedances of SCOs. A spider map showing all SCO exceedances will also be presented in the FER.

Chemical labs used for all end-point sample analysis and contingency sample analysis will be NYSDOH ELAP certified.

End point sampling, including bottom and side-wall sampling where needed, will be performed in accordance with DER-10 sample frequency requirements at a rate of one for every 900 square feet. A post-excavation sampling plan is shown in **Figure 5.1** where the grids are 30 by 30 feet. Post-excavation samples will be collected from center of each grid as the excavation proceeds. In addition, although not depicted on the plan, sidewall samples will be collected within the Site in accordance with DER-10 where adjacent grids are excavated to different depths (greater than 2 foot variance). The results will be shared with the NYSDEC in the monthly report. The FER will provide a tabular and map summary of all end-point sample results and exceedances of SCOs.

5.4 ESTIMATED MATERIAL REMOVAL QUANTITIES

Source removal excavation activities will be implemented during the course of the remediation activities throughout the footprint of the Site. Based on the RI, the depth of contaminated fill/ soil in potential exposure pathways ranges from 0 to 20.0 ft-bgs. The remedial action will consist of the removal of surficial soils to a maximum depth of 2.0 ft-bgs or import of clean fill to varying elevations across the Site to address near-surface contamination and facilitate attainment of Track 4 SCOs. An earthwork model depicting the proposed cut and fill is included as **Appendix H**. Estimated removal quantities for Track 2 and 4 are provided as **Tables 3.2 and 3.4**, respectively.

The estimated quantity of soil/fill to be removed as part of the remedial action includes approximately 500 cubic yards for the potential exposure pathway excavations. Potential exposure pathways will be excavated in 20’ x 20’ square grids to the required excavation depth. Required excavation depths are varied based upon contaminant depths determined during the remedial investigation work. A plan depicting the proposed excavation depths for Track 4 is included as **Figure 3.2**. The depth was determined based on the vertical delineations determined during the RI. **Table 3.5** includes the proposed excavation depths for each potential exposure pathway. The actual excavated volume will be reported in the FER as a tally of the manifests and tickets of the soils disposed off-site.

5.5 SOIL/MATERIALS MANAGEMENT PLAN

Material will be required to be excavated during remediation activities. Any required fill will consist of imported clean fill that meets the requirements per 6 NYCRR Part 375-6.8(d) and the

requirements for emerging contaminants sampling per the October 2020 NYSDEC Guidance Document.

5.5.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the Certificate of Completion.
All primary contaminant sources identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the FER.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.5.2 STOCKPILE METHODS

Stockpiles of contaminated materials, if needed, will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. At a minimum, a storm event should be considered a rainfall of three inches or greater in 12 hours. Judgement should be used to evaluate water infiltration, nearby waterbodies where runoff is likely, and engineering controls that may be affected.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced. Soil stockpiles will be encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

5.5.3 MATERIALS EXCAVATION AND LOAD-OUT

The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site has been investigated during the remedial investigation work. It has been determined that no risk or impediment to the planned work under this RAWP is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and New York State Department of Transportation requirements (and all other applicable transportation requirements).

A truck wash associated with construction activities will be operational during construction. A truck wash is always required for large soil excavation projects such as this. The Remediation Engineer will be responsible for ensuring that all outbound trucks are not causing any off-site tracking of the contaminated soils.

Locations where vehicles enter or exit the Site will be inspected daily for evidence of off-Site sediment tracking.

The Remediation Engineer will ensure that all egress points for truck and equipment transported from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.
Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the FER.

5.5.4 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Truck transport routes will be included in the SOP. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed inbound and outbound truck routes to the Site will take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; (f) overall safety in transport; and (g) community input, which was sought and obtained during the local land use approval process.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.
A tracking pad will be installed at the Site egress to ensure clean-up of the soils from the truck tires. If needed, truck tires will be washed. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

5.5.5 MATERIALS DISPOSAL OFF-SITE

Approval from appropriate disposal facilities will be received prior to start of work. The total quantity of material expected to be disposed off-Site is approximately 15,000 to 15,500 cubic yards. All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-Site management of materials from this Site will not be undertaken without formal NYSDEC approval.

Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York

State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. The Remedial Engineer is responsible for assuring material is properly characterized and determining the appropriate disposal methods based on the characterization results.

Historic fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities.

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the NYSDEC Division of Materials Management (DMM) to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC DMM. This material is prohibited from being sent or redirected to a Part 360-15 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

The FER will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER.

Hazardous wastes, if any, derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed of at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt. Waste characterization data will be used solely for complying with requirements for off-site disposal. Waste Characterization sampling cannot be utilized for:

- Delineating the extent of contamination required for remediation at a Site.
- Replacing or substituting data collected as part of Site Characterization and/or Remedial Investigation.
- Replacing or substituting confirmation or documentation sampling as described in NYSDEC DER-10, Section 5.4.
- To modify remedial decisions as formalized in a NYSDEC approved Decision Document or Record of Decision.

5.5.6 MATERIALS REUSE ON-SITE

The Remedial Engineer will ensure that procedures defined for material reuse in this RAWP are followed and that unacceptable material will not remain on-Site. A “Request to Import/Reuse Fill Material” form will be filed with the NYSDEC project manager for review and approval prior to material reuse on the site. Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos.

Concrete crushing or processing on-Site is prohibited, unless NYSDEC has specifically approved on-site processing and reuse of acceptable demolition material.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site. Reuse of organic matter or other solid waste is not included in the scope of work outlined in this RAWP.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the SMP.

5.5.7 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. If any liquids need to be discharged into the sewer system, then approval by local utility authority and NYSDEC will be sought prior to the discharge.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site.

Water generated during remedial construction will not be discharged to surface waters (i.e. a local pond, stream or river) without a state pollutant discharge elimination system permit.

5.5.8 DEMARCATION

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the “Residuals Management Zone,” the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the SMP. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the “Residuals Management Zone” in the SMP. A map showing the survey results will be included in the FER and the SMP.

5.5.9 BACKFILL FROM OFF-SITE SOURCES

Backfilling is expected to be needed in certain of areas on the Site. The imported material, if needed, will be sampled in accordance with DER-10 Section 5.4 (e), Table 5.4 (e)10, and paragraph 10. The samples will be analyzed for TCL VOCs, TCL SVOCs, pesticides, PCBs, and TAL metals, including cyanide. The soil may be used as cover material provided that all parameters meet the UUSCOs, per the NYSDEC regulatory requirements. In addition, composite samples will be collected for emerging contaminants in accordance with the NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (April 2023).

All materials proposed for import onto the Site will meet the UUSCOs, will be approved by the Remedial Engineer, and will be in compliance with provisions in this RAWP prior to receipt at the Site. A “Soil Reuse/Import” form will be submitted to the NYSDEC for pre-approval prior to importing any soils on -Site. Bills of Lading or equivalent documentation will be obtained to track the amount of soil arriving onto the Site and to verify the source of soil being imported.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The Final Engineering Report will include the following certification by the Remedial Engineer: “I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan”.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC will be construed as an approval for this purpose.

Soils that meet “exempt” fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan will be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

5.5.10 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

5.5.11 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. in accordance with DER-10. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides, PCBs and PFAS). Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

5.5.11.1 EXTREME STORM PREPAREDNESS AND RESPONSE CONTINGENCY PLAN

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the Volunteer will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to NYSDEC at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings,

structures or equipment will be reported to public safety authorities via appropriate means such as calling 911.

Petroleum spills will be reported to NYSDEC within two (2) hours of identification and consistent with State regulations. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed.

Dewatering is anticipated to be required for this Site. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary.

If soil or fill materials are discharged off site to adjacent properties, property owners and NYSDEC will be notified, and corrective measure plan designed to remove and clean dislocated material will be submitted to NYSDEC and implemented following approval by NYSDEC and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of NYSDEC.

If on-Site petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYSDEC's spill hotline at (800) 457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYSDEC.

Storm Response Reporting

A site inspection report will be submitted to NYSDEC at the completion of site inspection. An inspection report will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the NYSDEC project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number.

Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYSDEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to NYSDEC project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.5.12 COMMUNITY AIR MONITORING PLAN

A CAMP will be implemented during RAWP remedial actions in the field at the Site in accordance with the requirements of DER-10 Appendix 1A. The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise during all ground intrusive activities, and potentially contaminated soil and material handling and staging. In addition, the CAMP is intended to ensure that dust and contaminants are not leaving the work zone. Details of the air monitoring program including perimeter air monitoring objectives, methods, and actions levels are detailed in the CAMP, provided in **Appendix F**.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.

5.5.13 ODOR, DUST, AND NUISANCE CONTROL PLAN

Odor, dust, and nuisance control will be in accordance with the site-specific HASP and the CAMP. The FER will include the following certification by the Remedial Engineer: “I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.”

5.5.13.1 ODOR CONTROL PLAN

This odor control plan is designed to control emissions of nuisance odors off-Site and on-site. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical deodorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved, as appropriate, by a combination of, applying odor suppressants and when necessary if the odor suppressants are not working, sheltering the excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

5.5.13.2 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas, including excavations and stockpiles.
- Clearing and grubbing will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

5.5.13.3 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to local noise control standards.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since residual contaminated soil, groundwater and soil vapor will exist beneath the Site after the remedy is complete, Engineering and Institutional Controls (ECs and ICs) are required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances for Track 4.

7.0 ENGINEERING CONTROLS: SITE COVER SYSTEM

Exposure to residual contaminated soils will be prevented by an engineered site cover system that will be built on the Site. This site cover system will be comprised of asphalt covered roads, concrete covered sidewalks, landscaping and concrete building slabs.

Green remediation BMPs for designing and installing a conventional cover system include:

- Design in ways that mimic rather than alter the site's natural setting, to improve the cover's long-term performance and protect ecosystem services such as potable water, wildlife habitat, and carbon storage;
- Design a cover accounting for potential effects of climate change, which could involve changes in onsite soil development or increased vulnerability to flooding;
- Use uncontaminated soil or sediment from onsite excavation instead of imported soil/sediment for the cover's frost prevention and erosion control layers; similarly, uncontaminated sand, gravel, and rocks from onsite instead of offsite areas may be used for drainage;
- Apply low impact development strategies such as installing earthen berms to manage stormwater;
- Choose geotextile fabric or drainage tubing composed of 100% recycled materials rather than virgin materials for lining, erosion control, and drainage;
- Select materials with biobased content for daily activities during cover construction;
- Use clean fuel and emission control technologies for routine field vehicles and machinery such as backhoes and bulldozers to reduce fuel consumption and emission of air pollutants such as GHGs and particulate matter; and
- Investigate on-Site solar and wind resources to power equipment such as leachate pumps and flare units.

For alternative cover designs

- Consider using asphalt rubber (containing recycled tires) where the cover system includes a layer of asphalt;
- Substitute concrete with high albedo pavement, which reflects sunlight and heat away from the cover surface and may aid growth of nearby vegetation; and

- Consider using concrete containing a high percentage of industrial waste by-products as a substitute for cement, if tests show no contaminant leaching.

In addition to BMPs that apply to conventional covers, BMPs for designing and installing an evapotranspiration (ET) cover include:

- Choose recycled (crushed) concrete for biobarriers or capillary breaks instead of natural rock;
- Select native drought-resistant plants for the upper vegetative layer to reduce maintenance needs;
- Preserve biodiversity and related ecosystem services by installing a suitable mix of native shrubs, grasses, and forbs; and
- Use non-synthetic amendments such as compost instead of chemical fertilizers if the soil or vegetation is found to need supplementation over time.

A map showing the aerial distribution of each of the cover types to be built at the Site is included in **Figure 7.1.**

An Excavation Plan will be included in the Site Management Plan and will outline the procedures to be followed if the site cover system and underlying residual contamination are disturbed after the Remedial Action is complete.

The components of the site cover system will be documented in the FER. Maintenance of this site cover system will be described in the SMP.

8.0 CRITERIA FOR COMPLETION OF REMEDIATION/TERMINATION OF REMEDIAL SYSTEMS

8.1 COMPOSITE COVER SYSTEM

The composite cover system is a permanent control, and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

8.2 SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

The elements of a SSDS, including a venting layer, piping and sealing layer will be installed underneath the building foundation as an engineering control to mitigate the potential for soil vapor intrusion into the proposed buildings.

Based on the proposed Track 4 hotspot soil removal effort and groundwater concentrations, soil vapor intrusion is not expected to require long term ICs from any on-Site conditions. However, to confirm that vapor intrusion is not a concern, a soil vapor intrusion evaluation will be completed post-COC during the heating season (after construction of the lowest level of the building has been completely enclosed and has an active HVAC system, prior to occupancy) to determine if the elements of the SSDS will need to function as an EC (an active SSDS) to mitigate the potential for soil vapor intrusion from contaminant levels in the groundwater. If the initial soil vapor intrusion evaluation takes place outside of the heating season, an additional soil vapor intrusion evaluation will be completed during the first heating season after occupancy.

If the soil vapor intrusion evaluation indicates that the SSDS needs to be made active, the details for an active SSDS will be provided in an engineering design letter that will amend this RAWP. If an active system is not required, the SSDS piping, venting layer and sealing layer are permanent by nature, and they will remain in place throughout the life of the building as a protective passive VI measure, even if no longer required as an active EC.

8.3 GROUNDWATER MONITORING

The goal of the groundwater remedy is to achieve the TOGS AWQS standards or to reach asymptotic levels since it may not be possible to achieve the TOGS AWQS standards for every contaminant, particularly naturally occurring metals, given the surrounding urban environment in the Village of Tarrytown and area-wide groundwater contamination conditions. Post-remediation

groundwater sampling will be conducted in order to demonstrate that no additional groundwater remediation is required because the conditions have reached asymptotic levels.

Groundwater monitoring activities to assess the performance of the remedy, or natural attenuation following the removal of contaminant sources, will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP. It is anticipated that, following remediation, a minimum of eight quarterly monitoring events will be performed.

The current groundwater monitoring well network is presented in **Figure 2.1**. Wells that are damaged or lost during the remediation will be replaced or repaired for post-remediation sampling.

9.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. ECs for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two (2) elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a SMP.

All as-built drawings, diagrams, calculation and manufacturer documentation for treatment systems will be presented in the FER. A Site -specific Environmental Easement will be recorded with Westchester County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs.

The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

9.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. The Environmental Easement renders the Site a Controlled Property, and if required, will be recorded with the Westchester County Clerk before the Certificate of Completion is issued by NYSDEC.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Westchester County Clerk's Office before the Certificate of Completion can be issued by NYSDEC. A series of Institutional Controls are required under this

remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to restricted residential use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in the SMP;
- A site cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs must be inspected, certified and maintained as required in the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater, soil vapor, and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement and will be implemented under the SMP (discussed in the next section). The Controlled Property

(Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the SMP;
- The Controlled Property may be used for restricted residential use only, provided the long-term Engineering and Institutional Controls included in the SMP are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted use without an amendment or extinguishment of this Environmental Easement;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This statement must be certified by an expert that the NYSDEC finds acceptable.

9.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the COC for the Remedial Action. The SMP is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the SMP are performed.

The SMP should include methods to incorporate and track GSR. Measures should be taken to maintain a cost-effective, protective remedy that remains conscientious of the Site's environmental footprint. At a minimum, the following should be assessed: waste generation, energy usage, emissions, and water usage.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of a Monitoring Plan and SVI Evaluation; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of monitoring. The SMP for this Site, if needed, will not require the development of a plan to operate and maintain treatment, collection, containment, or recovery systems because the only proposed ongoing remedy will be monitoring the wells and evaluating soil vapor intrusion.

To address these needs, this SMP will include three (3) plans as applicable: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site groundwater monitoring; and (3) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. A Periodic Review Report (PRR) will be submitted to the NYSDEC beginning 16 months after the Certificate of Completion is issued. After the initial PRR, the next PRR will be submitted annually to the NYSDEC.

The SMP and the FER will include a monitoring plan for groundwater at the upgradient and the downgradient Site perimeter to evaluate Site-wide performance of the remedy. Groundwater

monitoring wells will be installed immediately downgradient of all remediation areas to monitor the natural attenuation. If the contaminants in groundwater do not attenuate below the Class GA AWQS concentrations or reach an asymptotic level that is accepted by the NYSDEC, an active treatment (e.g. oxidant injection) will be proposed and designed based on the monitoring data.

No exclusions for handling of remaining contaminated soils will be provided in the Site SMP. All handling of remaining contaminated material will be subject to provisions contained in the SMP.

10.0 FINAL ENGINEERING REPORT

A FER and Site Management Plan will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The FER will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan. The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling, and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. Applicable analytical data collected under this RAWP will be accompanied by DUSRs in the FER. The FER will document that all applicable analytical data was submitted to and accepted by the Department in the Department's approved Electronic Data Deliverable format. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the FER review.

The FER will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action. The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 UUSCO in 6NYCRR Part 375-6. A table that shows exceedances of Track 1 UUSCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER. A map that shows the location and summarizes exceedances of Track 1 UUSCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP, to the extent remaining, and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The FER will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

The FER must include a discussion of the green remediation practices/technologies employed throughout the remedial program, a final footprint analysis using a DER accepted model, and any tracking methods used through the construction including restoration activities. Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

10.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The certification will be signed by the Remedial Engineer, Fuad Dahan, who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I _____certify that I am currently a NYS registered professional engineer, I had primary direct responsibility for the implementation of the subject construction program, and I certify that the Remedial Work Plan was implemented and that all construction activities were completed in substantial conformance with the DER-approved Remedial Work Plan.

I certify that all use restrictions, institutional controls, engineering controls and/or any operation and maintenance requirements applicable to the site are contained in an environmental easement created and recorded pursuant to ECL 71-3605 and that any affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of any engineering controls employed at the Site including the proper maintenance of any remaining monitoring wells, and that such plan has been approved by DER.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department. I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, _____ , of _____, am certifying as Owner’s Designated Site Representative.

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

Tables

Table 2.1 RI Soil Exceedances
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Boring ID:						RI-SB-01						RI-SB-02							RI-SB-03						
Sample ID:						RI-SB-01(0-0.5)	RI-SB-01(1.5-2)	RI-SB-01(2-5)	RI-SB-01(5-10)	RI-SB-01(10-15)	RI-SB-01(15-20)	RI-SB-02(0-0.5)	RI-SB-02(1.5-2)	RI-SB-02(2-5)	DUP20260122-4	RI-SB-02(5-10)	RI-SB-02(10-15)	RI-SB-02(15-20)	RI-SB-03(0-0.5)	RI-SB-03(1.5-2)	RI-SB-03(2-5)	RI-SB-03(5-10)	RI-SB-03(10-15)	RI-SB-03(15-20)	DUP20260122-3
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE27507-1	JE27507-2	JE27507-3	JE27507-4	JE27507-5	JE27507-6	JE27432-24	JE27432-25	JE27432-26	JE27432-30	JE27432-27	JE27432-28	JE27432-29	JE27432-17	JE27432-18	JE27432-19	JE27432-20	JE27432-21	JE27432-22	JE27432-23
Sample Date:						1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	3.5-4.0	5.5-6.0	12.0-12.5	16.5-17.0	0.0-0.5	1.5-2.0	3.0-3.5	3.0-3.5	6.5-7.0	11.0-11.5	15.0-15.5	0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	18.5-19.0	18.5-19.0
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																									
3&4-Methylphenol		mg/kg	0.33	100		ND (0.081)	ND (0.076)	ND (0.079)	ND (0.078)	ND (0.21)	ND (0.075)	ND (0.077)	ND (0.078)	ND (0.079)	ND (0.074)	1.27	ND (0.13)	ND (0.078)	ND (0.08)	ND (0.074)	ND (0.075)	ND (0.074)	ND (0.075)	ND (0.086)	ND (0.085)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.0559	0.0321 J	0.03 J	0.0406	0.16	0.0488	3.08	0.228	0.181	0.0463	0.291	0.0916	0.0325 J	0.054	0.0295 J	0.0477	ND (0.037)	ND (0.037)	0.0292 J	0.0275 J
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	0.0621	0.0287 J	0.0229 J	0.0301 J	0.126	0.0324 J	2.49	0.267	0.177	0.051	0.272	0.0647	0.0366 J	0.0644	0.0289 J	0.0585	ND (0.037)	ND (0.037)	ND (0.043)	0.0251 J
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.0975	0.0401	0.0323 J	0.0449	0.162	0.0461	2.91	0.353	0.205	0.059	0.391	0.0807	0.0471	0.0859	0.0346 J	0.0786	ND (0.037)	ND (0.037)	ND (0.043)	ND (0.043)
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		0.0597	0.0238 J	ND (0.039)	0.0212 J	0.0738 J	0.0217 J	1.38	0.197	0.111	0.0346 J	0.198	ND (0.064)	0.0252 J	0.0565	0.0232 J	0.0435	ND (0.037)	ND (0.037)	ND (0.043)	ND (0.043)
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		0.0346 J	ND (0.038)	ND (0.039)	ND (0.039)	ND (0.1)	ND (0.037)	1.04	0.113	0.0897	0.0272 J	0.109	0.0339 J	ND (0.039)	0.0317 J	ND (0.037)	0.0322 J	ND (0.037)	ND (0.037)	ND (0.043)	ND (0.043)
Chrysene	218-01-9	mg/kg	1	4.9	1	0.0762	0.0279 J	0.0268 J	0.0377 J	0.108	0.0423	2.61	0.249	0.2	0.0521	0.406	0.0727	0.0432	0.0646	0.03 J	0.0688	ND (0.037)	ND (0.037)	0.0224 J	0.0337 J
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		ND (0.04)	ND (0.038)	ND (0.039)	ND (0.039)	ND (0.1)	ND (0.037)	0.506	0.0545	0.0266 J	ND (0.037)	0.044 J	ND (0.064)	ND (0.039)	ND (0.04)	ND (0.037)	ND (0.037)	ND (0.037)	ND (0.043)	ND (0.043)	ND (0.043)
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		0.0465	0.02 J	ND (0.039)	0.0193 J	0.0665 J	ND (0.037)	1.2	0.166	0.0875	0.0258 J	0.15	ND (0.064)	0.019 J	0.0545 [i]	0.0232 J [i]	0.0325 J	ND (0.037)	ND (0.037)	ND (0.043)	ND (0.043)
Phenanthrene	85-01-8	mg/kg	1.1	4.9		0.0761	0.0235 J	0.0241 J	0.0226 J	0.102	0.0232 J	2.16	0.0852	0.136	0.0308 J	0.674	0.0625 J	0.0394	0.0342 J	0.0187 J	0.0396	ND (0.037)	ND (0.037)	0.0881	0.101
METALS (SW846 6010D & 7471B)																									
Chromium	7440-47-3	mg/kg	30	110		20.1	20.2	7.6	6.5	27.5	6.3	13	16.3	10.9	9.1	12.1	26.1	8.2	32.3	14.9	38.3	6	5.2	15.3	12.7
Copper	7440-50-8	mg/kg	50	280		14.4 [b]	17.1 [b]	8.1	7.3	31.5 [b]	5	23.4	33.6	17	10.1	430 [b]	28.2	99.2	22.2	12.8	20.5	59.3	5.1	11.5	9.5
Lead	7439-92-1	mg/kg	63	400		59.6	59	18.5	12.2	91.8	21.8	58.5 [b]	55.1 [b]	66.3	25.1	378	56.3 [b]	57.9 [b]	60.7 [b]	58.3 [b]	11.6	9.3	5.8	32.5 [b]	22.8
Mercury	7439-97-6	mg/kg	0.18	0.3		0.13	0.23	0.075	0.034	0.53	0.065	0.22	0.34	0.11	0.14	1.2	0.2	0.13	0.26	0.083	0.089	ND (0.030)	ND (0.032)	0.13	ND (0.038)
Nickel	7440-02-0	mg/kg	30	320		13.9	15.4	6.8	6.1	28.8	5.8	12.7	17.7	10.3	8.9	8.4	30.2	7.5	15.6	11.1	28.3	25.4	5.3	12.5	10.6
Zinc	7440-66-6	mg/kg	109	6600		80.4	67.7	23.8	23.1	102	20.9	62.8	104	49.6	34.4	371	126	220	98.2	50.7	56.2	26.7	14.4	38.5	30.8
VOCs (SW846 8260D)																									
Acetone	67-64-1	mg/kg	0.03	100		ND (0.013)	ND (0.023)	ND (0.02)	0.0224	0.0686	0.0215	0.0146	ND (0.0089)	0.049	0.0268	0.118	0.0417	0.0333	ND (0.013)	ND (0.011)	0.0167	0.0102	0.0069 J	0.0716	0.0635
Xylene (total)	1330-20-7	mg/kg	0.26	100		ND (0.0013)	ND (0.0023)	ND (0.002)	ND (0.0015)	ND (0.0022)	ND (0.0013)	ND (0.0014)	ND (0.00089)	ND (0.0013)	ND (0.0012)	ND (0.0028)	ND (0.0018)	ND (0.001)	ND (0.0013)	ND (0.0011)	ND (0.0011)	ND (0.00099)	ND (0.0011)	ND (0.001)	ND (0.0015)
PESTICIDES (SW846 8081B)																									
4,4'-DDD	72-54-8	mg/kg	0.0033	5		ND (0.00081)	ND (0.00077)	ND (0.00079)	ND (0.00071)	ND (0.0011)	ND (0.00069)	ND (0.00075)	0.0024 [k]	ND (0.00075)	0.0015	ND (0.0015)	ND (0.0013)	ND (0.00075)	0.0239	0.0034	ND (0.00069)	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		0.0062	0.0028	ND (0.00079)	0.0025 [k]	ND (0.0011)	ND (0.00069)	0.0019	0.0022	ND (0.00075)	0.0015	0.0029	ND (0.0013)	ND (0.00075)	0.324	0.172	0.0067	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.0059	0.0035	0.00095	0.00069 J	ND (0.0011)	ND (0.00069)	0.0075	0.0018	ND (0.00075)	0.00088	ND (0.0015)	ND (0.0013)	ND (0.00075)	0.963	0.0552	0.0026	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		ND (0.00081)	ND (0.00077)	ND (0.00079)	ND (0.00071)	ND (0.0011)	ND (0.00069)	ND (0.00075)	ND (0.00074)	ND (0.00075)	ND (0.00068)	ND (0.0015)	ND (0.0013)	ND (0.00075)	ND (0.00078)	0.0012 [k]	ND (0.00069)	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
PFAS (EPA 1633A)																									
PFOS	1763-23-1	ng/g	0.88	44	1	NT	NT	0.468	NT	NT	ND (0.0785)	NT	NT	NT	NT	ND (0.078)	ND (0.0782)	NT	NT	NT	2.37	NT	NT	ND (0.0779)	ND (0.079)

Boring ID:						RI-SB-04						RI-SB-05						RI-SB-06					
Sample ID:						RI-SB-04(0-0.5)	RI-SB-04(1.5-2)	RI-SB-04(2-5)	RI-SB-04(5-10)	RI-SB-04(10-15)	RI-SB-04(15-20)	RI-SB-05(0-0.5)	RI-SB-05(1.5-2)	RI-SB-05(2-5)	RI-SB-05(5-10)	RI-SB-05(10-15)	RI-SB-05(15-20)	RI-SB-06(0-0.5)	RI-SB-06(1.5-2)	RI-SB-06(2-5)	RI-SB-06(5-10)	RI-SB-06(10-15)	RI-SB-06(15-20)
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE28403-1	JE28403-2	JE28403-3	JE28403-4	JE28403-5	JE28403-6	JE28403-7	JE28403-8	JE28403-9	JE28403-10	JE28403-11	JE28403-12	JE27507-19	JE27507-20	JE27507-21	JE27507-22	JE27507-23	JE27507-24
Sample Date:						2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	19.5-20.0	0.0-0.5	1.5-2.0	4.0-4.5	8.0-8.5	13.0-13.5	18.0-18.5	0.0-0.5	1.5-2.0	3.0-3.5	7.0-7.5	14.0-14.5	17.0-17.5
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																							
3&4-Methylphenol		mg/kg	0.33	100		ND (0.078)	ND (0.076)	ND (0.076)	0.0846 J	ND (0.11)	ND (0.088)	ND (0.074)	ND (0.076)	ND (0.075)	ND (0.11)	ND (0.092)	ND (0.087)	ND (0.073)	ND (0.08)	ND (0.079)	ND (0.071)	ND (0.076)	ND (0.08)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.729	0.873	0.128	0.139	0.194	ND (0.044)	0.468	0.0462	0.0483	0.0238 J	0.0484	ND (0.043)	0.0186 J	0.0337 J	0.0908	0.0747	0.0161 J	ND (0.04)
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	0.714	0.815	0.158	0.148	0.145	ND (0.044)	0.402	0.0347 J	0.0392	ND (0.054)	0.0368 J	ND (0.043)	ND (0.036)	0.0337 J	0.0976	0.0578	ND (0.038)	ND (0.04)
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.96	1.16	0.21	0.174	0.163	ND (0.044)	0.604	0.0432	0.0495	ND (0.054)	0.0389 J	ND (0.043)	0.0232 J	0.0422	0.133	0.0699	ND (0.038)	ND (0.04)
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		0.467	0.547	0.177	0.115	0.0733	ND (0.044)	0.266	0.0206 J	0.0237 J	ND (0.054)	ND (0.046)	ND (0.043)	ND (0.036)	0.0262 J	0.0998	0.0331 J	ND (0.038)	ND (0.04)
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		0.356	0.355	0.0749	0.0564	0.0714	ND (0.044)	0.18	ND (0.038)	ND (0.038)	ND (0.054)	ND (0.046)	ND (0.043)	ND (0.036)	ND (0.04)	0.0475	0.0292 J	ND (0.038)	ND (0.04)
Chrysene	218-01-9	mg/kg	1	4.9	1	0.738	0.833	0.145	0.135	0.167	ND (0.044)	0.482	0.0402	0.0422	ND (0.054)	0.0397 J	ND (0.043)	0.013 J	0.0319 J	0.117	0.0628	0.0133 J	ND (0.04)
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		0.16	0.187	0.0383	0.0319 J	0.0278 J	ND (0.044)	0.0921	ND (0.038)	ND (0.038)	ND (0.054)	ND (0.046)	ND (0.043)	ND (0.036)	ND (0.04)	0.0206 J	ND (0.036)	ND (0.038)	ND (0.04)
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		0.429	0.496	0.131	0.094	0.0638	ND (0.044)	0.243	0.0195 J	0.0206 J	ND (0.054)	ND (0.046)	ND (0.043)	ND (0.036)	0.0205 J	0.0687	0.0285 J	ND (0.038)	ND (0.04)
Phenanthrene	85-01-8	mg/kg	1.1	4.9		0.173	0.225	0.115	0.159	0.207	ND (0.044)	0.148	0.0201 J	0.0235 J	ND (0.054)	0.0244 J	ND (0.043)	ND (0.036)	0.0269 J	0.0571	0.0437	ND (0.038)	0.164
METALS (SW846 6010D & 7471B)																							
Chromium	7440-47-3	mg/kg	30	110		15.3	15.1	11.2	25.2	27.4	19.5	12	8	6.6	17	16.9	17.3	11.7	16.9	6.5	6.6	7.9	14.2
Copper	7440-50-8	mg/kg	50	280		27.8 [b]	35.7 [b]	14.4	31.8 [b]	26.5 [b]	25.2	23.2	11.1	7.5	15.5 [b]	14.2	18	13.5 [b]	22.2 [b]	5.3	13.6	10.1	14.9
Lead	7439-92-1	mg/kg	63	400		104 [b]	157 [b]	31.6	144 [b]	80.4 [b]	7.5	141	23.7	26.2	29.9 [b]	34.3	6.7	38	41	11.2	56.7	17.2	6.2 [b]
Mercury	7439-97-6	mg/kg	0.18	0.3		0.36	0.77	0.05	0.93	0.7	ND (0.039)	0.14	0.037	0.039	0.14	ND (0.038)	ND (0.039)	0.089	0.1	ND (0.035)	ND (0.031)	ND (0.030)	ND (0.040)
Nickel	7440-02-0	mg/kg	30	320		15	16.7	10.8	21.1	27.6	19.2	12.2	7.7	6.4	17.1	16.6	17.1	15.3	16.3	6.3	5.6	7.2	12.3
Zinc	7440-66-6	mg/kg	109	6600		87.2	147	45.8	114	112	48	82.1	30.1	22.8	54.9	54.1	45.2	39.2	71.2	22	27.1	24.4	32.5
VOCs (SW846 8260D)																							
Acetone	67-64-1	mg/kg	0.03	100		0.0105 J	ND (0.016)	0.0685	0.0902	0.0408	0.0606	0.0179	ND (0.011)	ND (0.012)	0.113	0.0175	0.0139 J	0.0115 J	ND (0.006)	ND (0.013)	0.0197	ND (0.0067)	0.0055 J
Xylene (total)	1330-20-7	mg/kg	0.26	100		2.17	0.232	ND (0.0011)	ND (0.0016)	0.0038	ND (0.0011)	ND (0.0011)	ND (0.0011)	ND (0.0012)	ND (0.0019)	ND (0.0012)	ND (0.0015)	ND (0.0015)	ND (0.0006)	ND (0.0013)	ND (0.001)	ND (0.00067)	0.0024
PESTICIDES (SW846 8081B)																							
4,4'-DDD	72-54-8	mg/kg	0.0033	5		ND (0.0007)	ND (0.00074)	ND (0.00073)	ND (0.00092)	ND (0.001)	ND (0.00088)	ND (0.00069)	ND (0.00077)	ND (0.00073)	ND (0.001)	ND (0.00084)	ND (0.0008)	ND (0.00067)	ND (0.00079)	ND (0.00074)	ND (0.0007)	ND (0.00072)	ND (0.00077)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		ND (0.0007)	ND (0.00074)	ND (0.00073)	ND (0.00092)	ND (0.001)	ND (0.00088)	ND (0.00069)	ND (0.00077)	ND (0.00073)	ND (0.001)	ND (0.00084)	ND (0.0008)	ND (0.00067)	ND (0.00079)	ND (0.00074)	ND (0.0007)	ND (0.00072)	ND (0.00077)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.0016 [k]	0.0021 [k]	0.0009	ND (0.00092)	ND (0.001)	ND (0.00088)	0.0017	ND (0.00077)	ND (0.00073)	ND (0.001)	ND (0.00084)	ND (0.0008)	ND (0.00067)	ND (0.00079)	0.00082	ND (0.0007)	ND (0.00072)	ND (0.00077)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		ND (0.0007)	ND (0.00074)	ND (0.00073)	ND (0.00092)	ND (0.001)	ND (0.00088)	ND (0.00069)	ND (0.00077)	ND (0.00073)	ND (0.001)	ND (0.00084)	ND (0.0008)	ND (0.00067)	ND (0.00079)	ND (0.00074)	ND (0.0007)	ND (0.00072)	ND (0.00077)
PFAS (EPA 1633A)																							
PFOS	1763-23-1	ng/g	0.88	44	1	NT	NT	NT	ND (0.0986)	NT	ND (0.0835)	NT	NT	NT	ND (0.0981)	NT	NT	NT	NT	ND (0.0788)	NT	NT	ND (0.0783)

NOTES:
mg/kg = milligrams per kilogram
ng/g = nanograms per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY UUSCO = NYSDEC Unrestricted Use Soil Cleanup Objectives (12/2025)
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (12/2025)
ND = Not Detected
NA = Not Analyzed
J = Estimated Value
= Exceeds NY UUSCO
= Exceeds NY RRSCO
= Exceeds NY PGWSCO

Table 2.1 RI Soil Exceedances
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Boring ID:						RI-SB-07						RI-SB-08						RI-SB-09					
Sample ID:						RI-SB-07(0-0.5)	RI-SB-07(1.5-2)	RI-SB-07(2-5)	RI-SB-07(5-10)	RI-SB-07(10-15)	RI-SB-07(15-20)	RI-SB-08(0-0.5)	RI-SB-08(1.5-2)	RI-SB-08(2-5)	RI-SB-08(5-10)	RI-SB-08(10-15)	RI-SB-08(15-20)	RI-SB-09(0-0.5)	RI-SB-09(1.5-2)	RI-SB-09(2-5)	RI-SB-09(5-10)	RI-SB-09(10-15)	RI-SB-09(15-20)
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE27507-13	JE27507-14	JE27507-15	JE27507-16	JE27507-17	JE27507-18	JE27507-7	JE27507-8	JE27507-9	JE27507-10	JE27507-11	JE27507-12	JE28403-13	JE28403-14	JE28403-15	JE28403-16	JE28403-17	JE28403-18
Sample Date:						1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	2.5-3.0	8.0-8.5	12.0-12.5	15.0-15.5	0.0-0.5	1.5-2.0	4.0-4.5	6.5-7.0	11.0-11.5	17.0-17.5	0.0-0.5	1.5-2.0	3.5-4.0	8.0-8.5	12.0-12.5	18.5-19.0
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																							
3&4-Methylphenol		mg/kg	0.33	100		ND (0.079)	ND (0.078)	ND (0.078)	ND (0.21)	ND (0.23)	ND (0.079)	ND (0.16)	ND (0.076)	ND (0.075)	ND (0.075)	0.203	ND (0.16)	ND (0.08)	ND (0.075)	0.182	ND (0.1)	0.0824 J	ND (0.08)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.217	1.03	0.338	ND (0.1)	ND (0.11)	ND (0.039)	0.0927	0.0119 J	0.0143 J	ND (0.037)	0.704	ND (0.078)	1.71	0.404	0.423	1.24	0.138	ND (0.04)
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	0.265	1.16	0.354	ND (0.1)	ND (0.11)	ND (0.039)	0.0894	ND (0.038)	ND (0.037)	ND (0.037)	0.553	ND (0.078)	1.57	0.372	0.223	1.09	0.104	ND (0.04)
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.325	1.55	0.458	ND (0.1)	ND (0.11)	0.0187 J	0.126	ND (0.038)	0.0249 J	ND (0.037)	0.627	ND (0.078)	2.01	0.533	0.419	1.09	0.129	ND (0.04)
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		0.204	0.9	0.279	ND (0.1)	ND (0.11)	ND (0.039)	0.075 J	ND (0.038)	0.0287 J	ND (0.037)	0.281	ND (0.078)	1.1	0.246	0.15	0.666	0.0623	ND (0.04)
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		0.123	0.415	0.152	ND (0.1)	ND (0.11)	ND (0.039)	0.04 J	ND (0.038)	ND (0.037)	ND (0.037)	0.172	ND (0.078)	0.743	0.161	0.11	0.374	0.0461 J	ND (0.04)
Chrysene	218-01-9	mg/kg	1	4.9	1	0.238	1.06	0.338	ND (0.1)	ND (0.11)	ND (0.039)	0.0966	ND (0.038)	ND (0.037)	ND (0.037)	0.521	ND (0.078)	1.68	0.397	0.86	1.2	0.119	ND (0.04)
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		0.0641	0.27	ND (0.039)	ND (0.1)	ND (0.11)	ND (0.039)	ND (0.081)	ND (0.038)	ND (0.037)	ND (0.037)	ND (0.04)	ND (0.078)	0.299	0.0832	0.0793	0.151	ND (0.059)	ND (0.04)
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		0.177	0.788	0.235	ND (0.1)	ND (0.11)	ND (0.039)	0.0562 J	ND (0.038)	0.0248 J	ND (0.037)	0.261	ND (0.078)	0.933	0.227	0.107	0.515	0.0526 J	ND (0.04)
Phenanthrene	85-01-8	mg/kg	1.1	4.9		0.0768	0.49	0.167	ND (0.1)	ND (0.11)	ND (0.039)	0.107	ND (0.038)	ND (0.037)	0.352	0.875	ND (0.078)	2.65	0.0814	1.21	3.42	0.123	ND (0.04)
METALS (SW846 6010D & 7471B)																							
Chromium	7440-47-3	mg/kg	30	110		25.1	38.5	9.8	22.3	7.6	6.2	25.6	16.1	51.8	5.7	20.3	14.9	15.1	11.9	6.6	12.9	29.2	18.5
Copper	7440-50-8	mg/kg	50	280		19.8 [b]	24.2 [b]	25.3 [b]	14.2	5.4	4.5	15.7	15 [b]	25.7 [b]	3.3	44.3	9.7 [b]	22.4	13.8 [b]	26.1	11	37.2 [b]	10.8 [b]
Lead	7439-92-1	mg/kg	63	400		108	43.9	204	14.5	17.9	6.1	93.4	42.8	11.9	2.7	123	14.3	59.3	48.8 [b]	48	40.6	97.6 [b]	6.8 [b]
Mercury	7439-97-6	mg/kg	0.18	0.3		0.31	0.27	0.17	ND (0.052)	ND (0.046)	ND (0.033)	0.16	0.046	ND (0.032)	ND (0.031)	0.11	ND (0.037)	0.26	0.081	0.075	0.059	0.67	ND (0.036)
Nickel	7440-02-0	mg/kg	30	320		18.3	30.3	10.6	29.1	6.7	5.4	9	13.8	37.7	5.7	9.1	14.1	13.8	11.3	7.3	11.7	28.1	21.2
Zinc	7440-66-6	mg/kg	109	6600		138	83.5	106	79.5	18.1	13.1	66.3	48.4	68	14.7	59.9	36.5	78	56.3	45.4	82.7	120	41.2
VOCs (SW846 8260D)																							
Acetone	67-64-1	mg/kg	0.03	100		ND (0.0099)	ND (0.014)	0.012 J	0.0717	0.0496	0.0097 J	0.0393	0.0107 J	ND (0.92)	0.0447	0.0282	0.0127	0.0082 J	0.042	ND (0.02) [d]	0.0353	0.0588 [l]	0.243 [l]
Xylene (total)	1330-20-7	mg/kg	0.26	100		ND (0.00099)	ND (0.0014)	ND (0.0013)	ND (0.0063)	ND (0.0023)	ND (0.0011)	ND (0.0015)	ND (0.0018)	ND (0.092)	ND (0.0011)	ND (0.0011)	ND (0.00062)	ND (0.0011)	ND (0.0011)	ND (0.002)	ND (0.0014)	ND (0.0021)	ND (0.0022)
PESTICIDES (SW846 8081B)																							
4,4'-DDD	72-54-8	mg/kg	0.0033	5		0.0196	0.0028 [k]	0.0016	ND (0.0011)	ND (0.001)	ND (0.00078)	0.0414	0.00084	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)	ND (0.00075)	ND (0.00074)	ND (0.00079)	ND (0.00091)	ND (0.0011)	ND (0.00078)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		0.293 [e]	0.016	0.0149	ND (0.0011)	ND (0.001)	ND (0.00078)	0.893	0.0284	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)	ND (0.00075)	ND (0.00074)	ND (0.00079)	ND (0.00091)	ND (0.0011)	ND (0.00078)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.147 [e]	0.0159	0.0092	ND (0.0011)	ND (0.001)	ND (0.00078)	0.746 [e]	0.0046	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)	0.0035	ND (0.00074)	0.0037 [k]	ND (0.00091)	ND (0.0011)	ND (0.00078)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		ND (0.00078)	ND (0.00077)	ND (0.00071)	ND (0.0011)	ND (0.001)	ND (0.00078)	ND (0.00084)	ND (0.00069)	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)	0.00082 [k]	ND (0.00074)	ND (0.00079)	ND (0.00091)	ND (0.0011)	ND (0.00078)
PFAS (EPA 1633A)																							
PFOS	1763-23-1	ng/g	0.88	44	1	NT	NT	1.47	NT	ND (0.0786)	NT	NT	NT	0.762	NT	ND (0.0783)	NT	NT	NT	NT	NT	ND (0.0985)	ND (0.0886)

Boring ID:						RI-SB-10						RI-SB-11							RI-SB-12					
Sample ID:						RI-SB-10(0-0.5)	RI-SB-10(1.5-2)	RI-SB-10(2-5)	DUP20260121	RI-SB-10(5-10)	RI-SB-10(10-15)	RI-SB-10(15-20)	RI-SB-11(0-0.5)	RI-SB-11(1.5-2)	RI-SB-11(2-5)	RI-SB-11(5-10)	RI-SB-11(10-15)	DUP20260122-1	RI-SB-11(15-20)	R1-SB-12(0-0.5)	R1-SB-12(1.5-2)	R1-SB-12(2-5)	R1-SB-12(5-10)	R1-SB-12(10-15)	R1-SB-12(15-20)
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE27318-5	JE27318-6	JE27318-7	JE27318-11	JE27318-8	JE27318-13	JE27318-15	JE27432-1	JE27432-2	JE27432-3	JE27432-4	JE27432-5	JE27432-16	JE27432-6	JE27432-31	JE27432-32	JE27432-33	JE27432-34	JE27432-35	JE27432-36
Sample Date:						1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	4.0-4.5	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0	0.0-0.5	1.5-2.0	3.5-4	5.5-6.0	13.0-13.5	13.0-13.5	18.0-18.5	0.0-0.5	1.5-2.0	2.5-3.0	6.5-7.0	13.5-14.0	16.5-17.0
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																									
3&4-Methylphenol		mg/kg	0.33	100		ND (0.084)	ND (0.074)	ND (0.075)	ND (0.071)	ND (0.074)	ND (0.11)	ND (0.081)	ND (0.079)	ND (0.078)	ND (0.072)	ND (0.078)	ND (0.11)	ND (0.11)	ND (0.084)	ND (0.071)	ND (0.081)	ND (0.072)	ND (0.069)	ND (0.07)	ND (0.073)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.265	0.0915	0.0979	0.0146 J	ND (0.037)	0.0251 J	ND (0.04)	0.1	0.0742	0.0339 J	ND (0.039)	0.0414 J	0.0574	0.0259 J	0.0852	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	0.346	0.101	0.113	ND (0.035)	ND (0.037)	ND (0.054)	ND (0.04)	0.108	0.0764	0.0354 J	ND (0.039)	0.0254 J	0.0384 J	ND (0.042)	0.0389	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.546	0.132	0.149	0.0199 J	ND (0.037)	0.0248 J	ND (0.04)	0.147	0.114	0.0483	ND (0.039)	0.0332 J	0.0442 J	ND (0.042)	0.055	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		0.374	0.0899	0.0854	ND (0.035)	ND (0.037)	ND (0.054)	ND (0.04)	0.0819	0.0613	0.0285 J	ND (0.039)	ND (0.055)	ND (0.056)	ND (0.042)	0.0423	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		0.159	0.0453	0.0534	ND (0.035)	ND (0.037)	ND (0.054)	ND (0.04)	0.0491	0.0336 J	ND (0.036)	ND (0.039)	ND (0.055)	ND (0.056)	ND (0.042)	ND (0.035)	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Chrysene	218-01-9	mg/kg	1	4.9	1	0.401	0.107	0.124	0.0142 J	ND (0.037)	0.0251 J	ND (0.04)	0.118	0.0861	0.0396	ND (0.039)	0.0329 J	0.0462 J	0.0232 J	0.021 J	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		0.0782	0.019 J	0.0244 J	ND (0.035)	ND (0.037)	ND (0.054)	ND (0.04)	0.0194 J	ND (0.039)	ND (0.036)	ND (0.039)	ND (0.055)	ND (0.056)	ND (0.042)	ND (0.035)	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		0.365	0.0758	0.0824	ND (0.035)	ND (0.037)	ND (0.054)	ND (0.04)	0.0804 [l]	0.063 [l]	0.0281 J	ND (0.039)	ND (0.055)	ND (0.056)	ND (0.042)	ND (0.035)	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
Phenanthrene	85-01-8	mg/kg	1.1	4.9		0.393	0.0691	0.0901	ND (0.035)	ND (0.037)	0.045 J	ND (0.04)	0.0683	0.0545	0.0231 J	ND (0.039)	0.0455 J	0.0522 J	0.0196 J	0.014 J	ND (0.04)	ND (0.036)	ND (0.035)	ND (0.035)	ND (0.036)
METALS (SW846 6010D & 7471B)																									
Chromium	7440-47-3	mg/kg	30	110		18.3	13.8	17.2	7.1	6.6	38.5	8.7	24.1	21.2	19.2	6	24.9	23.5	11.1	11.6	17.7	19.2	20.6	21.1	19.8
Copper	7440-50-8	mg/kg	50	280		39 [b]	13.3 [b]	15	6.3	6.8	27.4 [b]	5.1	18	15.9	13.1	4.4	18.2	19.5	10.1	28.4	19.1	19.9	19.7	16.3	17.7
Lead	7439-92-1	mg/kg	63	400		40.8 [b]	23.2 [b]	25.7 [b]	10.2	5	50.8 [b]	3.3	48.1 [b]	34.6 [b]	12.3 [b]	2.4	19.6 [b]	23.2 [b]	12.8	14.1 [b]	ND (5.9) [b]	6.2 [b]	6.8 [b]	ND (5.5) [b]	ND (5.4) [b]
Mercury	7439-97-6	mg/kg	0.18	0.3		0.26	0.2	0.1	ND (0.031)	ND (0.032)	0.45	ND (0.032)	0.17	0.18	0.19	ND (0.034)	0.089	0.13	0.26	0.045	ND (0.034)	ND (0.032)	ND (0.034)	ND (0.028)	ND (0.028)
Nickel	7440-02-0	mg/kg	30	320		18.2	11.5	12.8	6.9	6.4	26.8	6.4	14.3	13.6	15.7	5.4	24.7	23.3	10.7	13	17.4	18.2	16.7	17.2	16.8
Zinc	7440-66-6	mg/kg	109	6600		80.8	42.1	46.8	42.1	16.9	87.3	17.8	63.6	53.9	35.9	16.4	71.2	69.9	30.6	41	40.1	52.8	43.8	50.4	36.3
VOCs (SW846 8260D)																									
Acetone	67-64-1	mg/kg	0.03	100		0.0739	ND (0.0072)	0.112	0.003 J	ND (0.0056)	0.0677	0.0133	0.0156	ND (0.0063)	ND (0.013)	0.0257	0.125	0.0651	0.0105 J	0.0171	0.0087	ND (0.013)	ND (0.0087)	ND (0.01)	0.0164
Xylene (total)	1330-20-7	mg/kg	0.26	100		ND (0.0014)	ND (0.00072)	ND (0.001)	ND (0.00055)	ND (0.00056)	ND (0.00085)	ND (0.00073)	ND (0.001)	ND (0.00063)	ND (0.0013)	ND (0.00056)	ND (0.0012)	ND (0.0016)	ND (0.0012)	ND (0.0015)	ND (0.0008)	ND (0.0013)	ND (0.00087)	ND (0.001)	ND (0.00079)
PESTICIDES (SW846 8081B)																									
4,4'-DDD	72-54-8	mg/kg	0.0033	5		ND (0.00085)	0.0044	0.0165	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)	0.0042	0.0076	ND (0.0007)	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)	0.0035	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		ND (0.00085)	0.129	0.0552	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)	0.0978	0.16	0.0151	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)	0.0021	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.0023 [k]	0.136	0.414	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)	0.195	0.377	0.0074	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)	0.0044	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		ND (0.00085)	0.004 [k]	0.0019 [k]	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)	0.0016 [k]	0.0025 [k]	ND (0.0007)	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)	ND (0.00067)	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
PFAS (EPA 1633A)																									
PFOS	1763-23-1	ng/g	0.88	44	1	NT	NT	1.95	NT	NT	NT	NT	NT	NT	1.2	NT	NT	NT	ND (0.0777)	NT	NT	ND (0.0776)	ND (0.0781)	NT	NT

NOTES:
mg/kg = milligrams per kilogram
ng/g = nanograms per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY UUSCO = NYSDEC Unrestricted Use Soil Cleanup Objectives (12/2025)
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (12/2025)
ND = Not Detected
NA = Not Analyzed
J = Estimated Value
= Exceeds NY UUSCO
= Exceeds NY RRSCO
= Exceeds NY PGWSCO

Table 2.1 RI Soil Exceedances
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Boring ID:						RI-SB-13							RI-SB-14						RI-SB-15					
Sample ID:						RI-SB-13(0-0.5)	RI-SB-13(1.5-2)	RI-SB-13(2-5)	RI-SB-13(5-10)	RI-SB-13(10-15)	RI-SB-13(15-20)	DUP20260122-2	RI-SB-14(0-0.5)	RI-SB-14(1.5-2)	RI-SB-14(2-5)	RI-SB-14(5-10)	RI-SB-14(10-15)	RI-SB-14(15-20)	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)	RI-SB-15(2-5)	RI-SB-15(5-10)	RI-SB-15(10-15)	RI-SB-15(15-20)
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE27432-9	JE27432-10	JE27432-11	JE28284-1	JE27432-13	JE27432-14	JE27432-15	JE27318-1	JE27318-2	JE27318-3	JE27318-4	JE27318-12	JE27318-14	JE27507-25	JE27507-26	JE27507-27	JE27507-28	JE27507-29	JE27507-30
Sample Date:						1/22/2026	1/22/2026	1/22/2026	2/11/2026	1/22/2026	1/22/2026	1/22/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/21/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	3.5-4.0	6.5-7.0	13.0-13.5	17.5-18.0	17.5-18.0	0.0-0.5	1.5-2.0	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0	0.0-0.5	1.5-2.0	2.5-3.0	5.5-6.0	12.0-12.5	16.0-16.5
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																								
3&4-Methylphenol		mg/kg	0.33	100		ND (0.08)	ND (0.075)	ND (0.078)	ND (0.085)	ND (0.082)	ND (0.088)	ND (0.081)	ND (0.081)	ND (0.074)	ND (0.075)	ND (0.078)	ND (0.076)	ND (0.072)	ND (0.095)	ND (0.077)	ND (0.072)	ND (0.078)	ND (0.076)	ND (0.17)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.0672	0.0136 J	0.035 J	0.0453	ND (0.041)	ND (0.044)	ND (0.04)	0.142	0.0676	0.213	ND (0.039)	ND (0.038)	ND (0.036)	0.699	0.804	1.54	0.101	0.0843	0.348
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	0.101	ND (0.037)	0.0465	0.0592	ND (0.041)	ND (0.044)	ND (0.04)	0.168	0.0946	0.257	ND (0.039)	ND (0.038)	ND (0.036)	0.666	0.78	1.24	0.0845	0.072	0.317
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.116	0.019 J	0.0639	0.0764	ND (0.041)	ND (0.044)	ND (0.04)	0.236	0.126	0.341	ND (0.039)	ND (0.038)	ND (0.036)	0.901	1.02	1.61	0.103	0.0822	0.372
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		0.078	ND (0.037)	0.044	0.0671	ND (0.041)	ND (0.044)	ND (0.04)	0.144	0.0849	0.219	ND (0.039)	ND (0.038)	ND (0.036)	0.533	0.624	0.878	0.0525	0.043	0.223
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		0.0338 J	ND (0.037)	0.0217 J	0.0246 J	ND (0.041)	ND (0.044)	ND (0.04)	0.0664	0.039	0.109	ND (0.039)	ND (0.038)	ND (0.036)	0.283	0.331	0.525	0.0381 J	0.0316 J	0.13
Chrysene	218-01-9	mg/kg	1	4.9	1	0.0827	0.022 J	0.0491	0.0516	ND (0.041)	ND (0.044)	ND (0.04)	0.166	0.0788	0.256	ND (0.039)	ND (0.038)	ND (0.036)	0.748	0.776	1.49	0.094	0.0739	0.307
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		0.0198 J	ND (0.037)	ND (0.039)	ND (0.043)	ND (0.041)	ND (0.044)	ND (0.04)	0.0324 J	0.0189 J	0.0476	ND (0.039)	ND (0.038)	ND (0.036)	0.145	0.167	0.231	ND (0.039)	ND (0.038)	0.0554 J
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		0.074 [l]	ND (0.037) [a]	0.0447	0.0477	ND (0.041)	ND (0.044)	ND (0.04)	0.144	0.077	0.208	ND (0.039)	ND (0.038)	ND (0.036)	0.45	0.518	0.769	0.049	0.0387	0.175
Phenanthrene	85-01-8	mg/kg	1.1	4.9		0.0363 J	ND (0.037)	0.0195 J	0.058	ND (0.041)	ND (0.044)	ND (0.04)	0.122	0.0288 J	0.147	ND (0.039)	ND (0.038)	0.0205 J	0.641	0.533	2.27	0.0551	0.0469	0.225
METALS (SW846 6010D & 7471B)																								
Chromium	7440-47-3	mg/kg	30	110		48.3	40.7	12.7	10.9	6.7	16.8	17.7	32.4	27.7	7.8	6.7	5.4	6.2	20.2	17.5	7.8	5.8	5.8	20.3
Copper	7440-50-8	mg/kg	50	280		20.9	23.8	20.1	7.4	4.5	14.5	17.3	16.7 [b]	18.3	5.2	4.6	7.9	10.6	26	22.3	9	7.6	48.4	31.3
Lead	7439-92-1	mg/kg	63	400		55.2 [b]	11.3 [b]	70.3 [b]	14.8	10.2	41.3 [b]	7.9 [b]	40.4 [b]	21.2 [b]	13		478 [B]	12.6	90.3 [b]	68.3 [b]	83.9	22.3	46.3	126 [b]
Mercury	7439-97-6	mg/kg	0.18	0.3		0.31	0.072	0.042	0.034	ND (0.032)	0.19	ND (0.032)	0.25	0.12	ND (0.033)	ND (0.031)	4.9	1.7	42.7	48.9	0.59	0.038	0.15	0.43
Nickel	7440-02-0	mg/kg	30	320		19.4	36	13.2	9.6	5.9	16.4	16.2	17.5	20.7	8.6	7.7	6.8	6.2	18.3	15.5	7.3	8.1	6.5	16.8
Zinc	7440-66-6	mg/kg	109	6600		90.6	60.2	94.1	31.9	18.6	46.7	41.9	93.8	78	26.4	22.1	37.4	71.2	178	147	36.8	74.3	64.4	81.8
VOCs (SW846 8260D)																								
Acetone	67-64-1	mg/kg	0.03	100		0.0232	ND (0.0087)	0.012 J	0.0195	0.006	0.0172	0.0107 J	0.0072 J	ND (0.0098)	0.003 J	0.0362	ND (0.0058)	0.005 J	0.0177 J	ND (0.014)	ND (0.013)	0.0064 J	0.0189	0.0359
Xylene (total)	1330-20-7	mg/kg	0.26	100		ND (0.001)	ND (0.00087)	ND (0.0015)	ND (0.00098)	ND (0.00059)	ND (0.00071)	ND (0.0014)	ND (0.0011)	ND (0.00098)	ND (0.00059)	ND (0.00064)	ND (0.00058)	ND (0.00066)	ND (0.002)	ND (0.0014)	ND (0.0013)	ND (0.00091)	ND (0.00087)	ND (0.0014)
PESTICIDES (SW846 8081B)																								
4,4'-DDD	72-54-8	mg/kg	0.0033	5		0.0111	0.0015	0.00095	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)	0.0079 [k]	0.00072	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)	ND (0.00089)	ND (0.00073)	ND (0.00066)	ND (0.00079)	ND (0.00068)	ND (0.00086)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		0.715	0.14	0.0134	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)	0.3	0.0419	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)	0.00093 [k]	ND (0.00073)	ND (0.00066)	ND (0.00079)	ND (0.00068)	ND (0.00086)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.545	0.0553	0.0067	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)	0.297	0.0313	0.00088 [k]	ND (0.0007)	ND (0.0007)	ND (0.0007)	0.0124	0.0095	0.0022	ND (0.00079)	ND (0.00068)	ND (0.00086)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		0.0028 [k]	0.00081 [k]	ND (0.00076)	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)	0.0435 [k]	0.0029 [k]	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)	ND (0.00089)	ND (0.00073)	ND (0.00066)	ND (0.00079)	ND (0.00068)	ND (0.00086)
PFAS (EPA 1633A)																								
PFOS	1763-23-1	ng/g	0.88	44	1	NT	3.33	NT	NT	NT	NT	ND (0.0765)	ND (0.0772)	NT	NT	2.49	NT	NT	NT	NT	NT	NT	NT	NT

Boring ID:						RI-SB-16					
Sample ID:						RI-SB-16(0-0.5)	RI-SB-16(1.5-2)	RI-SB-16(2-5)	RI-SB-16(5-10)	RI-SB-16(10-15)	RI-SB-16(15-20)
Lab ID:	**CAS**	**UNITs**	**NY UUSCO**	**NY RRSCO**	**NY PGWSCO**	JE28284-2	JE28284-3	JE28284-4	JE28284-5	JE28284-6	JE28284-7
Sample Date:						2/11/2026	2/11/2026	2/11/2026	2/11/2026	2/11/2026	2/11/2026
Sample Depth (ft bgs):						0.0-0.5	1.5-2.0	4.5-5.0	6.0-6.5	12.0-12.5	18.5-19.0
Matrix:						Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)											
3&4-Methylphenol		mg/kg	0.33	100		ND (0.077)	ND (0.074)	0.0948	ND (0.12)	ND (0.077)	ND (0.11)
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1	0.0156 J	ND (0.037)	0.354	0.0236 J	ND (0.038)	0.0288 J
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22	ND (0.039)	ND (0.037)	0.45	ND (0.061)	ND (0.038)	0.0309 J
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1	0.0186 J	ND (0.037)	0.597	ND (0.061)	ND (0.038)	0.0294 J
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9		ND (0.039)	ND (0.037)	0.45	ND (0.061)	ND (0.038)	ND (0.053)
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9		ND (0.039)	ND (0.037)	0.192	ND (0.061)	ND (0.038)	ND (0.053)
Chrysene	218-01-9	mg/kg	1	4.9	1	0.0144 J	ND (0.037)	0.462	ND (0.061)	ND (0.038)	0.0221 J
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33		ND (0.039)	ND (0.037)	0.0935	ND (0.061)	ND (0.038)	ND (0.053)
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4		ND (0.039)	ND (0.037)	0.358	ND (0.061)	ND (0.038)	ND (0.053)
Phenanthrene	85-01-8	mg/kg	1.1	4.9		ND (0.039)	ND (0.037)	0.262	0.0426 J	ND (0.038)	ND (0.053)
METALS (SW846 6010D & 7471B)											
Chromium	7440-47-3	mg/kg	30	110		29	26	30.6	20.1	4.7	36.1
Copper	7440-50-8	mg/kg	50	280		32.4	21.1	22.8	16.3	3.3	44
Lead	7439-92-1	mg/kg	63	400		27.6 [b]	9.3 [b]	21.8 [b]	35.6	1.7	102 [b]
Mercury	7439-97-6	mg/kg	0.18	0.3		0.059	ND (0.030)	0.065	0.22	ND (0.034)	0.84
Nickel	7440-02-0	mg/kg	30	320		22.6	24.9	28.2	20.5	5.2	30.1
Zinc	7440-66-6	mg/kg	109	6600		65.9	61.2	70.8	61.7	13.4	156
VOCs (SW846 8260D)											
Acetone	67-64-1	mg/kg	0.03	100		0.0063 J	0.0048 J	0.14	0.0342	0.0073 J	0.0799
Xylene (total)	1330-20-7	mg/kg	0.26	100		0.347	0.005	ND (0.0013)	ND (0.002)	ND (0.0013)	ND (0.0018)
PESTICIDES (SW846 8081B)											
4,4'-DDD	72-54-8	mg/kg	0.0033	5		0.0047	ND (0.00076)	0.0019	ND (0.0012)	ND (0.00069)	ND (0.0011)
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4		0.0485	0.0037	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8		0.0611	0.0036	0.0011 [k]	ND (0.0012)	ND (0.00069)	ND (0.0011)
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65		0.156 [k]	0.0091 [k]	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)
PFAS (EPA 1633A)											
PFOS	1763-23-1	ng/g	0.88	44	1	NT	NT	NT	NT	NT	NT

NOTES:
mg/kg = milligrams per kilogram
ng/g = nanograms per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY UUSCO = NYSDEC Unrestricted Use Soil Cleanup Objectives (12/2025)
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (12/2025)
ND = Not Detected
NA = Not Analyzed
J = Estimated Value

= Exceeds NY UUSCO
= Exceeds NY RRSCO
= Exceeds NY PGWSCO

Table 2.2 RI Groundwater Exceedances
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Monitoring Well ID:				RI-MW-01							RI-MW-02				RI-MW-03				RI-MW-04				
Sample ID:				R1-MW-01	MW-1	DUP20260225	MW-1	MW-1	DUP20260415	DUP20260415	R1-MW-02	MW-2	MW-2	MW-2	R1-MW-03	MW-3	MW-3	MW-3	RI-MW-04	DUP20260129	MW-4	MW-4	MW-4
Matrix:	**CAS**	**UNITS**	**NYSDEC AWQS**	Ground Water	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Ground Water	Groundwater Filtered
Sample Date:				1/27/2026	2/25/2026	2/25/2026	4/15/2026	4/15/2026	4/15/2026	4/15/2026	1/28/2026	2/26/2026	4/14/2026	4/14/2026	1/28/2026	2/25/2026	4/14/2026	4/14/2026	1/29/2026	1/29/2026	2/25/2026	4/15/2026	4/15/2026
SVOCs																							
Benzo(a)anthracene	56-55-3	ug/l	0.002	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	0.72 J	ND (1.0)	ND (1.0)	NT
Benzo(a)pyrene	50-32-8	ug/l	ND	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	0.56 J	ND (1.0)	ND (1.0)	NT
Benzo(b)fluoranthene	205-99-2	ug/l	0.002	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	0.85 J	ND (1.0)	ND (1.0)	NT
Chrysene	218-01-9	ug/l	0.002	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	0.62 J	ND (1.0)	ND (1.0)	NT
Indeno(1,2,3-cd)pyrene	193-39-5	ug/l	0.002	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.7)	ND (1.0)	ND (1.0)	NT
Naphthalene	91-20-3	ug/l	10	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.7)	ND (1.0)	ND (1.0)	NT
Naphthalene (TIC)	91-20-3	ug/l	10	ND	ND	ND	ND	NT	ND	NT	ND	ND	ND	NT	ND	ND	ND	NT	ND	ND	ND	NT	NT
VOCs																							
Chloroform	67-66-3	ug/l	7	0.61 J	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	NT	0.65 J	ND (1.0)	ND (1.0)	NT	0.67 J	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NT
PESTICIDES																							
Dieldrin	60-57-1	ug/l	0.004	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT	ND (0.0050)	NT	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT
METALS																							
Antimony	7440-36-0	ug/l	3	ND (6.0)	ND (6.0)	ND (12) [b]	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)
Arsenic	7440-38-2	ug/l	25	ND (3.0)	3.2	5.6	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)
Barium	7440-39-3	ug/l	1000	ND (200)	ND (200)	445	209	202	217	204	366	346	348	344	ND (200)	ND (200)	204	200	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)
Beryllium	7440-41-7	ug/l	3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chromium	7440-47-3	ug/l	50	ND (10)	ND (10)	100	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	7440-50-8	ug/l	200	ND (10)	ND (10)	97.2	ND (10)	ND (10)	ND (10)	ND (10)	78.6	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	10.1	14.3	ND (10)
Iron	7439-89-6	ug/l	300	1670	876	53300	338	ND (100)	914	ND (100)	3060	1990	2830	ND (100)	2230	3570	688	ND (100)	3760	3270	5440	9530	ND (100)
Lead	7439-92-1	ug/l	25	ND (3.0)	ND (3.0)	102 [b]	5	ND (3.0)	6	4	ND (3.0)	3.4	9.6	ND (3.0)	ND (3.0)	ND (3.0)	4.4	4.5	9.7	6.4	12.5	25.9	ND (3.0)
Magnesium	7439-95-4	ug/l	35000	35500	39400	57200	51900	51100	50900	49100	49600	49500	49900	50600	40400	41800	45800	45500	38100	35100	34400	33600	32200
Manganese	7439-96-5	ug/l	300	586	663	864	154	152	239	206	127	118	114	108	452	238	237	205	300	354	354	410	324
Mercury	7439-97-6	ug/l	0.7	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Nickel	7440-02-0	ug/l	100	ND (10)	ND (10)	50.4	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	7440-23-5	ug/l	20000	157000	159000	143000	166000	166000	170000	164000	133000	132000	128000	131000	70800	73800	64300	65800	93000	100000	104000	110000	112000
PFAS																							
PFOA	335-67-1	ng/L	6.7	45.2	37.8	34.6	NT	NT	NT	NT	30.8	29.9	NT	NT	20.9	22.4	NT	NT	7.26	7.12	10.7 J	NT	NT
PFOS	1763-23-1	ng/L	2.7	5.35	7.31	6.76	NT	NT	NT	NT	6.64	6.92	NT	NT	1.32 J	1.52 J	NT	NT	1.05 J	1.13 J	ND (7.04)	NT	NT

Monitoring Well ID:				RI-MW-05				RI-MW-06				RI-MW-07				RI-MW-08			
Sample ID:				R1-MW-05	MW-5	MW-5	MW-5	RI-MW-06	MW-6	MW-6	MW-6	RI-MW-07	MW-7	MW-7	MW-7	RI-MW-08	MW-8	MW-8	MW-8
Matrix:	**CAS**	**UNITS**	**NYSDEC AWQS**	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Groundwater Filtered	Ground Water	Ground Water	Ground Water	Groundwater Filtered
Sample Date:				1/28/2026	2/26/2026	4/14/2026	4/14/2026	1/29/2026	2/25/2026	4/15/2026	4/15/2026	1/29/2026	2/26/2026	4/15/2026	4/15/2026	1/29/2026	2/26/2026	4/15/2026	4/15/2026
SVOCs																			
Benzo(a)anthracene	56-55-3	ug/l	0.002	ND (1.0)	0.25 J	0.45 J	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Benzo(a)pyrene	50-32-8	ug/l	ND	ND (1.0)	ND (1.0)	0.32 J	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Benzo(b)fluoranthene	205-99-2	ug/l	0.002	ND (1.0)	0.26 J	0.43 J	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Chrysene	218-01-9	ug/l	0.002	ND (1.0)	ND (1.0)	0.27 J	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Indeno(1,2,3-cd)pyrene	193-39-5	ug/l	0.002	ND (1.0)	0.35 J	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Naphthalene	91-20-3	ug/l	10	ND (1.0)	ND (1.0)	ND (1.0)	NT	117	150	132	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT	ND (1.0)	ND (1.0)	ND (1.0)	NT
Naphthalene (TIC)	91-20-3	ug/l	10	ND	ND	ND	NT	150 JN	320 JN	130 JN	NT	ND	ND	ND	NT	ND	ND	ND	NT
VOCs																			
Chloroform	67-66-3	ug/l	7	9.4	ND (1.0)	ND (1.0)	NT	1.6	ND (1.0)	ND (1.0)	NT	ND (1.0)	0.58 J	ND (1.0)	NT	0.59 J	ND (1.0)	ND (1.0)	NT
PESTICIDES																			
Dieldrin	60-57-1	ug/l	0.004	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT	ND (0.0050)	ND (0.0050)			0.03	0.018	0.025	NT	ND (0.0050)	ND (0.0050)	ND (0.0050)	NT
METALS																			
Antimony	7440-36-0	ug/l	3	ND (6.0)	32.2	11.2	7.6	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)	ND (6.0)
Arsenic	7440-38-2	ug/l	25	6	112	15.5	ND (3.0)	25.9	ND (3.0)	3.8	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	ND (3.0)	3.8	ND (3.0)	ND (3.0)	ND (3.0)
Barium	7440-39-3	ug/l	1000	ND (200)	1600	ND (200)	ND (200)	319	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)	ND (200)
Beryllium	7440-41-7	ug/l	3	1.1	4.5	ND (1.0)	ND (1.0)	3.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chromium	7440-47-3	ug/l	50	20.6	1190	102	ND (10)	264	ND (10)	28.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	7440-50-8	ug/l	200	23.1	450	76	ND (10)	126	ND (10)	17.8	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Iron	7439-89-6	ug/l	300	14400	414000	41400	1870	137000	14800	21200	161	3550	577	1250	ND (100)	19900	12700	17100	343
Lead	7439-92-1	ug/l	25	116	2850	611	9.3	126	ND (3.0)	21.2	3.6	4.2	ND (3.0)	4.3	3.3	18.5	5.9	6.5	4.4
Magnesium	7439-95-4	ug/l	35000	22400	56900	48800	48300	73800	57600	48300	46100	13900	14700	15000	14900	46900	26000	24300	23600
Manganese	7439-96-5	ug/l	300	794	10100	1850	1600	3520	2250	1870	1600	137	60	40.1	19.6	1960	775	700	593
Mercury	7439-97-6	ug/l	0.7	0.28	79.2	ND (0.20)	ND (0.20)	0.35	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Nickel	7440-02-0	ug/l	100	ND (10)	153	24.2	ND (10)	120	ND (10)	11.8	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	7440-23-5	ug/l	20000	103000	239000	185000	194000	148000	165000	175000	170000	155000	172000	166000	168000	118000	125000	116000	114000
PFAS																			
PFOA	335-67-1	ng/L	6.7	ND (8.47)	11.5 J	NT	NT	ND (8.33)	6.61	NT	NT	28	26.9	NT	NT	9.83 J	24.3	NT	NT
PFOS	1763-23-1	ng/L	2.7	ND (8.47)	10.9 J	NT	NT	ND (8.33)	12.1	NT	NT	6.23	5.59	NT	NT	ND (8.77)	ND (7.04)	NT	NT

Notes:
ug/L = micrograms per liter
ng/L = nanograms per liter
ND = Not Detected
NT = Not Tested
J = Estimated Value
NYSDEC = New York State Department of Environmental Concervation
TOGS = Technical and Operational Guidance Series
AWQS = NY TOGS Class GA GW Standards (6/2004) and Std. Guidance Values (2/2023)
= Exceeds NYSDEC AWQS

Table 3.1 Proposed Excavation Depths (Track 1)
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

SOIL BORING	DEPTH OF DEEPEST EXCEEDANCE (FT-BGS)	TYPE OF EXCEEDANCE / EXCAVATION REASON	PROPOSED AVG. EXCAVATION DEPTH (FT-BGS)	ESTIMATED EXCAVATION VOLUME (CY)*
RI-SB-01 THROUGH RI-SB-15	20.0	UUSCO Exceedance	15.8	170625
20% Contingency				34125
			TOTAL	**204749**

NOTES:
1. Assumes an average 15.8-ft cut across entire BCP site, excluding a 50'x50' clean area near RI-SB-06
- = Not Applicable
CY = Cubic Yards
FT-BGS = Feet Below Grade Surface

Table 3.2 Soil Exceedances (Track 2)
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Sample ID:	CAS	UNITs	NY RRSCO	NY PGWSCO	RI-SB-01(10-15)	RI-SB-02(0-0.5)	RI-SB-02(1.5-2)	RI-SB-02(5-10)	RI-SB-03(2-5)	RI-SB-04(0-0.5)	RI-SB-04(1.5-2)	RI-SB-04(5-10)	RI-SB-04(10-15)	RI-SB-07(0-0.5)	RI-SB-07(1.5-2)	RI-SB-07(2-5)	RI-SB-09(0-0.5)
Sample Date:					1/23/2026	1/22/2026	1/22/2026	1/22/2026	1/22/2026	2/16/2026	2/16/2026	2/16/2026	2/16/2026	1/23/2026	1/23/2026	1/23/2026	2/16/2026
Sample Depth (ft bgs):					12.0-12.5	0.0-0.5	1.5-2.0	6.5-7.0	3.5-4.0	0.0-0.5	1.5-2.0	8.5-9.0	13.0-13.5	0.0-0.5	1.5-2.0	2.5-3.0	0.0-0.5
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																	
Benzo(a)anthracene	56-55-3	mg/kg	1.4	1	0.16	3.08	0.228	0.291	0.0477	0.729	0.873	0.139	0.194	0.217	1.03	0.338	1.71
Benzo(a)pyrene	50-32-8	mg/kg	1	22	0.126	2.49	0.267	0.272	0.0585	0.714	0.815	0.148	0.145	0.265	1.16	0.354	1.57
Benzo(b)fluoranthene	205-99-2	mg/kg	1.4	2.1	0.162	2.91	0.353	0.391	0.0786	0.96	1.16	0.174	0.163	0.325	1.55	0.458	2.01
Chrysene	218-01-9	mg/kg	4.9	1	0.108	2.61	0.249	0.406	0.0688	0.738	0.833	0.135	0.167	0.238	1.06	0.338	1.68
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33		ND (0.1)	0.506	0.0545	0.044 J	ND (0.037)	0.16	0.187	0.0319 J	0.0278 J	0.0641	0.27	ND (0.039)	0.299
METALS (SW846 6010D & 7471B)																	
Copper	7440-50-8	mg/kg	280		31.5	23.4	33.6	1430	20.5	27.8	35.7	31.8	26.5	19.8	24.2	25.3	22.4
Lead	7439-92-1	mg/kg	400		91.8	58.5	55.1	378	11.6	104	157	144	80.4	108	43.9	204	59.3
Mercury	7439-97-6	mg/kg	0.3		0.53	0.22	0.34	1.2	0.089	0.36	0.77	0.83	0.7	0.41	0.27	0.17	0.26
PFAS (EPA 1633A)																	
PFOS	1763-23-1	ng/g	44	1	NT	NT	NT	ND (0.078)	2.37	NT	NT	ND (0.0986)	NT	NT	NT	1.47	NT

Sample ID:	CAS	UNITs	NY RRSCO	NY PGWSCO	RI-SB-09(10-15)	RI-SB-10(2-5)	RI-SB-10(10-15)	RI-SB-11(2-5)	RI-SB-13(0-0.5)	RI-SB-13(1.5-2)	RI-SB-14(2-5)	RI-SB-14(10-15)	RI-SB-14(15-20)	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)	RI-SB-15(2-5)	RI-SB-15(15-20)
Sample Date:					2/16/2026	1/21/2026	1/21/2026	1/22/2026	1/22/2026	1/22/2026	1/21/2026	1/21/2026	1/21/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026
Sample Depth (ft bgs):					12.0-12.5	4.0-4.5	12.5-13.0	3.5-4	0.0-0.5	1.5-2.0	4.0-4.5	12.5-13.0	17.5-18.0	0.0-0.5	1.5-2.0	2.5-3.0	16.0-16.5
Matrix:					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
SVOCs (SW846 8270E)																	
Benzo(a)anthracene	56-55-3	mg/kg	1.4	1	0.138	0.0979	0.0251 J	0.0339 J	0.0672	0.0136 J	0.213	ND (0.038)	ND (0.036)	0.699	0.804	1.54	0.348
Benzo(a)pyrene	50-32-8	mg/kg	1	22	0.104	0.113	ND (0.054)	0.0354 J	0.101	ND (0.037)	0.257	ND (0.038)	ND (0.036)	0.666	0.78	1.24	0.317
Benzo(b)fluoranthene	205-99-2	mg/kg	1.4	2.1	0.129	0.149	0.0248 J	0.0483	0.116	0.019 J	0.341	ND (0.038)	ND (0.036)	0.901	1.02	1.61	0.372
Chrysene	218-01-9	mg/kg	4.9	1	0.119	0.124	0.0251 J	0.0396	0.0827	0.022 J	0.256	ND (0.038)	ND (0.036)	0.748	0.776	1.49	0.307
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33		ND (0.059)	0.0244 J	ND (0.054)	ND (0.036)	0.0198 J	ND (0.037)	0.0476	ND (0.038)	ND (0.036)	0.145	0.167	0.231	0.0554 J
METALS (SW846 6010D & 7471B)																	
Copper	7440-50-8	mg/kg	280		37.2	15	27.4	13.1	20.9	23.8	5.2	7.9	10.6	26	22.3	9	31.3
Lead	7439-92-1	mg/kg	400		97.6	25.7	50.8	12.3	55.2	11.3	13	478	12.6	90.3	68.3	83.9	126
Mercury	7439-97-6	mg/kg	0.3		0.87	0.1	0.45	0.19	0.31	0.072	ND (0.033)	4.8	1.7	42.7	48.9	0.59	0.43
PFAS (EPA 1633A)																	
PFOS	1763-23-1	ng/g	44	1	ND (0.0985)	1.95	NT	1.2	NT	3.33	2.49	NT	NT	NT	NT	NT	NT

NOTES:
mg/kg = milligrams per kilogram
ng/g = nanograms per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/
NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (1
ND = Not Detected
NA = Not Analyzed
J = Estimated Value
= Exceeds NY RRSCO
= Exceeds NY PGWSCO

Table 3.3 Proposed Excavation Depths (Track 2)
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

SOIL BORING	DEPTH OF DEEPEST EXCEEDANCE (FT-BGS)	TYPE OF EXCEEDANCE / EXCAVATION REASON	PROPOSED EXCAVATION DEPTH (FT-BGS)	50x50' PROPOSED EXCAVATION VOLUME (CY)
RI-SB-1	12.5	RRSCO Exceedance	13.5	1250
RI-SB-2	7.0	RRSCO Exceedance	8.0	741
RI-SB-4	13.5	RRSCO Exceedance	14.5	1343
RI-SB-7	2.0	RRSCO Exceedance	3.0	278
RI-SB-9	12.5	RRSCO Exceedance	13.5	1250
RI-SB-10	13.0	RRSCO Exceedance	14.0	1296
RI-SB-13	0.5	RRSCO Exceedance	1.5	139
RI-SB-14	18.0	RRSCO Exceedance	19.0	1759
RI-SB-15	16.5	RRSCO Exceedance	17.5	1620
RI-SB-16	19.0	RRSCO Exceedance	20.0	1852
20% Contingency				2306
			TOTAL	**13833**

NOTES:
- = Not Applicable
CY = Cubic Yards
FT-BGS = Feet Below Grade Surface

`

Table 3.4 Soil Exceedances (Track 4)
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

Sample ID:	CAS	UNITs	NY RRSCO	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)
Sample Date:				1/23/2026	1/23/2026
Sample Depth (ft bgs):				0.0-0.5	1.5-2.0
Matrix:				Soil	Soil
METALS (SW846 6010D & 7471B)					
Mercury	7439-97-6	mg/kg	0.3	42.7	48.9

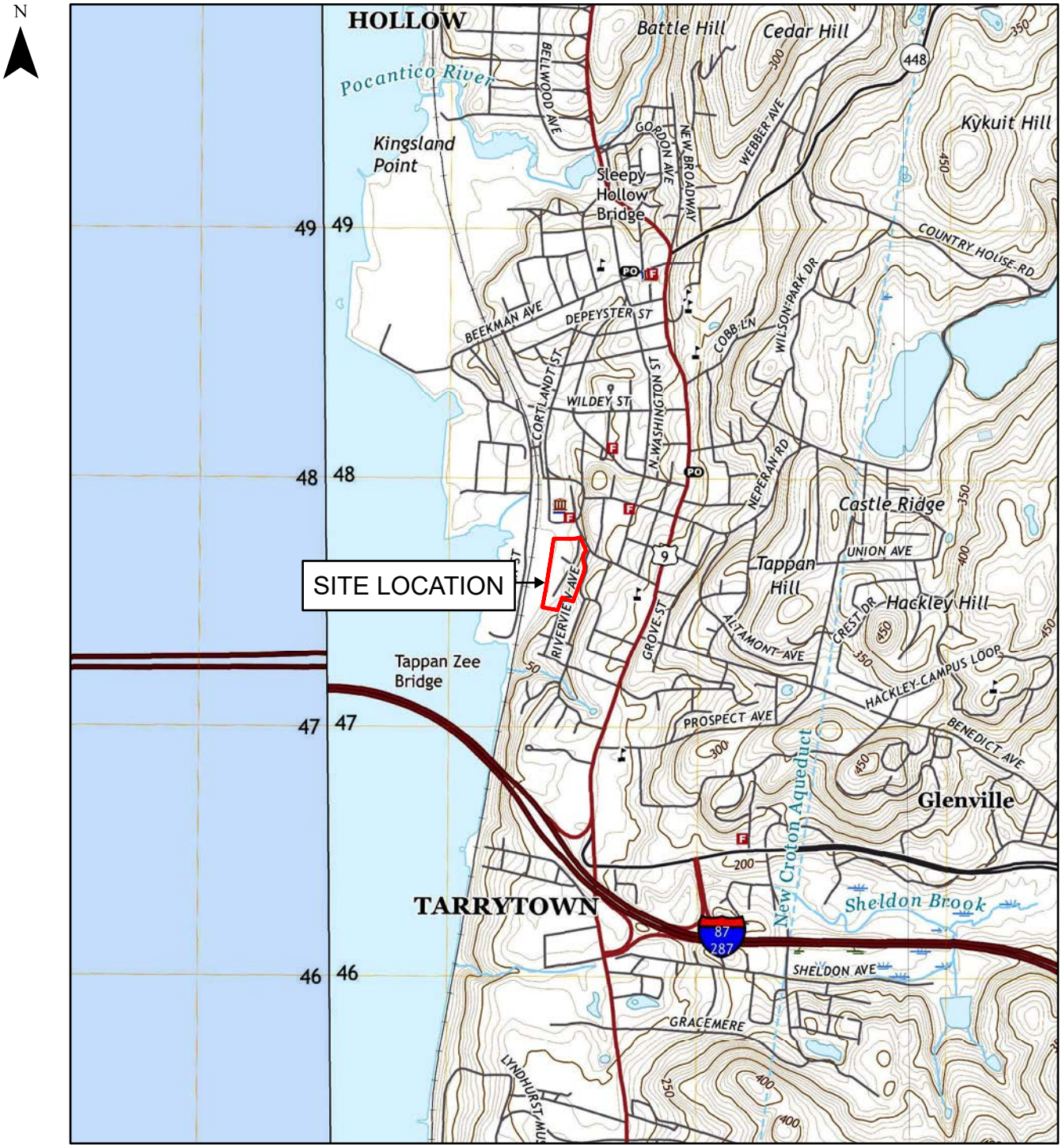
NOTES:
mg/kg = milligrams per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
= Exceeds RRSCO

Table 3.5 Proposed Excavation Depths (Track 4)
Franklin Courts Site (C360252)
Franklin Court, Tarrytown, NY
SESI Project # 12345

SOIL BORING	DEPTH OF DEEPEST EXCEEDANCE (FT-BGS)	TYPE OF EXCEEDANCE / EXCAVATION REASON	PROPOSED EXCAVATION DEPTH (FT-BGS)	ESTIMATED EXCAVATION VOLUME (CY)*
RI-SB-15	2.0	Hot Spot	3.0	44
20% Hot Spot Contingency				9
2 Foot Site Cut				9300
			TOTAL	**9353**

NOTES:
*Excavations in RI-SB-15 hot spots are assumed 20' x 20'
- = Not Applicable
CY = Cubic Yards
FT-BGS = Feet Below Grade Surface

Figures



REFERENCE:

UNITED STATES GEOLOGICAL SURVEY (USGS)
WHITE PLAINS, NY USGS QUADRANGLE - 2019

LEGEND:

SITE LOCATION

SCALE: 1" = 2,000'

0 1,000 2,000 4,000 FEET

PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

SITE LOCATION MAP

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FIG-1.1	
DRAWN BY:	KBV
CHECKED BY:	CM
SCALE:	AS NOTED
DATE:	2/21/2024
JOB NO:	12345

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 2/21/2024 9:44 AM, Kim Vanderklein, LAYOUT: FIG-1.1

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dwg by: KBV
chk by: CM
scale: AS NOTED
date: 4/19/2024

project:
PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title:
SITE PLAN

job no.: 12345
drawing no:
FIG-1.2

NYS Education Law

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REFERENCE:

IMAGERY: NEW YORK STATE, MAXAR, MICROSOFT;
BCP SITE BOUNDARY TAKEN FROM "GRADING AND UTILITIES PLAN", PREPARED BY INSITE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE, P.C., DATED 4/5/24.

LEGEND:

BCP SITE BOUNDARY

SCALE: 1" = 100'

0 50 100 200 FEET

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 4/19/2024 10:12 AM, Kim Vanderklein, LAYOUT: FIG-2.1



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NOTE:

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REFERENCE:

IMAGERY: MICROSOFT, VANTOR; BCP SITE BOUNDARY TAKEN FROM "GRADING AND UTILITIES PLAN", PREPARED BY INSITE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE, P.C., DATED 4/5/24.

LEGEND:

- BCP SITE BOUNDARY
- HARDSCAPE / UTILITY INSTALLATION AREAS
- HOUSING DEVELOPMENT AREAS
- STORMWATER MANAGEMENT AREA
- EXISTING FEATURES

SCALE: 1" = 100'

0 50 100 200 FEET

dwg by: KBV
chk by: MKC
scale: AS NOTED
date: 12/8/2025

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project: PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **PROPOSED DEVELOPMENT PLAN**

job no.: 12345

drawing no:

FIG 1.3

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 12/8/2025 10:29 AM, Kim Vanderklein, LAYOUT: EXHIBIT G-1



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REFERENCE:

1. BOUNDARY OF PHASE 1 AND 2 WORK TAKEN FROM "PHASING PLAN - PHASE 1", PREPARED BY INSITE ENGINEERING SURVEYING AND LANSCAPE ARCHITECTURE. DATED 12-5-24, REV. 2-20-25.
2. NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

LEGEND:

- EXTENT OF PHASE 1 WORK
- EXTENT OF PHASE 2 WORK
- TEMPORARY PARKING
- BCP BOUNDARY

SCALE: 1" = 100'

0 50 100 200 FEET

dwg by: KBV
chk by: MKC
scale: AS NOTED
date: 5/28/2026

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project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **PHASING PLAN**

job no.: 12345
drawing no:

FIG-1.4

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 5/28/2026 10:15 AM, Kim VanderKlein, LAYOUT: FIG-2.5



REFERENCE:

PARCELS: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

NOTE:

1. THIS PLAN IS FOR LOCATING SAMPLE LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.
2. WELL LOCATIONS HAVE NOT BEEN SURVEYED. ONCE THE LOCATIONS HAVE BEEN SURVEYED A NEW FIGURE WILL BE SUBMITTED WITH THE CORRECTED LOCATIONS.

LEGEND:

- RI-SB-01 — SOIL BORING NO. AND APPROX. LOCATION
- RI-MW-01 — MONITORING WELL NO. AND APPROX. LOCATION
- RI-SV-01 — SOIL VAPOR SAMPLE NO. AND APPROX. LOCATION
- RI-AA-01 — AMBIENT AIR SAMPLE NO. AND APPROX. LOCATION
- RI-SSSV-05 / RI-IA-05 — SUB-SLAB SOIL VAPOR / COLOCATED INDOOR AIR SAMPLE NO. AND APPROX. LOCATION
- BCP SITE BOUNDARY

SCALE: 1" = 40'

0 20 40 80 120 160 FEET

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rev	date	description	by

dwg by: KBV
chk by: AC
scale: AS NOTED
date: 3/4/2026

project:
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title:
REMEDIAL INVESTIGATION SAMPLE LOCATION PLAN

job no.: 12345
drawing no:
FIG-2.1
1 of 1

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 3/4/2026 1:40 PM, Kim Vanderkien, LAYOUT: FIG-4.1



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REFERENCE:

IMAGERY: NEW YORK STATE, MICROSOFT, VANTOR; BCP SITE BOUNDARY TAKEN FROM "GRADING AND UTILITIES PLAN", PREPARED BY INSITE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE, P.C., DATED 4/5/24.

LEGEND:

- HISTORIC COAL SINK
- HISTORIC COAL YARD
- HISTORIC AUTOMOBILE GARAGE
- EXISTING FEATURES
- SUSPECTED AND/OR KNOWN LOCATIONS OF HEATING OIL USTS
- OTHER ANOMALIES
- BCP BOUNDARY

SCALE: 1" = 100'

0 50 100 200 FEET

dwg by: KBV
chk by: MKC
scale: AS NOTED
date: 5/28/2026

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GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
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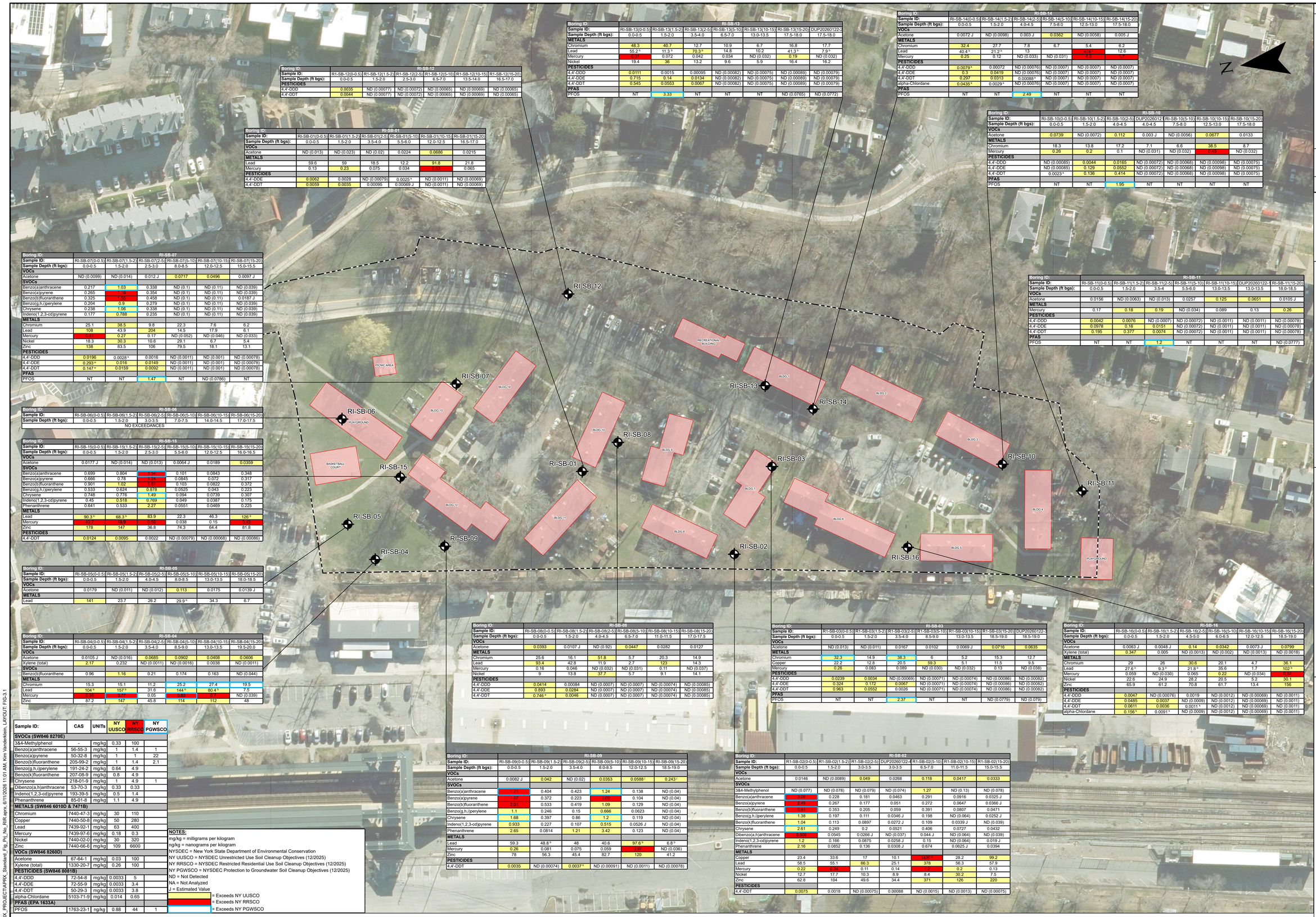
project: PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **AREA OF CONCERN LOCATION MAP**

job no.: 12345

drawing no: FIG 2.2

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 5/28/2026 11:09 AM, Kim Vanderklein, LAYOUT: EXHIBIT G-1



Boring ID:	RI-SB-12					
Sample ID:	RI-SB-12(0-0.5)	RI-SB-12(1.5-2)	RI-SB-12(2-5)	RI-SB-12(5-10)	RI-SB-12(10-15)	RI-SB-12(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	6.5-7.0	13.5-14.0	16.5-17.0
PESTICIDES						
4,4'-DDD	0.0035	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
4,4'-DDT	0.0044	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)

Boring ID:	RI-SB-13						
Sample ID:	RI-SB-13(0-0.5)	RI-SB-13(1.5-2)	RI-SB-13(2-5)	RI-SB-13(5-10)	RI-SB-13(10-15)	RI-SB-13(15-20)	DUP20260122-2
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	6.5-7.0	13.0-13.5	17.5-18.0	17.5-18.0
METALS							
Chromium	48.3	40.7	12.7	10.9	6.7	16.8	17.7
Lead	55.2 [a]	11.3 [a]	70.3 [a]	14.8	10.2	41.3 [a]	7.9 [a]
Mercury	0.61	0.072	0.042	0.034	ND (0.032)	0.19	ND (0.032)
Nickel	19.4	36	13.2	9.6	5.9	16.4	16.2
PESTICIDES							
4,4'-DDD	0.0111	0.0015	0.00095	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
4,4'-DDE	0.715	0.14	0.0134	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
4,4'-DDT	0.545	0.0553	0.0067	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
PFAS							
PFOS	NT	3.33	NT	NT	NT	ND (0.0765)	ND (0.0772)

Boring ID:	RI-SB-14					
Sample ID:	RI-SB-14(0-0.5)	RI-SB-14(1.5-2)	RI-SB-14(2-5)	RI-SB-14(5-10)	RI-SB-14(10-15)	RI-SB-14(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0
VOCs						
Acetone	0.0072 J	ND (0.0098)	0.003 J	0.0362	ND (0.0058)	0.005 J
METALS						
Chromium	32.4	27.7	7.8	6.7	5.4	6.2
Lead	40.4 [a]	21.2 [a]	13		478 [a]	12.6
Mercury	0.25	0.12	ND (0.033)	ND (0.031)	4.8 [a]	1.2
PESTICIDES						
4,4'-DDD	0.0079 [a]	0.00072	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
4,4'-DDE	0.3	0.0419	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
4,4'-DDT	0.297	0.0313	0.00088 [a]	ND (0.0007)	ND (0.0007)	ND (0.0007)
alpha-Chlordane	0.0435 [a]	0.0029 [a]	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
PFAS						
PFOS	NT	NT	2.49	NT	NT	NT

Boring ID:	RI-SB-10						
Sample ID:	RI-SB-10(0-0.5)	RI-SB-10(1.5-2)	RI-SB-10(2-5)	DUP20260122-1	RI-SB-10(5-10)	RI-SB-10(10-15)	RI-SB-10(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0
VOCs							
Acetone	0.0739	ND (0.0072)	0.112	0.003 J	ND (0.0056)	0.0677	0.0133
METALS							
Chromium	18.3	13.8	17.2	7.1	6.6	38.5	8.7
Mercury	0.29	0.2	0.1	ND (0.031)	ND (0.032)	1.45	ND (0.032)
PESTICIDES							
4,4'-DDD	ND (0.00085)	0.0044	0.0165	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
4,4'-DDE	ND (0.00085)	0.129	0.0552	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
4,4'-DDT	0.0023 [a]	0.136	0.414	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
PFAS							
PFOS	NT	NT	1.95	NT	NT	NT	NT

Boring ID:	RI-SB-11						
Sample ID:	RI-SB-11(0-0.5)	RI-SB-11(1.5-2)	RI-SB-11(2-5)	RI-SB-11(5-10)	RI-SB-11(10-15)	DUP20260122-3	RI-SB-11(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4	5.5-6.0	13.0-13.5	13.0-13.5	18.0-18.5
VOCs							
Acetone	0.0156	ND (0.0063)	ND (0.013)	0.0257	0.125	0.0651	0.0105 J
METALS							
Mercury	0.17	0.18	0.19	ND (0.034)	0.089	0.13	0.26
PESTICIDES							
4,4'-DDD	0.0042	0.0076	ND (0.0007)	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
4,4'-DDE	0.0978	0.16	0.0151	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
4,4'-DDT	0.195	0.377	0.0074	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
PFAS							
PFOS	NT	NT	1.2	NT	NT	NT	ND (0.0777)

Boring ID:	RI-SB-07						
Sample ID:	RI-SB-07(0-0.5)	RI-SB-07(1.5-2)	RI-SB-07(2-5)	RI-SB-07(5-10)	RI-SB-07(10-15)	RI-SB-07(15-20)	
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	8.0-8.5	12.0-12.5	15.0-15.5	
VOCs							
Acetone	ND (0.0099)	ND (0.014)	0.012 J	0.0717	0.0496	0.0097 J	
SVOCs							
Benzo(a)anthracene	0.217	1.03	0.338	ND (0.1)	ND (0.11)	ND (0.039)	
Benzo(a)pyrene	0.265	1.03	0.354	ND (0.1)	ND (0.11)	ND (0.039)	
Benzo(b)fluoranthene	0.325	1.55	0.458	ND (0.1)	ND (0.11)	0.0187 J	
Benzo(g,h,i)perylene	0.204	0.9	0.279	ND (0.1)	ND (0.11)	ND (0.039)	
Chrysene	0.238	1.06	0.338	ND (0.1)	ND (0.11)	ND (0.039)	
Indeno(1,2,3-cd)pyrene	0.177	0.788	0.235	ND (0.1)	ND (0.11)	ND (0.039)	
METALS							
Chromium	25.1	38.5	9.8	22.3	7.8	6.2	
Lead	108	43.9	204	14.5	17.9	6.1	
Mercury	0.43	0.27	0.17	ND (0.052)	ND (0.046)	ND (0.033)	
Nickel	18.3	30.3	10.6	29.1	6.7	5.4	
Zinc	138	83.5	106	79.5	18.1	13.1	
PESTICIDES							
4,4'-DDD	0.0196	0.0028 [a]	0.0016	ND (0.0011)	ND (0.001)	ND (0.00078)	
4,4'-DDE	0.293 [a]	0.016	0.0149	ND (0.0011)	ND (0.001)	ND (0.00078)	
4,4'-DDT	0.147 [a]	0.0159	0.0092	ND (0.0011)	ND (0.001)	ND (0.00078)	
PFAS							
PFOS	NT	NT	1.47	NT	ND (0.0786)	NT	

Boring ID:	RI-SB-06					
Sample ID:	RI-SB-06(0-0.5)	RI-SB-06(1.5-2)	RI-SB-06(2-5)	RI-SB-06(5-10)	RI-SB-06(10-15)	RI-SB-06(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.0-3.5	7.0-7.5	14.0-14.5	17.0-17.5
	NO EXCEEDANCES					

Boring ID:	RI-SB-15					
Sample ID:	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)	RI-SB-15(2-5)	RI-SB-15(5-10)	RI-SB-15(10-15)	RI-SB-15(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	5.5-6.0	12.0-12.5	16.0-16.5
VOCs						
Acetone	0.0177 J	ND (0.014)	ND (0.013)	0.0064 J	0.0189	0.0359
SVOCs						
Benzo(a)anthracene	0.699	0.804	1.54	0.101	0.0843	0.348
Benzo(a)pyrene	0.666	0.78	1.24	0.0845	0.072	0.317
Benzo(b)fluoranthene	0.901	1.02	1.33	0.103	0.0822	0.372
Benzo(g,h,i)perylene	0.533	0.624	0.878	0.0525	0.043	0.223
Chrysene	0.748	0.776	1.49	0.094	0.0739	0.307
Indeno(1,2,3-cd)pyrene	0.45	0.518	0.769	0.049	0.0387	0.175
Phenanthrene	0.641	0.533	2.27	0.0551	0.0489	0.225
METALS						
Lead	90.3 [b]	68.3 [b]	83.9	22.3	46.3	126 [b]
Mercury	42.7	48.9	1.39	0.038	0.15	1.45
Zinc	178	147	36.8	74.3	64.4	81.8
PESTICIDES						
4,4'-DDT	0.0124	0.0095	0.0022	ND (0.00079)	ND (0.00068)	ND (0.00086)

Boring ID:	RI-SB-05					
Sample ID:	RI-SB-05(0-0.5)	RI-SB-05(1.5-2)	RI-SB-05(2-5)	RI-SB-05(5-10)	RI-SB-05(10-15)	RI-SB-05(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	8.0-8.5	13.0-13.5	18.0-18.5
VOCs						
Acetone	0.0179	ND (0.011)	ND (0.012)	0.113	0.0175	0.0139 J
METALS						
Lead	141	23.7	26.2	29.9 [b]	34.3	6.7

Boring ID:	RI-SB-04					
Sample ID:	RI-SB-04(0-0.5)	RI-SB-04(1.5-2)	RI-SB-04(2-5)	RI-SB-04(5-10)	RI-SB-04(10-15)	RI-SB-04(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	19.5-20.0
VOCs						
Acetone	0.0105 J	ND (0.016)	0.0685	0.0902	0.0408	0.0606
Xylene (total)	2.17	0.232	ND (0.0011)	ND (0.0016)	0.0038	ND (0.0011)
SVOCs						
Benzo(b)fluoranthene	0.96	1.16	0.21	0.174	0.163	ND (0.044)
METALS						
Chromium	15.3	15.1	11.2	25.2	27.4	19.5
Lead	104 [b]	157 [b]	31.6	144 [b]	80.4 [b]	7.5
Mercury	0.36	0.77	0.05	0.83	0.1	ND (0.039)
Zinc	87.2	147	45.8	114	112	48

Boring ID:	RI-SB-08					
Sample ID:	RI-SB-08(0-0.5)	RI-SB-08(1.5-2)	RI-SB-08(2-5)	RI-SB-08(5-10)	RI-SB-08(10-15)	RI-SB-08(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	6.5-7.0	11.0-11.5	17.0-17.5
VOCs						
Acetone	0.0393	0.0107 J	ND (0.92)	0.0447	0.0282	0.0127
METALS						
Chromium	25.6	16.1	51.8	5.7	20.3	14.9
Lead	93.4	42.8	11.9	2.7	123	14.3
Mercury	0.16	0.046	ND (0.032)	ND (0.031)	0.11	ND (0.037)
Nickel	9	13.8	37.7	5.7	9.1	14.1
PESTICIDES						
4,4'-DDD	0.0414	0.00084	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)
4,4'-DDE	0.893	0.0284	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)
4,4'-DDT	0.746 [a]	0.0046	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)

Boring ID:	RI-SB-03						
Sample ID:	RI-SB-03(0-0.5)	RI-SB-03(1.5-2)	RI-SB-03(2-5)	RI-SB-03(5-10)	RI-SB-03(10-15)	RI-SB-03(15-20)	DUP20260122-5
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	18.5-19.0	18.5-19.0
VOCs							
Acetone	ND (0.013)	ND (0.011)	0.0167	0.0102	0.0069 J	0.0716	0.0635
METALS							
Chromium	32.3	14.9	38.3	6	5.2	15.3	12.7
Copper	22.2	12.8	20.5	59.3	5.1	11.5	9.5
Mercury	0.26	0.083	0.089	ND (0.030)	ND (0.032)	0.13	ND (0.038)
PESTICIDES							
4,4'-DDD	0.0239	0.0034	ND (0.00069)	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDE	0.324	0.172	0.0067	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDT	0.963	0.0552	0.0026	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
PFAS							
PFOS	NT	NT	2.37	NT	NT	ND (0.0779)	ND (0.079)

Boring ID:	RI-SB-16						
Sample ID:	RI-SB-16(0-0.5)	RI-SB-16(1.5-2)	RI-SB-16(2-5)	RI-SB-16(5-10)	RI-SB-16(10-15)	RI-SB-16(15-20)	
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.5-5.0	6.0-6.5	12.0-12.5	18.5-19.0	
VOCs							
Acetone	0.0063 J	0.0048 J	0.14	0.0342	0.0073 J	0.0799	
Xylene (total)	0.347	0.005	ND (0.0013)	ND (0.002)	ND (0.0013)	ND (0.0018)	
METALS							
Chromium	29	26	30.6	20.1	4.7	36.1	
Lead	27.6 [b]	9.3 [b]	21.8 [b]	35.6	1.7	102 [b]	
Mercury	0.059	ND (0.030)	0.065	0.22	ND (0.034)	0.84	
Nickel	22.6	24.9	28.2	20.5	5.2	30.1	
Zinc	65.9	61.2	70.8	61.7	13.4	156	
PESTICIDES							
4,4'-DDD	0.0047	ND (0.00076)	0.0019	ND (0.0012)	ND (0.00069)	ND (0.0011)	
4,4'-DDE	0.0485	0.0037	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)	
4,4'-DDT	0.0611	0.0036	0.0011 [a]	ND (0.0012)	ND (0.00069)	ND (0.0011)	
alpha-Chlordane	0.156 [a]	0.0091 [a]	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)	

Boring ID:	RI-SB-09					
Sample ID:	RI-SB-09(0-0.5)	RI-SB-09(1.5-2)	RI-SB-09(2-5)	RI-SB-09(5-10)	RI-SB-09(10-15)	RI-SB-09(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.0-8.5	12.0-12.5	18.5-19.0
VOCs						
Acetone	0.0082 J	0.042	ND (0.02)	0.0353	0.0588 [j]	0.243 [j]
SVOCs						
Benzo(a)anthracene	1.71	0.404	0.423	1.24	0.138	ND (0.04)
Benzo(a)pyrene	1.57	0.372	0.223	1.09	0.104	ND (0.04)
Benzo(b)fluoranthene	2.01	0.533	0.419	1.09	0.129	ND (0.04)
Benzo(g,h,i)perylene	1.1	0.246	0.15	0.666	0.0623	ND (0.04)
Chrysene	1.68	0.397	0.86	1.2	0.119	ND (0.04)
Indeno(1,2,3-cd)pyrene	0.933	0.227	0.107	0.515	0.0526 J	ND (0.04)
Phenanthrene	2.65	0.0814	1.21	3.42	0.123	ND (0.04)
METALS						
Lead	59.3	48.8 [b]	48	40.6	97.6 [b]	6.8 [b]
Mercury	0.26	0.081	0.075	0.059	0.97	ND (0.036)
Zinc	78	56.3	45.4	82.7	120	41.2
PESTICIDES						
4,4'-DDT	0.0035	ND (0.00074)	0.0037 [k]	ND (0.00091)	ND (0.0011)	ND (0.00078)

Boring ID:	RI-SB-02						
Sample ID:	RI-SB-02(0-0.5)	RI-SB-02(1.5-2)	RI-SB-02(2-5)	DUP20260122-4	RI-SB-02(5-10)	RI-SB-02(10-15)	RI-SB-02(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.0-3.5	3.0-3.5	6.5-7.0	11.0-11.5	15.0-15.5
VOCs							
Acetone	0.0146	ND (0.0089)	0.049	0.0268	0.118	0.0417	0.0333
SVOCs							
3&4-Methylphenol	ND (0.077)	ND (0.078)	ND (0.079)	ND (0.074)	1.27	ND (0.13)	ND (0.078)
Benzo(a)anthracene	3.08	0.228	0.181	0.0463	0.291	0.0916	0.0325 J
Benzo(a)pyrene	2.49	0.267	0.177	0.051	0.272	0.0647	0.0366 J
Benzo(b)fluoranthene	2.91	0.353	0.205	0.059	0.391	0.0807	0.0471
Benzo(g,h,i)perylene	1.38	0.197	0.111	0.0346 J	0.198	ND (0.064)	0.0252 J
Benzo(k)fluoranthene	1.04	0.113	0.0897	0.0272 J	0.109	0.0339 J	ND (0.039)
Chrysene	2.61	0.249	0.2	0.0521	0.406	0.0727	0.0432
Dibenzo(a,h)anthracene	0.506	0.0545	0.0266 J	ND (0.037)	0.044 J	ND (0.064)	ND (0.039)
Indeno(1,2,3-cd)pyrene	1.2	0.166	0.0875	0.0258 J	0.15	ND (0.064)	0.019 J
Phenanthrene	2.16	0.0852	0.136	0.0308 J	0.674	0.0625 J	0.0394
METALS							
Copper	23.4	33.6	17	10.1	1420	28.2	99.2
Lead	58.5	55.1	66.3	25.1	378	56.3	57.9
Mercury	0.22	0.24	0.11	0.14	1.8	0.2	0.13
Nickel	12.7	17.7	10.3	8.9	8.4	30.2	7.5
Zinc	62.8	104	49.6	34.4	371	126	220
PESTICIDES							
4,4'-DDT	0.0075	0.0018	ND (0.00075)	0.00088	ND (0.0015)	ND (0.0013)	ND (0.00075)

Sample ID:	CAS	UNITs	NY UUSCO	NY RRSCO	NY PGWSCO
SVOCs (SW846 8270E)					
3&4-Methylphenol	-	mg/kg	0.33	100	
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9	
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9	
Chrysene	218-01-9	mg/kg	1	4.9	1
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33	
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4	
Phenanthrene	85-01-8	mg/kg	1.1	4.9	
METALS (SW846 6010D & 7471B)					
Chromium	7440-47-3	mg/kg	30	110	
Copper	7440-50-8	mg/kg	50	280	
Lead	7439-92-1	mg/kg	63	400	
Mercury	7439-97-6	mg/kg	0.18	0.3	
Nickel	7440-02-0	mg/kg	30	320	
Zinc	7440-66-6	mg/kg	109	6600	
VOCs (SW846 8260D)					
Acetone	67-64-1	mg/kg	0.03	100	
Xylene (total)	1330-20-7	mg/kg	0.26	100	
PESTICIDES (SW846 8081B)					
4,4'-DDD	72-54-8	mg/kg	0.0033	5	
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4	
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8	
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65	
PFAS (EPA 1633A)					
PFOS	1763-23-1	ng/kg	0.88	44	1

NOTES:
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY UUSCO = NYSDEC Unrestricted Use Soil Cleanup Objectives (12/2025)
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (12/2025)
ND = Not Detected
NA = Not Analyzed
J = Estimated Value

= Exceeds NY UUSCO
= Exceeds NY RRSCO
= Exceeds NY PGWSCO

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NOTE:
THIS PLAN IS FOR LOCATING PROPOSED SOIL BORING LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
PARCELS: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE. NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

LEGEND:
SOIL BORING NO. AND APPROX. LOCATION
EXISTING BUILDINGS
BCP BOUNDARY

SCALE: 1" = 40'
0 20 40 80 120 160 FEET

by	description	date	rev

dwg by: KBV
chk by: AC
scale: AS NOTED
date: 6/11/2026

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

project:
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title:
SOIL SAMPLING EXCEEDANCES

job no.: 12345
drawing no:
FIG-2.3

Y:\GIS\Project_Numbers\12345\APRX_PROJECT\APRX_Standard_Fig_Pg_No_RIR.aprx, 6/11/2026 11:01 AM, Kim Vanderklein, LAYOUT: FIG-3.1

Well ID:	RI-MW-02			
Sample ID:	R1-MW-02	MW-2	MW-2	MW-2
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/28/2026	2/26/2026	4/14/2026	4/14/2026
METALS				
Iron	3060	1990	2830	ND (100)
Magnesium	49600	49500	49900	50600
Sodium	133000	132000	128000	131000
PFAS				
PFOA	30.8	29.9	NT	NT
PFOS	6.64	6.92	NT	NT

Well ID:	RI-MW-03			
Sample ID:	R1-MW-03	MW-3	MW-3	MW-3
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/28/2026	2/25/2026	4/14/2026	4/14/2026
METALS				
Iron	2230	3570	688	ND (100)
Magnesium	40400	41800	45800	45500
Manganese	452	238	237	205
Sodium	70800	73800	64300	65800
PFAS				
PFOA	20.9	22.4	NT	NT

Well ID:	RI-MW-01						
Sample ID:	R1-MW-01	MW-1	DUP20260225	MW-1	MW-1	DUP20260415	DUP20260415
Matrix:	GW	GW	GW	GW	GW-F	GW	GW-F
Sample Date:	1/27/2026	2/25/2026	2/25/2026	4/15/2026	4/15/2026	4/15/2026	4/15/2026
METALS							
Chromium	ND (10)	ND (10)	100	ND (10)	ND (10)	ND (10)	ND (10)
Iron	1670	876	53300	338	ND (100)	914	ND (100)
Lead	ND (3.0)	ND (3.0)	102 [1]	5	ND (3.0)	6	4
Magnesium	35500	39400	57200	51900	51100	50900	49100
Manganese	586	663	864	154	152	239	206
Sodium	157000	159000	143000	166000	166000	170000	164000
PFAS							
PFOA	45.2	37.8	34.6	NT	NT	NT	NT
PFOS	5.35	7.31	6.76	NT	NT	NT	NT

Well ID:	RI-MW-04				
Sample ID:	RI-MW-04	DUP20260129	MW-4	MW-4	MW-4
Matrix:	GW	GW	GW	GW	GW-F
Sample Date:	1/29/2026	1/29/2026	2/25/2026	4/15/2026	4/15/2026
SVOCs					
Benzo(a)anthracene	ND (1.0)	0.72 J	ND (1.0)	ND (1.0)	NT
Benzo(a)pyrene	ND (1.0)	0.56 J	ND (1.0)	ND (1.0)	NT
Benzo(b)fluoranthene	ND (1.0)	0.85 J	ND (1.0)	ND (1.0)	NT
Chrysene	ND (1.0)	0.62 J	ND (1.0)	ND (1.0)	NT
METALS					
Iron	3760	3270	5440	9530	ND (100)
Lead	9.7	6.4	12.5	25.9	ND (3.0)
Magnesium	38100	35100	34400	33600	32200
Manganese	300	354	354	410	324
Mercury	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Nickel	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	93000	100000	104000	110000	112000
PFAS					
PFOA	7.26	7.12	10.7 J	NT	NT

Well ID:	RI-MW-05			
Sample ID:	R1-MW-05	MW-5	MW-5	MW-5
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/28/2026	2/26/2026	4/14/2026	4/14/2026
SVOCs				
Benzo(a)anthracene	ND (1.0)	0.25 J	0.45 J	NT
Benzo(a)pyrene	ND (1.0)	ND (1.0)	0.32 J	NT
Benzo(b)fluoranthene	ND (1.0)	0.26 J	0.43 J	NT
Chrysene	ND (1.0)	ND (1.0)	0.27 J	NT
Indeno(1,2,3-cd)pyrene	ND (1.0)	0.35 J	ND (1.0)	NT
VOCs				
Chloroform	9.4	ND (1.0)	ND (1.0)	NT
METALS				
Antimony	ND (6.0)	32.2	11.2	7.6
Arsenic	6	112	15.5	ND (3.0)
Barium	ND (200)	1600	ND (200)	ND (200)
Beryllium	1.1	4.5	ND (1.0)	ND (1.0)
Chromium	20.6	1190	102	ND (10)
Copper	23.1	450	76	ND (10)
Iron	14400	414000	41400	1870
Lead	116	2850	611	9.3
Magnesium	22400	56900	48800	48300
Manganese	794	10100	1850	1600
Mercury	0.28	79.2	ND (0.20)	ND (0.20)
Nickel	ND (10)	153	24.2	ND (10)
Sodium	103000	239000	185000	194000
PFAS				
PFOA	ND (8.47)	11.5 J	NT	NT
PFOS	ND (8.47)	10.9 J	NT	NT

Well ID:	RI-MW-08			
Sample ID:	RI-MW-08	MW-8	MW-8	MW-8
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/29/2026	2/26/2026	4/15/2026	4/15/2026
METALS				
Iron	19900	12700	17100	343
Magnesium	46900	26000	24300	23600
Manganese	1960	775	700	593
Sodium	118000	125000	116000	114000
PFAS				
PFOA	9.83 J	24.3	NT	NT

Well ID:	RI-MW-06			
Sample ID:	RI-MW-06	MW-6	MW-6	MW-6
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/29/2026	2/25/2026	4/15/2026	4/15/2026
SVOCs				
Naphthalene	117	150	132	NT
Naphthalene (TIC)	150 JN	320 JN	130 JN	NT
METALS				
Arsenic	25.9	ND (3.0)	3.8	ND (3.0)
Beryllium	3.1	ND (1.0)	ND (1.0)	ND (1.0)
Chromium	264	ND (10)	28.5	ND (10)
Iron	137000	14800	21200	161
Lead	126	ND (3.0)	21.2	3.6
Magnesium	73800	57600	48300	46100
Manganese	3520	2250	1870	1600
Nickel	120	ND (10)	11.8	ND (10)
Sodium	148000	165000	175000	170000
PFAS				
PFOS	ND (8.33)	12.1	NT	NT

Well ID:	RI-MW-07			
Sample ID:	RI-MW-07	MW-7	MW-7	MW-7
Matrix:	GW	GW	GW	GW-F
Sample Date:	1/29/2026	2/26/2026	4/15/2026	4/15/2026
PESTICIDES				
Dieldrin	0.03	0.018	0.025	NT
METALS				
Iron	3550	577	1250	ND (100)
Sodium	155000	172000	166000	168000
PFAS				
PFOA	28	26.9	NT	NT
PFOS	6.23	5.59	NT	NT

Monitoring Well ID:			
Sample ID:	**CAS**	**UNITS**	**NYSDEC AWQS**
Matrix:			
Sample Date:			
SVOCs			
Benzo(a)anthracene	56-55-3	ug/l	0.002
Benzo(a)pyrene	50-32-8	ug/l	ND
Benzo(b)fluoranthene	205-99-2	ug/l	0.002
Chrysene	218-01-9	ug/l	0.002
Indeno(1,2,3-cd)pyrene	193-39-5	ug/l	0.002
Naphthalene	91-20-3	ug/l	10
Naphthalene (TIC)	91-20-3	ug/l	10
VOCs			
Chloroform	67-66-3	ug/l	7
PESTICIDES			
Dieldrin	60-57-1	ug/l	0.004
METALS			
Antimony	7440-36-0	ug/l	3
Arsenic	7440-38-2	ug/l	25
Barium	7440-39-3	ug/l	1000
Beryllium	7440-41-7	ug/l	3
Chromium	7440-47-3	ug/l	50
Copper	7440-50-8	ug/l	200
Iron	7439-89-6	ug/l	300
Lead	7439-92-1	ug/l	25
Magnesium	7439-95-4	ug/l	35000
Manganese	7439-96-5	ug/l	300
Mercury	7439-97-6	ug/l	0.7
Nickel	7440-02-0	ug/l	100
Sodium	7440-23-5	ug/l	20000
PFAS			
PFOA	335-67-1	ng/l	6.7
PFOS	1763-23-1	ng/l	2.7

Notes:
ug/L = micrograms per liter
ng/L = nanograms per liter
GW-F = Filtered Groundwater Sample
ND = Not Detected
NT = Not Tested
J = Estimated Value
NYSDEC = New York State Department of Environmental Concervation
TOGS = Technical and Operational Guidance Series
AWQS = NY TOGS Class GA GW Standards (6/2004) and Std. Guidance Values (2/2023)
= Exceeds NYSDEC AWQS

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REFERENCE:
PARCELS: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES.
IMAGERY: NEW YORK STATE, MICROSOFT, VANTOR.

NOTE:
1. THIS PLAN IS FOR LOCATING MONITORING WELLS LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.
2. WELL LOCATIONS HAVE NOT BEEN SURVEYED. ONCE THE LOCATIONS HAVE BEEN SURVEYED A NEW FIGURE WILL BE SUBMITTED WITH THE CORRECTED LOCATIONS.

LEGEND:
RI-MW-01 — MONITORING WELL NO. AND APPROX. LOCATION
EXISTING BUILDINGS
BCP BOUNDARY

SCALE: 1" = 40'
0 20 40 80 120 160 FEET

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 6/5/2026 2:27 PM, Kim Vanderklein, LAYOUT: FIG-5.2

rev	date	description	by

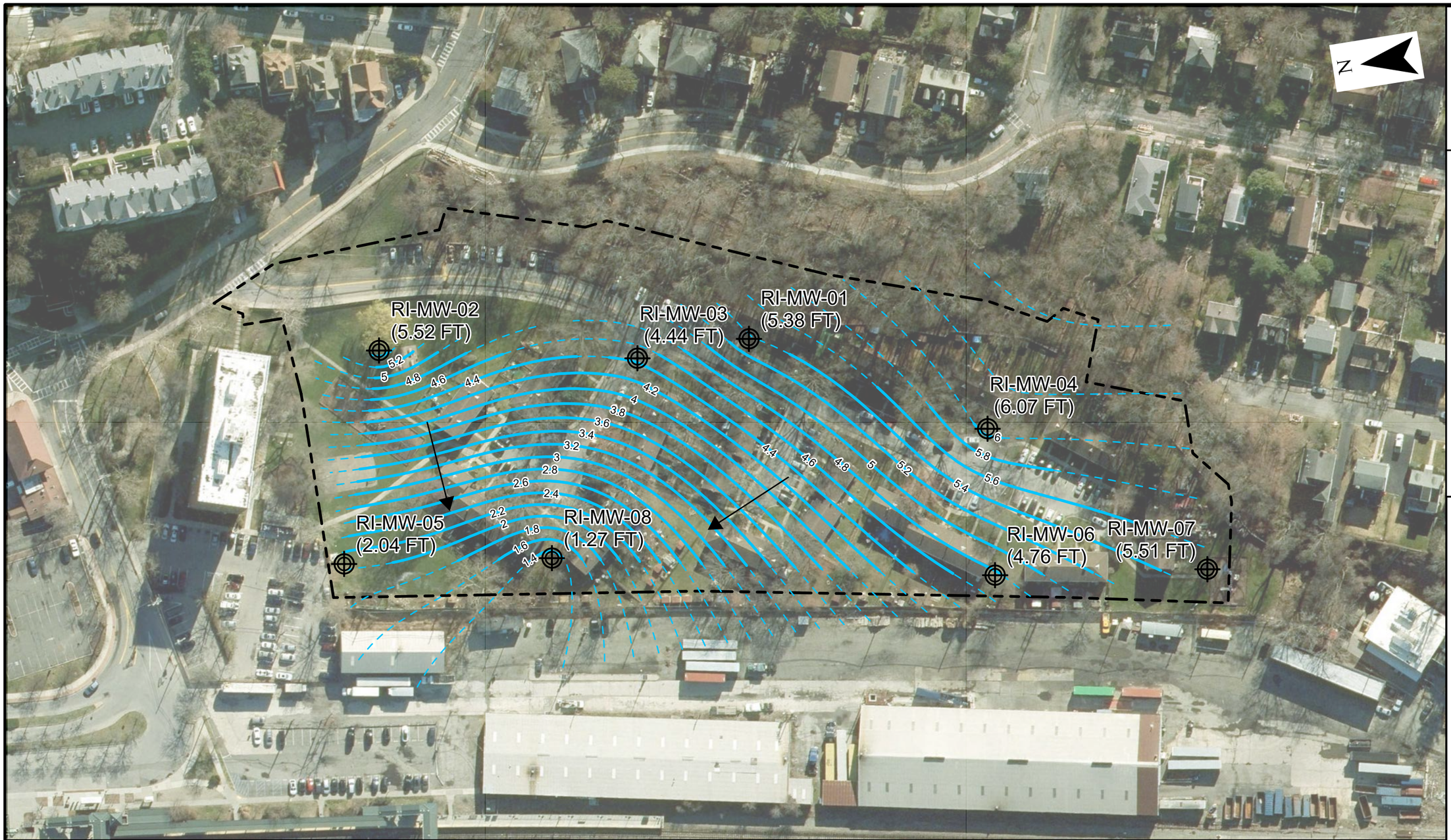
dwg by: KBV
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959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: GROUNDWATER SAMPLE RESULTS PLAN

job no.: 12345
drawing no: FIG-2.4
5.2 of 8



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LEGEND:

- RI-MW-01 — RI MONITORING WELL NO. AND APPROX. LOCATION
- INTERPOLATED GROUNDWATER CONTOURS
- INFERRED GROUNDWATER CONTOURS
- SITE BOUNDARY
- (5.38 FT) - GROUNDWATER ELEVATION (AMSL)

SCALE: 1" = 100'

0 50 100 200 FEET

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date: 5/28/2026

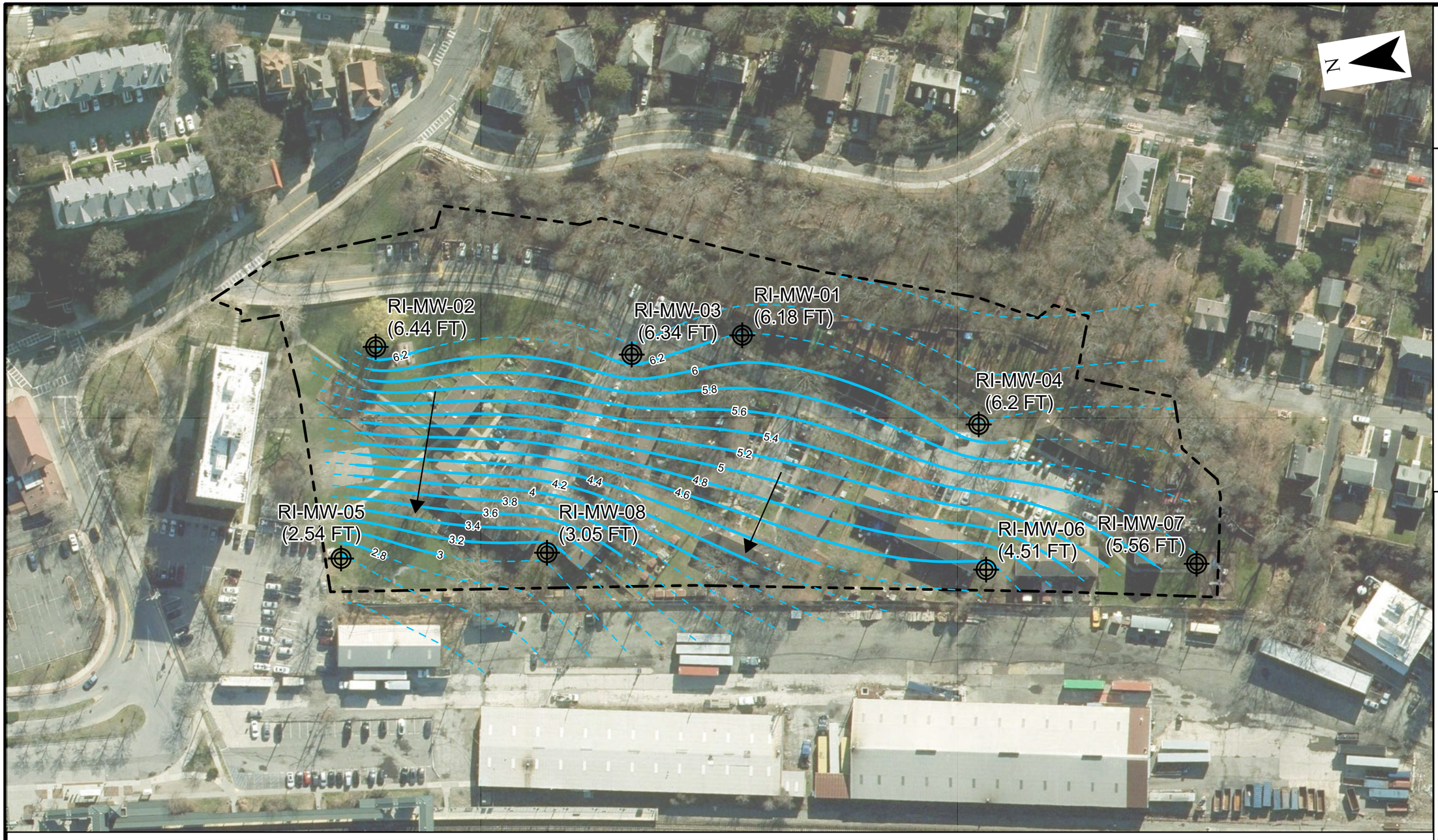
project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **GROUNDWATER CONTOUR MAP - JANUARY 2026**

job no.: 12345
drawing no:

FIG 2.5A

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LEGEND:

- RI-MW-01 — RI MONITORING WELL NO. AND APPROX. LOCATION
- INTERPOLATED GROUNDWATER CONTOURS
- INFERRED GROUNDWATER CONTOURS
- BCP BOUNDARY
- (6.18 FT) - GROUNDWATER ELEVATION (AMSL)

SCALE: 1" = 100'

0 50 100 200 FEET

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chk by: MKC
scale: AS NOTED
date: 5/28/2026

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project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **GROUNDWATER CONTOUR MAP - FEBRUARY 2026**

job no.: 12345
drawing no:

FIG 2.5B

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LEGEND:

- RI-MW-01 ⊕ RI MONITORING WELL NO. AND APPROX. LOCATION
- INTERPOLATED GROUNDWATER CONTOURS
- INFERRED GROUNDWATER CONTOURS
- BCP BOUNDARY
- (5.98 FT) - GROUNDWATER ELEVATION (AMSL)

SCALE: 1" = 100'

0 50 100 200 FEET

dwg by: KBV
chk by: MKC
scale: AS NOTED
date: 5/28/2026

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project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **GROUNDWATER CONTOUR MAP - APRIL 2026**

job no.: 12345
drawing no:

FIG 2.5C

Y:\GIS\Project_Numbers\12345\FINAL_MAPS, 5/28/2026 10:30 AM, Kim Vanderklein, LAYOUT: EXHIBIT A-2

Sample ID:	RI-SV-04
Matrix:	Soil Vapor
Sample Date:	2/11/2026
VOCs (TO-15)	
Acetone (2-Propanone)	21
Benzene	4.5 J
Carbon disulfide	6.2
Chloroform	10
Ethanol	36
Ethyl Acetate	25
Ethylbenzene	**1890**
Heptane	9.4
Hexane	58.5
m,p-Xylene	**4820**
o-Xylene	**1160**
Tertiary Butyl Alcohol	4.2 J
Tetrahydrofuran	87.9
Toluene	20
Xylenes (total)	5990

Sample ID:	RI-SV-01
Matrix:	Soil Vapor
Sample Date:	2/11/2026
VOCs (TO-15)	
2,2,4-Trimethylpentane	3.5
Acetone (2-Propanone)	29.5
Benzene	12
Carbon disulfide	17
Chloromethane	1.4
Cyclohexane	5.9
Dichlorodifluoromethane	1.9
Ethanol	50.3
Ethylbenzene	**79.5**
Heptane	12
Hexane	87.4
Isopropyl Alcohol	2.3
m,p-Xylene	259
Methyl ethyl ketone	5.9
Methyl Isobutyl Ketone	0.70 J
Methylene chloride	0.73
o-Xylene	72.1
Tertiary Butyl Alcohol	4.2
Tetrachloroethylene	1.6
Tetrahydrofuran	90.2
Toluene	65.9
Trichlorofluoromethane	0.70
Xylenes (total)	331

Sample ID:	RI-SSSV-B10	RI-IA-B10
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	1.4	ND (0.79)
Acetone (2-Propanone)	15	13
Benzene	0.67	0.73
Chloromethane	0.74	1.1
Dichlorodifluoromethane	2	2.6
Ethanol	349 E	447 E
Ethyl Acetate	30	35
Ethylbenzene	0.78 J	ND (0.69)
Heptane	0.41 J	ND (0.66)
Hexane	1.5	0.92
Isopropyl Alcohol	10	22
m,p-Xylene	2.6	ND (0.69)
Methyl ethyl ketone	0.50 J	0.97
Methylene chloride	1.7	0.94
o-Xylene	0.87	ND (0.69)
Toluene	3	1.7
trans-1,2-Dichloroethylene	0.79	ND (0.63)
Trichlorofluoromethane	1.3	1.3
Vinyl Acetate	ND (0.70)	0.56
Xylenes (total)	3.5	ND (0.69)

Sample ID:	RI-AA-2
Matrix:	Ambient Air
Sample Date:	2/11/2026
VOCs (TO-15)	
Acetone (2-Propanone)	2.9
Benzene	0.45 J
Chloromethane	1.1
Dichlorodifluoromethane	2.1
Ethanol	2.4
Ethyl Acetate	0.83
Hexane	0.78
Isopropyl Alcohol	0.57
Methyl ethyl ketone	0.53
Methylene chloride	0.83
Toluene	0.33 J
Trichlorofluoromethane	0.9

Sample ID:	RI-AA-01
Matrix:	Ambient Air
Sample Date:	1/30/2026
VOCs (TO-15)	
Acetone (2-Propanone)	5.7
Benzene	0.61 J
Chloromethane	1.2
Dichlorodifluoromethane	2.2
Ethanol	2.3
Ethyl Acetate	37.1
Hexane	0.78
Isopropyl Alcohol	0.52
Methylene chloride	1.3
Toluene	0.53 J
Trichlorofluoromethane	1.2

Sample ID:	RI-SSSV-B9	RI-IA-B9
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	4.9	ND (0.79)
1,2-Dichloroethane	0.49 J	0.69
1,3,5-Trimethylbenzene	1.2	ND (0.79)
4-Ethyltoluene	1.3	ND (0.79)
Acetone (2-Propanone)	18	14
Benzene	7.7	0.58
Chloroform	0.78 J	0.93
Chloromethane	0.99	1.1
Dichlorodifluoromethane	2.5	2.5
Ethanol	58.2	89.5 E
Ethyl Acetate	33	17
Ethylbenzene	1.8	ND (0.69)
Heptane	0.66 J	ND (0.66)
Hexane	1.3	0.92
Isopropyl Alcohol	8.4	5.7
m,p-Xylene	7.4	ND (0.69)
Methyl ethyl ketone	0.59	0.65
Methylene chloride	2	1.7
o-Xylene	2.7	ND (0.69)
Tetrachloroethylene	1.8	1.7
Toluene	3.8	0.53 J
trans-1,2-Dichloroethylene	0.87	ND (0.63)
Trichlorofluoromethane	1.4	1.2
Vinyl Acetate	0.67 J	1.2
Xylenes (total)	10	ND (0.69)

Sample ID:	RI-SSSV-B7	RI-IA-B7
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	6.4	ND (0.79)
1,3,5-Trimethylbenzene	1.4	ND (0.79)
4-Ethyltoluene	1.3	ND (0.79)
Acetone (2-Propanone)	11	3.6
Benzene	0.64	0.48 J
Chloromethane	0.6	1.1
Dichlorodifluoromethane	2.3	2.6
Ethanol	1.8	2.4
Ethyl Acetate	16	26
Ethylbenzene	2.4	ND (0.69)
Heptane	0.66 J	ND (0.66)
Hexane	1.8	0.99
Isopropyl Alcohol	1.1	0.39
m,p-Xylene	10	ND (0.69)
Methyl ethyl ketone	ND (0.59)	0.53
Methylene chloride	1.9	1.1
o-Xylene	3.6	ND (0.69)
Toluene	4.9	0.38 J
trans-1,2-Dichloroethylene	1.1	ND (0.63)
Trichlorofluoromethane	1.3	1.4
Xylenes (total)	14	ND (0.69)

Sample ID:	RI-SV-02
Matrix:	Soil Vapor
Sample Date:	1/22/2026
VOCs (TO-15)	
1,2,4-Trimethylbenzene	1.3
1,3,5-Trimethylbenzene	0.59 J
1,3-Butadiene	7.3
2,2,4-Trimethylpentane	0.61 J
2-Hexanone	2.2
4-Ethyltoluene	0.59 J
Acetone (2-Propanone)	28.3
Benzene	4.2
Carbon disulfide	5.6
Chloroform	0.46 J
Chloromethane	0.6
Cyclohexane	0.48 J
Dichlorodifluoromethane	2.3
Ethanol	5.1
Ethyl Acetate	8.6
Ethylbenzene	1.3
Heptane	1.7
Hexane	2.7
Isopropyl Alcohol	0.71
m,p-Xylene	3.5
Methyl ethyl ketone	18
Methyl Isobutyl Ketone	0.94
Methylene chloride	1.2
o-Xylene	1.8
Propylene	51.7
Tertiary Butyl Alcohol	0.67
Tetrachloroethylene	5.9
Toluene	4.9
Trichlorofluoromethane	1.2
Xylenes (total)	5.3

Sample ID:	RI-SV-06
Matrix:	Soil Vapor
Sample Date:	1/22/2026
VOCs (TO-15)	
2-Hexanone	0.86
Acetone (2-Propanone)	14
Benzene	1.8
Carbon disulfide	2.1
Chloroform	0.73 J
Chloromethane	0.62
Dichlorodifluoromethane	2
Ethanol	1.6
Ethyl Acetate	13
Heptane	0.9
Hexane	1.7
Isopropyl Alcohol	0.69
Methyl ethyl ketone	6.5
Methyl Isobutyl Ketone	0.57 J
Methylene chloride	1.1
Propylene	38.1
Tertiary Butyl Alcohol	0.91
Tetrachloroethylene	0.75
Toluene	2.3
Trichlorofluoromethane	1

Sample ID:	RI-SSSV-B13	RI-IA-B13
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	1.4	ND (0.79)
2,2,4-Trimethylpentane	0.51 J	ND (0.75)
Acetone (2-Propanone)	39.9	19
Benzene	87.5	0.86
Chloromethane	1.4	1.4
Dichlorodifluoromethane	2.2	2.5
Ethanol	78	75.2
Ethyl Acetate	41.4	64.1
Ethylbenzene	1.3	ND (0.69)
Heptane	0.82	0.37 J
Hexane	1.9	1.2
Isopropyl Alcohol	2.3	0.98
m,p-Xylene	4	ND (0.69)
Methyl ethyl ketone	1.5	0.44 J
Methylene chloride	1.7	1.2
o-Xylene	1.3	ND (0.69)
p-Dichlorobenzene	1.7	4.1
Toluene	4.9	1.6
trans-1,2-Dichloroethylene	1.2	ND (0.63)
Trichlorofluoromethane	1.3	1.3
Vinyl Acetate	ND (0.70)	0.95
Xylenes (total)	5.3	ND (0.69)

Sample ID:	RI-SV-07
Matrix:	Soil Vapor
Sample Date:	1/22/2026
VOCs (TO-15)	
1,2,4-Trimethylbenzene	0.54 J
1,3-Butadiene	1.9
2-Hexanone	1
Acetone (2-Propanone)	16
Benzene	0.8
Carbon disulfide	1.6
Chloroform	1.5
Chloromethane	0.21 J
Cyclohexane	0.41 J
Dichlorodifluoromethane	2.2
Ethanol	1.9
Ethyl Acetate	14
Heptane	0.53 J
Hexane	1
Isopropyl Alcohol	0.64
m,p-Xylene	1.3
Methyl ethyl ketone	11
Methyl Isobutyl Ketone	0.41 J
Methylene chloride	0.83
o-Xylene	0.61 J
Propylene	13
Tertiary Butyl Alcohol	0.7
Tetrachloroethylene	11
Toluene	2
Trichlorofluoromethane	1.1
Xylenes (total)	1.9

Sample ID:	RI-SV-03
Matrix:	Soil Vapor
Sample Date:	2/11/2026
VOCs (TO-15)	
2,2,4-Trimethylpentane	1.1
Acetone (2-Propanone)	17
Benzene	3.8
Cyclohexane	2.5
Dichlorodifluoromethane	2.3
Ethanol	1.7
Ethylbenzene	1.5
Heptane	3.9
Hexane	58.5
Isopropyl Alcohol	2.2
m,p-Xylene	5.2
Methyl ethyl ketone	3.8
Methylene chloride	0.83
o-Xylene	2
Tertiary Butyl Alcohol	4.5
Tetrachloroethylene	1.4
Tetrahydrofuran	79.6
Toluene	7.5
Trichlorofluoromethane	1.1
Xylenes (total)	7.2

Sample ID:	RI-SSSV-B12	RI-IA-B12
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	5.9	ND (0.79)
1,3,5-Trimethylbenzene	1.2	ND (0.79)
4-Ethyltoluene	1.2	ND (0.79)
Acetone (2-Propanone)	16	3.1
Benzene	0.54 J	0.48 J
Chloromethane	0.68	1
Dichlorodifluoromethane	2	2.4
Ethanol	2.1	6.4
Ethyl Acetate	17	11
Ethylbenzene	2.3	ND (0.69)
Heptane	0.61 J	ND (0.66)
Hexane	1.3	0.99
Isopropyl Alcohol	0.96	1.2
m,p-Xylene	10	ND (0.69)
Methyl ethyl ketone	ND (0.59)	0.38 J
Methylene chloride	1.1	0.94
o-Xylene	3.3	ND (0.69)
Toluene	4.9	0.6
trans-1,2-Dichloroethylene	0.83	ND (0.63)
Trichlorofluoromethane	1.2	1.2
Vinyl Acetate	ND (0.70)	0.49 J
Xylenes (total)	13	ND (0.69)

Sample ID:	RI-SSSV-B11	RI-IA-B11
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	14	ND (0.79)
1,3,5-Trimethylbenzene	2.8	ND (0.79)
4-Ethyltoluene	3.1	ND (0.79)
Acetone (2-Propanone)	43.7	8.3
Benzene	1.2	0.48 J
Chloromethane	0.33 J	1.1
Cyclohexane	0.59 J	ND (0.55)
Dichlorodifluoromethane	3.1	8.9
Ethanol	3.4	115 E
Ethyl Acetate	42.5	14
Ethylbenzene	6.5	ND (0.69)
Heptane	1.9	ND (0.66)
Hexane	3.4	1
Isopropyl Alcohol	3.2	5.2
m,p-Xylene	27	ND (0.69)
Methyl ethyl ketone	0.68	0.65
Methylene chloride	2.4	1.4
o-Xylene	9.1	ND (0.69)
Styrene	0.64 J	ND (0.68)
Tetrachloroethylene	0.6	ND (0.22)
Toluene	14	0.79
trans-1,2-Dichloroethylene	3.5	ND (0.63)
Trichlorofluoromethane	1.7	1.2
Vinyl Acetate	ND (0.70)	0.74
Xylenes (total)	36	ND (0.69)

Sample ID:	RI-SV-05
Matrix:	Soil Vapor
Sample Date:	2/11/2026
VOCs (TO-15)	
2,2,4-Trimethylpentane	1.2 J
Acetone (2-Propanone)	63.2
Benzene	8.3
Carbon disulfide	18
Cyclohexane	3
Dichlorodifluoromethane	1.8 J
Ethanol	72.5
Ethyl Acetate	13
Ethylbenzene	**291**
Heptane	8.2
Hexane	39.8
Isopropyl Alcohol	1.7
m,p-Xylene	**1070**
Methyl ethyl ketone	11
o-Xylene	**294**
Tetrachloroethylene	1.6
Tetrahydrofuran	40.1
Toluene	20
Xylenes (total)	1360

Sample ID:	RI-SSSV-B8	RI-IA-B8
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	8.4	ND (0.79)
1,3,5-Trimethylbenzene	1.7	ND (0.79)
4-Ethyltoluene	2	ND (0.79)
Acetone (2-Propanone)	24.9	24.5
Benzene	0.73	0.54
Carbon tetrachloride	0.6	ND (0.20)
Chloromethane	0.76	1.2
Cyclohexane	0.34 J	ND (0.55)
Dichlorodifluoromethane	2.5	2.7
Ethanol	68.8	74.4
Ethyl Acetate	76.7	27
Ethylbenzene	2.8	ND (0.69)
Freon 113	0.77	ND (0.61)
Heptane	0.98	ND (0.66)
Hexane	1.5	1.8
Isopropyl Alcohol	2.2	1.6
m,p-Xylene	12	ND (0.69)
Methyl ethyl ketone	3.2	9.1
Methyl Isobutyl Ketone	ND (0.82)	0.94
Methylene chloride	1.6	2.2
o-Xylene	4.2	ND (0.69)
Styrene	0.72 J	0.39 J
Tertiary Butyl Alcohol	0.33 J	ND (0.49)
Tetrachloroethylene	0.56	ND (0.22)
Toluene	5.3	1.2
trans-1,2-Dichloroethylene	1.1	ND (0.63)
Trichloroethylene	0.23	ND (0.17)
Trichlorofluoromethane	1.5	1.3
Vinyl Acetate	ND (0.70)	0.46 J
Xylenes (total)	16	ND (0.69)

Sample ID:	RI-SSSV-B6	RI-IA-B6
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/30/2026	1/30/2026
VOCs (TO-15)		
2,2,4-Trimethylpentane	0.51 J	ND (0.75)
Acetone (2-Propanone)	12	7.1
Benzene	0.7	0.48 J
Chloromethane	1	1.1
Dichlorodifluoromethane	2.4	2.4
Ethanol	19.4	29.4
Ethyl Acetate	7.6	14
Hexane	26	0.67
Isopropyl Alcohol	4.4	0.81
m,p-Xylene	1.1	ND (0.69)
Methyl ethyl ketone	0.77	2
Methylene chloride	17	1.1
Tertiary Butyl Alcohol	ND (0.61)	0.26 J
Toluene	1.6	0.34 J
Trichlorofluoromethane	1.4	1.1
Vinyl Acetate	1.1	0.46 J
Xylenes (total)	1.1	ND (0.69)

Sample ID:	RI-SSSV-B5	RI-IA-B5
Matrix:	SS Soil Vapor	Indoor Air
Sample Date:	1/22/2026	1/30/2026
VOCs (TO-15)		
1,2,4-Trimethylbenzene	3.2	ND (0.79)
1,3,5-Trimethylbenzene	0.64 J	ND (0.79)
2,2,4-Trimethylpentane	0.56 J	ND (0.75)
4-Ethyltoluene	0.64 J	ND (0.79)
Acetone (2-Propanone)	10	52.3
Benzene	0.67	1.2
Chloroform	ND (0.98)	0.59 J
Chloromethane	0.66	1.2
Dichlorodifluoromethane	2.5	2.6
Ethanol	5.3	343 E
Ethyl Acetate	5.8	20
Ethylbenzene	1.2	ND (0.69)
Heptane	0.45 J	0.41 J
Hexane	31	1.3
Isopropyl Alcohol	6.9	15
m,p-Xylene	5.2	ND (0.69)
Methyl ethyl ketone	0.41 J	0.71
Methylene chloride	24	1.7
o-Xylene	1.8	ND (0.69)
Tertiary Butyl Alcohol	ND (0.61)	0.45 J
Toluene	2.9	0.53 J
trans-1,2-Dichloroethylene	0.52 J	ND (0.63)
Trichlorofluoromethane	1.6	1.2
Vinyl Acetate	ND (0.70)	0.63
Xylenes (total)	7	ND (0.69)

Sample ID:					NYSDOH Decision Matrices A-F Soil Vapor		NYSDOH Decision Matrices A-F Indoor Air	
Lab ID:	CAS	UNIT	NYSDOH Matrix					
Matrix:					Low	High	Low	High
Sample Date:								
VOCs (TO-15)								
1,1,1-Trichloroethane	71-55-6	ug/m³		B	100	1000	3	10
1,1-Dichloroethylene	75-35-4	ug/m³		A	6	60	0.2	1
1,2,4-Trimethylbenzene	95-63-6	ug/m³		D	60	600	2	10
1,3,5-Trimethylbenzene	108-67-8	ug/m³		D	60	600	2	10
2,2,4-Trimethylpentane	540-84-1	ug/m³		D	60	600	2	10
Benzene	71-43-2	ug/m³		D	60	600	2	10
Carbon tetrachloride	56-23-5	ug/m³		A	6	60	0.2	1
cis-1,2-Dichloroethylene	156-59-2	ug/m³		A	6	60	0.2	1
Cyclohexane	110-82-7	ug/m³		D	60	600	2	10
Ethylbenzene	100-41-4	ug/m³		D	60	600	2	10
Heptane	142-82-5	ug/m³		E	200	2000	6	20
Hexane	110-54-3	ug/m³		E	200	2000	6	20
m,p-Xylene	-	ug/m³		E	200	2000	6	20
Methylene chloride	75-09-2	ug/m³		B	100	1000	3	10
o-Xylene	95-47-6	ug/m³		D	60	600	2	10
Tetrachloroethylene	127-18-4	ug/m³		B	100	1000	3	10
Toluene	108-88-3	ug/m³		F	300	3000	10	50
Trichloroethylene	79-01-6	ug/m³		A	6	60	0.2	1
Vinyl chloride	75-01-4	ug/m³		C	6	60	0	0.2

NOTES:
Bold = Elevated Concentration
NYSDOH Matrices = NYSDOH Matrix A-F Sub-slab/Indoor Air Vapor Concentration Criteria Lower Threshold.
ug/m3 = Micrograms per cubic meter.
ND = Compound not detected.
J = Estimated Value.
E = Exceeds calibration range.

NOTE:
THIS PLAN IS FOR LOCATING SOIL VAPOR AND AMBIENT AIR LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
PARCELS: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

LEGEND:
- SOIL VAPOR SAMPLE NO. AND APPROX. LOCATION
- SUB-SLAB SOIL VAPOR / COLOCATED INDOOR AIR SAMPLE NO. AND APPROX. LOCATION
- AMBIENT AIR SAMPLE NO. AND APPROX. LOCATION
- EXISTING BUILDINGS
- BCP BOUNDARY

SCALE: 1" = 40'
0 20 40 80 120 160 FEET

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Y:\GIS\Project_Numbers\12345\FINAL_MAPS_5/28/2026 10:58 AM, Kim Vandeklein, LAYOUT FIG-5.3

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
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dwg by: KBV
chk by: AC
scale: AS NOTED
date: 5/28/2026

by | description | date | rev

project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: SOIL VAPOR, INDOOR AIR AND AMBIENT AIR RESULTS PLAN

job no.: 12345
drawing no: FIG-2.6
5.3 of 8



Boring ID: RI-SB-12

Sample ID:	RI-SB-12(0-0.5)	RI-SB-12(1.5-2)	RI-SB-12(2-5)	RI-SB-12(5-10)	RI-SB-12(10-15)	RI-SB-12(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	6.5-7.0	13.5-14.0	16.5-17.0
PESTICIDES						
4,4'-DDD	0.0035	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)
4,4'-DDT	0.0044	ND (0.00077)	ND (0.00072)	ND (0.00065)	ND (0.00069)	ND (0.00065)

Boring ID: RI-SB-01

Sample ID:	RI-SB-01(0-0.5)	RI-SB-01(1.5-2)	RI-SB-01(2.5-5)	RI-SB-01(5-10)	RI-SB-01(10-15)	RI-SB-01(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	5.5-6.0	12.0-12.5	16.5-17.0
VOCs						
Acetone	ND (0.013)	ND (0.023)	ND (0.02)	0.0224	0.0686	0.0215
METALS						
Lead	59.6	59	18.5	12.2	91.8	21.8
Mercury	0.13	0.23	0.075	0.034	0.83	0.065
PESTICIDES						
4,4'-DDE	0.0062	0.0028	ND (0.00079)	0.0025 a	ND (0.0011)	ND (0.00069)
4,4'-DDT	0.0059	0.0035	0.00095	0.00069 J	ND (0.0011)	ND (0.00069)

Boring ID: RI-SB-13

Sample ID:	RI-SB-13(0-0.5)	RI-SB-13(1.5-2)	RI-SB-13(2-5)	RI-SB-13(5-10)	RI-SB-13(10-15)	RI-SB-13(15-20)	DUP20260122-2
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	6.5-7.0	13.0-13.5	17.5-18.0	17.5-18.0
METALS							
Chromium	48.3	40.7	12.7	10.9	6.7	16.8	17.7
Lead	55.2 a	11.3 a	70.3 a	14.8	10.2	41.3 a	7.9 a
Mercury	0.81	0.072	0.042	0.034	ND (0.032)	0.19	ND (0.032)
Nickel	19.4	36	13.2	9.6	5.9	16.4	16.2
PESTICIDES							
4,4'-DDD	0.0111	0.0015	0.00095	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
4,4'-DDE	0.715	0.14	0.0134	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
4,4'-DDT	0.545	0.0553	0.0067	ND (0.00082)	ND (0.00075)	ND (0.00089)	ND (0.00079)
PFAS							
PFOS	NT	3.33	NT	NT	NT	ND (0.0765)	ND (0.0772)

Boring ID: RI-SB-14

Sample ID:	RI-SB-14(0-0.5)	RI-SB-14(1.5-2)	RI-SB-14(2-5)	RI-SB-14(5-10)	RI-SB-14(10-15)	RI-SB-14(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0
VOCs						
Acetone	0.0072 J	ND (0.0098)	0.003 J	0.0362	ND (0.0058)	0.005 J
METALS						
Chromium	32.4	27.7	7.8	6.7	5.4	6.2
Lead	40.4 a	21.2 a	13		478 a	12.6
Mercury	0.25	0.12	ND (0.033)	ND (0.031)	4.8	1.6
PESTICIDES						
4,4'-DDD	0.0079 a	0.00072	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
4,4'-DDE	0.3	0.0419	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
4,4'-DDT	0.297	0.0313	0.00088 a	ND (0.0007)	ND (0.0007)	ND (0.0007)
alpha-Chlordane	0.0435 a	0.0029 a	ND (0.00076)	ND (0.0007)	ND (0.0007)	ND (0.0007)
PFAS						
PFOS	NT	NT	2.49	NT	NT	NT

Boring ID: RI-SB-10

Sample ID:	RI-SB-10(0-0.5)	RI-SB-10(1.5-2)	RI-SB-10(2-5)	DUP20260122	RI-SB-10(5-10)	RI-SB-10(10-15)	RI-SB-10(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	4.0-4.5	7.5-8.0	12.5-13.0	17.5-18.0
VOCs							
Acetone	0.0739	ND (0.0072)	0.112	0.003 J	ND (0.0056)	0.0677	0.0133
METALS							
Chromium	18.3	13.8	17.2	7.1	6.6	38.5	8.7
Mercury	0.29	0.2	0.1	ND (0.031)	ND (0.032)	1.45	ND (0.032)
PESTICIDES							
4,4'-DDD	ND (0.00085)	0.0044	0.0165	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
4,4'-DDE	ND (0.00085)	0.129	0.0552	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
4,4'-DDT	0.0023 a	0.136	0.414	ND (0.00072)	ND (0.00068)	ND (0.00098)	ND (0.00075)
PFAS							
PFOS	NT	NT	1.95	NT	NT	NT	NT

Boring ID: RI-SB-07

Sample ID:	RI-SB-07(0-0.5)	RI-SB-07(1.5-2)	RI-SB-07(2-5)	RI-SB-07(5-10)	RI-SB-07(10-15)	RI-SB-07(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	8.0-8.5	12.0-12.5	15.0-15.5
VOCs						
Acetone	ND (0.0099)	ND (0.014)	0.012 J	0.0717	0.0496	0.0097 J
SVOCs						
Benzo(a)anthracene	0.217	1.03	0.338	ND (0.1)	ND (0.11)	ND (0.039)
Benzo(a)pyrene	0.265	1.12	0.354	ND (0.1)	ND (0.11)	ND (0.039)
Benzo(b)fluoranthene	0.325	1.55	0.458	ND (0.1)	ND (0.11)	0.0187 J
Benzo(g,h,i)perylene	0.204	0.9	0.279	ND (0.1)	ND (0.11)	ND (0.039)
Chrysene	0.238	1.06	0.338	ND (0.1)	ND (0.11)	ND (0.039)
Indeno(1,2,3-cd)pyrene	0.177	0.788	0.235	ND (0.1)	ND (0.11)	ND (0.039)
METALS						
Chromium	25.1	38.5	9.8	22.3	7.6	6.2
Lead	108	43.9	204	14.5	17.9	6.1
Mercury	0.43	0.27	0.17	ND (0.052)	ND (0.046)	ND (0.033)
Nickel	18.3	30.3	10.6	29.1	6.7	5.4
Zinc	138	83.5	106	79.5	18.1	13.1
PESTICIDES						
4,4'-DDD	0.0196	0.0028 a	0.0016	ND (0.0011)	ND (0.001)	ND (0.00078)
4,4'-DDE	0.293 a	0.016	0.0149	ND (0.0011)	ND (0.001)	ND (0.00078)
4,4'-DDT	0.147 a	0.0159	0.0092	ND (0.0011)	ND (0.001)	ND (0.00078)
PFAS						
PFOS	NT	NT	1.47	NT	ND (0.0786)	NT

Boring ID: RI-SB-11

Sample ID:	RI-SB-11(0-0.5)	RI-SB-11(1.5-2)	RI-SB-11(2-5)	RI-SB-11(5-10)	RI-SB-11(10-15)	DUP20260122-1	RI-SB-11(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4	5.5-6.0	13.0-13.5	13.0-13.5	18.0-18.5
VOCs							
Acetone	0.0156	ND (0.0063)	ND (0.013)	0.0257	0.125	0.0651	0.0105 J
METALS							
Mercury	0.17	0.18	0.19	ND (0.034)	0.089	0.13	0.26
PESTICIDES							
4,4'-DDD	0.0042	0.0076	ND (0.0007)	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
4,4'-DDE	0.0978	0.16	0.0151	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
4,4'-DDT	0.195	0.377	0.0074	ND (0.00072)	ND (0.0011)	ND (0.0011)	ND (0.00078)
PFAS							
PFOS	NT	NT	1.2	NT	NT	NT	ND (0.0777)

Boring ID: RI-SB-06

Sample ID:	RI-SB-06(0-0.5)	RI-SB-06(1.5-2)	RI-SB-06(2-5)	RI-SB-06(5-10)	RI-SB-06(10-15)	RI-SB-06(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.0-3.5	7.0-7.5	14.0-14.5	17.0-17.5
	NO EXCEEDANCES					

Boring ID: RI-SB-15

Sample ID:	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)	RI-SB-15(2-5)	RI-SB-15(5-10)	RI-SB-15(10-15)	RI-SB-15(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	5.5-6.0	12.0-12.5	16.0-16.5
VOCs						
Acetone	0.0177 J	ND (0.014)	ND (0.013)	0.0064 J	0.0189	0.0359
SVOCs						
Benzo(a)anthracene	0.699	0.804	1.54	0.101	0.0843	0.348
Benzo(a)pyrene	0.666	0.78	1.24	0.0845	0.072	0.317
Benzo(b)fluoranthene	0.901	1.02	1.61	0.103	0.0822	0.372
Benzo(g,h,i)perylene	0.533	0.624	0.878	0.0525	0.043	0.223
Chrysene	0.748	0.776	1.49	0.094	0.0739	0.307
Indeno(1,2,3-cd)pyrene	0.45	0.518	0.769	0.049	0.0387	0.175
Phenanthrene	0.641	0.533	2.27	0.0551	0.0469	0.225
METALS						
Lead	90.3 b	68.3 b	83.9	22.3	46.3	126 b
Mercury	42.7	48.9	0.56	0.038	0.15	0.43
Zinc	178	147	36.8	74.3	64.4	81.8
PESTICIDES						
4,4'-DDT	0.0124	0.0095	0.0022	ND (0.00079)	ND (0.00068)	ND (0.00086)

Boring ID: RI-SB-05

Sample ID:	RI-SB-05(0-0.5)	RI-SB-05(1.5-2)	RI-SB-05(2-5)	RI-SB-05(5-10)	RI-SB-05(10-15)	RI-SB-05(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	8.0-8.5	13.0-13.5	18.0-18.5
VOCs						
Acetone	0.0179	ND (0.011)	ND (0.012)	0.113	0.0175	0.0139 J
METALS						
Lead	141	23.7	28.2	29.9 b	34.3	6.7

Boring ID: RI-SB-04

Sample ID:	RI-SB-04(0-0.5)	RI-SB-04(1.5-2)	RI-SB-04(3.5-4)	RI-SB-04(5-10)	RI-SB-04(10-15)	RI-SB-04(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	19.5-20.0
VOCs						
Acetone	0.0105 J	ND (0.016)	0.0685	0.0902	0.0408	0.0606
Xylene (total)	2.17	0.232	ND (0.0011)	ND (0.0016)	0.0038	ND (0.0011)
SVOCs						
Benzo(b)fluoranthene	0.96	1.16	0.21	0.174	0.163	ND (0.044)
METALS						
Chromium	15.3	15.1	11.2	25.2	27.4	19.5
Lead	104 b	157 b	31.6	144 b	80.4 b	7.5
Mercury	0.36	0.27	0.05	0.83	0.7	ND (0.039)
Zinc	87.2	147	45.8	114	112	48

Boring ID: RI-SB-08

Sample ID:	RI-SB-08(0-0.5)	RI-SB-08(1.5-2)	RI-SB-08(2-5)	RI-SB-08(5-10)	RI-SB-08(10-15)	RI-SB-08(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.0-4.5	6.5-7.0	11.0-11.5	17.0-17.5
VOCs						
Acetone	0.0393	0.0107 J	ND (0.92)	0.0447	0.0282	0.0127
METALS						
Chromium	25.6	16.1	51.8	5.7	20.3	14.9
Lead	93.4	42.8	11.9	2.7	123	14.3
Mercury	0.16	0.046	ND (0.032)	ND (0.031)	0.11	ND (0.037)
Nickel	9	13.8	37.7	5.7	9.1	14.1
PESTICIDES						
4,4'-DDD	0.0414	0.00084	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)
4,4'-DDE	0.893	0.0284	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)
4,4'-DDT	0.746 a	0.0046	ND (0.0007)	ND (0.0007)	ND (0.00074)	ND (0.00085)

Boring ID: RI-SB-03

Sample ID:	R1-SB-03(0-0.5)	RI-SB-03(1.5-2)	RI-SB-03(2-5)	RI-SB-03(5-10)	RI-SB-03(10-15)	RI-SB-03(15-20)	DUP20260122-3
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.5-9.0	13.0-13.5	18.5-19.0	18.5-19.0
VOCs							
Acetone	ND (0.013)	ND (0.011)	0.0167	0.0102	0.0069 J	0.0716	0.0635
METALS							
Chromium	32.3	14.9	38.3	6	5.2	15.3	12.7
Copper	22.2	12.8	20.5	59.3	5.1	11.5	9.5
Mercury	0.26	0.083	0.089	ND (0.030)	ND (0.032)	0.13	ND (0.038)
PESTICIDES							
4,4'-DDD	0.0239	0.0034	ND (0.00069)	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDE	0.324	0.172	0.0067	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
4,4'-DDT	0.963	0.0552	0.0026	ND (0.00071)	ND (0.00074)	ND (0.00086)	ND (0.00082)
PFAS							
PFOS	NT	NT	2.37	NT	NT	ND (0.0779)	ND (0.079)

Boring ID: RI-SB-16

Sample ID:	RI-SB-16(0-0.5)	RI-SB-16(1.5-2)	RI-SB-16(2-5)	RI-SB-16(5-10)	RI-SB-16(10-15)	RI-SB-16(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	4.5-5.0	6.0-6.5	12.0-12.5	18.5-19.0
VOCs						
Acetone	0.0063 J	0.0048 J	0.14	0.0342	0.0073 J	0.0799
Xylene (total)	0.347	0.005	ND (0.0013)	ND (0.002)	ND (0.0013)	ND (0.0018)
METALS						
Chromium	29	26	30.6	20.1	4.7	36.1
Lead	27.6 b	9.3 b	21.8 b	35.6	1.7	102 b
Mercury	0.059	ND (0.030)	0.065	0.22	ND (0.034)	0.14
Nickel	22.6	24.9	28.2	20.5	5.2	30.1
Zinc	65.9	61.2	70.8	61.7	13.4	156
PESTICIDES						
4,4'-DDD	0.0047	ND (0.00076)	0.0019	ND (0.0012)	ND (0.00069)	ND (0.0011)
4,4'-DDE	0.0485	0.0037	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)
4,4'-DDT	0.0611	0.0035	0.0011 a	ND (0.0012)	ND (0.00069)	ND (0.0011)
alpha-Chlordane	0.158 a	0.0091 a	ND (0.0009)	ND (0.0012)	ND (0.00069)	ND (0.0011)

Boring ID: RI-SB-09

Sample ID:	RI-SB-09(0-0.5)	RI-SB-09(1.5-2)	RI-SB-09(2-5)	RI-SB-09(5-10)	RI-SB-09(10-15)	RI-SB-09(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.5-4.0	8.0-8.5	12.0-12.5	18.5-19.0
VOCs						
Acetone	0.0082 J	0.042	ND (0.02) a	0.0353	0.0588 a	0.243 a
SVOCs						
Benzo(a)anthracene	1.71	0.404	0.423	1.24	0.138	ND (0.04)
Benzo(a)pyrene	1.51	0.372	0.223	1.06	0.104	ND (0.04)
Benzo(b)fluoranthene	2.01	0.533	0.419	1.09	0.129	ND (0.04)
Benzo(g,h,i)perylene	1.1	0.246	0.15	0.666	0.0623	ND (0.04)
Chrysene	1.68	0.397	0.86	1.2	0.119	ND (0.04)
Indeno(1,2,3-cd)pyrene	0.933	0.227	0.107	0.515	0.0526 J	ND (0.04)
Phenanthrene	2.65	0.0814	1.21	3.42	0.123	ND (0.04)
METALS						
Chromium	15.1	11.9	6.6	12.9	29.2	18.5
Lead	59.3	48.8 b	48	40.6	97.6 b	6.8 b
Mercury	0.26	0.081	0.075	0.059	0.87	ND (0.036)
Zinc	78	56.3	45.4	82.7	120	41.2
PESTICIDES						
4,4'-DDT	0.0035	ND (0.00074)	0.0037 a	ND (0.00091)	ND (0.0011)	ND (0.00078)

Boring ID: RI-SB-02

Sample ID:	R1-SB-02(0-0.5)	R1-SB-02(1.5-2)	R1-SB-02(2-5)	DUP20260122-4	R1-SB-02(5-10)	R1-SB-02(10-15)	R1-SB-02(15-20)
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	3.0-3.5	3.0-3.5	6.5-7.0	11.0-11.5	15.0-15.5
VOCs							
Acetone	0.0146	ND (0.0089)	0.049	0.0268	0.118	0.0417	0.0333
SVOCs							
3&4-Methylphenol	ND (0.077)	ND (0.078)	ND (0.079)	ND (0.074)	1.27	ND (0.13)	ND (0.078)
Benzo(a)anthracene	3.66	0.228	0.181	0.0463	0.291	0.0916	0.0325 J
Benzo(a)pyrene	2.49	0.267	0.177	0.051	0.272	0.0647	0.0366 J
Benzo(b)fluoranthene	2.91	0.353	0.205	0.059	0.391	0.0807	0.0471
Benzo(g,h,i)perylene	1.38	0.197	0.111	0.0346 J	0.198	ND (0.064)	0.0252 J
Benzo(k)fluoranthene	1.04	0.113	0.0897	0.0272 J	0.109	0.0339 J	ND (0.039)
Chrysene	2.61	0.249	0.2	0.0521	0.406	0.0727	0.0432
Dibenzo(a,h)anthracene	0.508	0.0545	0.0296 J	ND (0.037)	0.044 J	ND (0.064)	ND (0.039)
Indeno(1,2,3-cd)pyrene	1.2	0.166	0.0875	0.0258 J	0.15	ND (0.064)	0.019 J
Phenanthrene	2.16	0.0852	0.136	0.0308 J	0.674	0.0625 J	0.0394
METALS							
Chromium	13	16.3	10.9	9.1	12.1	26.1	8.2
Copper	23.4	33.6	17	10.1	58.2	28.2	99.2
Lead	58.5 b	55.1 b	66.3	25.1	378	56.3 b	57.9 b
Mercury	0.22	0.53	0.11	0.14	1.2	0.2	0.13
Nickel	12.7	17.7	10.3	8.9	5.4	30.2	7.5
Zinc	62.8	104	49.6	34.4	371	126	220
PESTICIDES							
4,4'-DDT	0.0075	0.0018	ND (0.00075)	0.00088	ND (0.0015)	ND (0.0013)	ND (0.00075)

Sample ID:	CAS	UNITs	NY UUSCO	NY RRSCO	NY PGWSCO
SVOCs (SW846 8270E)					
3&4-Methylphenol	-	mg/kg	0.33	100	.33*
Benzo(a)anthracene	56-55-3	mg/kg	1	1.4	1
Benzo(a)pyrene	50-32-8	mg/kg	1	1	22
Benzo(b)fluoranthene	205-99-2	mg/kg	1	1.4	2.1
Benzo(g,h,i)perylene	191-24-2	mg/kg	0.64	4.9	1000*
Benzo(k)fluoranthene	207-08-9	mg/kg	0.8	4.9	2*
Chrysene	218-01-9	mg/kg	1	4.9	1
Dibenzo(a,h)anthracene	53-70-3	mg/kg	0.33	0.33	1000*
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.5	1.4	6.6*
Phenanthrene	85-01-8	mg/kg	1.1	4.9	1000*
METALS (SW846 6010D & 7471B)					
Chromium	7440-47-3	mg/kg	30	110	19*
Copper	7440-50-8	mg/kg	50	280	
Lead	7439-92-1	mg/kg	63	400	450*
Mercury	7439-97-6	mg/kg	0.18	0.3	0.73*
Nickel	7440-02-0	mg/kg	30	320	130*
Zinc	7440-66-6	mg/kg	109	6600	
VOCs (SW846 8260D)					
Acetone	67-64-1	mg/kg	0.03	100	0.03*
Xylene (total)	1330-20-7	mg/kg	0.26	100	
PESTICIDES (SW846 8081B)					
4,4'-DDD	72-54-8	mg/kg	0.0033	5	
4,4'-DDE	72-55-9	mg/kg	0.0033	3.4	
4,4'-DDT	50-29-3	mg/kg	0.0033	3.8	
alpha-Chlordane	5103-71-9	mg/kg	0.014	0.65	
PFAS (EPA 1633A)					
PFOS	1763-23-1	ng/kg	0.88	44	1

NOTES:

* RI-SB-02 and RI-SB-09 were compared to PGWSCOs even if that compound was not detected in groundwater due to their installation in the proposed stormwater management area.

mg/kg = milligrams per kilogram

ng/kg = nanograms per kilogram

NYSDEC = New York State Department of Environmental Conservation

NY UUSCO = NYSDEC Unrestricted Use Soil Cleanup Objectives (12/2025)

NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)

NY PGWSCO = NYSDEC Protection to Groundwater Soil Cleanup Objectives (12/2025)

ND = Not Detected

NA = Not Analyzed

J = Estimated Value

= Exceeds NY UUSCO

= Exceeds NY RRSCO

= Exceeds NY PGWSCO

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NOTE:
THIS PLAN IS FOR LOCATING PROPOSED SOIL BORING LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
PARCELS: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES - GIS PROGRAM OFFICE, NYS DEPT OF TAXATION AND FINANCE'S OFFICE OF REAL PROPERTY TAX SERVICES

LEGEND:

- RI-SB-01 — SOIL BORING NO. AND APPROX. LOCATION
- RI-MW-01 — MONITORING WELL NO. AND APPROX LOCATION – PROPOSED FOR DECOMMISSION/ REINSTALLATION
- RI-MW-02 — MONITORING WELL NO. AND APPROX LOCATION – PROPOSED FOR REUSE
- PROPOSED EXCAVATION (50' x 50')
- EXISTING BUILDINGS
- 2-FT CUT (LANDSCAPED AREAS)
- BCP BOUNDARY
- 13.5' - DEPTH OF PROPOSED EXCAVATION

SCALE: 1" = 40'
0 20 40 80 120 160 FEET

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GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
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dwg by: KBV
chk by: AC
scale: AS NOTED
date: 6/10/2026

rev	date	description	by

project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: SOIL TRACK 2 EXCAVATION PLAN

job no.: 12345
drawing no: FIG-3.1
3.1 of 8

Y:\GIS\Project_Numbers\12345\APRX_PROJECT\APRX_Standard_Fig_Pg_No_RIR.aprx, 6/10/2026 12:41 PM, Kim Vanderklein, LAYOUT: FIG-3.1



Boring ID:	RI-SB-15					
Sample ID:	RI-SB-15(0-0.5)	RI-SB-15(1.5-2)	RI-SB-15(2-5)	RI-SB-15(5-10)	RI-SB-15(10-15)	RI-SB-15(15-20)
Sample Date:	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026	1/23/2026
Sample Depth (ft bgs):	0.0-0.5	1.5-2.0	2.5-3.0	5.5-6.0	12.0-12.5	16.0-16.5
METALS (SW846 6010D & 7471B)						
Mercury	42.7	48.9	0.59	0.038	0.15	0.43

ANALYTE	UNITs	NY RRSCO	10X NY RRSCO
METALS (SW846 6010D & 7471B)			
Mercury	mg/kg	0.3	3

NOTES:
mg/kg = milligrams per kilogram
NYSDEC = New York State Department of Environmental Conservation
NY RRSCO = NYSDEC Restricted Residential Use Soil Cleanup Objectives (12/2025)
ND = Not Detected
Exceeds 10X NY RRSCO

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NOTE:
THIS PLAN IS FOR LOCATING SOIL VAPOR AND AMBIENT AIR LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
BCP BOUNDARY AND PROPOSED LANDSCAPE BOUNDARIES TAKEN FROM INSIGHT ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE, P.C. DESIGN MODEL, DATED MARCH 3, 2026.

LEGEND:
- RI-SB-14 — SOIL BORING NO. AND APPROX. LOCATION
- RI-MW-01 — MONITORING WELL NO. AND APPROX.LOCATION – PROPOSED FOR DECOMMISSION/ REINSTALLATION
- RI-MW-02 — MONITORING WELL NO. AND APPROX.LOCATION – PROPOSED FOR REUSE
- OTHER ANOMALIES
- SUSPECTED AND/OR KNOWN LOCATIONS OF HEATING OIL USTS
- PROPOSED EXCAVATION (25' x 25')
- BCP BOUNDARY
- 17.5' - DEPTH OF PROPOSED EXCAVATION

SCALE: 1" = 40'
0 20 40 80 120 160 FEET

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chk by: AC
scale: AS NOTED
date: 6/18/2026

rev	date	description	by

project:
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title:
SOIL TRACK 4 EXCAVATION PLAN

job no.: 12345
drawing no:
FIG-3.2

Y:\ES\Project_Numbers\12345\APRX_PROJECT\APRX_Standard_Fig_Pl_No_RAW\Plan.aprx, 6/18/2026 5:38 PM, Kim Verderhein, LAYOUT: FIG-3.2

N

NOTE:
THIS PLAN IS FOR LOCATING CUT/FILL AREAS WITHIN THE PROPOSED LANDSCAPED AREAS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
CUT AND FILL AREAS ARE TAKEN FROM THE "CUT AND CAP EARTHWORK PLAN", PREPARED BY INSITE, DATED 6/10/26.

LEGEND:

- LANDSCAPED AREA TO BE CUT
- LANDSCAPED AREA TO BE FILLED
- BCP BOUNDARY

SCALE: 1" = 30'

0 15 30 60 90 120 FEET

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date: 6/11/2026

rev	date	description	by

project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: LANDSCAPE AREAS CUT AND FILL PLAN

job no.: 12345
drawing no: FIG-3.3
3.3 of 8

Y:\GIS\Project_Numbers\12345\ARPX_PROJECT\ARPX_Standard_Fig_PL_No_RAMP.aprx, 6/11/2026 10:49 AM, Kim Vandeklein, LAYOUT: FIG-3.3

RI-MW-02
RI-MW-03
RI-MW-01
RI-MW-04
RI-MW-05
RI-MW-08
RI-MW-06
RI-MW-07

N

NOTE:
THIS PLAN IS FOR LOCATING POST EXCAVATION SOIL SAMPLE LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
BCP BOUNDARY AND PROPOSED LANDSCAPE BOUNDARIES TAKEN FROM INSIGHT ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE, P.C. DESIGN MODEL, DATED MARCH 3, 2026.

LEGEND:

- PROPOSED POST-EXCAVATION BASE SAMPLE
- PROPOSED POST-EXCAVATION SIDEWALL SAMPLE
- RI-MW-01 — MONITORING WELL NO. AND APPROX LOCATION – PROPOSED FOR DECOMMISSION/ REINSTALLATION
- RI-MW-02 — MONITORING WELL NO. AND APPROX LOCATION – PROPOSED FOR REUSE
- BCP BOUNDARY

SCALE: 1" = 40'

0 20 40 80 120 160 FEET

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rev	date	description	by

dwg by: KBV
chk by: MKC
scale: AS NOTED
date: 6/10/2026

project: FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NY

title: **POST-EXCAVATION SOIL SAMPLE LOCATION PLAN**

job no.: 12345
drawing no: FIG-5.1

Y:\ES\Project_Numbers\12345\APRX_PROJECT\APRX_Standard_Fig_Pl_No_RIR.aprx, 6/10/2026 12:43 PM, Kim Vanderkwin, LAYOUT: FIG-5.1



LEGEND

- PROPERTY LINE
- CONCRETE
- BUILDING
- ASPHALT
- LANDSCAPING
- PAVERS
- BCP BOUNDARY

NYS Education Law
Unauthorized alterations or additions to this plan are a violation of section 7209 (2) of the New York State Education Law. Copies of this map not having the seal of the engineer shall not be valid.

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REFERENCE:

1. INSIGHT ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C. DESIGN MODEL, DATED MARCH 3, 2026.

Scale: 1"= 40'

0 20 40 80 120 160

K:\CAD\12345\CAD\ENVIRONMENTAL\12345 SWC.DPP\FIG 7.1 SWC 03/23/26 10:14:11AM apg LAYOUT:FIG 7.1

KEY MAP

rev	date	description

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999 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

DRAFT

project:
PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER, NEW YORK

title:
AERIAL DISTRIBUTION OF COVER TYPES

dwg by: APG
chk by: MKC
scale: AS NOTED
date: 03/19/2026

job no. 12345
drawing no.
FIG 7.1
1 of 1

Appendix A:

Metes and Bounds

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

22145.100 March 18, 2024

Lands known as Franklin Courts

ALL that certain piece or parcel of land situate, lying and being in the Village of Tarrytown, Town of Greenburgh, County of Westchester and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly line of Franklin Street where the same is intersected by the division line between lands now or formerly belonging to the Village of Tarrytown to the north and Parcel No. 1B as shown on a map entitled " PHA-Aided Low-Rent Housing Project NY-13-1 Property Line Map", filed April 21, 1951 in the Office of the County Clerk of Westchester (Division of Land Records) as Map No. 7375 on the south;

thence along said line of Franklin Street, South 34°38'56" East 2.925 feet to the westerly line of Riverview Avenue at a point of curvature;

thence along said line and also along lands now or formerly belonging to Scott Schachter & Lisa Sloane designated as Lots 200-203 as shown on a map entitled "Benedict Park Subdivided and Developed by Miller Brothers…", filed September 6, 1924 as Map No. 2660, the following:

along said curve, to the left with a radius of 118.55 feet, a radial bearing of S27°01'23"E to its center and an arc length of 169.62 feet to a point of reverse curve,

along said curve, to the right with a radius of 226.47 feet and an arc length of 153.12 feet to a point of tangency, and

South 19°44'14" West 400.00 feet to other lands now or formerly belonging to the Village of Tarrytown designated as Lot 10 as shown on a map entitled, "Subdivision Map of West Benedict Park … ", filed September 2, 1937 as Map No. 4525;

thence continuing along said lands and crossing a former 50' ROW known as Mac Arthur Lane (formerly Spring Street) on the aforementioned filed Map No. 7375, North 70°15'46" West 150.00 feet to Parcel No. 1A;

thence along Parcel No. 1A, South 19°44'14" West 225.00 feet to lands now or formerly belonging to Lu Charisse & Diana J. Arroyo designated as Lot 7, as shown on the aforementioned filed Map No. 4525;

thence along said line of Lot 7, Lot 6 and partly along Lot 5, North 70°15'46" West 100.00 feet and South 19°44'14" West 114.69 feet to the northeast corner of lands now or formerly belonging to the County of Westchester;

thence continuing along said lands and through Parcel No. 1A on the aforementioned filed Map No. 7375, North 43°56'56" West 69.52 feet and North 34°16'56" West 32.52 feet to the easterly line of lands now or formerly belonging to Metro North Railroad;

thence along said lands the following:

Lands of known as Franklin Courts

(continued)

North 41°09'42" East 6.58 feet,

North 10°38'27" East 263.06 feet to a point of curve,

along said curve, to the left with a radius of 10556.50 feet and an arc length of 732.66 feet to lands now or formerly belonging to Tarrytown Municipal Housing Authority;

thence along said lands, North 89°39'04" East 218.77 feet to the westerly line of Franklin Courts;

thence crossing Franklin Courts, North 84°20'34" East 50.035 feet to the easterly line of Franklin Courts and lands now or formerly belonging to the Village of Tarrytown;

thence along said lands, South 03°30'16" East 174.63 feet, North 89°44'45" East 58.32 feet and North 82°20'44" East 30.92 feet to the point or place of BEGINNING.

EXCEPTING from the above described parcel a 50' ROW referred to as Franklin Courts as described in Liber 5227 Page 100 recorded April 11th, 1953, further bounded and described as follows:

BEGINNING at a point on the westerly line of Franklin Courts, said point also being on the northerly line of the above described parcel and at the southeastern corner of lands now or formerly belonging to Tarrytown Municipal Housing Authority;

thence running through the above described parcel and continuing along Franklin Courts the following:

South 00°39'16" East 71.79 feet to a point of curvature,

along said curve, to the right with a radius of 534.79 feet and an arc length of 189.43 feet to a compound curve,

along said curve, to the right with a radius of 258.00 feet and an arc length of 62.29 feet to a compound curve,

along said curve, to the right with a radius of 15.00 feet and an arc length of 23.56 feet to a compound curve,

along said curve, to the right with a radius of 513.00 feet and an arc length of 90.08 feet to a non-tangent curve,

along said curve, to the left with a radius of 44.00 feet, a radial bearing of North 79°03'23" West to its center and an arc length of 223.26 feet to a non-tangent curve,

along said curve, to the left with a radius of 563.00 feet, a radial bearing of South 43°43'22" West to its center and an arc length of 100.64 feet to a reverse curve,

Lands of known as Franklin Courts

(continued)

along said curve, to the right with a radius of 15.00 feet and an arc length of 23.56 feet to a point of tangency,

South 33°28'24" West 280.20 feet to a non-tangent curve,

along said curve, to the left with a radius of 44.00 feet, a radial bearing of South 01°09'06" East to its center and an arc length of 223.28 feet to a point of non-tangency,

North 33°28'24" East 360.20 feet to a curve,

along said curve, to the left with a radius of 308.00 feet and an arc length of 74.36 feet to a compound curve,

along said curve, to the left with a radius of 584.79 feet and an arc length of 108.54 feet to a point, and North 89°45'44" East 16.82 feet to lands now or formerly belonging to the Village of Tarrytown;

thence continuing along said lands North 03°30'16" West 174.63' feet to a point,

thence turning and crossing Franklin Courts, South 84°20'34" West 50.035 feet to the point or place of BEGINNING.

Containing 7.402 acres

Appendix B:

Stormwater Management Design Plan

INSITE
ENGINEERING, SURVEYING &
LANDSCAPE ARCHITECTURE, P.C.

STORMWATER POLLUTION PREVENTION PLAN

For

Franklin Courts

1-99 Franklin Court
Tarrytown, New York

February 6, 2025

Applicant Information:

WBP Development LLC
480 Bedford Road
Chappaqua, NY 10514

Note: This report in conjunction with the project plans make up the complete Stormwater Pollution Prevention Plan.



Prepared by:
Insite Engineering, Surveying & Landscape Architecture, P.C.
3 Garrett Place
Carmel, New York 10512

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1.2 Existing Site Conditions 1
1.3 Proposed Site Conditions 1
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2.2 NYSDEC Water Quality Volume, WQ_v 4
2.3 NYSDEC Stream Channel Protection Volume, CP_v 5
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4.0 EROSION AND SEDIMENT CONTROL 6
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APPENDICES

Appendix A NYSDEC Water Quality Volume (WQv) and Runoff Reduction (RRv) Calculation Worksheets
Appendix B Pre-Development Computer Data
Appendix C Post-Development Computer Data
Appendix D Project and Owner Information
Appendix E NYSDEC SPDES General Permit for Construction Activities Construction Site Log Book
Appendix F Bioretention Filter Sizing Calculations
Appendix G Hydrodynamic Separator Sizing Information
Appendix H Pipe Sizing Calculations
Appendix I Soil/Boring Testing Data

FIGURES

Figure 1: Location Map
Figure 2: Pre-Development Drainage Map
Figure 3: Post-Development Drainage Map
Figure 4: Impervious Area Map

1.0 INTRODUCTION

1.1 Project Description

The subject project is located on a 8.9 ± acres parcel off of Franklin Street in the Village of Tarrytown. The parcel and its surroundings are delineated on the attached Location Map (Figure 1), is designated as Tax Map Number 1.70-29-32, and is located in the M-3 (Multi-Family Residence) zoning district. The property is currently developed with 70-units of multi-family housing buildings, driveway, parking areas and other site appurtenances. Stormwater runoff on the existing property discharges to the west side of the property towards the Metro North Railroad. The project site is located in the Hudson River Basin Watershed.

The proposed redevelopment of this site will include the removal of the existing buildings, parking and amenities, the transfer of ownership of the existing Franklin Courts road right of way and two Village owned parcels along Franklin Street, from the Village to TMHA, construction of 11 townhouse style multi-family buildings (3 and 4 dwelling units each), construction of two 20 unit multi-family buildings, new access driveway and parking, a new clubhouse building, new green space / recreation areas including an updated playground, a basketball court, outdoor sitting area, a walking trail and a dedicated, expanded green space.

1.2 Existing Site Conditions

The subject project is located on the corner of Franklin Street and White Sheet in the Village of Tarrytown. As previously stated, the site currently exists as a multi-family housing development with several buildings, parking areas, walkways, and other appurtenances. The stormwater runoff from the existing property generally drains west towards the Metro North Railroad. Also, there is an existing onsite collection system that captures a majority of the runoff from the property and discharge towards the Metro North Railroad as well. The existing onsite collection system connects to an existing Village of Tarrytown collection & conveyance system. There is an easement for the portion of Village stormwater collection & conveyance system which runs through the site from Riverview Avenue to the Metro North Railroad. It should be noted that it is proposed to relocate this portion of the stormwater system. A grant has been obtained and the location has been coordinated with the Village. See below for more information.

Onsite soils belong to the Hydrologic Groups B & D. Pursuant to the National Resource Conservation Service Web Soil Survey, the soil designations of the onsite soils consist of Charlton loam (ChE), Udorthents (Uf), Urban Land-Charlton complex (UhB, UhC & UhD) and Urban Land Charlton Chatfield complex (UIC & UID). The soil boundaries are shown on the enclosed pre- and post-development drainage figures, Figures 2 and 3 of this report. Based on borings and soil testing completed, a filtration bioretention area with an impermeable liner at the bottom and on the sides of the drainage layer is proposed. See Appendix I for portions of the Geotechnical Investigation Report completed by SESI Consulting Engineers dated January 22, 2024, for more information.

Stormwater runoff from the site drains currently to one design point, as shown on Figures 2 and 3. Design Point 1 represents the drainage structure that is part of the existing collection system that discharges towards the Metro North Railroad.

1.3 Proposed Site Conditions

The proposed redevelopment project includes the demolition of the existing onsite buildings & parking lot and the construction of a 120-unit townhouse community and community center including an associated clubhouse, driveway and parking lot. It is proposed to maintain the existing onsite collection system to the maximum extent practical in the proposed condition. New drainage structures will capture the runoff from the redeveloped site and will discharge into the proposed stormwater management practice (SMP) for treatment and attenuation of the new impervious areas. Stormwater treatment for the subject project will be accomplished through the use of a bioretention filter. The intent is to capture and treat the stormwater runoff from the redeveloped area of the site and treat it in accordance with the

NYSDEC standards for quality and quantity prior to discharging to the existing stormwater collection systems, such there is no impact to the surrounding stormwater design.

There are proposed retaining walls that run along the east side of Buildings 1 & 2 that interfere with the above-mentioned existing Village stormwater conveyance system. As such it is proposed to reroute the existing Village stormwater system that runs through the property, around the proposed retaining walls. It should be noted that a grant has been obtained and the location has been coordinated with the Village.

As shown in the following sections of this report, the stormwater quality and quantity for the proposed development have been treated in accordance with the requirements of the General Permit, GP-0-20-001. Additionally, an erosion and sediment control plan has been prepared in accordance with the *New York State Standards and Specifications for Erosion and Sediment Control* (Blue Book) to protect the existing waterbodies and drainage features during construction activities.

2.0 STORMWATER MANAGEMENT

The proposed stormwater management system for the project has been designed to meet the requirements of the state stormwater ordinances and guidelines, including but not limited to those of the NYSDEC.

Since the subject project proposes the disturbance of more than one (1) acre, coverage under the New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit No. GP-0-20-001 (General Permit) is required. Chapter 4 of the NYSSMDM specifies five design criteria that are Water Quality Volume (WQ_v), Runoff Reduction Volume (RR_v), Stream Channel Protection Volume (CP_v), Overbank Flood Control (Q_p), and Extreme Storm Control (Q_f). The first two of these requirements relates to treating water quality, while the later pertain to stormwater quantity (peak flow) attenuation. As noted in previous sections of this report, this project is a redevelopment project with an increase in impervious area. Per the requirements of Chapter 9 of the NYSSMDM, all new impervious areas are required to be treated in accordance with the requirements of Chapter 4 for both stormwater quality and quantity. Per Chapter 9, 25% of the existing impervious area within the subcatchments is required to be treated to meet the WQv requirements for redevelopment projects. As shown in the calculations in later sections of this report the 25% of the existing impervious areas were accounted for in the WQv sizing of the stormwater treatment practices. The attached Figure 4 (Impervious Area Map) indicates the areas of existing impervious to be redeveloped as well as the proposed impervious area.

To meet the above referenced requirements, the following post construction stormwater management practices are proposed for the project:

Table 2.0.1 – Proposed SMP Design Criteria Summary Table

Proposed SMP ID	NYSSMDM Ch. 6 Design Designation	Contributing Subcatchments	NYSDEC Uniform Stormwater Sizing Criteria Satisfied
SMP 1.1P	F-5, Bioretention Filter	1.1S	RRv / WQ_v

To address stormwater quantity requirements of the NYSDEC, the “HydroCAD” Stormwater Modeling System,” by HydroCAD Software Solutions LLC in Tamworth, New Hampshire, was used to model and assess the peak stormwater flows for the subject project. HydroCAD is a computer aided design program for modeling the hydrology and hydraulics of stormwater runoff. It is based primarily on hydrology techniques developed by the United States Department of Agriculture, Soil Conservation Service (USDA, SCS) TR-20 method combined with standard hydraulic calculations. For details on the input data for the subcatchments and design storms, please refer to Appendices B and C.

The input requirements for the HydroCAD computer program are as follows:

Subcatchments (contributing watershed/sub-watersheds)

- Design storm rainfall in inches
- CN (runoff curve number) values which are based on soil type and land use/ground cover
- T_c (time of concentration) flow path information
- Watershed Area in Acres

Stormwater Basins

- Surface area at appropriate elevations
- Flood elevation
- Outlet structure information

The following is a general description of the input data used to calculate the pre- and post-development stormwater runoff values. For detailed information for each subcatchment and stormwater management practice, see Appendices B & C. The 1-year, 10-year, and 100-year 24-hour design storm were obtained from the New York State Stormwater Management Design Manual. The values provided are for 24-hour design storms.

Table 2.0.1 – Precipitation Values for Corresponding Design Storms

Design Storm	24-Hour Rainfall
1-Year	2.79”
10-Year	5.10”
100-Year	9.11”

The CN (runoff curve number) values utilized in this report were referenced from the USDA, SCS publication *Urban Hydrology for Small Watersheds*. The following is a summary of the various land uses/ground covers and their associated CN values utilized in this report.

Table 2.0.2 – Project Ground Cover and Associated Curve Numbers (CN)

Land Use/Ground Cover	CN Value
Paved Parking and Roofs, All Soils	98
>75% Grass Cover, D Soils	80
Woods, Good, HSG D	77
>75% Grass Cover, B Soils	61
Woods, Good, HSG B	55

2.1 NYSDEC Runoff Reduction Volume, RR_v

The Runoff Reduction Volume (RR_v) criterion is intended to replicate pre-development hydrology by maintaining preconstruction infiltration, peak flow runoff, discharge volume, as well as minimizing concentrated stormwater flow. As stated in Chapter 4 of the NYSSMDM, RR_v may be treated with standard stormwater management practices (SMP’s) sized in accordance with the Chapter 4/6 requirements, or with green infrastructure practices (GIP’s) sized in accordance with the requirements set forth for each practice in Chapter 5. This requirement has been achieved on the subject project providing a bioretention filter in accordance with the design standards. Runoff reduction is achieved when runoff from a percentage of the impervious area on the site is captured, routed through an SMP or a GIP, infiltrated to the ground, reused, reduced by evapotranspiration, and eventually removed from the stormwater discharge from the site. The design of the bioretention filter as an SMP with the runoff reduction capacity will allow 40% of the WQ_v to be reduced from the site.

The intent is to provide RR_v equivalent to the entire WQ_v and Section 4.3 of the NYSSMDM states for sites that do not achieve runoff reduction to pre-construction condition must, at a minimum reduce a percentage of the runoff from impervious areas to be constructed on the site a minimum RR_v. The following equation can be used to determine the minimum runoff reduction volume:

The minimum runoff reduction volume shall be $RRv_{minimum} = \frac{(P)(R_v)(Ai)}{12}$

Where,

S = Hydrologic Soil Group (HSG) Specific Reduction Factor = 0.40 (B Soils), 0.30 (C Soils)

Aic = Total Area of New Impervious Cover

Ai = Impervious cover targeted for Runoff Reduction = (S)(Aic)

Rv = 0.95

For detailed calculations of the runoff reduction for the proposed bioretention filter see Appendix A & B. Listed in Table 2.3.1 below is a summary of the NYSDEC compliant practice, and its satisfaction of the NYSDEC RRv requirements:

Table 2.3.1 Runoff Reduction Volume Summary

RR_v *Required* = WQ_v (c.f.) From Appendix A	**RR_v *Minimum* (c.f.)** Calculated in Appendix A	**NYSDEC Practice Designation**	**Allowable % of WQv provided to be applied towards RRv**	**RRv *Provided* (c.f.)**
8,236	1,210	F-5, Bioretention Filter	40%	3,294

As shown in the table above the $RRv_{provided}$ is greater than the $RRv_{minimum.}$ Due to several factors, the project was not able to provide 100% RRv. In order to achieve 100% RRv an infiltration type practice must be employed. Soil testing in many locations of the site indicated the presence of groundwater. These conditions limit the effectiveness of standard SMP's with RRV capacity like infiltration practices and green infrastructure practices such as rain gardens. Due to the soils as a limiting factor, a bioretention filter was used to maximize the amount of RRv that could be achieved on the site. By providing RRv to the greatest extent practical and achieving the $RRv_{minimum}$, it is assumed that the requirements of the NYSDEC for RRv have been met.

2.2 NYSDEC Water Quality Volume, WQ_v

The stormwater management practice has been designed in accordance with the *Water Quality Volume (*WQ_v*)* Section (Chapter 4.2) of the NYSSMDM. As outlined in Chapter 4.2, the WQ_v is the runoff volume generated from the entire 90th percentile rain event. As previously stated, partitions of the proposed impervious surfaces will overlap existing impervious surfaces within the site area. As stated in Chapter 9 of the NYSSMDM only 25% of existing impervious (redevelopment) and 100% of new impervious surfaces within the proposed subcatchment require treatment. The proposed bioretention filter has been designed to treat the WQv in accordance with the NYSSMDM. In Appendix A of this report the calculation for an adjusted WQ_v to account for the redeveloped areas is shown.

The following equation, per Chapter 4.2 and Chapter 9, was used to determine the water quality volume for the 90% storm each of the contributing areas to the treatment practices:

The water quality volume shall be: $WQ_v = \frac{(P)(R_{v,e})(A_e)}{12} \times 25\% + \frac{(P)(R_{v,p})(A_p)}{12}$

Where,

WQ_v = water quality volume (in acre-feet)
P = 90% Rainfall Event Number = 1.4 inches
$R_{v,e}$ = 0.05 + 0.009(I), where I is percent impervious cover = 0.95
A = Subcatchment Area
A_e = Existing Impervious Area to be Redeveloped
A_p = Proposed Impervious Area
A_i = Total Impervious Area
I = (Ap)/(A-Ae)
$R_{v,p}$ = 0.05 +0.009 (I%)

Table 2.2.1 and 2.2.2 below summarizes the WQv treatment and Required Elements for the proposed bioretention filter, sized in accordance with Chapters 3 and 6 of the NYSSMDM for the proposed practice. The bioretention filter has been designed in accordance with the Chapter 9 of the Design Manual for a standard practice. The flowsplitters are sized to convey at a minimum the peak WQv flow to the bioretention filter, while allowing portions of larger storms to bypass the bioretention filter as allowed by the NYSSMDM. Pretreatment for the bioretention filter has been provided in the form of a hydrodynamic separators. The data (including capacities) for the hydrodynamic separators are included in Appendix G. The tables below summarize the WQv peak flows and hydrodynamic separate flow rates.

Table 2.2.1 Bioretention Filter - Water Quality Volume Treatment Summary

Subcatchment	Treatment Practice	NYSDEC Design Practice Designation	Required WQ_v (c.f.)
1.1AS & 1.1BS	SMP 1.1P	F-5	8,236

Table 2.2.2 Bioretention Filter - Water Quality Volume Treatment Summary

Total Required WQ_v (c.f.)	Required Filter Area (s.f.)	Provided Filter Area (s.f.)	Minimum Storage Volume Required (75% WQv) (c.f.)	Storage Volume Provided Below Permanent Pool (c.f.)
8,236	8,220	11,800	6,177	6,325

Table 2.2.3 – Pretreatment Hydrodynamic Separator Summary

Subcatchment	WQ_v Peak Flow (C.F.S).	Hydrodynamic Separator Model	Maximum Treatment Flow Rate (C.F.S.)
1.1AS	1.0	3ft First Defense	1.02 CFS
1.1BS	1.2	4ft First Defense	1.81 CFS

It should be noted that the above tables illustrate the water quality volume storage requirements set forth in the NYSSMDM have been met for the bioretention filter design. See Appendix F for the Bioretention filter sizing calculation.

2.3 NYSDEC Stream Channel Protection Volume, CP_v

The Stream Channel Protection (CP_v) criterion is intended to protect stream channels from erosion and is accomplished by the 24-hour extended detention of the center-of-mass of the one-year, 24-hour storm event. As per the NYSSWDM Chapter 9, if the post-construction 1-year 24 hour discharge rate and velocities are less than or equal to the pre-construction design rate, providing 24

hours detention of the 1 year storm to meet CPv criteria is not required. Table 2.3.1 below summarizes the peak flows discharging for the 1-Year 24-Hour design storm and demonstrates that the 1-Year 24-Hour post development rate is less than the predevelopment rate.

Table 2.4.1– Pre and Post-Development Peak Flows at the Design Point

	1-YEAR (Channel Protection Volume)	
	Pre	**Post**
Design Point 1	12.4	11.5

The data for the table above was taken from Appendix B & C of this SWPPP. As shown in the table above the peak flows discharging to the design point have beem mitigated for the 1-Year 24-Hour Storm. By providing a reduction in peak flows during the 1-Year, 24-hour storm, the NYSDEC requirements for Stream Channel Protection (Cp_v) have been met.

2.4 NYSDEC Overbank Flood Control, Q_p, and Extreme Flood Control, Q_f

The Overbank Flood Control (Q_p) requirement is intended to prevent an increase in the frequency and magnitude of out-of-bank flooding events generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge to pre-development rates. The Extreme Flood Control (Q_f) requirement is intended to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the pre-development 100-year flood plain, and protect the physical integrity of stormwater management practices. Extreme flood control requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. As shown in Table 2.4.1 attenuation for both the 10-year and 100-year 24-hour storms has been provided thus satisfying the Q_p and Q_f requirements.

Table 2.4.1– Pre and Post-Development Peak Flows at the Design Point

24-HOUR DESIGN STORM PEAK FLOWS (c.f.s.)				
	10-YEAR (Overbank Flood Control)		100-YEAR (Extreme Flood Control)	
	Pre	**Post**	**Pre**	**Post**
Design Point 1	32.8	32.6	66.5	64.8

As shown in the above table the peak flows discharging to the design point in the proposed condition have been mitigated to below the existing condition levels, therefore the receiving downstream drainage systems will see a reduction in peak flows during the storm events shown above and as such satisfy the Overbank and Extreme Overbank Flood Control requirements.

3.0 STORMWATER CONVEYANCE SYSTEM

The stormwater collection and conveyance systems for the project will consist of catch basins, drain inlets, yard drains, and HDPE pipe. The pipe conveyance system will be sized to collect and convey at minimum the 25-year, 1-hour design storm using the Rational Method. The Rational Method is a standard method used by engineers to develop flow rates for sizing collection systems. The Rational Method calculates flows based on a one-hour design storm. Pipe sizing is provided as Appendix H.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control should be accomplished by four basic principles: diversion of clean water, containment of sediment, treatment of dirty water, and stabilization of disturbed areas. Diversion of clean water should be accomplished with swales. This diverted water should be safely conveyed around the construction area as necessary and discharged downstream of the disturbed areas. Sediment should be contained with the use of silt fence at the toe of disturbed slopes and excavation of the temporary sediment basin. Disturbed areas should be permanently stabilized within 14 days of final grading to limit the required

length of time that the temporary facilities must be utilized. The owner will be responsible for the maintenance of the temporary erosion control facilities.

4.1 Temporary Erosion and Sediment Control Facilities

Temporary erosion and sediment control facilities should be installed and maintained as required to reduce the impacts to off-site properties. The owner will be required to provide maintenance for the temporary erosion and sediment control facilities. In general, the following temporary methods and materials should be used to control erosion and sedimentation from the project site:

- Stabilized Construction Entrance
- Silt Fence Barriers
- Storm Drain Inlet Protection

A stabilized construction entrance should be installed at the entrance to the site. The design drawings will include details to guide the contractor in the construction of this entrance. The intent of the stabilized construction entrance is to prevent the "tracking" of soil from the site. Dust control should be accomplished with water sprinkling trucks if required. During dry periods, sprinkler trucks should wet all exposed earth surfaces as required to prevent the transport of air-borne particles to adjoining areas.

Siltation barriers constructed of geosynthetic filter cloth should be installed at the toe of all disturbed slopes. The intent of these barriers is to contain silt and sediment at the source and inhibit its transport by stormwater runoff. The siltation barriers will also help reduce the rate of runoff by creating filters through which the stormwater must pass.

Storm drain inlet protection in the form of stone drop inlet protection will be installed around all proposed inlets. The stone drop inlet protection will serve to filter stormwater runoff before it enters the collection system. Throughout construction the concrete drainage structures, associated piping and inlet protections shall be inspected weekly and after a rainfall event. These items shall be cleaned, repaired and/or replaced when needed.

4.2 Permanent Erosion and Sediment Control Facilities

Permanent erosion and sediment control will be accomplished by diverting stormwater runoff from steep slopes, controlling/reducing stormwater runoff velocities and volumes, and vegetative and structural surface stabilization. All of the permanent facilities are relatively maintenance free and only require periodic inspections. The owner will provide maintenance for all the permanent erosion and sediment control facilities.

Other than the buildings and paved surfaces, disturbed surfaces will be stabilized with vegetation. The vegetation will control stormwater runoff by preventing soil erosion, reducing runoff volume and velocities, and providing a filter medium. Permanent seeding should optimally be undertaken in the spring from March 21st through May 20th and in late summer from August 15th to October 15th.

5.0 IMPLEMENTATION, MAINTENANCE & GENERAL HOUSEKEEPING

5.1 Construction Phase

Details associated with the implementation and maintenance of the proposed stormwater facilities and erosion control measures during construction are shown on the project drawings. A construction sequence has been provided to guide the contractor in the installation of the erosion control measures as well as the site plan features. The erosion control plan, includes associated details and notes to aid the contractor in implementing the plan.

During construction, a Site Log Book, Appendix E, is required to be kept per NYSDEC SPDES General Permit GP-0-20-001. Erosion and sediment control inspections are required to be conducted

as necessary under coverage of the permit (minimum once a week, two times a week should the overall disturbance exceed five acres) and an updated logbook and a copy of the SWPPP is required to be kept on site for the duration of the construction activities. The Construction Site Log Book is an appendix taken from the *New York Standards and Specifications for Erosion and Sediment Control* (Blue Book).

In addition to the proposed erosion and sediment control facilities, the following good housekeeping best management practices shall be implemented to mitigate potential pollution during the construction phase of the project. The general contractor overseeing the day-to-day site operation shall be responsible for the good housekeeping best management practices included in the following general categories:

- Material Handling and Waste Management
- Establishment of Building Material Staging Areas
- Establishment of Washout Areas
- Proper Equipment Fueling and Maintenance Practices
- Spill Prevention and Control Plan

All construction waste materials shall be collected and removed from the site regularly by the general contractor. The general contractor shall supply waste barrels for proper disposal of waste materials. All personnel working on the site shall be instructed of the proper procedures for construction waste disposal.

Although it is not anticipated any hazardous waste materials will be utilized during construction, any hazardous waste materials shall be disposed of in accordance with federal, state, and local regulations. No hazardous waste shall be disposed of on-site. Hazardous waste materials shall be stored in appropriate and clearly marked containers and segregated from the other non-waste materials. All hazardous waste shall be stored in structurally sound and sealed shipping containers located in the staging areas. Material safety data sheets, material inventory, and emergency contact numbers will be maintained in the office trailer. All personnel working on the site shall be instructed of the proper procedures for hazardous waste disposal.

Temporary sanitary facilities (portable toilets) shall be provided on site during the entire length of construction. The sanitary facilities shall be located in an alternate area away from the construction activities on the site. The portable toilets shall be inspected weekly for evidence of leaking holding tanks.

All recyclables, including wood pallets, cardboard boxes, and all other recyclable construction scraps shall be disposed of in a designated recycling barrel provided by the contractor and removed from the site regularly. All personnel working on the site shall be instructed of the proper procedures for construction waste recycling.

All construction equipment and maintenance materials shall be stored in a designated staging area. Silt fence shall be installed down gradient of the construction staging area. Shipping containers shall be utilized to store hand tools, small parts, and other construction materials, not taken off site daily. Construction waste barrels, recycling barrels and if necessary hazardous waste containers shall be located within the limits of the construction staging area.

Throughout the construction of the project, several types of vehicles and equipment will be used on-site. Fueling of the equipment shall occur within the limits of the construction staging area. Fuel will be delivered to the site as needed, by the general contractor, or a party chosen by the general contractor. Only minor vehicle equipment maintenance shall occur on-site, all major maintenance shall be performed off-site. All equipment fluids generated from minor maintenance activities shall be disposed of into designated drums and stored in accordance with the hazardous waste storage as previously discussed.

Vehicles and equipment shall be inspected on each day of use. Any leak discovered shall be repaired immediately. All leaking equipment unable to be repaired shall be removed from the site. Ample supplies of absorbent, spill-cleanup materials, and spill kits shall be located in the construction staging area. All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site

immediately after the spill is cleaned for disposal at a local landfill. All personnel working on the site shall be instructed of the proper procedures for spill prevention and control.

During the construction phase of the project the subsurface infiltration system shall be cordoned off with construction fence to prevent undue compaction of the surrounding soils. The infiltration areas shall not be allowed to receive runoff until the contributing area to the system is completely stabilized in accordance with the erosion and sediment control notes on the project drawings. Installation of the system after the contributing area is stable will help to prevent any sediment from entering the SMP.

5.2 Long Term Maintenance Plan

Each spring the paved areas should be cleaned to remove the winter's accumulation of traction sand. After this is completed, all drain inlets sumps and the stormwater basins should be cleaned. All pipes should be checked for debris and blockages and cleaned as required. During the cleaning process, the drain inlets, catch basins, and pipes should be inspected for structural integrity and overall condition; repairs and/or replacement will be made as required.

The stormwater facilities for the subject project have been designed to minimize the required maintenance. This section discusses the minimum maintenance requirements to insure long-term performance of the stormwater facilities. Initially the stormwater facilities will require an increased maintenance and inspection schedule until all portions of the site are stable. Generally, the stormwater facilities consist of either collection and conveyance components or treatment components.

The stormwater collection and conveyance system is composed of HDPE, drainage pipe and precast concrete drainage structures. The owner will assume the maintenance responsibilities for the drainage system. Minimal maintenance is typically required for these facilities. All pipes should be checked for debris and blockages and cleaned as required. All drain inlet sumps shall be cleaned to removed deposited sediment. During the cleaning process, the pipes should be inspected for structural integrity and overall condition; repairs and/or replacement should be made as required.

Additionally, the bioretention filter and hydrodynamic separator shall be checked for deposited sediment. Visual inspection of the bioretention filter shall take place after major storm events. Visual inspection of the hydrodynamic separator shall take place yearly. The bioretention filter shall have its berms mowed and any deposited sediment and debris shall be removed bi-annually. The deposited sediment shall be removed from the separator manually or with a vacuum truck.

APPENDIX A

NYSDEC Water Quality Volume WQv and Runoff Reduction RRv Calculation Worksheets

WQv Flow Calculation Worksheet

Project: Franklin Courts
Project #: 22220.100
Date: 2/6/2025

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The following calculation determines the water quality flow rate for the 90% Water Quality Event using the Small Storm Hydrology Method specified in Appendix B of the New York State Stormwater Management Design Manual.

Subcatchment ID: 1.1S

1.Water Quality Volume Redevelopment = $WQ_{vr} = \frac{P * R_{ve} * A_e}{12} * 0.25$

P = WQv 24-hour Rainfall Amount	=	1.5	in.
A_e = Area of Existing Impervious to be Redeveloped	=	95832	SF
R_{ve} = 0.05 + 0.009(100%)	=	0.95	
WQ_{vr} = Water Quality Volume of existing	=	2,845	CF

2.Water Quality Volume Proposed = $WQ_{vp} = \frac{P * R_{vp} * (A - A_e)}{12}$

P = WQv 24-hour Rainfall Amount	=	1.5	in.
A = Subcatchment Area of Practice	=	239580	SF
A_p= Proposed New Impervious Area	=	39204	SF
I = (Ap)/(A-Ae)	=	27.3	%
R_{vp} = 0.05 + 0.009(I%)	=	0.3	
WQvp = Water Quality Volume	=	5,391	CF

3.Water Quality Volume Total = $WQ_v = \frac{P * R_{ve} * A_e}{12} * 25\% + \frac{P * R_{vp} * (A - A_e)}{12} = WQ_{vr} + WQ_{vp}$

A_i = Total Impervious Area	=	135036	SF
WQv = Water Quality Volume	=	8,236	CF

RRv Calculation Worksheet - Subcatchments 1.1S/1.1P

Project #: Franklin Courts
Project #: 22220.100
Date: 2/6/2025

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

1. RRv Initial = Water Quality Volume (WQv) *0.189 ac-ft* = *8,236 c.f.*
(refer to HydroCAD Subcatchments 1.1S for Water Quality Volume)

2. *RRv Minimum* = [(P) (Rv) (S) (Aic)] /12 where…

P = Rainfall (in.)	=	1.50	in.
Rv = 0.05 + 0.009 (100%)	=	0.95	
S = Hydrologic Soil Group Specific Reduction Factor [HSG A = 0.55] [HSG B = 0.40] [HSG C = 0.30] [HSG D = 0.20]	=	0.26	
Aic = Total area of new impervious cover	=	0.90	Acres
RRv Minimum	=	*1,210*	*c.f.*

3. *RRv Required* = RRv Initial - Green Infrastructure Practice (GIP) with Area Reduction

GIP with Area Reduction Applied in Project		
5.3.1 Conservation of Natural Area	N/A	
5.3.2 Sheet Flow to Riparian Buffers or Filter Strips	N/A	
5.3.4 Tree Planting / Tree Box (100 s.f. per tree - 15 trees)	-	c.f.
5.3.5 Disconnection of Rooftop Runoff	-	
5.3.6 Stream Daylighting	N/A	
RRv Required(=WQv-RRV by area)(Refer to HydroCAD output in this Appendix) =	8,236	c.f.

4. *RRv Provided*

GIP with Volume Reduction Applied in Project	WQv Treated (c.f.)	% of WQv Applied to *RRv Provided*	*RRv Provided (c.f.)*
5.3.3 Vegetated Open Swales		20%	0
[HSG A / B = 20%] [HSG C / D = 10%] {Modified HSG C - D = 15% - 12%]		10%	0
5.3.7 Rain Garden		40%	0
[No underdrains / Good Soils = 100%] [With underdrains / Poor Soils = 40%]			
5.3.8 Green Roof		100%	N/A
[RRv provided equals volume provided in Green Roof]			
5.3.9 Stormwater Planters		45%	N/A
[Infiltration Planters = 100%] [Flow Through HSG C = 45%] [Flow Though HSG D = 30%]			
5.3.10 Rain Tank / Cisterns		100%	N/A
5.3.11 Porous Pavement		100%	0
Infiltration Practice (Standard SMP)		100%	N/A
Bioretention Practice (Standard SMP)	8,236	40%	3294
[Without Underdrains HSG A/B = 80%] [With Underdrain HSG C\D = 40%]			
Dry Swale (Open Channel Practice) (Standard SMP)		20%	N/A
[HSG A/B = 40%] [HSG C/D = 20%]			
RRv Provided =			*3,294*

5. Summary

RRv Initial	=	8,236	c.f.
RRv Required	=	8,236	c.f.
RRv Minimum	=	1,210	c.f.
RRv Provided	=	3,294	c.f.
WQv Required for Downstream SMP	=	4,942	c.f. (= RRv Required - RRv Provided)

Is RRv Provided greater than or equal to RRv Minimum? No

APPENDIX B

Pre-Development Computer Data



Subcat Reach Pond Link

Routing Diagram for Franklin Cts - Pre Development

Prepared by Insite Engineering, Surveying and Landscape Architecture, P.C., Printed 1/2/2024

HydroCAD® 10.00-15 s/n 00891 © 2015 HydroCAD Software Solutions LLC

Summary for Subcatchment PRE 1:

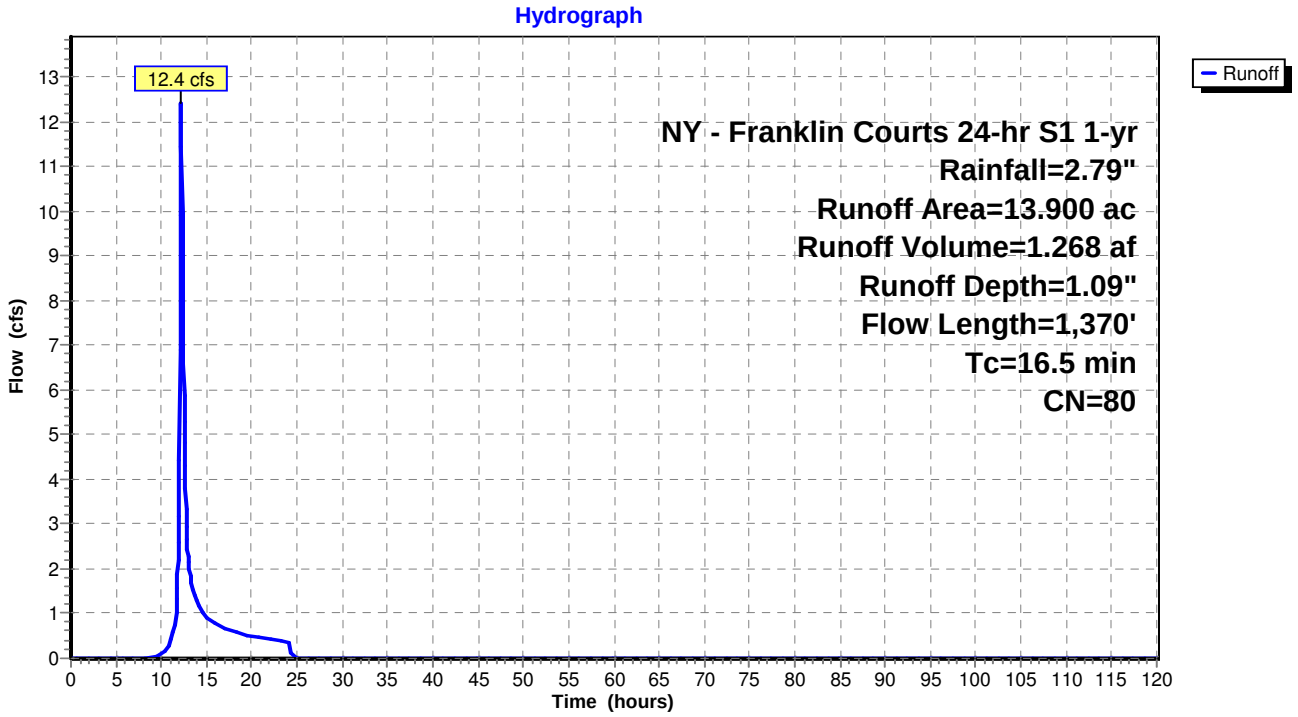
Runoff = 12.4 cfs @ 12.19 hrs, Volume= 1.268 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 1-yr Rainfall=2.79"

Area (ac)	CN	Description
5.400	98	Paved parking, HSG D
2.000	55	Woods, Good, HSG B
0.100	77	Woods, Good, HSG D
2.200	61	>75% Grass cover, Good, HSG B
4.200	80	>75% Grass cover, Good, HSG D
13.900	80	Weighted Average
8.500		61.15% Pervious Area
5.400		38.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	30	0.1500	0.31		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.0	70	0.1700	0.39		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.5	120	0.0700	3.97		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	80	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	80	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	60	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	120	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.9	810	0.0045	1.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.5	1,370	Total			

Subcatchment PRE 1:



Summary for Subcatchment PRE 1:

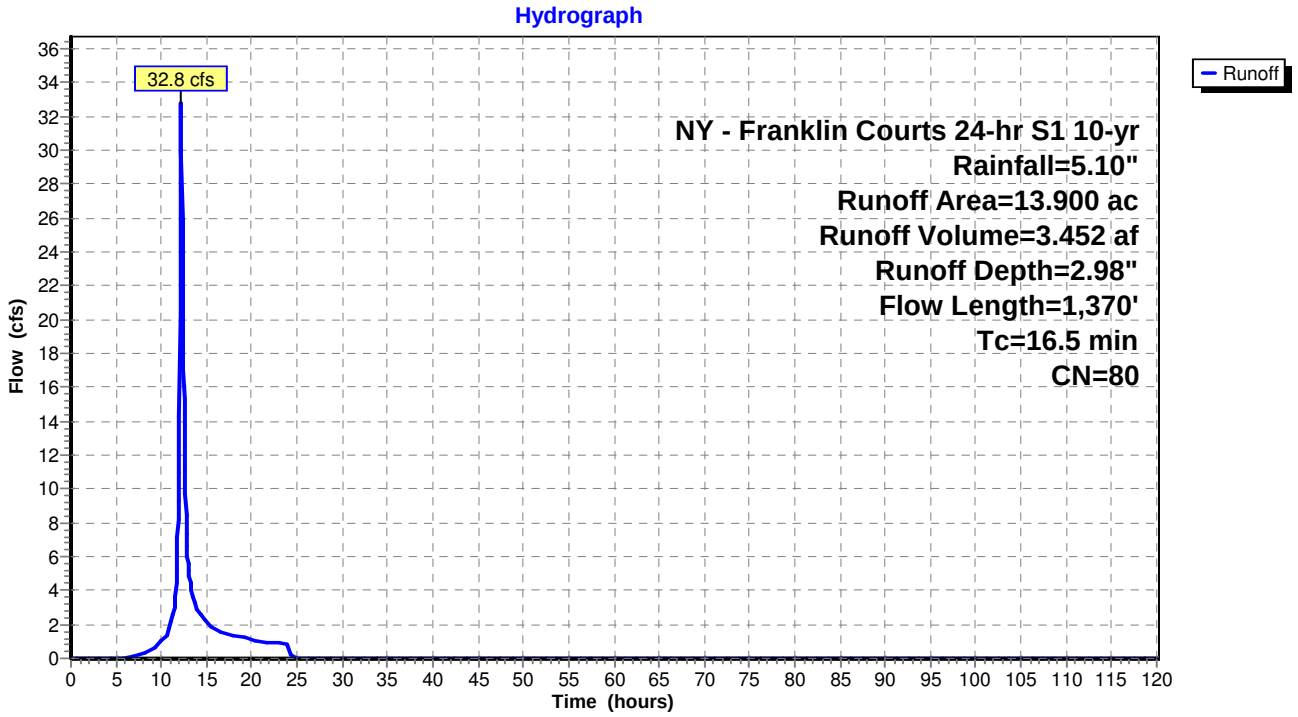
Runoff = 32.8 cfs @ 12.18 hrs, Volume= 3.452 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 10-yr Rainfall=5.10"

Area (ac)	CN	Description
5.400	98	Paved parking, HSG D
2.000	55	Woods, Good, HSG B
0.100	77	Woods, Good, HSG D
2.200	61	>75% Grass cover, Good, HSG B
4.200	80	>75% Grass cover, Good, HSG D
13.900	80	Weighted Average
8.500		61.15% Pervious Area
5.400		38.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	30	0.1500	0.31		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.0	70	0.1700	0.39		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.5	120	0.0700	3.97		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	80	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	80	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	60	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	120	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.9	810	0.0045	1.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.5	1,370	Total			

Subcatchment PRE 1:



Summary for Subcatchment PRE 1:

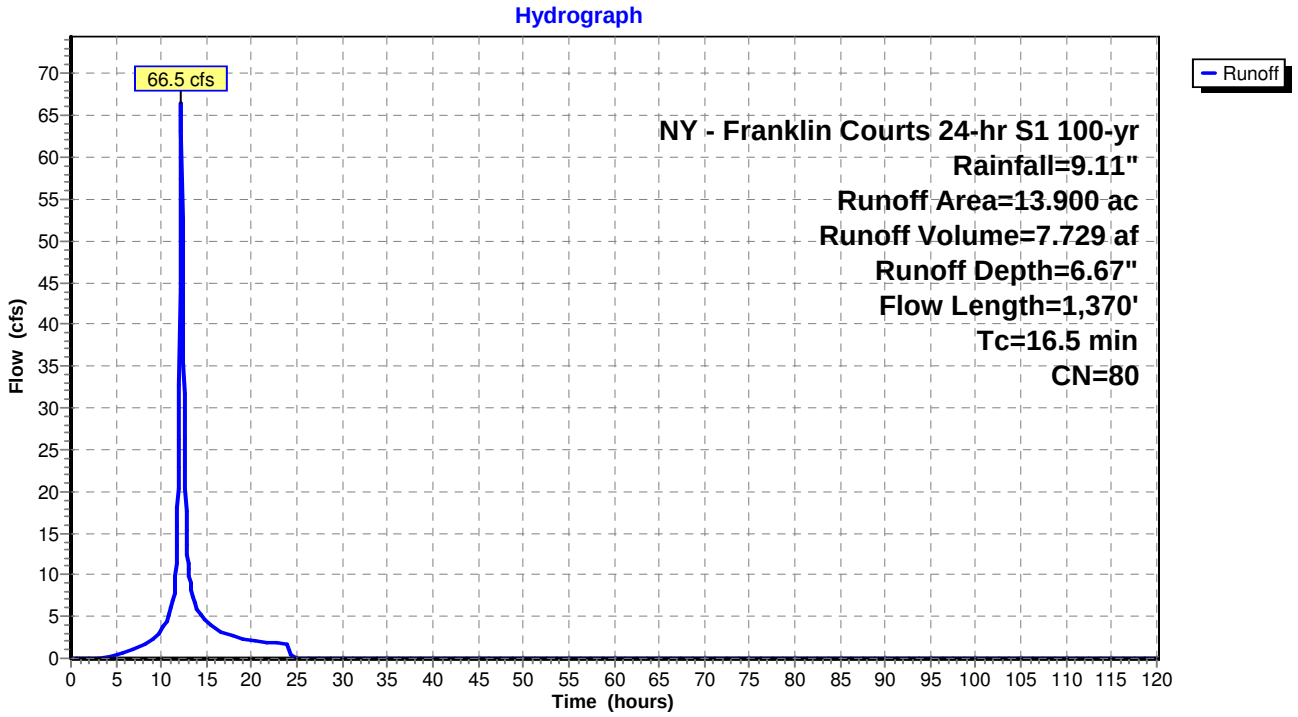
Runoff = 66.5 cfs @ 12.18 hrs, Volume= 7.729 af, Depth= 6.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 100-yr Rainfall=9.11"

Area (ac)	CN	Description
5.400	98	Paved parking, HSG D
2.000	55	Woods, Good, HSG B
0.100	77	Woods, Good, HSG D
2.200	61	>75% Grass cover, Good, HSG B
4.200	80	>75% Grass cover, Good, HSG D
13.900	80	Weighted Average
8.500		61.15% Pervious Area
5.400		38.85% Impervious Area

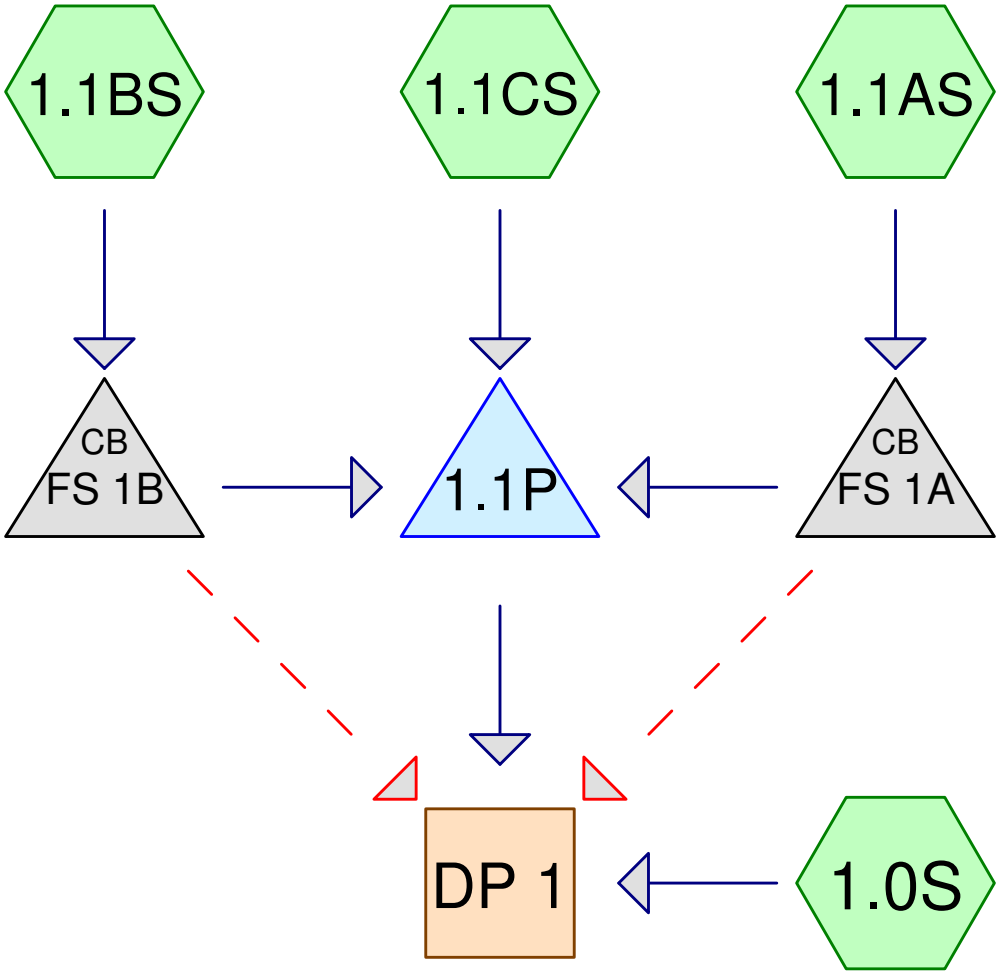
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	30	0.1500	0.31		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.0	70	0.1700	0.39		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.5	120	0.0700	3.97		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	80	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	80	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.3	60	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	120	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.9	810	0.0045	1.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
16.5	1,370	Total			

Subcatchment PRE 1:



APPENDIX C

Post-Development Computer Data



DESIGN POINT 1

Subcat Reach Pond Link

Routing Diagram for Franklin Cts - Post Development
Prepared by {enter your company name here}, Printed 2/6/2025
HydroCAD® 10.00-15 s/n 02171 © 2015 HydroCAD Software Solutions LLC

Summary for Subcatchment 1.0S:

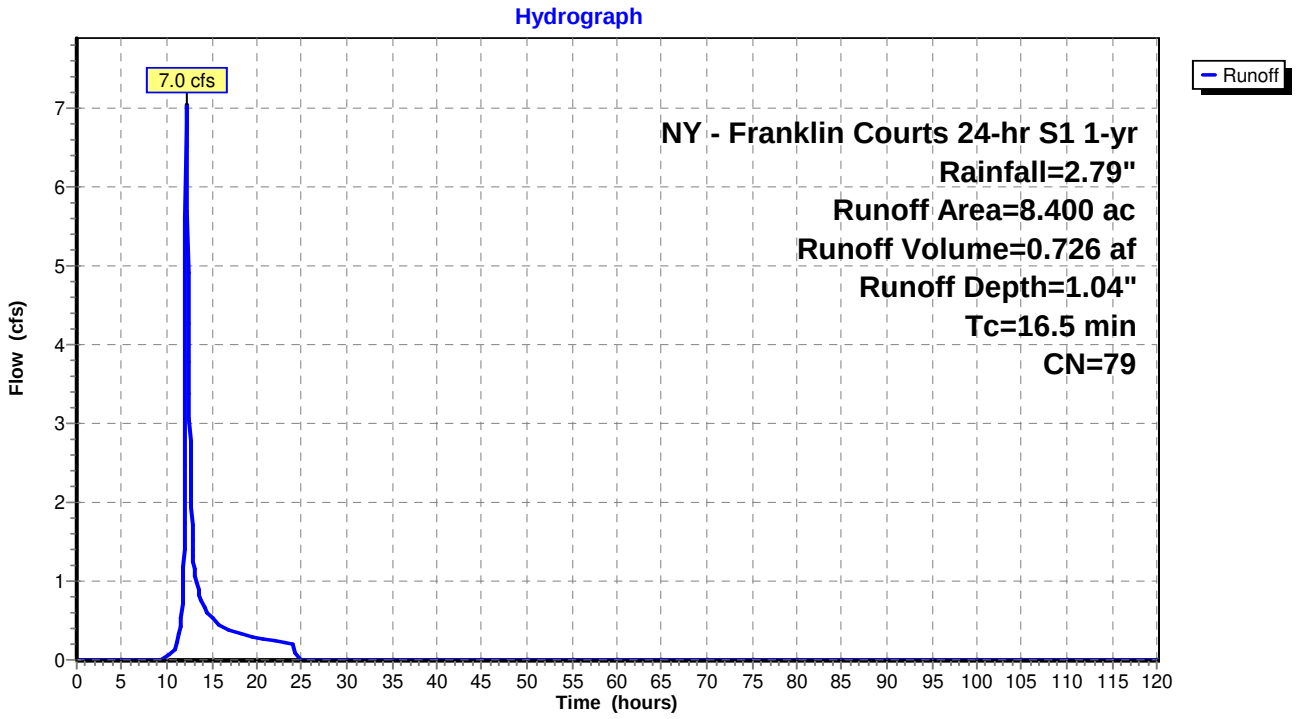
Runoff = 7.0 cfs @ 12.19 hrs, Volume= 0.726 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 1-yr Rainfall=2.79"

Area (ac)	CN	Description
3.200	98	Paved parking, HSG D
1.700	55	Woods, Good, HSG B
0.700	77	Woods, Good, HSG D
1.100	61	>75% Grass cover, Good, HSG B
1.700	80	>75% Grass cover, Good, HSG D
8.400	79	Weighted Average
5.200		61.90% Pervious Area
3.200		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5					**Direct Entry,**

Subcatchment 1.0S:



Summary for Subcatchment 1.1AS:

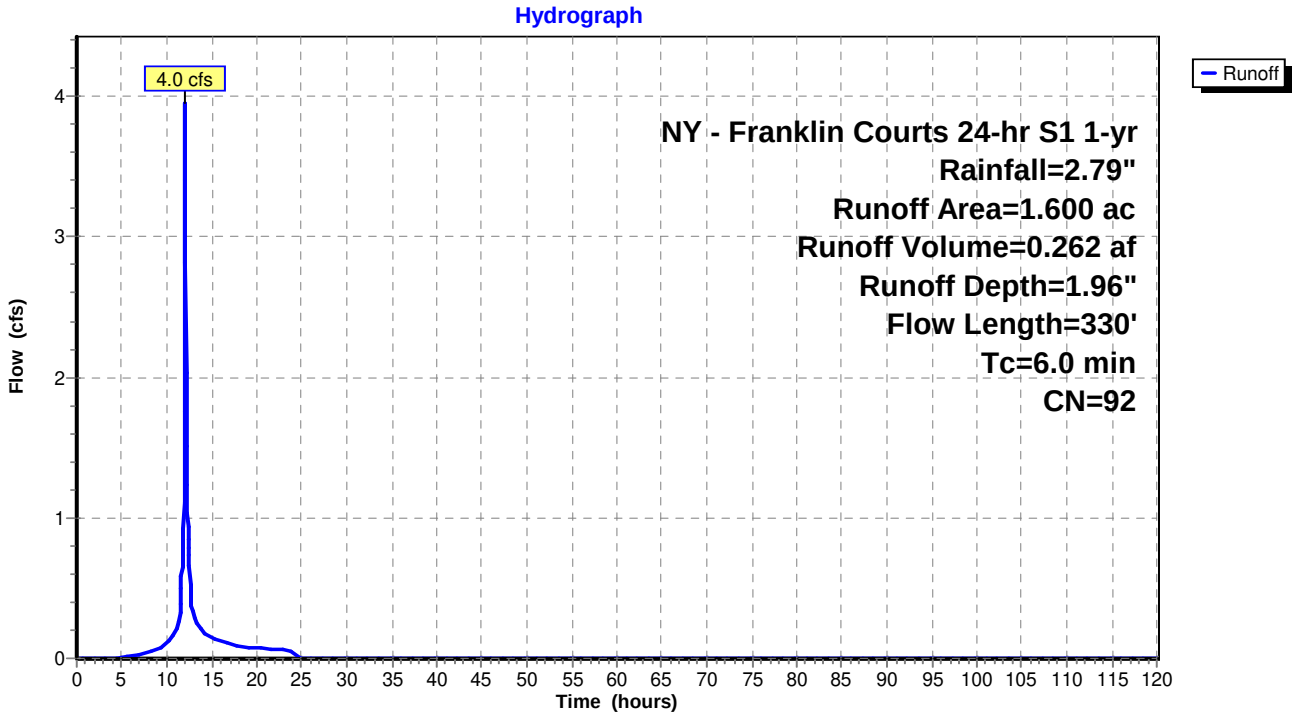
Runoff = 4.0 cfs @ 12.04 hrs, Volume= 0.262 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 1-yr Rainfall=2.79"

Area (ac)	CN	Description
1.300	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
1.600	92	Weighted Average
0.300		18.75% Pervious Area
1.300		81.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0350	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.7	50	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.6	100	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	50	0.0500	10.99	8.63	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.2	80	0.0300	7.91	23.72	**Channel Flow,** Area= 3.0 sf Perim= 5.4' r= 0.56' n= 0.022 Earth, clean & straight
6.0	330	Total			

Subcatchment 1.1AS:



Summary for Subcatchment 1.1BS:

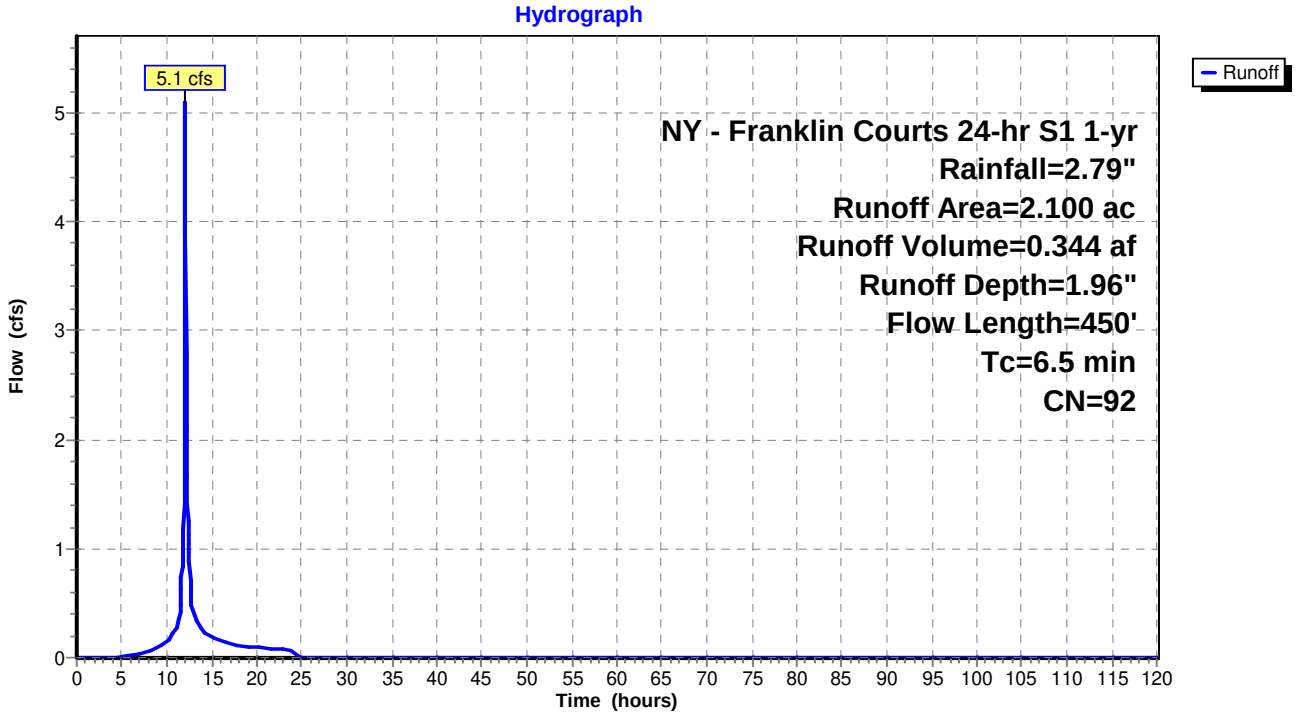
Runoff = 5.1 cfs @ 12.05 hrs, Volume= 0.344 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 1-yr Rainfall=2.79"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
2.100	92	Weighted Average
0.500		23.81% Pervious Area
1.600		76.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	75	0.0450	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.3	25	0.0500	1.55		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.8	350	0.0200	6.95	5.46	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.5	450	Total			

Subcatchment 1.1BS:



Summary for Subcatchment 1.1CS:

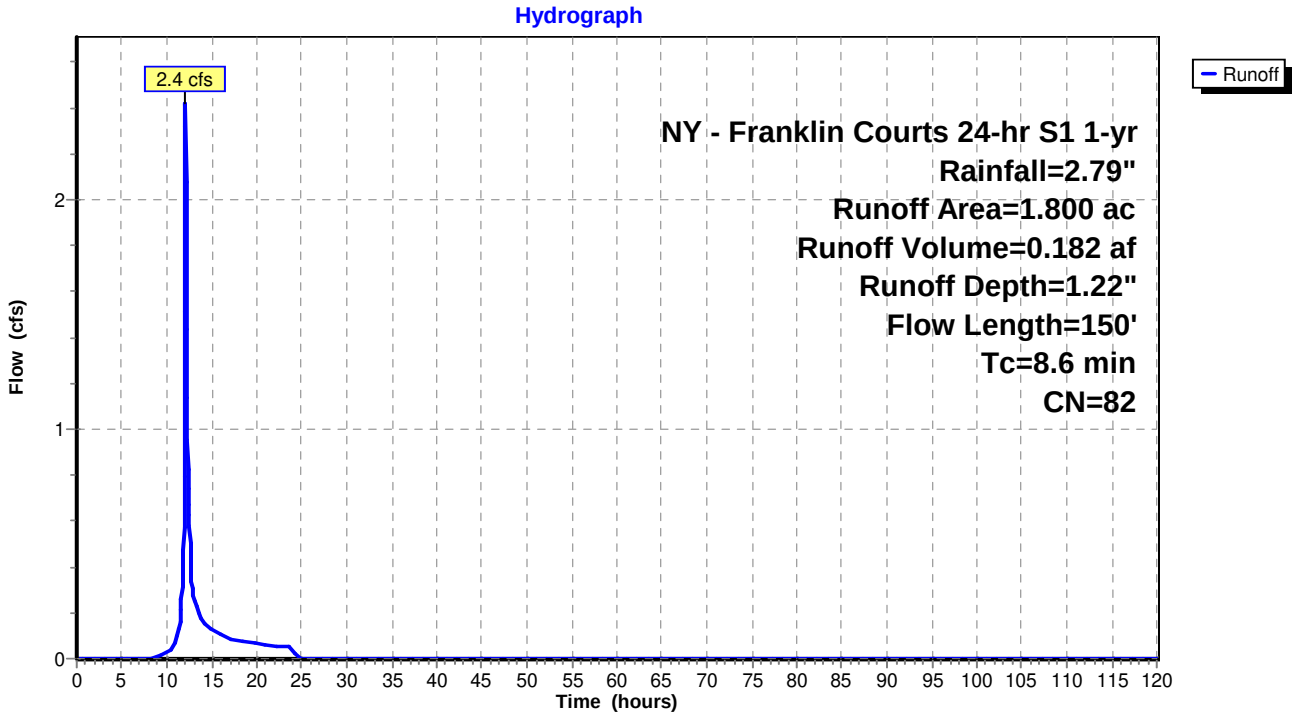
Runoff = 2.4 cfs @ 12.07 hrs, Volume= 0.182 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 1-yr Rainfall=2.79"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
1.600	80	>75% Grass cover, Good, HSG D
1.800	82	Weighted Average
1.600		88.89% Pervious Area
0.200		11.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.5	50	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.6	150	Total			

Subcatchment 1.1CS:

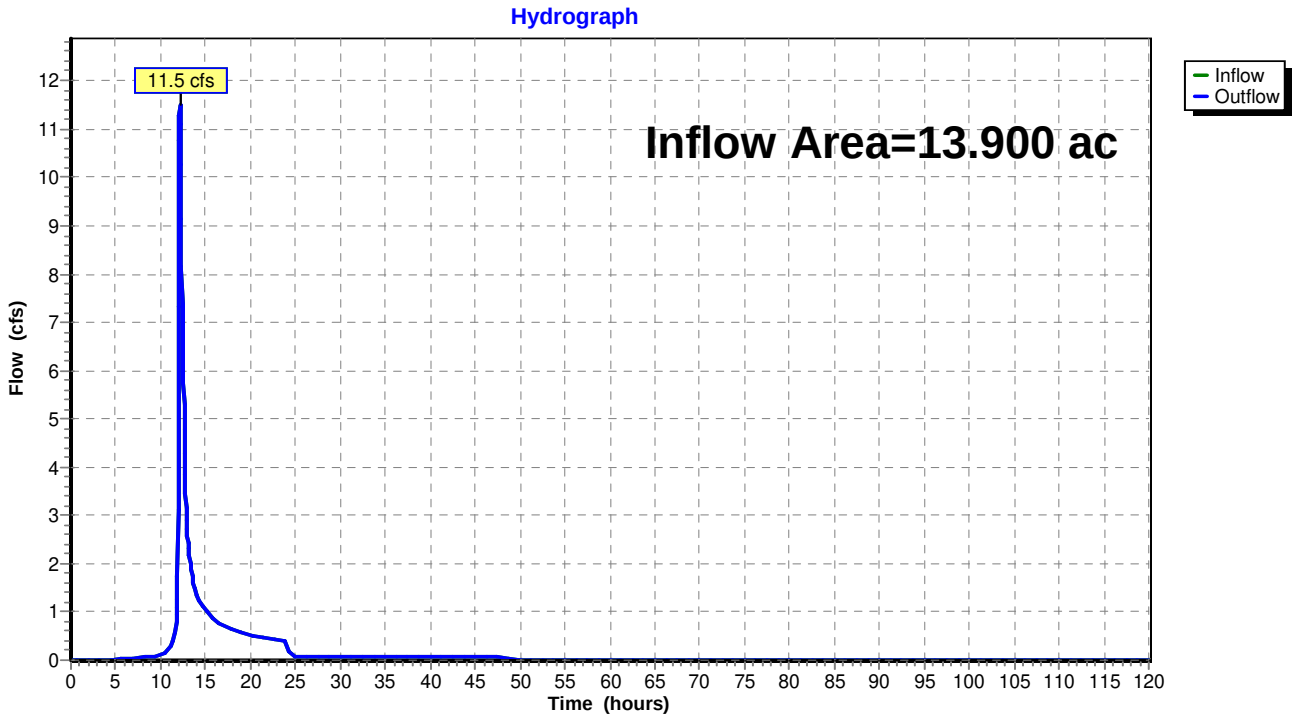


Summary for Reach DP 1: DESIGN POINT 1

Inflow Area = 13.900 ac, 45.32% Impervious, Inflow Depth = 1.31" for 1-yr event
Inflow = 11.5 cfs @ 12.14 hrs, Volume= 1.514 af
Outflow = 11.5 cfs @ 12.14 hrs, Volume= 1.514 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Reach DP 1: DESIGN POINT 1



Summary for Pond 1.1P:

Inflow Area = 5.500 ac, 56.36% Impervious, Inflow Depth = 1.54" for 1-yr event
Inflow = 5.5 cfs @ 12.07 hrs, Volume= 0.706 af
Outflow = 3.2 cfs @ 12.30 hrs, Volume= 0.706 af, Atten= 41%, Lag= 14.0 min
Primary = 3.2 cfs @ 12.30 hrs, Volume= 0.706 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 5.71' @ 12.30 hrs Surf.Area= 14,203 sf Storage= 9,188 cf

Plug-Flow detention time= 330.9 min calculated for 0.706 af (100% of inflow)
Center-of-Mass det. time= 330.7 min (1,169.2 - 838.5)

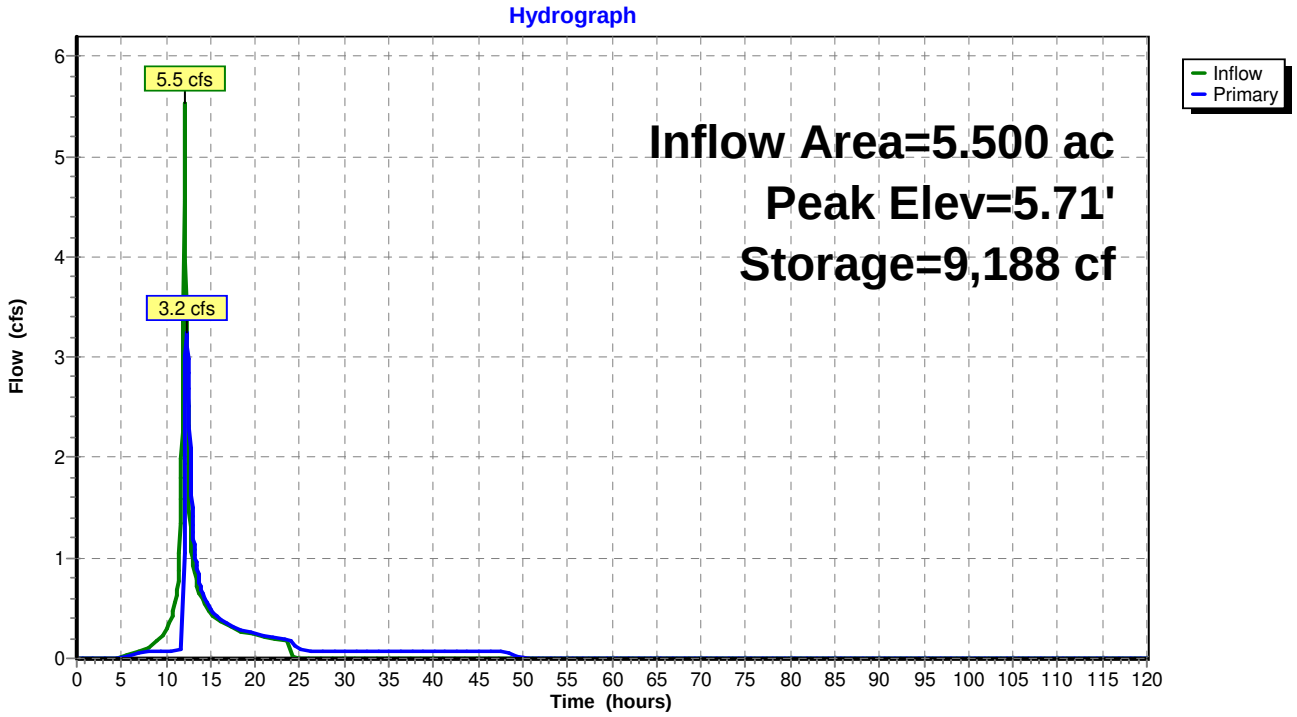
Volume	Invert	Avail.Storage	Storage Description
#1	5.00'	13,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5.00	11,800	0	0
6.00	15,200	13,500	13,500

Device	Routing	Invert	Outlet Devices
#1	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	2.20'	**24.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.20' / 1.80' S= 0.0400 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#4	Device 3	5.00'	**0.250 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Primary OutFlow Max=3.2 cfs @ 12.30 hrs HW=5.71' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 3.2 cfs of 23.9 cfs potential flow)
  ├─**1=Broad-Crested Rectangular Weir** (Weir Controls 2.1 cfs @ 1.27 fps)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.1 cfs @ 1.27 fps)
  └─**4=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond 1.1P:


Hydrograph
Inflow Area=5.500 ac
Peak Elev=5.71'
Storage=9,188 cf
5.5 cfs
3.2 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1A:

Inflow Area = 1.600 ac, 81.25% Impervious, Inflow Depth = 1.96" for 1-yr event
Inflow = 4.0 cfs @ 12.04 hrs, Volume= 0.262 af
Outflow = 4.0 cfs @ 12.04 hrs, Volume= 0.262 af, Atten= 0%, Lag= 0.0 min
Primary = 1.3 cfs @ 12.04 hrs, Volume= 0.225 af
Secondary = 2.6 cfs @ 12.04 hrs, Volume= 0.037 af

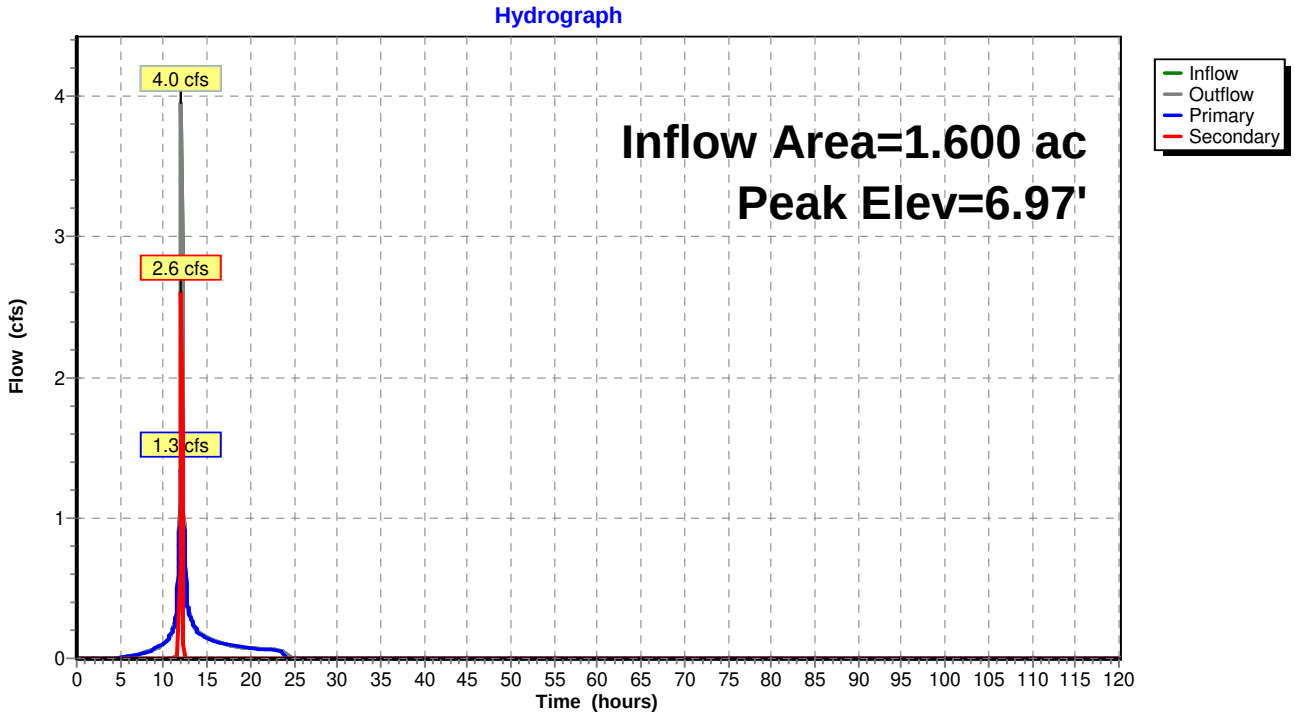
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 6.97' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	6.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.00' / 5.00' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	5.50'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.50' / 3.00' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	6.60'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.3 cfs @ 12.04 hrs HW=6.96' TW=5.58' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.3 cfs @ 3.81 fps)

Secondary OutFlow Max=2.5 cfs @ 12.04 hrs HW=6.96' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.5 cfs of 10.1 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 2.5 cfs @ 1.74 fps)

Pond FS 1A:


Hydrograph
Inflow Area=1.600 ac
Peak Elev=6.97'
4.0 cfs
2.6 cfs
1.3 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1B:

Inflow Area = 2.100 ac, 76.19% Impervious, Inflow Depth = 1.96" for 1-yr event
Inflow = 5.1 cfs @ 12.05 hrs, Volume= 0.344 af
Outflow = 5.1 cfs @ 12.05 hrs, Volume= 0.344 af, Atten= 0%, Lag= 0.0 min
Primary = 1.8 cfs @ 12.05 hrs, Volume= 0.299 af
Secondary = 3.3 cfs @ 12.05 hrs, Volume= 0.045 af

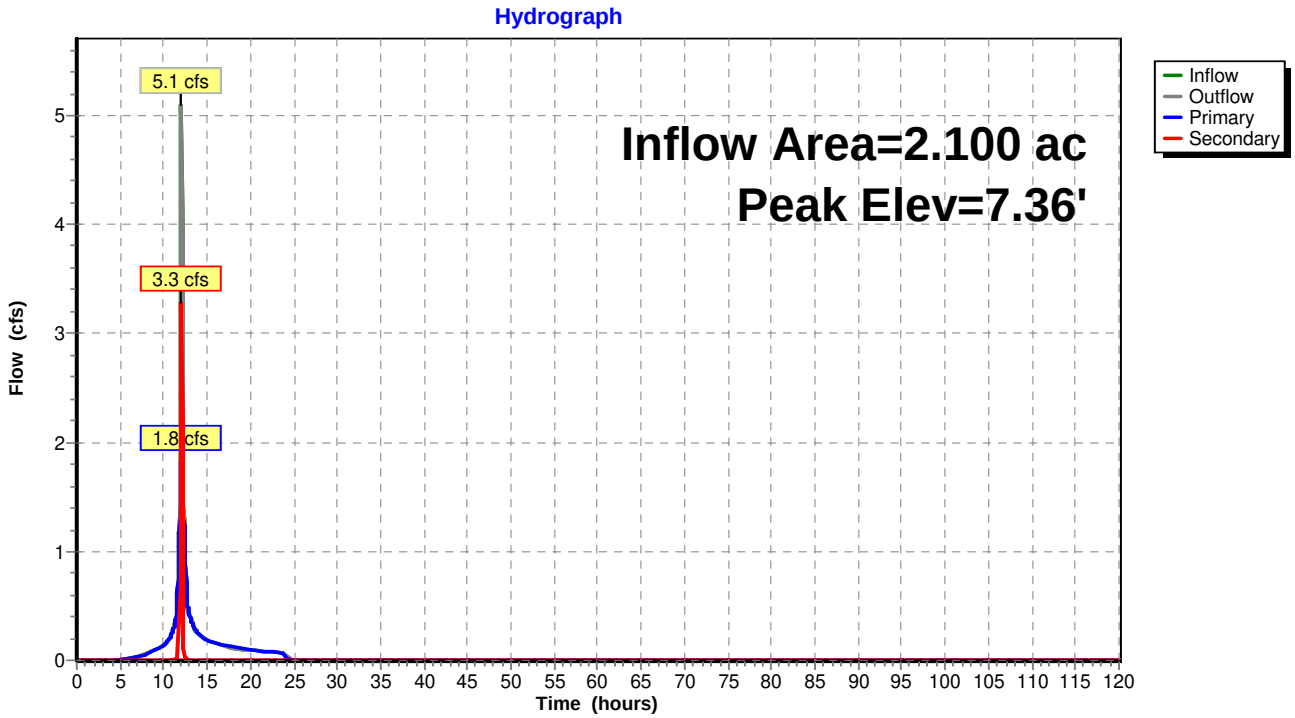
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 7.36' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 5.10' S= 0.0140 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	6.60'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.60' / 3.00' S= 0.0360 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=1.8 cfs @ 12.05 hrs HW=7.36' TW=5.59' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.8 cfs @ 5.19 fps)

Secondary OutFlow Max=3.2 cfs @ 12.05 hrs HW=7.36' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 3.2 cfs @ 2.96 fps)

Pond FS 1B:



Summary for Subcatchment 1.0S:

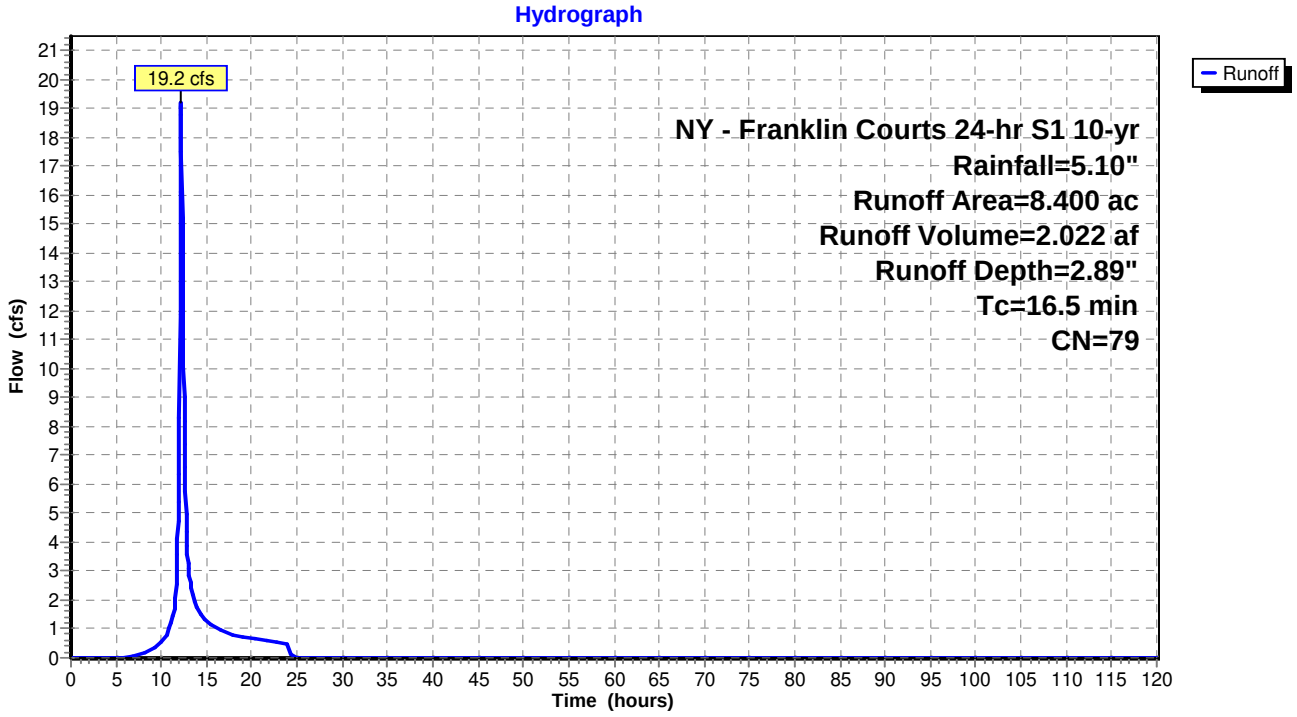
Runoff = 19.2 cfs @ 12.18 hrs, Volume= 2.022 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 10-yr Rainfall=5.10"

Area (ac)	CN	Description
3.200	98	Paved parking, HSG D
1.700	55	Woods, Good, HSG B
0.700	77	Woods, Good, HSG D
1.100	61	>75% Grass cover, Good, HSG B
1.700	80	>75% Grass cover, Good, HSG D
8.400	79	Weighted Average
5.200		61.90% Pervious Area
3.200		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5					**Direct Entry,**

Subcatchment 1.0S:



Summary for Subcatchment 1.1AS:

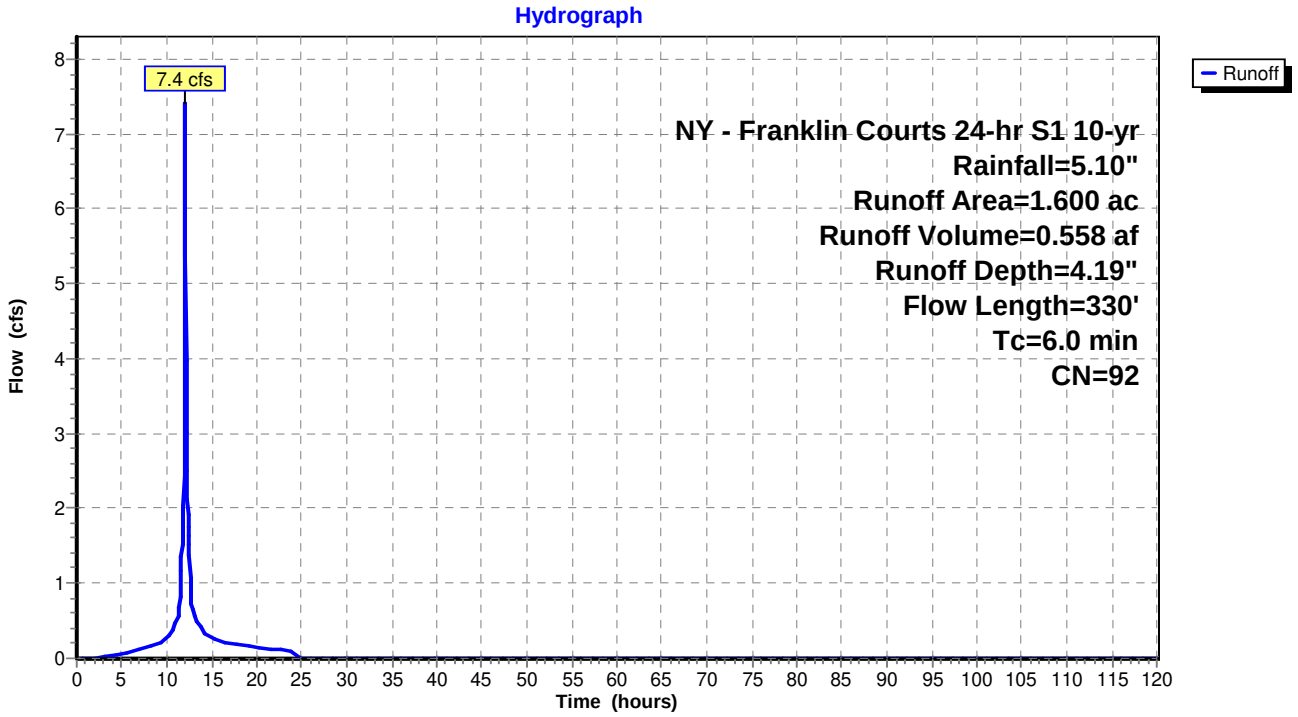
Runoff = 7.4 cfs @ 12.04 hrs, Volume= 0.558 af, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 10-yr Rainfall=5.10"

Area (ac)	CN	Description
1.300	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
1.600	92	Weighted Average
0.300		18.75% Pervious Area
1.300		81.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0350	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.7	50	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.6	100	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	50	0.0500	10.99	8.63	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.2	80	0.0300	7.91	23.72	**Channel Flow,** Area= 3.0 sf Perim= 5.4' r= 0.56' n= 0.022 Earth, clean & straight
6.0	330	Total			

Subcatchment 1.1AS:



Summary for Subcatchment 1.1BS:

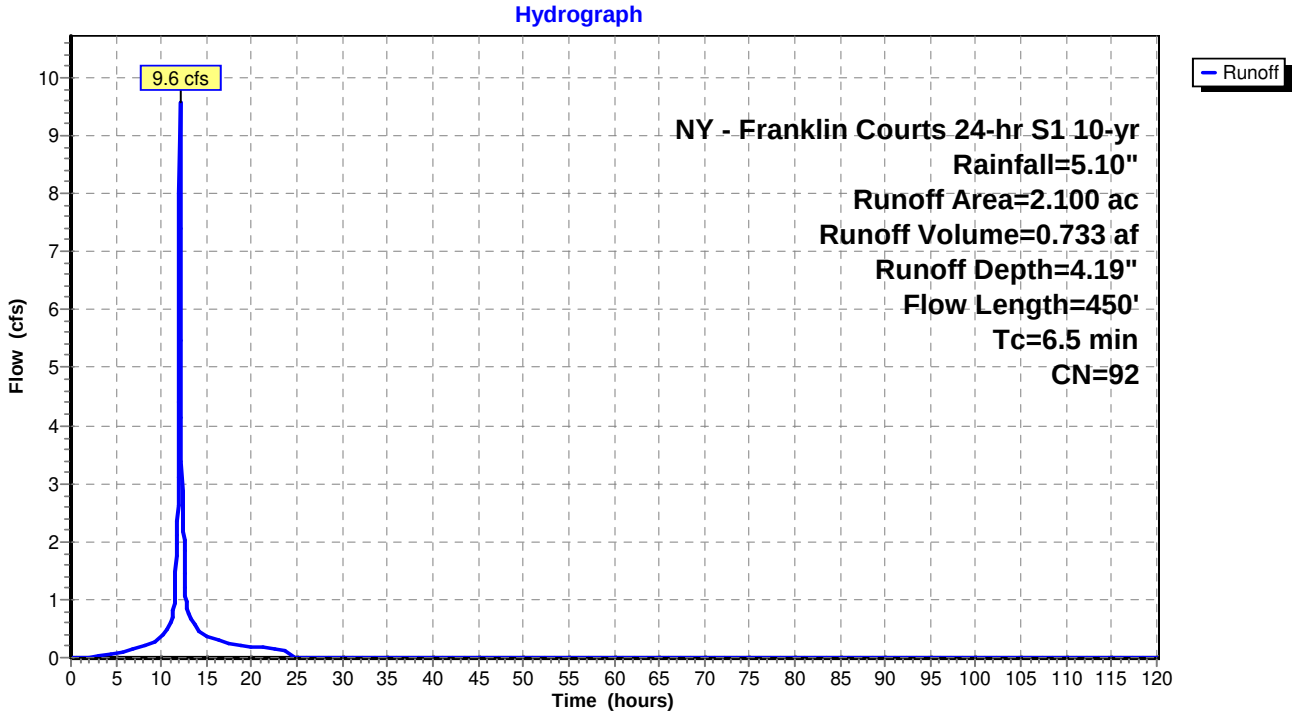
Runoff = 9.6 cfs @ 12.05 hrs, Volume= 0.733 af, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 10-yr Rainfall=5.10"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
2.100	92	Weighted Average
0.500		23.81% Pervious Area
1.600		76.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	75	0.0450	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.3	25	0.0500	1.55		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.8	350	0.0200	6.95	5.46	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.5	450	Total			

Subcatchment 1.1BS:



Summary for Subcatchment 1.1CS:

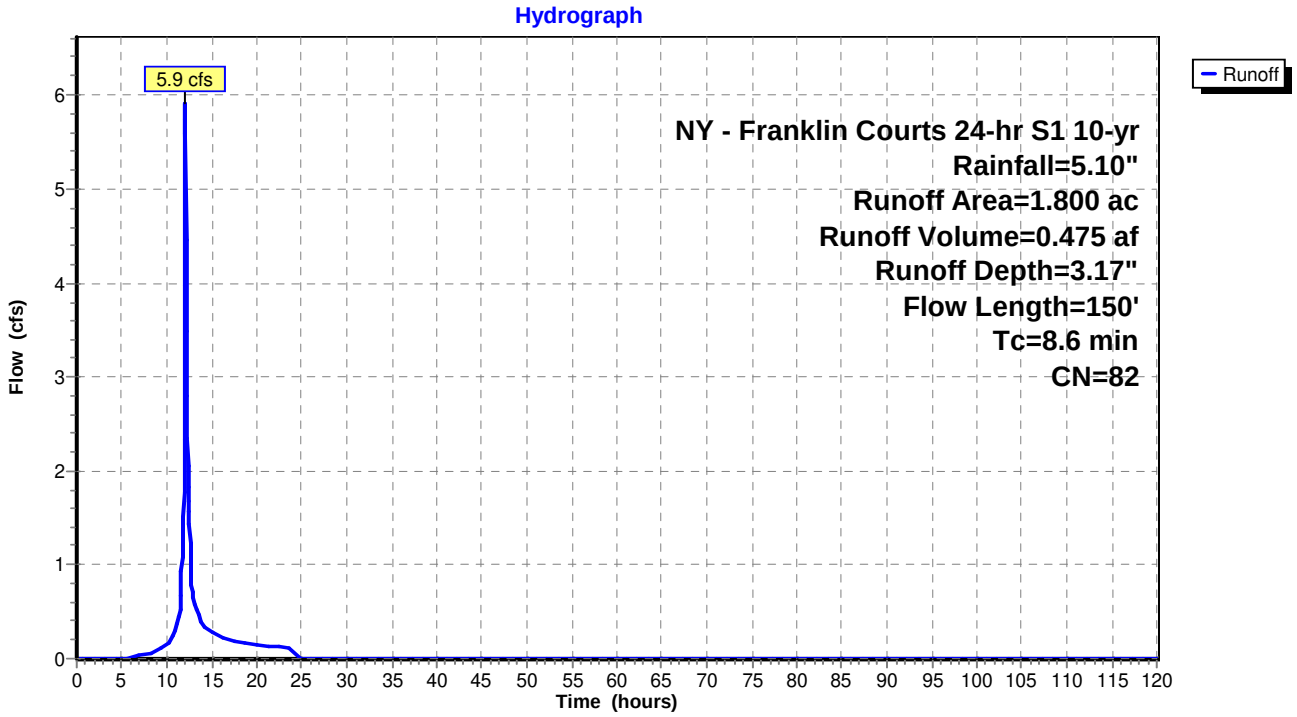
Runoff = 5.9 cfs @ 12.07 hrs, Volume= 0.475 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 10-yr Rainfall=5.10"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
1.600	80	>75% Grass cover, Good, HSG D
1.800	82	Weighted Average
1.600		88.89% Pervious Area
0.200		11.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.5	50	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.6	150	Total			

Subcatchment 1.1CS:

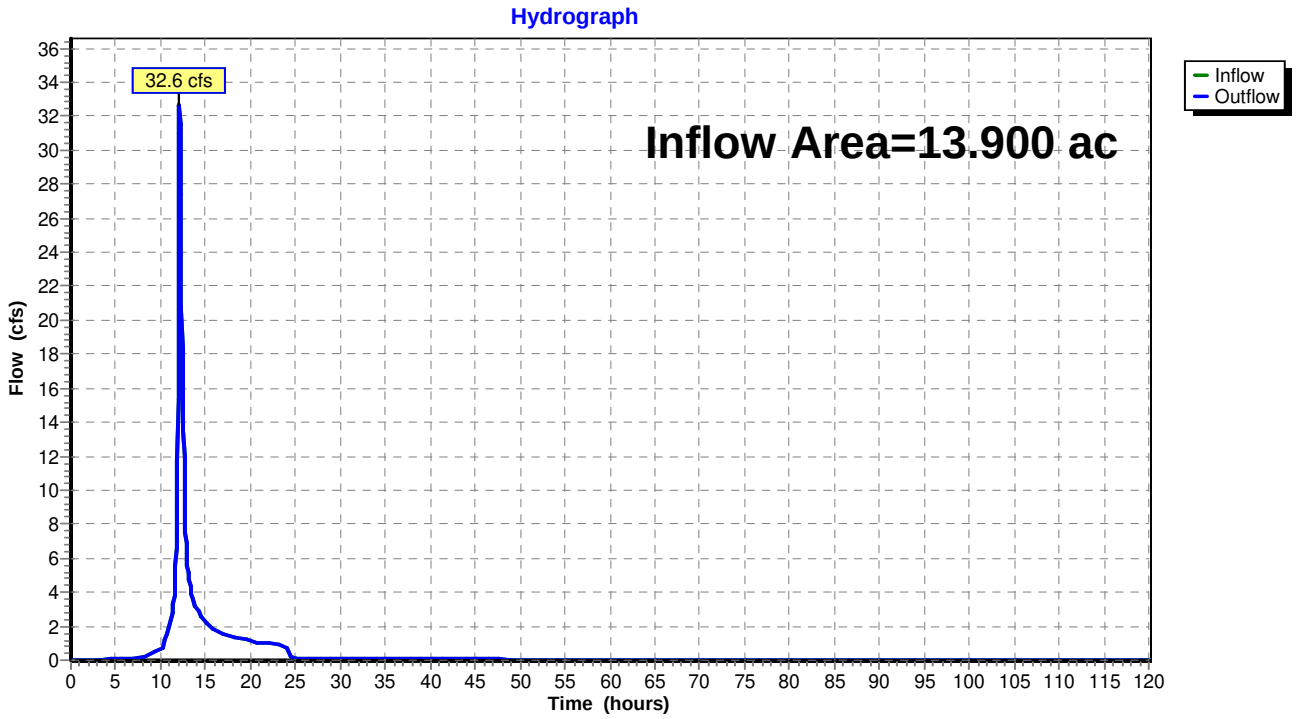


Summary for Reach DP 1: DESIGN POINT 1

Inflow Area = 13.900 ac, 45.32% Impervious, Inflow Depth = 3.27" for 10-yr event
Inflow = 32.6 cfs @ 12.13 hrs, Volume= 3.788 af
Outflow = 32.6 cfs @ 12.13 hrs, Volume= 3.788 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Reach DP 1: DESIGN POINT 1



Summary for Pond 1.1P:

Inflow Area = 5.500 ac, 56.36% Impervious, Inflow Depth = 3.22" for 10-yr event
Inflow = 9.5 cfs @ 12.07 hrs, Volume= 1.475 af
Outflow = 7.4 cfs @ 12.17 hrs, Volume= 1.475 af, Atten= 22%, Lag= 5.9 min
Primary = 7.4 cfs @ 12.17 hrs, Volume= 1.475 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 5.85' @ 12.17 hrs Surf.Area= 14,702 sf Storage= 11,312 cf

Plug-Flow detention time= 183.6 min calculated for 1.475 af (100% of inflow)
Center-of-Mass det. time= 184.1 min (1,001.0 - 816.8)

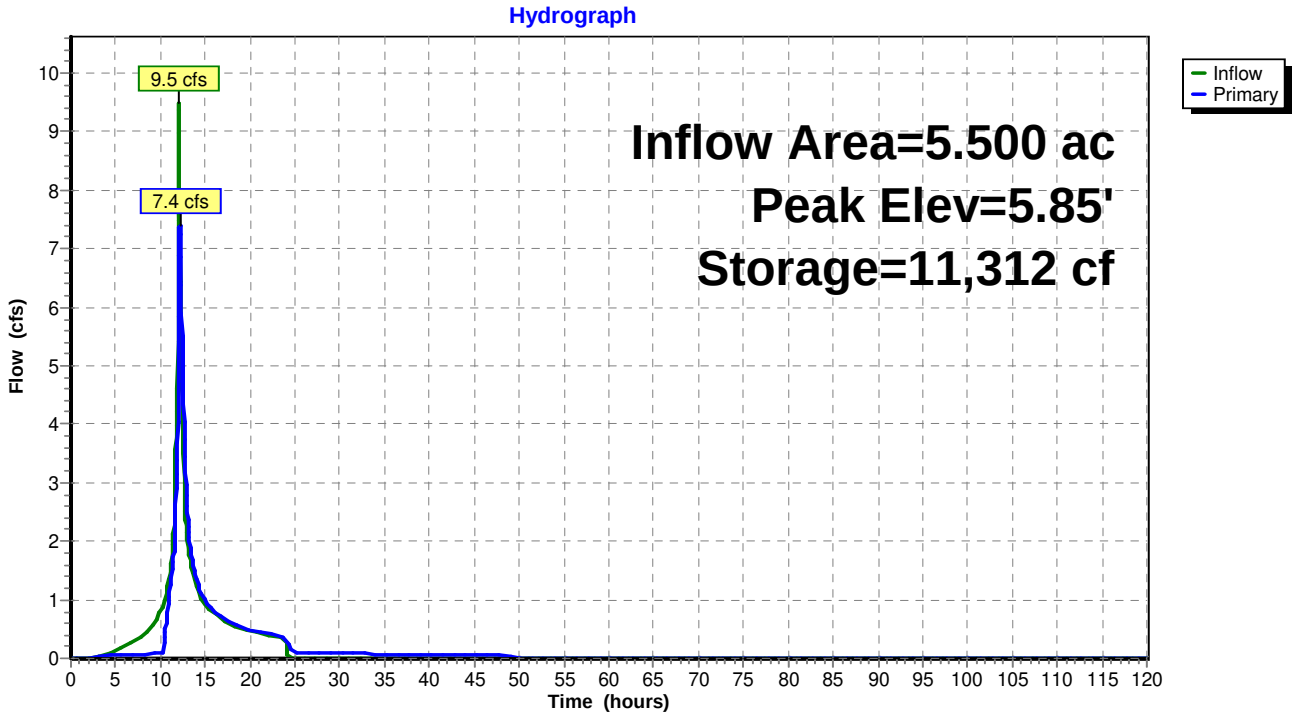
Volume	Invert	Avail.Storage	Storage Description
#1	5.00'	13,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5.00	11,800	0	0
6.00	15,200	13,500	13,500

Device	Routing	Invert	Outlet Devices
#1	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	2.20'	**24.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.20' / 1.80' S= 0.0400 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#4	Device 3	5.00'	**0.250 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Primary OutFlow Max=7.3 cfs @ 12.17 hrs HW=5.85' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 7.3 cfs of 24.6 cfs potential flow)
  ├─**1=Broad-Crested Rectangular Weir** (Weir Controls 4.8 cfs @ 1.71 fps)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.4 cfs @ 1.71 fps)
  └─**4=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond 1.1P:


Hydrograph
Inflow Area=5.500 ac
Peak Elev=5.85'
Storage=11,312 cf
9.5 cfs
7.4 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1A:

Inflow Area = 1.600 ac, 81.25% Impervious, Inflow Depth = 4.19" for 10-yr event
Inflow = 7.4 cfs @ 12.04 hrs, Volume= 0.558 af
Outflow = 7.4 cfs @ 12.04 hrs, Volume= 0.558 af, Atten= 0%, Lag= 0.0 min
Primary = 1.6 cfs @ 12.04 hrs, Volume= 0.430 af
Secondary = 5.8 cfs @ 12.04 hrs, Volume= 0.129 af

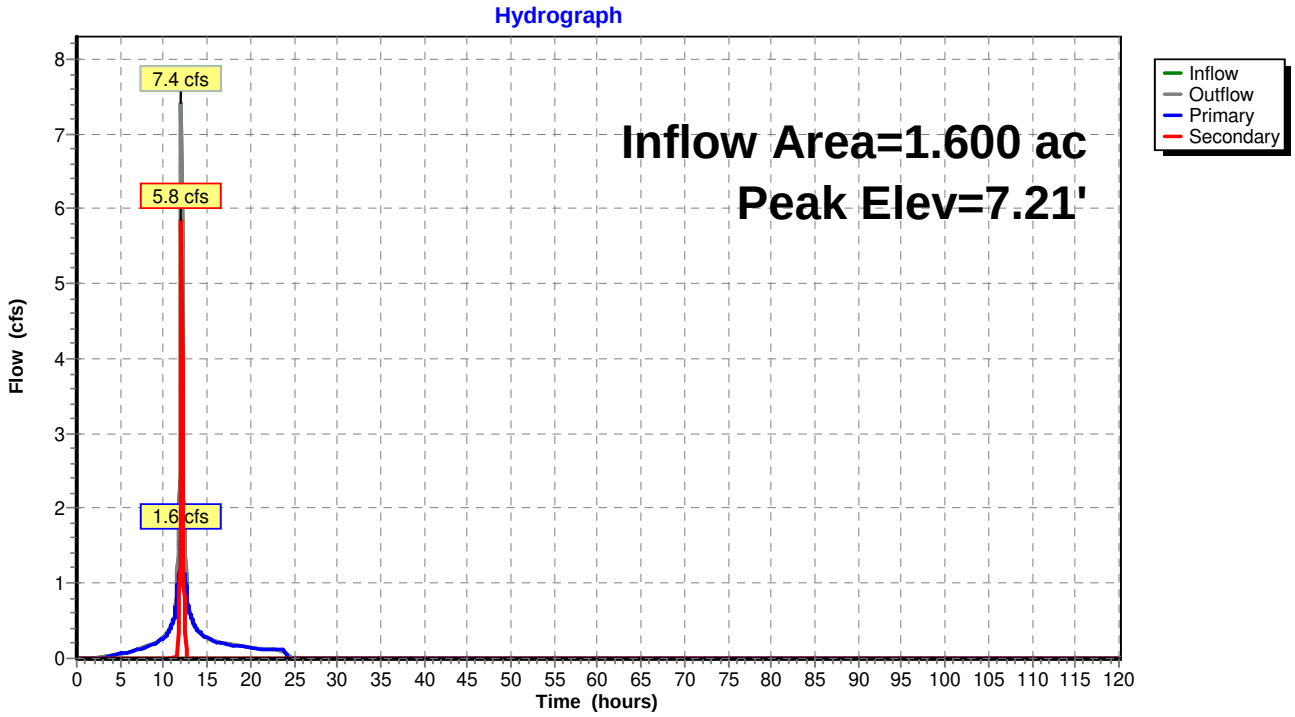
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 7.21' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	6.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.00' / 5.00' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	5.50'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.50' / 3.00' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	6.60'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.6 cfs @ 12.04 hrs HW=7.19' TW=5.80' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.6 cfs @ 4.46 fps)

Secondary OutFlow Max=5.6 cfs @ 12.04 hrs HW=7.19' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 5.6 cfs of 12.6 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 5.6 cfs @ 2.37 fps)

Pond FS 1A:


Hydrograph
Inflow Area=1.600 ac
Peak Elev=7.21'
7.4 cfs
5.8 cfs
1.6 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1B:

Inflow Area = 2.100 ac, 76.19% Impervious, Inflow Depth = 4.19" for 10-yr event
Inflow = 9.6 cfs @ 12.05 hrs, Volume= 0.733 af
Outflow = 9.6 cfs @ 12.05 hrs, Volume= 0.733 af, Atten= 0%, Lag= 0.0 min
Primary = 2.1 cfs @ 12.04 hrs, Volume= 0.570 af
Secondary = 7.5 cfs @ 12.05 hrs, Volume= 0.162 af

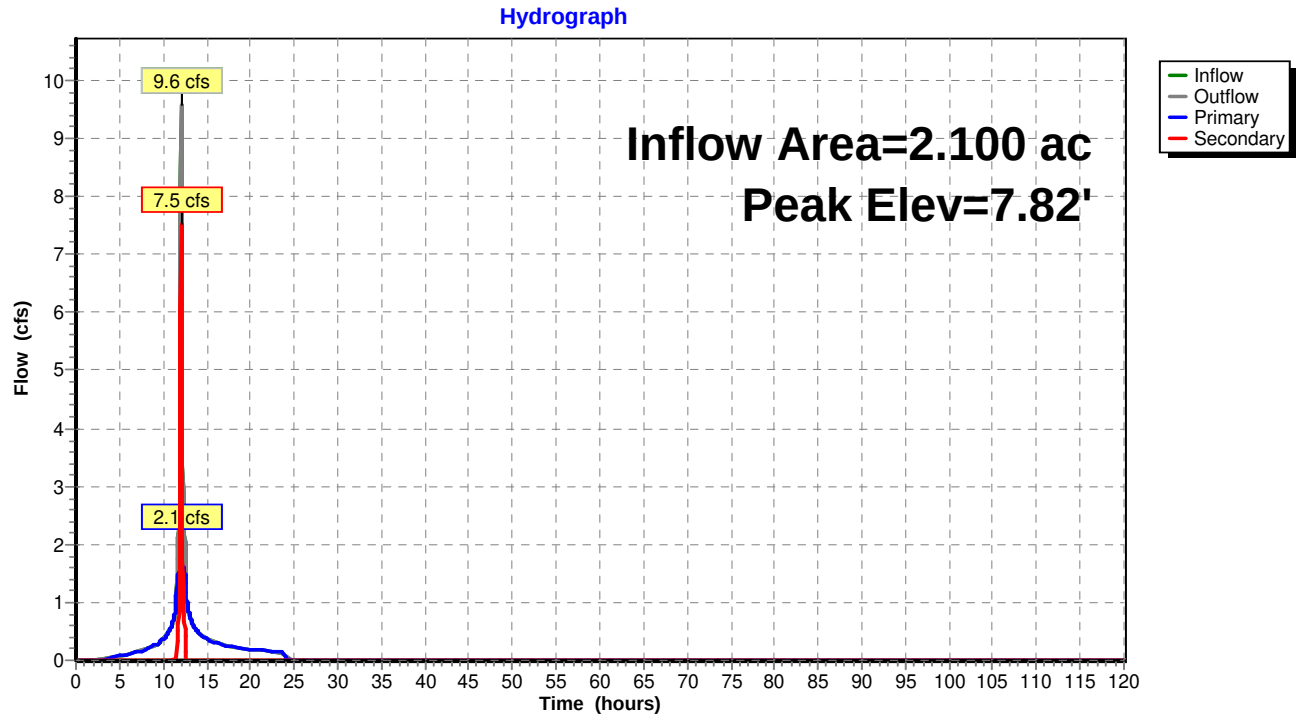
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 7.82' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 5.10' S= 0.0140 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	6.60'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.60' / 3.00' S= 0.0360 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=2.0 cfs @ 12.04 hrs HW=7.80' TW=5.80' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.0 cfs @ 5.82 fps)

Secondary OutFlow Max=7.4 cfs @ 12.05 hrs HW=7.80' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 7.4 cfs @ 3.74 fps)

Pond FS 1B:



Summary for Subcatchment 1.0S:

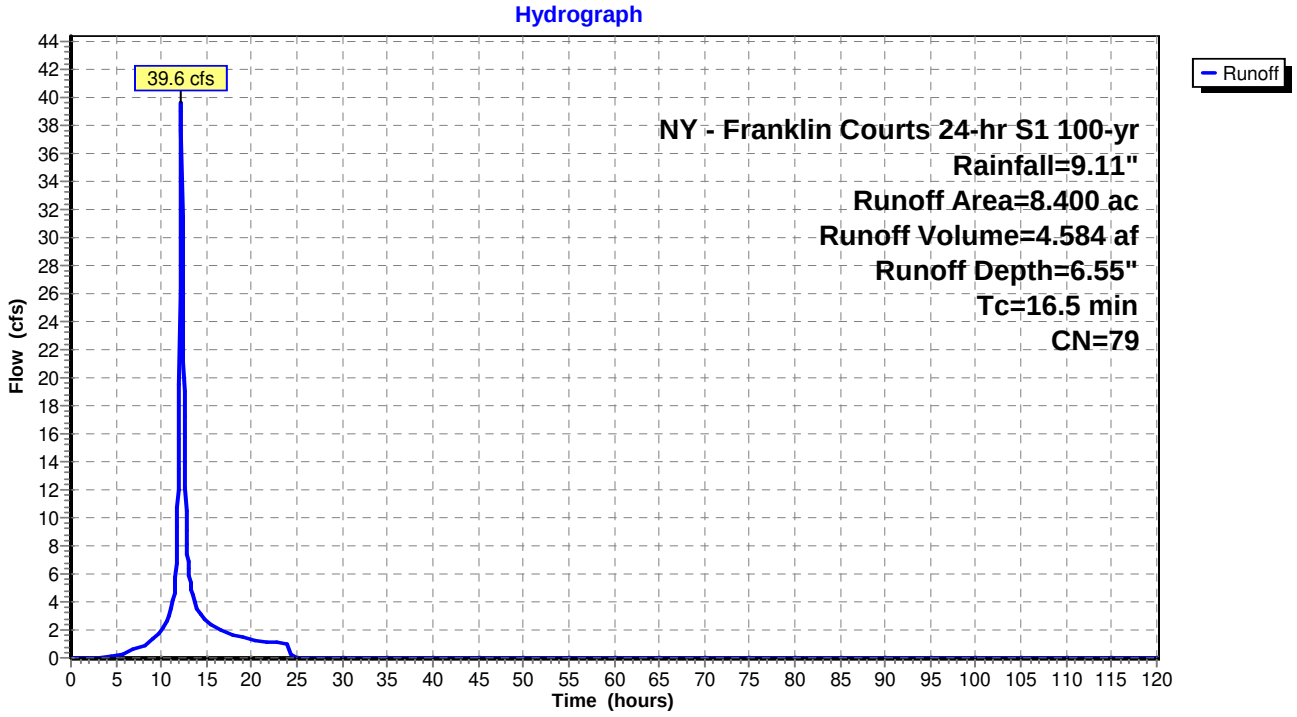
Runoff = 39.6 cfs @ 12.18 hrs, Volume= 4.584 af, Depth= 6.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 100-yr Rainfall=9.11"

Area (ac)	CN	Description
3.200	98	Paved parking, HSG D
1.700	55	Woods, Good, HSG B
0.700	77	Woods, Good, HSG D
1.100	61	>75% Grass cover, Good, HSG B
1.700	80	>75% Grass cover, Good, HSG D
8.400	79	Weighted Average
5.200		61.90% Pervious Area
3.200		38.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5					**Direct Entry,**

Subcatchment 1.0S:



Summary for Subcatchment 1.1AS:

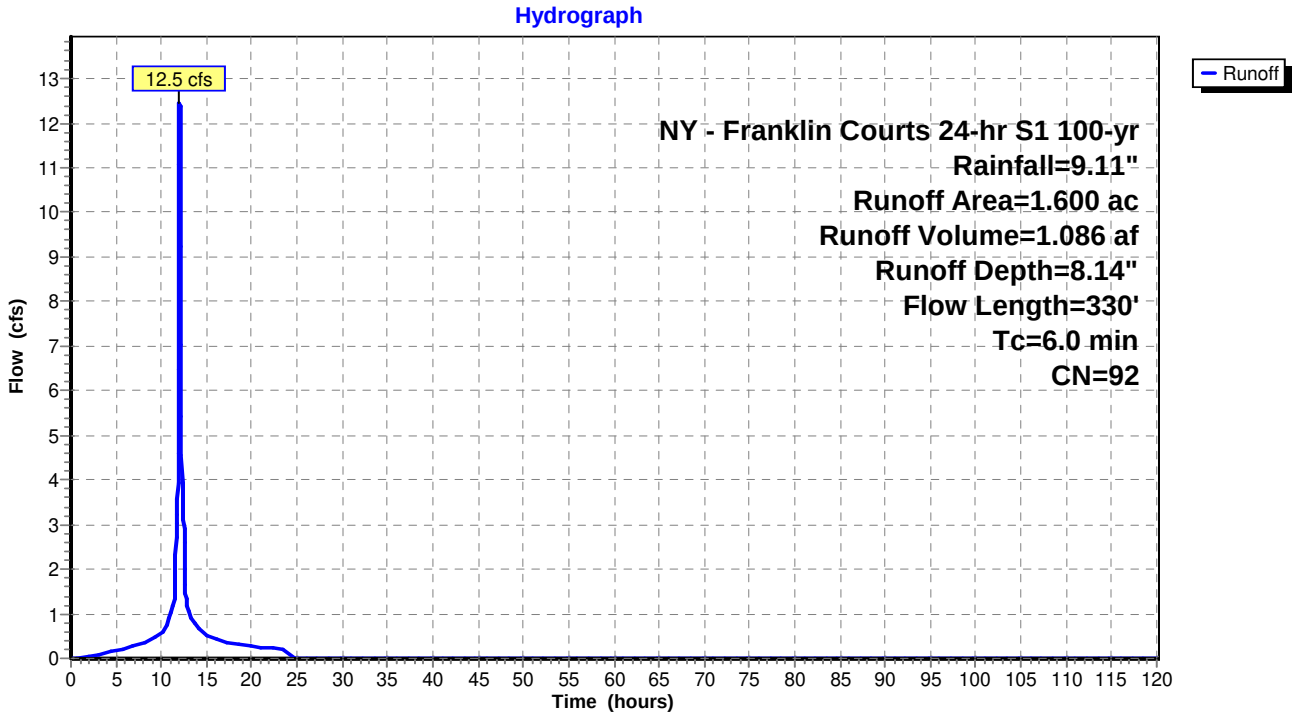
Runoff = 12.5 cfs @ 12.04 hrs, Volume= 1.086 af, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 100-yr Rainfall=9.11"

Area (ac)	CN	Description
1.300	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
1.600	92	Weighted Average
0.300		18.75% Pervious Area
1.300		81.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0350	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.7	50	0.0200	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.6	100	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	50	0.0500	10.99	8.63	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.2	80	0.0300	7.91	23.72	**Channel Flow,** Area= 3.0 sf Perim= 5.4' r= 0.56' n= 0.022 Earth, clean & straight
6.0	330	Total			

Subcatchment 1.1AS:



Summary for Subcatchment 1.1BS:

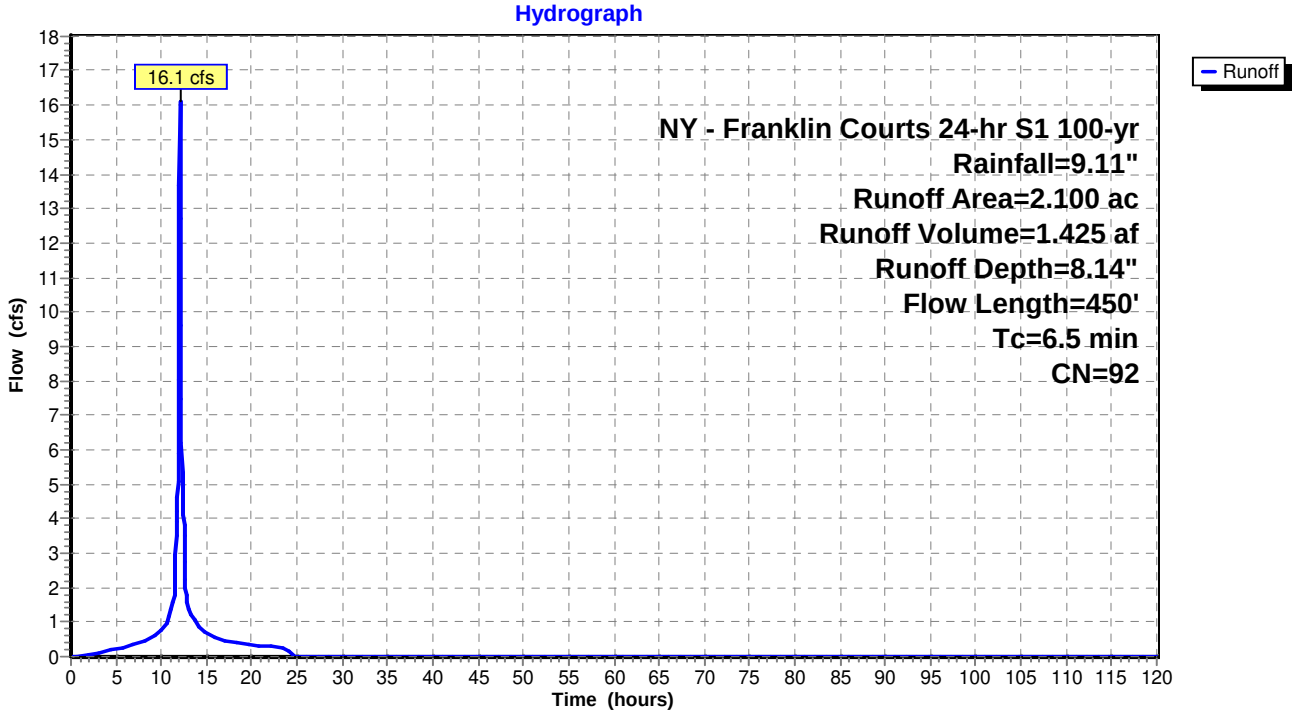
Runoff = 16.1 cfs @ 12.05 hrs, Volume= 1.425 af, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 100-yr Rainfall=9.11"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.300	80	>75% Grass cover, Good, HSG D
0.200	61	>75% Grass cover, Good, HSG B
2.100	92	Weighted Average
0.500		23.81% Pervious Area
1.600		76.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	75	0.0450	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.3	25	0.0500	1.55		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.42"
0.8	350	0.0200	6.95	5.46	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.5	450	Total			

Subcatchment 1.1BS:



Summary for Subcatchment 1.1CS:

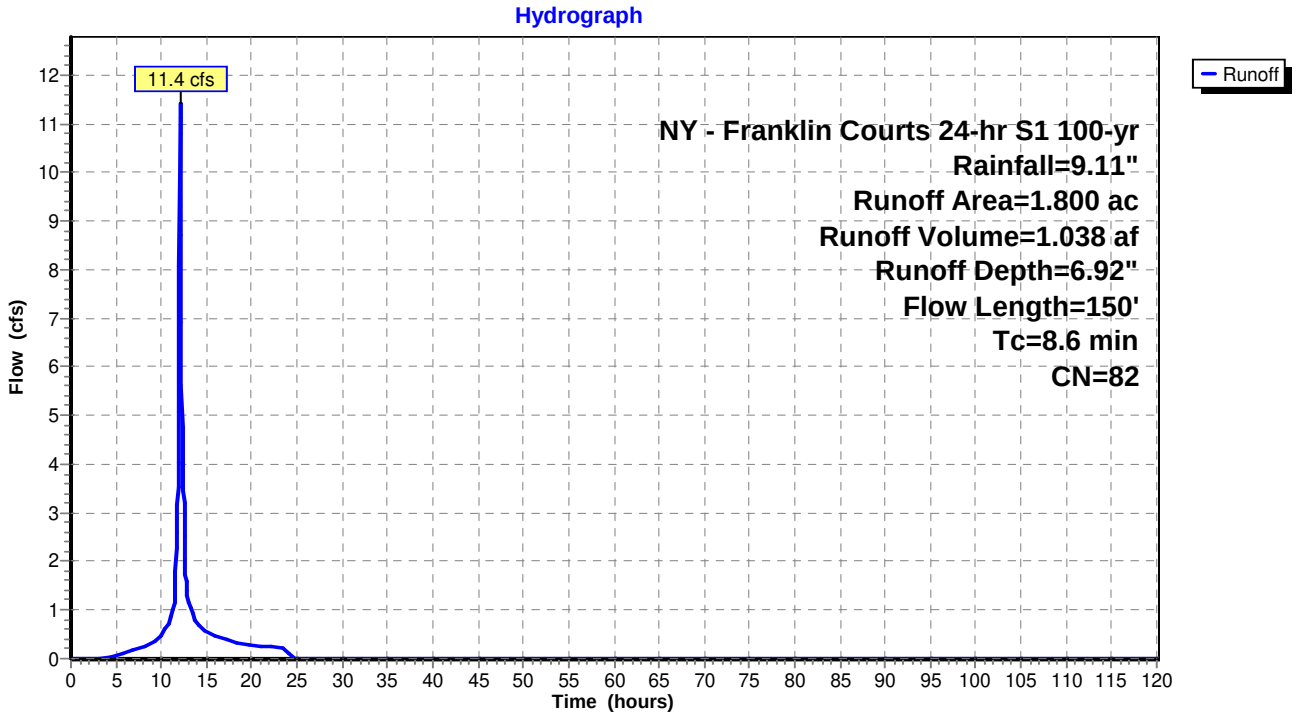
Runoff = 11.4 cfs @ 12.07 hrs, Volume= 1.038 af, Depth= 6.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
NY - Franklin Courts 24-hr S1 100-yr Rainfall=9.11"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
1.600	80	>75% Grass cover, Good, HSG D
1.800	82	Weighted Average
1.600		88.89% Pervious Area
0.200		11.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	100	0.0300	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.42"
0.5	50	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.6	150	Total			

Subcatchment 1.1CS:

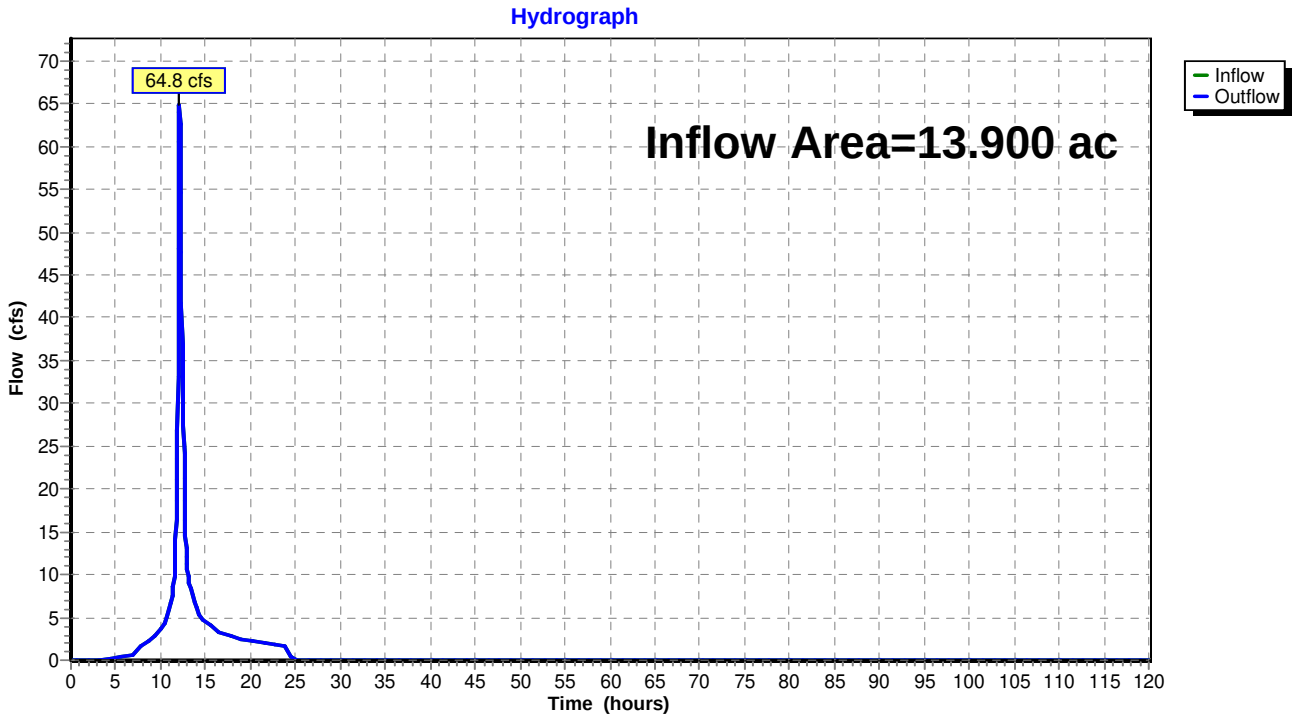


Summary for Reach DP 1: DESIGN POINT 1

Inflow Area = 13.900 ac, 45.32% Impervious, Inflow Depth = 7.02" for 100-yr event
Inflow = 64.8 cfs @ 12.13 hrs, Volume= 8.133 af
Outflow = 64.8 cfs @ 12.13 hrs, Volume= 8.133 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Reach DP 1: DESIGN POINT 1



Summary for Pond 1.1P:

Inflow Area = 5.500 ac, 56.36% Impervious, Inflow Depth = 6.14" for 100-yr event
Inflow = 15.4 cfs @ 12.07 hrs, Volume= 2.812 af
Outflow = 12.4 cfs @ 12.15 hrs, Volume= 2.812 af, Atten= 20%, Lag= 5.2 min
Primary = 12.4 cfs @ 12.15 hrs, Volume= 2.812 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 5.99' @ 12.15 hrs Surf.Area= 15,165 sf Storage= 13,345 cf

Plug-Flow detention time= 113.8 min calculated for 2.812 af (100% of inflow)
Center-of-Mass det. time= 113.7 min (909.8 - 796.2)

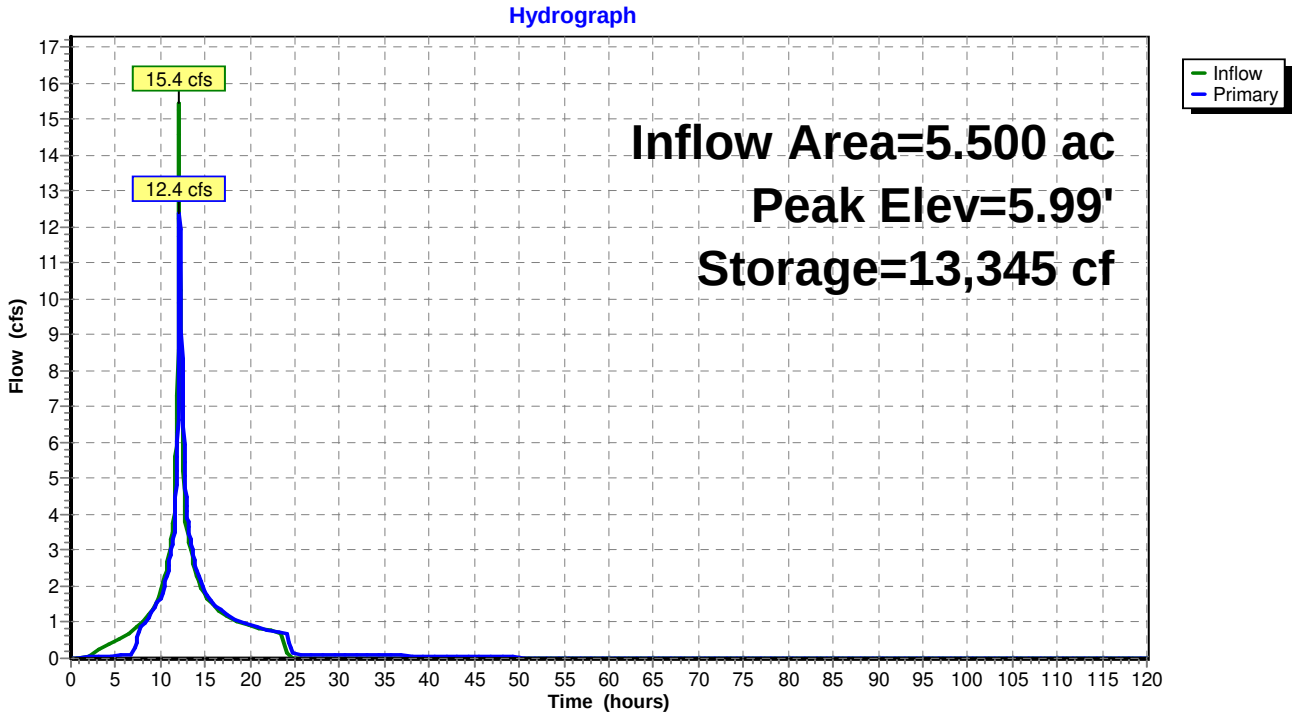
Volume	Invert	Avail.Storage	Storage Description
#1	5.00'	13,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
5.00	11,800	0	0
6.00	15,200	13,500	13,500

Device	Routing	Invert	Outlet Devices
#1	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Device 3	5.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	2.20'	**24.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 2.20' / 1.80' S= 0.0400 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#4	Device 3	5.00'	**0.250 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Primary OutFlow Max=12.4 cfs @ 12.15 hrs HW=5.99' TW=0.00' (Dynamic Tailwater)
└─**3=Culvert** (Passes 12.4 cfs of 25.3 cfs potential flow)
  ├─**1=Broad-Crested Rectangular Weir** (Weir Controls 8.2 cfs @ 2.09 fps)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.1 cfs @ 2.09 fps)
  └─**4=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond 1.1P:


Hydrograph
Inflow Area=5.500 ac
Peak Elev=5.99'
Storage=13,345 cf
15.4 cfs
12.4 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1A:

Inflow Area = 1.600 ac, 81.25% Impervious, Inflow Depth = 8.14" for 100-yr event
Inflow = 12.5 cfs @ 12.04 hrs, Volume= 1.086 af
Outflow = 12.5 cfs @ 12.04 hrs, Volume= 1.086 af, Atten= 0%, Lag= 0.0 min
Primary = 1.8 cfs @ 12.04 hrs, Volume= 0.764 af
Secondary = 10.7 cfs @ 12.04 hrs, Volume= 0.322 af

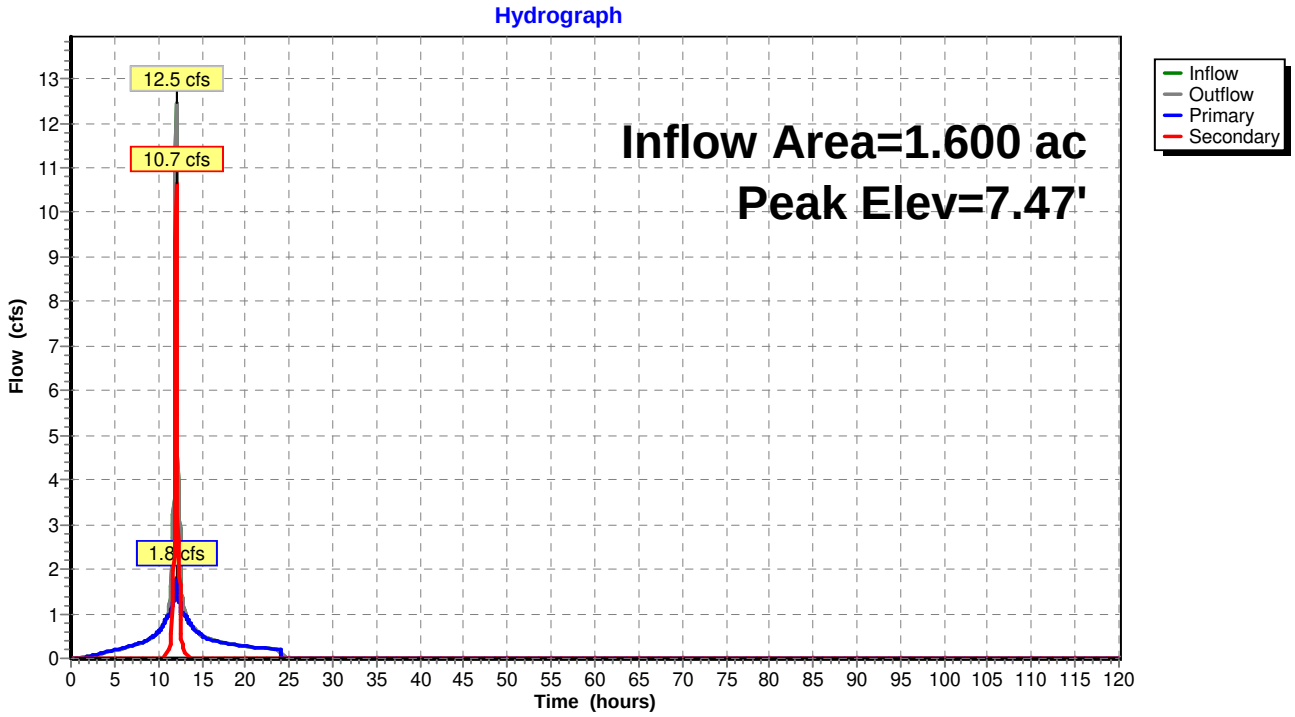
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 7.47' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	6.00'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.00' / 5.00' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	5.50'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.50' / 3.00' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	6.60'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.8 cfs @ 12.04 hrs HW=7.45' TW=5.91' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.8 cfs @ 5.08 fps)

Secondary OutFlow Max=10.3 cfs @ 12.04 hrs HW=7.45' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 10.3 cfs of 14.8 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 10.3 cfs @ 3.04 fps)

Pond FS 1A:


Hydrograph
Inflow Area=1.600 ac
Peak Elev=7.47'
12.5 cfs
10.7 cfs
1.8 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

Summary for Pond FS 1B:

Inflow Area = 2.100 ac, 76.19% Impervious, Inflow Depth = 8.14" for 100-yr event
Inflow = 16.1 cfs @ 12.05 hrs, Volume= 1.425 af
Outflow = 16.1 cfs @ 12.05 hrs, Volume= 1.425 af, Atten= 0%, Lag= 0.0 min
Primary = 2.3 cfs @ 12.04 hrs, Volume= 1.011 af
Secondary = 13.8 cfs @ 12.05 hrs, Volume= 0.414 af

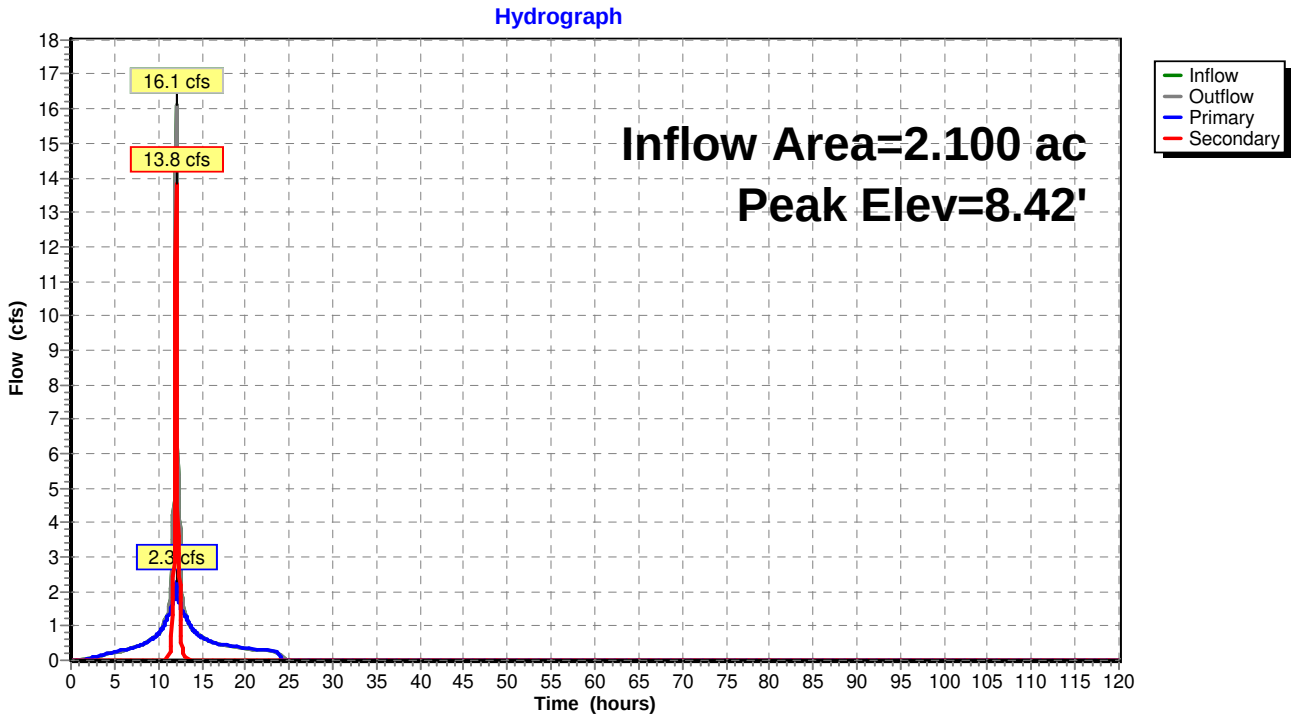
Routing by Dyn-Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 8.42' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	**8.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 5.10' S= 0.0140 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Secondary	6.60'	**24.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.60' / 3.00' S= 0.0360 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=2.3 cfs @ 12.04 hrs HW=8.38' TW=5.92' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.3 cfs @ 6.47 fps)

Secondary OutFlow Max=13.6 cfs @ 12.05 hrs HW=8.40' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 13.6 cfs @ 4.57 fps)

Pond FS 1B:



APPENDIX D

Project and Owner Information

Site Data:

Franklin Courts
1-15 Franklin Courts
Tarrytown, New York 10591

Applicant Information:

WBP Development LLC
480 Bedford Road
Chappaqua, NY 10514

Party Responsible for Implementation of the Stormwater Pollution Prevention Plan:

To be determined prior to construction

Qualified Professional Responsible for Inspection of the Stormwater Pollution Prevention Plan:

Inspector to be determined at time of construction

APPENDIX E

NYSDEC SPDES General Permit for Construction Activities Construction Site Log Book

APPENDIX F
CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

I. Pre-Construction Meeting Documents
   a. Preamble to Site Assessment and Inspections
   b. Pre-Construction Site Assessment Checklist

II. Construction Duration Inspections
   a. Directions
   b. Modification to the SWPPP

I. **PRE-CONSTRUCTION MEETING DOCUMENTS**

Project Name _____

Permit No. _____ **Date of Authorization** _____

Name of Operator _____

Prime Contractor _____

a. **Preamble to Site Assessment and Inspections**

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified inspector[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 Refer to "Qualified Inspector" inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.
2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.
3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_____
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Access

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page _____
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? _____

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:

Inspection Forms will be filled out during the entire construction phase of the project.

Required Elements:

1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

Inspector (print name)	**Date of Inspection**
Qualified Inspector (print name)	**Qualified Inspector Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA

[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions at the outfalls?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA

[ ] [ ] [ ] Is construction site litter, debris and spoils appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA

[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

3. Stabilized Construction Access

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Runoff Control Practices

1. Excavation Dewatering

Yes No NA

[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

Runoff Control Practices (continued)

2. Flow Spreader

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Silt Fence and Linear Barriers

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
[ ] [ ] [ ] Manufactured insert fabric is free of tears and punctures.
[ ] [ ] [ ] Filter Sock is not torn or flattened and fill material is contained within the mesh sock.

Sediment accumulation ___% of design capacity.

3. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
[ ] [ ] [ ] Sediment trap slopes and disturbed areas are stabilized.

Sediment accumulation is ___% of design capacity.

4. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
[ ] [ ] [ ] Sediment basin dewatering pool is dewatering at appropriate rate.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. All practices shall be maintained in accordance with their respective standards.

Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

b. Operators Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law. "

Name (please print):_____

Title _____ **Date:**_____

Address: _____

Phone: _____ **Email:**_____

Signature:_____

c. Qualified Professional's Credentials & Certification

" I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print): _____

Title _____ **Date:** _____

Address: _____

Phone: _____ **Email:** _____

Signature: _____

d. Contractors Certification Statement

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

_____

Signature of Contractor Date

_____

Print Name Title

_____

Signature of Trained Contractor Date

_____

Print Name of Trained Contractor Title

Name of Contracting Firm _____

Street Address _____

City, State, Zip _____

Telephone No. _____

A copy of this statement shall be retained as part of the Stormwater Pollution Prevention Plan (SWPPP) for a period off at least five (5) years after the subject property is stabilized.

APPENDIX F

Bioretention Filter Sizing Calculations

SMP 1.1P - NYSDEC Bioretention Filter (Design F-4)

Project: Franklin Courts
Project #: 22220.100
Date: 2/5/2025

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

1a. WQv Required for Downstream SMP = 0.149 ac-ft 8,236 c.f.

1b. Subcatchment % Imperviousness = 56.7% %

2. Required Practice Volume

2a. Total required volume = 75% of WQv (in filter and pretreatment) = 6,177 c.f.

2b. Total volume provided in filter = = 6,325 c.f.
(Calculated using Stage - Volume information in HydroCAD output.)

3. Pretreatment Requirements:
Pretreatment will be provided by a hydrodynamic separator.

4. Required Filter Area:

4a. Required Filter Area = $\frac{WQv\ (df)}{k\ (hf + df) + tf}$

df=	2.50	ft.
hf=	0.50	ft.
k=	0.50	ft./day
tf=	1.67	days
Required Filter Area=	8220	s.f.

4b. Provided Filter Area = 11,800 s.f.

4c. Volume provided in filter= 6,325 c.f.
(Calculated using Stage - Volume information in HydroCAD output.)

APPENDIX G

Hydrodynamic Separator Sizing Information

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHILIP D. MURPHY
Governor
SHEILA Y. OLIVER
Lt. Governor
DIVISION OF WATERSHED PROTECTION AND RESTORATION
BUREAU OF NJPDES STORMWATER PERMITTING & WATER QUALITY MANAGEMENT
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
609-633-7021 / Fax: 609-777-0432
www.njstormwater.org
SHAWN M. LATOURETTE
Commissioner

July 19, 2021

Mr. Jeremy Fink
Pr. Product Development Engineer
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® Optimum Vortex Separator by Hydro International
Online Installation

TSS Removal Rate 50%

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.2(f) and 5.2(j) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Bio Clean Environmental, Inc. has requested an MTD Laboratory Certification for the First Defense® Optimum Vortex Separator (FD Optimum).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report dated June 2021 with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® Optimum Vortex Separator by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The FD Optimum shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in in item 6 below.

3. This FD Optimum cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the FD Optimum, which is attached to this document. However, it is recommended to review the maintenance manual at https://www.hydro-int.com/en/resources/first-defense-operations-maintenance-manual for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the FD Optimum:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a FD Optimum. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 21, Fig. 5-10 of Chapter 5 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the FD Optimum 3-ft model with a MTFR of 1.02 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2.

Table 1. FD Optimum Model and MTFRs

FD Optimum Model	Manhole Diameter (ft)	MTFR (cfs)
3-ft	3	1.02
4-ft	4	1.81
5-ft	5	2.83
6-ft	6	4.07
7-ft	7	5.53
8-ft	8	7.23
10-ft	10	11.33

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Lisa Schaefer of my office at lisa.schaefer@dep.nj.gov.

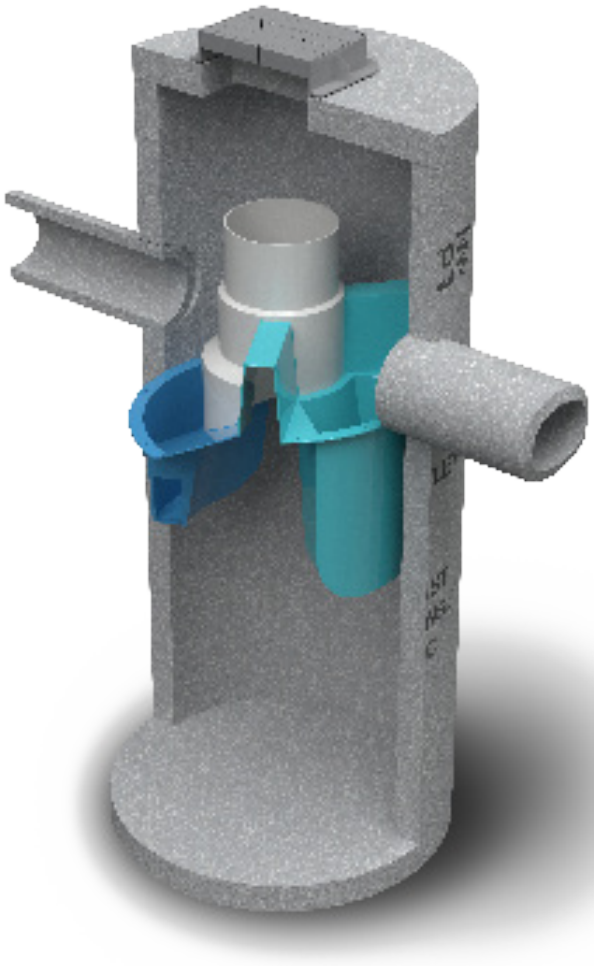
Sincerely,



Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
New Jersey Department of Environmental Protection

Attachment: Maintenance Plan

cc: Richard Magee, NJCAT



Operation and Maintenance Manual

First Defense® High Capacity and First Defense®Optimum

Vortex Separator for Stormwater Treatment

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- **First Defense® Components**

5 **Maintenance**
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- **Maintenance Equipment Considerations**
- **Determining Your Maintenance Schedule**

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- **Floatables and Sediment Clean Out**

8 **First Defense® Installation Log**

9 **First Defense® Inspection and Maintenance Log**

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's First Defense®. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc has a policy of continuous product development and reserves the right to amend specifications without notice.

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

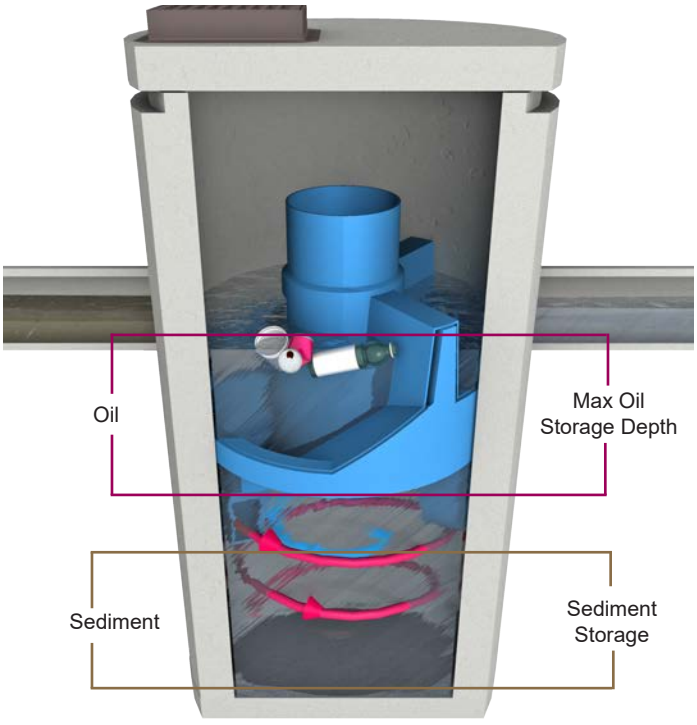


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

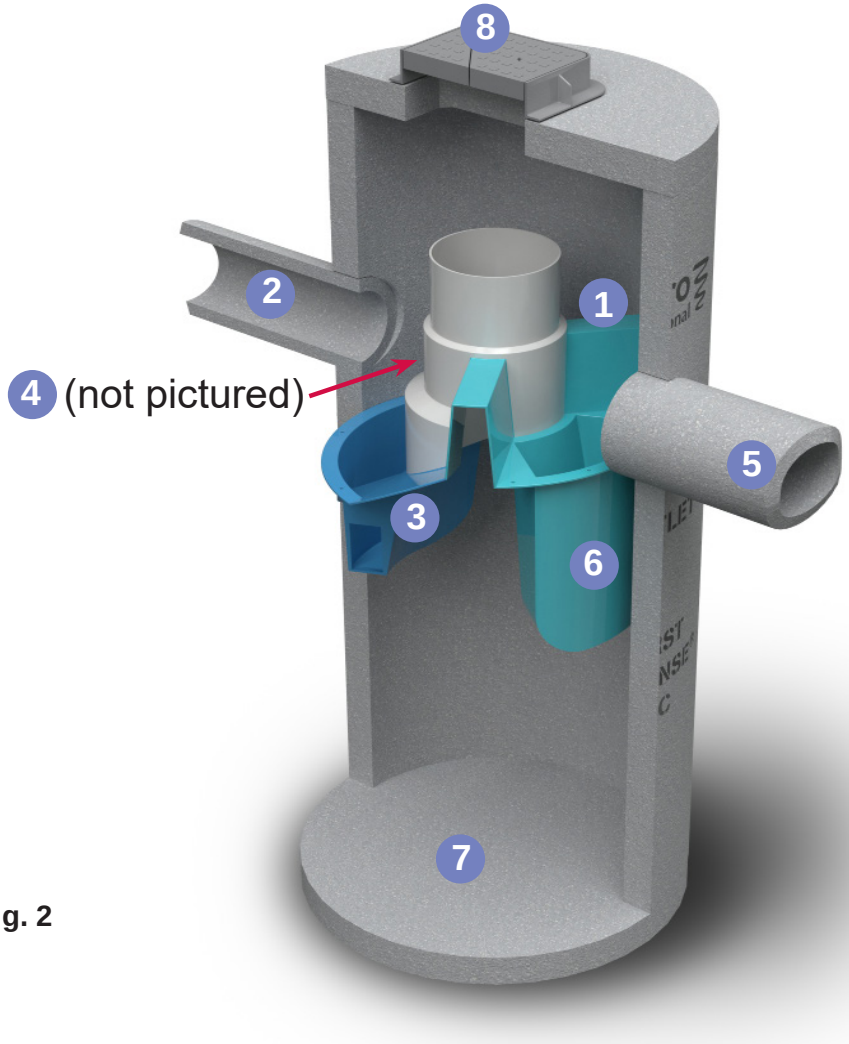


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

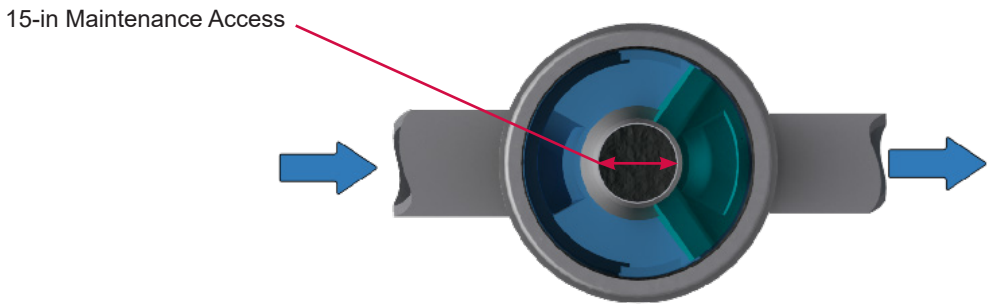


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.



Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

APPENDIX H

Pipe Sizing Calculations

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

DRAINAGE SYSTEM CALCULATIONS
Design Storm: 25-Year

PROJECT: **Franklin Courts**
JOB NUMBER: **22220.100**
BY: JJS DATE: 2-5-2025
CHK: JWM DATE: 2-5-2025

STRUCTURE		IMPERVIOUS AREA			PERVIOUS AREA			CA	TIME OF CONC. (min.)			I	Q (cfs)		PIPE DESIGN				
FROM	TO	A (ac.)	C	CA	A (ac.)	C	CA		INLET	PIPE	TOTAL		DESIGN	CAP.	V(ft/s)	n	s (%)	L (ft)	DIA (in)
CB 27	CB 26	**0.06**	0.9	0.05	**0.03**	0.3	0.01	0.06	**6**	-	6	**7.3**	0.4	3.0	2.7	**0.012**	**0.6**	**47**	**12**
CB 26	CB 25	**0.17**	0.9	0.15	**0.06**	0.3	0.02	0.23	**6**	-	6	**7.3**	1.7	2.7	3.7	**0.012**	**0.5**	**74**	**12**
CB 25	CB 24	**0.07**	0.9	0.06	**0.02**	0.3	0.01	0.30	**6**	-	6	**7.3**	2.2	2.7	3.9	**0.012**	**0.5**	**96**	**12**
CB 24	CB 23	**0.09**	0.9	0.08	**0.04**	0.3	0.01	0.39	**6**	-	6	**7.3**	2.8	4.9	4.2	**0.012**	**0.5**	**113**	**15**
CB 23	DMH 22	**0.34**	0.9	0.31	**0.07**	0.3	0.02	1.28	**6**	-	6	**7.3**	9.3	17.3	5.6	**0.012**	**0.5**	**68**	**24**
DMH 22	DMH 22A	**0.00**	0.9	0.00	**0.00**	0.3	0.00	1.28	**6**	-	6	**7.3**	9.3	19.0	6.0	**0.012**	**0.6**	**23**	**24**
DMH 22A	FS 21	**0.00**	0.9	0.00	**0.00**	0.3	0.00	1.28	**6**	-	6	**7.3**	9.3	17.3	5.6	**0.012**	**0.5**	**63**	**24**
FS 21	HDS 1.1B	**SIZED IN HYDROCAD**																	
HDS 1.1B	ES 20	**SIZED IN HYDROCAD**																	
CB 30	CB 29	**0.09**	0.9	0.08	**0.01**	0.3	0.00	0.08	**6**	-	6	**7.3**	0.6	5.5	4.6	**0.012**	**2.1**	**63**	**12**
CB 29	CB 28	**0.10**	0.9	0.09	**0.08**	0.3	0.02	0.19	**6**	-	6	**7.3**	1.4	7.0	7.0	**0.012**	**3.3**	**24**	**12**
CB 28	CB 24	**0.07**	0.9	0.06	**0.02**	0.3	0.01	0.26	**6**	-	6	**7.3**	1.9	5.3	6.2	**0.012**	**1.9**	**59**	**12**
CB 18A	CB 18	**0.36**	0.9	0.33	**0.04**	0.3	0.01	0.34	**6**	-	6	**7.3**	2.5	2.7	3.9	**0.012**	**0.5**	**80**	**12**
CB 18	CB 17	**0.10**	0.9	0.09	**0.05**	0.3	0.01	0.44	**6**	-	6	**7.3**	3.2	5.4	4.6	**0.012**	**0.6**	**33**	**15**
CB 17	CB 16	**0.08**	0.9	0.07	**0.02**	0.3	0.01	0.52	**6**	-	6	**7.3**	3.8	5.4	4.8	**0.012**	**0.6**	**49**	**15**
CB 16	DMH 22	**0.01**	0.9	0.01	**0.09**	0.3	0.03	0.56	**6**	-	6	**7.3**	4.1	12.2	9.0	**0.012**	**3.1**	**18**	**15**
CB 15	CB 14	**0.35**	0.9	0.32	**0.04**	0.3	0.01	0.33	**6**	-	6	**7.3**	2.4	2.8	4.0	**0.012**	**0.5**	**49**	**12**
CB 14	CB 13	**0.18**	0.9	0.16	**0.06**	0.3	0.02	0.51	**6**	-	6	**7.3**	3.7	5.5	4.8	**0.012**	**0.6**	**53**	**15**
CB 13	CB 12	**0.10**	0.9	0.09	**0.02**	0.3	0.01	0.61	**6**	-	6	**7.3**	4.5	5.0	4.6	**0.012**	**0.5**	**96**	**15**
CB 12	CB 11B	**0.18**	0.9	0.16	**0.05**	0.3	0.02	0.79	**6**	-	6	**7.3**	5.8	8.1	5.0	**0.012**	**0.5**	**68**	**18**
CB 11B	CB 11A	**0.12**	0.9	0.11	**0.05**	0.3	0.02	0.92	**6**	-	6	**7.3**	6.7	9.0	5.6	**0.012**	**0.6**	**32**	**18**
CB 11A	FS 11	**0.05**	0.9	0.05	**0.00**	0.3	0.00	1.14	**6**	-	6	**7.3**	8.3	15.3	8.8	**0.012**	**1.8**	**11**	**18**
FS 11	DMH 10	**SIZED IN HYDROCAD**																	
DMH 10	DMH 9A	**SIZED IN HYDROCAD**																	
DMH 9A	DMH 9	**SIZED IN HYDROCAD**																	
CB 11C	CB 11A	**0.15**	0.9	0.14	**0.10**	0.3	0.03	0.17	**6**	-	6	**7.3**	1.2	4.0	4.5	**0.012**	**1.1**	**45**	**12**
FS 11	HDS 1.1A	**SIZED IN HYDROCAD**																	
HDS 1.1A	ES 10	**SIZED IN HYDROCAD**																	

APPENDIX I

Boring / Soil Testing Data

SESI
CONSULTING ENGINEERS

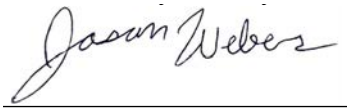
Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

GEOTECHNICAL INVESTIGATION REPORT

For

Proposed Redevelopment
Franklin Courts
Tarrytown, Westchester, New York



Jason J. Weber, P.E.

NOTE: PORTIONS OF THIS REPORT HAVE BEEN REMOVED THAT ARE NOT RELEVANT TO THE SWPPP.

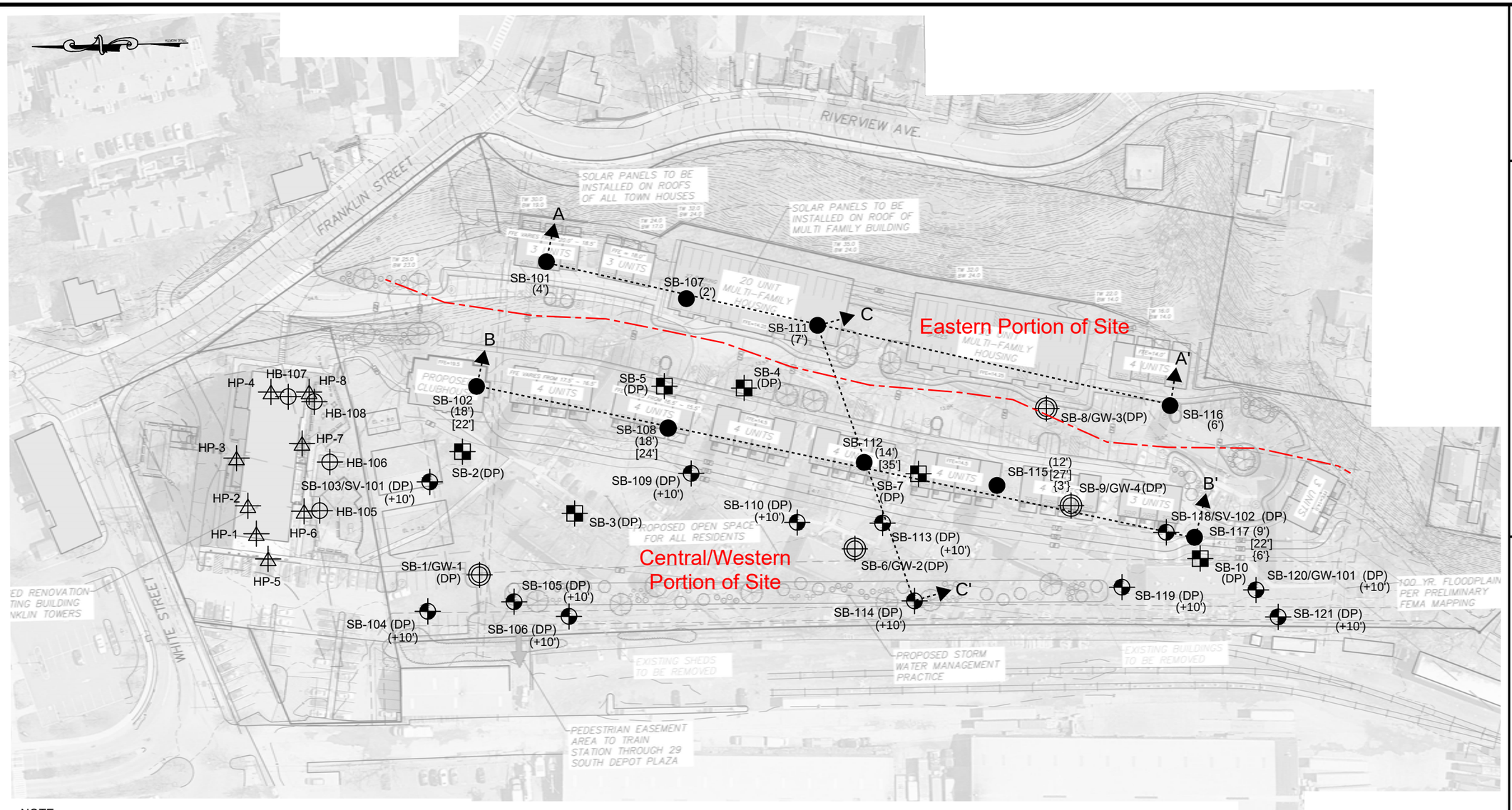


Michael St. Pierre, P.E.
Lic. No. 80271

Prepared for:
WBP Development LLC
January 22, 2024

SESI Contact:
Jason J. Weber, P.E.
Jason.weber@sesi.org

SESI Project No:
12345



NOTE:
THIS PLAN IS FOR LOCATING BORINGS AND VAPOR POINTS ONLY.
OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
1. EXISTING CONDITIONS & BOUNDARY ARE TAKEN FROM "CONCEPTUAL GRADING PLAN - DWG NO. CG-1", PROVIDED BY INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C., DATED 9-12-23, REV. 12-4-23.

NYS Education Law
Unauthorized alterations or additions to this plan are a violation of section 7209 (2) of the New York State Education Law. Copies of this map not having the seal of the engineer shall not be valid.

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LEGEND:

- SB-113 - ENVIRONMENTAL BORING NUMBER & APPROX. LOCATION (SESI 2023)
- SB-4 - ENVIRONMENTAL BORING NUMBER & APPROX. LOCATION (SESI 2022)
- SB-4 - ENVIRONMENTAL BORING/TEMP WELL NUMBER & APPROX. LOCATION (SESI 2022)
- SV-1 - ENVIRONMENTAL VAPOR POINT NUMBER & APPROX. LOCATION (SESI 2022)
- SB-116 - GEOTECH BORING NUMBER & APPROX. LOCATION (SESI 2023)
- HB-106 - HISTORIC BORING NUMBER & APPROX. LOCATION (OTHERS 1965)
- HP-4 - HISTORIC BORING NUMBER & APPROX. LOCATION (OTHERS 1962)
- A A' - GEOTECHNCIAL CROSS SECTION LINE
- (X') - APPROXIMATE DEPTH TO BOTTOM OF FILL
- [X'] - APPROXIMATE DEPTH TO BOTTOM OF SOFT SILTY CLAY
- (DP) - DIRECT PUSH ENVIRONMENTAL BORING
- {X'} - APPROXIMATE THICKNESS OF ORGANIC SOILS
- APPROXIMATE PARTION LINE BETWEEN THE EASTERN AND CENTERAL/WESTERN PORTIONS OF THE SITE

SCALE: 1"=100'
0 100 200

dwg by: AW
chk by: JW
scale: AS NOTED
date: 12/28/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

project: PROPOSED FRANKLIN COURTS REDEVELOPMENT
FRANKLIN COURTS
VILLAGE OF TARRYTOWN
WESTCHESTER COUNTY, NEW YORK

title: EXPLORATION LOCATION PLAN

job no: 12345
drawing no: DWG-1

N:\ACAD\12345\CAD\GEOTECH\12345.DWG_EXPLORATION_LOC_PLAN.DWG 12/28/23 09:26:00AM, alan.ward, LAYOUT:FIG-1 EXPLORATION PLAN

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL

BOREHOLE NUMBER: SB-105

PROJECT NAME Franklin Courts Redevlopment
PROJECT NO. 12345
DATE STARTED 12-13-2023 **COMPLETED** 12-13-2023
DRILLING CONTRACTOR Coastal
SAMPLER Direct Push
EQUIPMENT 7822DT Rig
DRILLING FOREMAN Brian **HELPER** Paul
LOGGED BY T. Jodexnis **CHECKED BY** J. Weber
LATITUDE 41.075150 **LONGITUDE** -73.864074

PROJECT LOCATION Tarrytown, New York
ELEVATION DATUM NAVD88 **GROUND ELEVATION** 7.0±
DRILLING METHOD Direct Push
SAMPLE HAMMER
AUGER INNER DIAMETER **OUTER DIAMETER**
ROTARY BIT DIAMETER **GROUNDWATER LEVELS:**
CASING DIAMETER ▽ **AT TIME OF DRILLING** 5.00± ft
CASING DEPTH ▼ **AT END OF DRILLING**
FINAL DEPTH 10.0± ft ▼ **AFTER DRILLING**

Material Symbol	EL (ft)	Sample Description	Depth (ft)	Sleeve Number	Sample Data: Type	Sample Data: Rec. (in)	Sample Data: Environmental Soil Sample Name	Sample Data: Blows/6-in Core time/ft	Sample Data: PID (ppm)	Remarks
		Topsoil, with occasional roots							0.0	
		Fill: Brown medium to fine SAND, some Silt, little medium to fine Gravel		S-1		48	S-1		0.0	
		Fill: Dark brown Silty CLAY, little coarse to fine Gravel, with concrete and wood fragments							0.1	
	2	Fill: Tan-brown Clayey SILT, some medium to fine Sand, little medium to fine Gravel	5						0.1	
		Fill: Dark gray Silty CLAY, trace fine Sand, with Roots		S-2		48	S-2 SB-105(8-8.5)		0.1	
		Fill: Same as above with little coarse to fine Gravel							0.2	
	-3	BOREHOLE COMPLETED AT 10± FEET	10						0.2	
									0.1	
	-8		15							
	-13		20							
	-18		25							
	-23		30							

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL

BOREHOLE NUMBER: SB-106

PROJECT NAME Franklin Courts Redevlopment
PROJECT NO. 12345
DATE STARTED 12-13-2023 **COMPLETED** 12-13-2023
DRILLING CONTRACTOR Coastal
SAMPLER Direct Push
EQUIPMENT 7822DT Rig
DRILLING FOREMAN Brian **HELPER** Paul
LOGGED BY T. Jodexnis **CHECKED BY** J. Weber
LATITUDE 41.075014 **LONGITUDE** -73.864136

PROJECT LOCATION Tarrytown, New York
ELEVATION DATUM NAVD88 **GROUND ELEVATION** 7.0±
DRILLING METHOD Direct Push
SAMPLE HAMMER
AUGER INNER DIAMETER **OUTER DIAMETER**
ROTARY BIT DIAMETER **GROUNDWATER LEVELS:**
CASING DIAMETER ▽ **AT TIME OF DRILLING** 5.00± ft
CASING DEPTH ▼ **AT END OF DRILLING**
FINAL DEPTH 10.0± ft ▼ **AFTER DRILLING**

Material Symbol	EL (ft)	Sample Description	Depth (ft)	Sleeve Number	Sample Data: Type	Sample Data: Rec. (in)	Sample Data: Environmental Soil Sample Name	Sample Data: Blows/6-in Core time/ft	Sample Data: PID (ppm)	Remarks
		Topsoil, with occasional roots								
		Fill: Brown medium to fine SAND, some Silt, little medium to fine Gravel, with coal fragments		S-1		48	S-1		0.0 0.0 0.0 0.0	
	2	Fill: Gray medium to fine SAND, some Silt, little coarse to fine Gravel	5						0.0	
		Fill: Tan-gray Clayey SILT, some coarse to fine Sand, little medium to fine Gravel, with Roots					SB-106(5.5-6)		0.1	
				S-2		49	S-2		0.1 0.1 0.1	
	-3	BOREHOLE COMPLETED AT 10± FEET	10						0.1	
	-8		15							
	-13		20							
	-18		25							
	-23		30							

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL

BOREHOLE NUMBER: SB-114

PROJECT NAME Franklin Courts Redevlopment
PROJECT NO. 12345
DATE STARTED 12-13-2023 **COMPLETED** 12-13-2023
DRILLING CONTRACTOR Coastal
SAMPLER Direct Push
EQUIPMENT 7822DT Rig
DRILLING FOREMAN Brian **HELPER** Paul
LOGGED BY T. Jodexnis **CHECKED BY** J. Weber
LATITUDE 41.074148 **LONGITUDE** -73.864344

PROJECT LOCATION Tarrytown, New York
ELEVATION DATUM NAVD88 **GROUND ELEVATION** 7.0±
DRILLING METHOD Direct Push
SAMPLE HAMMER
AUGER INNER DIAMETER **OUTER DIAMETER**
ROTARY BIT DIAMETER **GROUNDWATER LEVELS:**
CASING DIAMETER ▽ **AT TIME OF DRILLING** 6.00± ft
CASING DEPTH ▼ **AT END OF DRILLING**
FINAL DEPTH 10.0± ft ▼ **AFTER DRILLING**

Material Symbol	EL (ft)	Sample Description	Depth (ft)	Sleeve Number	Sample Data: Type	Sample Data: Rec. (in)	Sample Data: Environmental Soil Sample Name	Sample Data: Blows/6-in Core time/ft	Sample Data: PID (ppm)	Remarks
		Topsoil with Roots								
		Fill: Brown SILT, some coarse to fine SAND, little coarse to fine Gravel							0.0	
		Fill: Brown coarse to fine SAND, some medium to fine Gravel, trace Silt							0.1	
		Fill: Gray coarse to fine SAND, some Silt, some coarse to fine Gravel, with Shell fragments		S-1		40	S-1		0.1	
							SB-114(4-4.5)		0.1	
	2		5						0.2	
				S-2		48	S-2		0.0	
									0.1	
		Fill: Gray CLAY, trace fine Sand, with Roots							0.1	
		Fill: Dark gray coarse to fine SAND, some Silt, some coarse to fine Gravel, with shell fragments, fabric, and wood fragments							0.1	
	-3		10						0.2	
		BOREHOLE COMPLETED AT 10± FEET								
	-8		15							
	-13		20							
	-18		25							
	-23		30							

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL

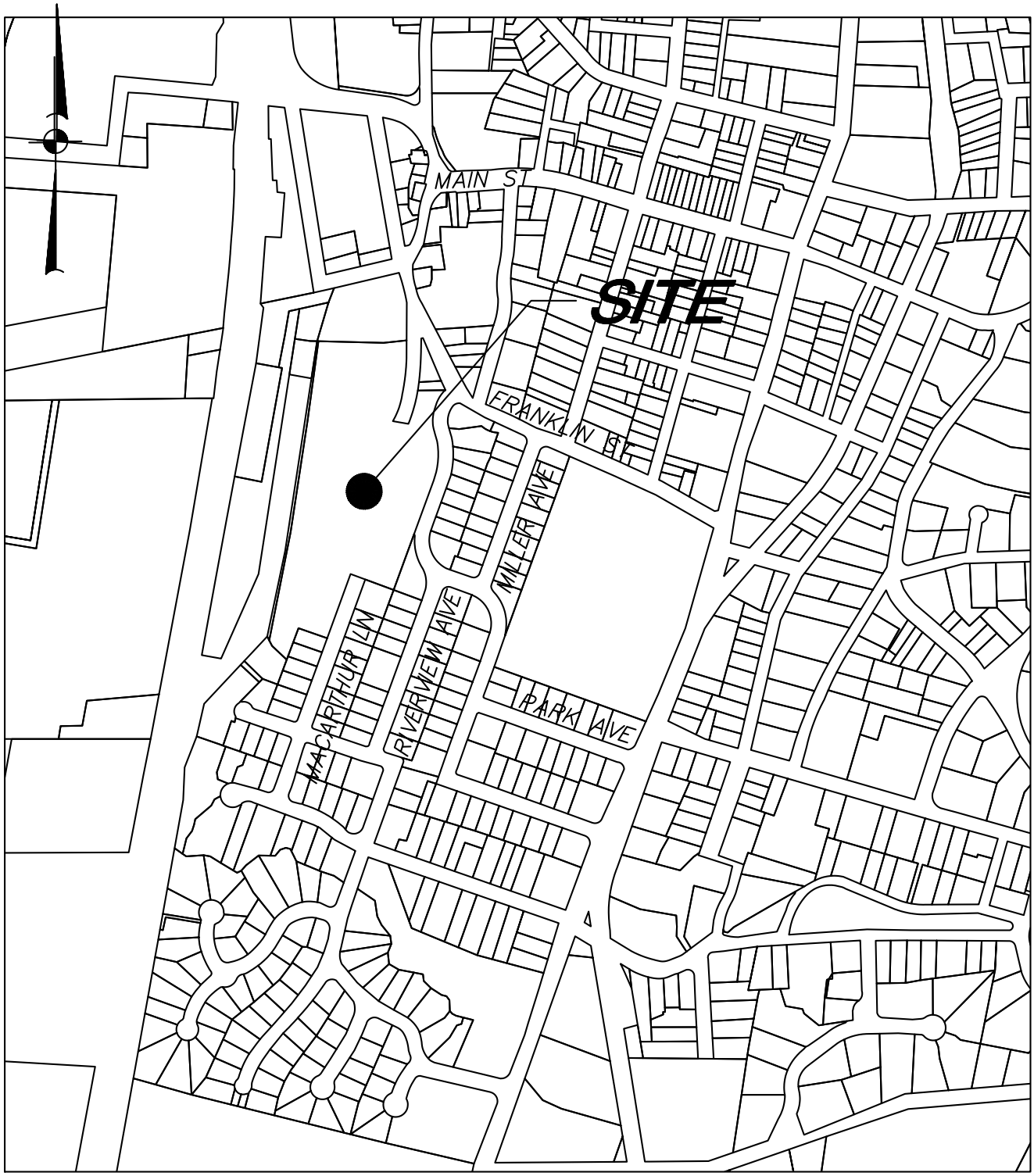
BOREHOLE NUMBER: SB-119

PROJECT NAME Franklin Courts Redevlopment
PROJECT NO. 12345
DATE STARTED 12-13-2023 **COMPLETED** 12-13-2023
DRILLING CONTRACTOR Coastal
SAMPLER Direct Push
EQUIPMENT 7822DT Rig
DRILLING FOREMAN Brian **HELPER** Paul
LOGGED BY T. Jodexnis **CHECKED BY** J. Weber
LATITUDE 41.073623 **LONGITUDE** -73.864421

PROJECT LOCATION Tarrytown, New York
ELEVATION DATUM NAVD88 **GROUND ELEVATION** 8.0±
DRILLING METHOD Direct Push
SAMPLE HAMMER
AUGER INNER DIAMETER **OUTER DIAMETER**
ROTARY BIT DIAMETER **GROUNDWATER LEVELS:**
CASING DIAMETER ▽ **AT TIME OF DRILLING** 6.00± ft
CASING DEPTH ▼ **AT END OF DRILLING**
FINAL DEPTH 10.0± ft ▼ **AFTER DRILLING**

Material Symbol	EL (ft)	Sample Description	Depth (ft)	Sleeve Number	Sample Data: Type	Sample Data: Rec. (in)	Sample Data: Environmental Soil Sample Name	Sample Data: Blows/6-in Core time/ft	Sample Data: PID (ppm)	Remarks
		Topsoil with Roots								
		Fill: Brown SILT, some medium to fine Sand, little coarse to fine Gravel, with Roots		S-1		42	S-1		0.0 0.0 0.0 0.0	
	3	Fill: Gray SILT, little medium to fine Sand	5						0.0	
		Fill: Gray medium to fine SAND, some coarse to fine Gravel, little Silty Clay		S-2		60	S-2 SB-119(8-8.5)		0.1 0.1 0.1	
		Fill: Gray coarse to fine SAND, some Silty Clay							0.1	
	-2	BOREHOLE COMPLETED AT 10± FEET	10						0.1	
	-7		15							
	-12		20							
	-17		25							
	-22		30							

FIGURES



GRAPHIC SCALE

0 10 20 40

(IN FEET)

1 inch = 20 ft.

PROJECT:

FRANKLIN COURTS

50 WHITE STREET, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY

DRAWING:

LOCATION MAP

PREPARED BY:

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place • Carmel, New York 10512
Phone (845) 225-9690 • Fax (845) 225-9717
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DATE:	1/4/24
SCALE:	1" = 500'
PROJECT NO.:	22220.100
FIGURE:	1

\\192.0.0.102\CADServer\E\22220100 WB Franklin Courts\Stormwater\Figures\Figure 1- Location Map.dwg, 1/2/2024 2:43:42 PM, jmcmanus, 1:1



LEGEND

PRE 1	SUBCATCHMENT
SF →	TIME OF CONCENTRATION SHEET FLOW
SCF →	TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW
DESIGN POINT	DESIGN POINT
	SUBCATCHMENT CONTRIBUTING AREA

SOILS LEGEND

SOILS	DESCRIPTION	HYDROLOGICAL GROUP
ChE	Charlton loam, 25% to 35% slopes	B
Uf	Udorthents, smoothed	B
UhB	Urban land–Charlton complex, 3% to 8% slopes	D
UhC	Urban land–Charlton complex, 8% to 15% slopes	B
UhD	Urban land–Charlton complex, 15% to 25% slopes	B
UlC	Urban land–Charlton Chatfield complex, rolling	D
UlD	Urban land–Charlton Chatfield complex, hilly	D
	NRCS Soil Boundary Line	

GRAPHIC SCALE

0 50 100 200

(IN FEET)
1 inch = 100 ft.

NO.	DATE	REVISION	BY

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PROJECT:
FRANKLIN COURTS
50 WHITE STREET, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY

DRAWING:
PRE–DEVELOPMENT MAP

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.
DATE	1–4–24	DRAWN BY	I.B.
SCALE	1" = 100"	CHECKED BY	J.W.M.

DRAWING NO.
FIG–2

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Z:\E\22220100 WB Franklin Courts\Stormwater\Figures\Figure 2- Pre Development Map.dwg, 8/7/2024 9:26:50 AM, jmcmanus, 1:1



SOILS LEGEND

SOILS	DESCRIPTION	HYDROLOGICAL GROUP
ChE	Charlton loam, 25% to 35% slopes	B
Uf	Udorthents, smoothed	D
UhB	Urban land–Charlton complex, 3% to 8% slopes	D
UhC	Urban land–Charlton complex, 8% to 15% slopes	B
UhD	Urban land–Charlton complex, 15% to 25% slopes	B
UlC	Urban land–Charlton Chatfield complex, rolling	D
UlD	Urban land–Charlton Chatfield complex, hilly	D
	NRCS Soil Boundary Line	

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GRAPHIC SCALE

0 50 100 200

(IN FEET)

1 inch = 100 ft.

NO.	DATE	REVISION	BY

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PROJECT:

FRANKLIN COURTS

50 WHITE STREET, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY

DRAWING:

POST–DEVELOPMENT MAP

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.
DATE	8–8–24	DRAWN BY	I.B.
SCALE	1" = 100'	CHECKED BY	J.W.M.

DRAWING NO.

FIG–3

Z:\E\22220100 WB Franklin Courts\Stormwater\Figures\Figure 3 - Post Development Map.dwg, 2/6/2025 10:13:08 AM, jmcmanus, 1:1



GROUND COVER REDEVELOPMENT SUMMARY TABLE

DESCRIPTION	1.1S AREAS
OVERALL:	5.5± AC
Proposed New Impervious Area	1.9± AC*
Existing Impervious to be Redeveloped as Impervioust Area	1.3± AC
Existing Impervious to be Redeveloped as Pervious Area	1.0± AC*

*The Proposed New Impervious Area noted in the WQv Calculation is the Proposed New Impervious Area noted above reduced by the Existing Impervious Area to be Redeveloped as Pervious Area (1.9 ac – 1.0 ac = 0.9 ac). Although only 1.8 ac of Proposed New Impervious Area is in the Subcatchment 1.1S, the practice has been sized for 0.9 ac of Proposed New Impervious Area and 2.2 ac of Existing Impervious to be Redeveloped as Impervious to account for all new impervious surfaces onsite.

LEGEND

- PROPOSED NEW IMPERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REDEVELOPED AS IMPERVIOUS AREA
- EXISTING IMPERVIOUS AREA TO BE REDEVELOPED AS PERVIOUS AREA
- SUBCATCHMENT BOUNDARY

GRAPHIC SCALE

0 25 50 100

(IN FEET)
1 inch = 50 ft.

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PROJECT:
FRANKLIN COURTS
50 WHITE STREET, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY

DRAWING:
IMPERVIOUS AREA MAP

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.
DATE	1-13-24	DRAWN BY	J.J.S.
SCALE	1" = 50'	CHECKED BY	J.W.M.

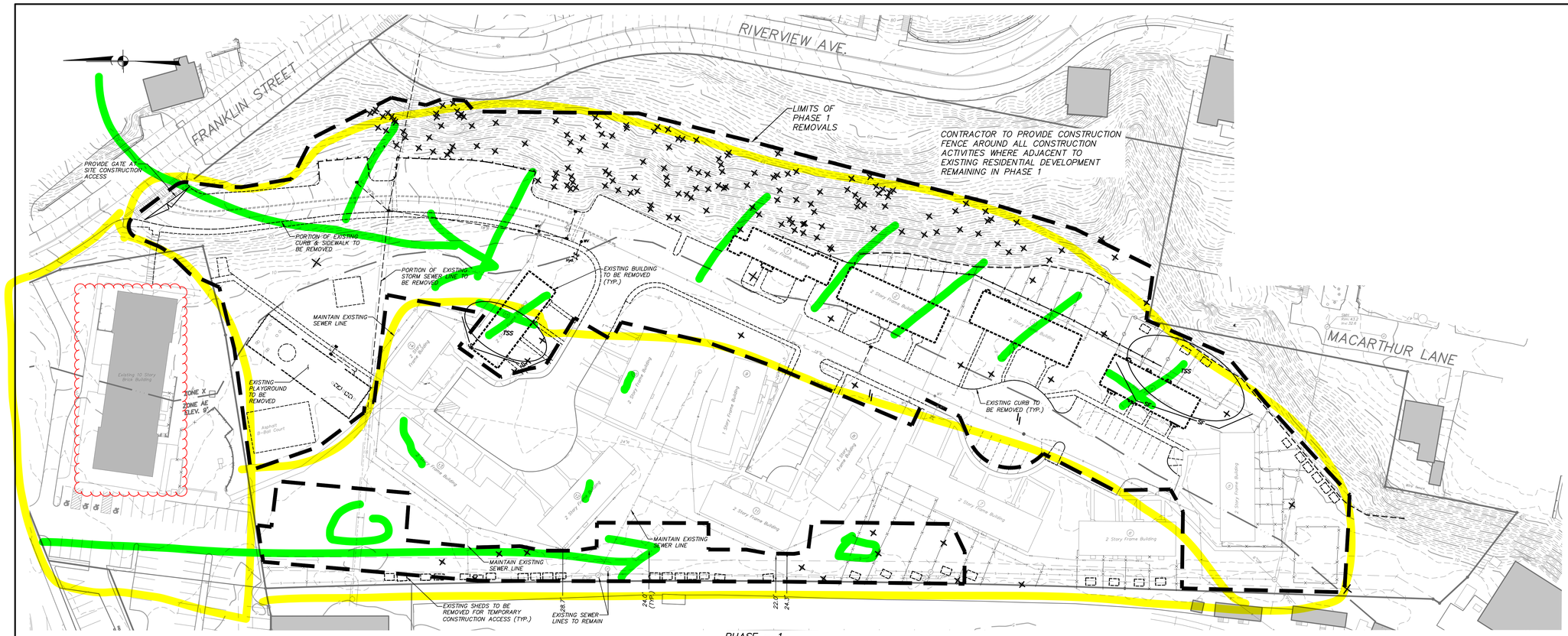
DRAWING NO.
FIG-4

ALTERATION OF THIS DOCUMENT, UNLESS UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, IS A VIOLATION OF SECTION 7209 OF ARTICLE 145 OF THE EDUCATION LAW.

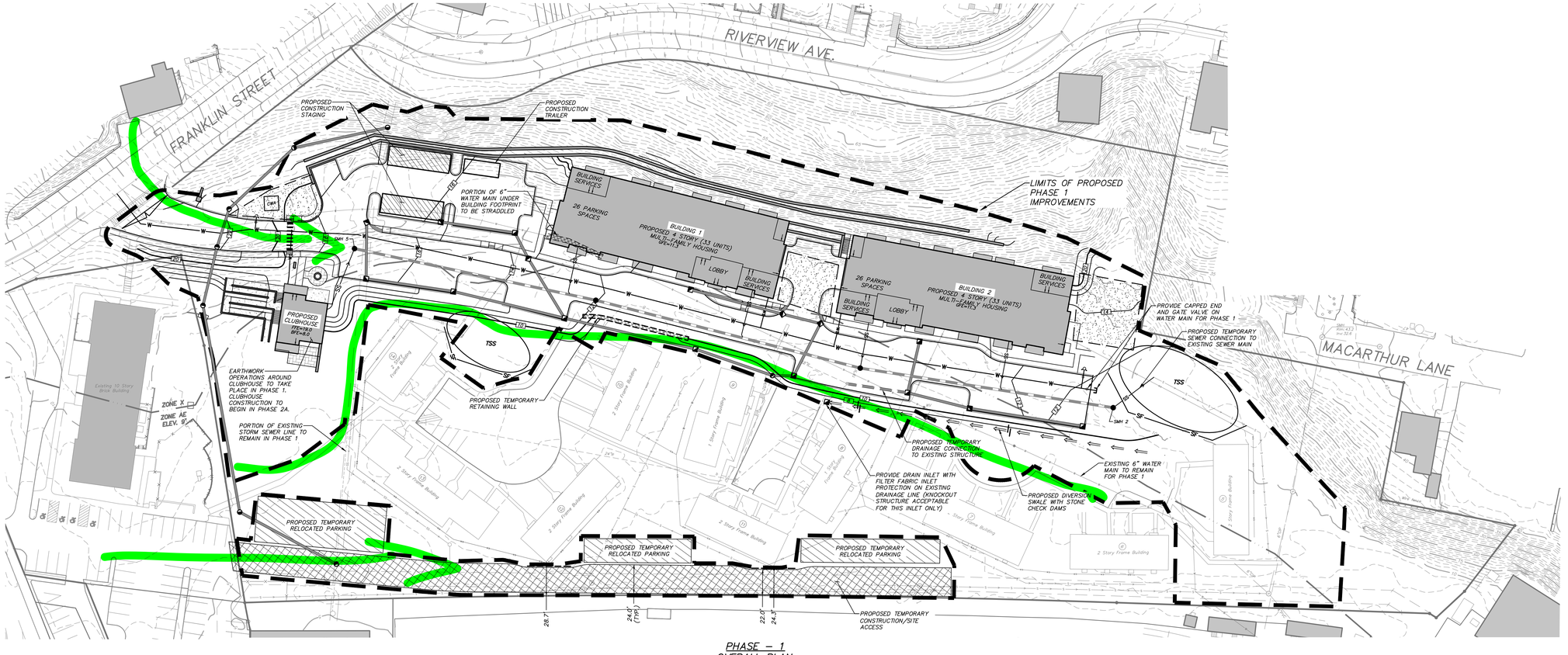
Z:\E\22220100 WB Franklin Courts\Stormwater\Figures\Figure 4 - Impervious Area Map.dwg, 2/6/2025 10:20:38 AM, jmcmanus, 1:1

Appendix C:

Phasing Plans



PHASE – 1
EXISTING CONDITIONS & REMOVALS
SCALE: 1" = 40'



PHASE – 1
OVERALL PLAN
SCALE: 1" = 40'

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PHASE 1 SCOPE OF WORK AND CERTIFICATE OF OCCUPANCY CONDITIONS:

1. Scope of Work
   - i. Relocate existing storm sewer line that flows from Riverview Avenue through the property to the northwestern corner of the site.
   - ii. Construct access and temporary parking along western property line for existing units to remain.
   - iii. Raze five (5) existing buildings identified on the project phasing plans as Buildings 1, 2, 3, 4 and 15 as well as the existing playground.
   - iv. Construct the two multifamily buildings.
   - v. Install the proposed water main from Franklin Street to just past multifamily Building 2 (approx. 860 ft).
   - vi. Install the proposed sewer line from SMH 5 to SMH 2, and install temporary sewer connection to existing main as shown on the project phasing drawings.
2. Items to be satisfied prior to issuance of CO for Multifamily Building 1:
   - i. The storm sewer line that flows from Riverview Avenue through the property to the northwester corner of the site shall be installed.
   - ii. Water main shall be installed from Franklin Court to just past multifamily Building 1 (approx. 580 ft) and approved for use by WCDOH.
   - iii. Sewer main and service to building (WCDOH main by definition) shall be installed and tested between SMH 5 and SMH 2 (including temporary connection to existing sewer main and shall be approved for use by WCDOH.
   - iv. Site improvements deemed necessary for site safety to access Multifamily Building 1 shall be installed to the satisfaction of the Project Engineer and Village Engineer. This includes but is not limited to site lighting, curbing, sidewalks, confirmation of ADA accessible routes, and appropriate temporary measures (such as fencing) to ensure the useable portion of the site is separated from areas under construction.
   - v. Provide interim as–built of completed improvements and utilities.
3. Items to be satisfied prior to issuance of CO for Multifamily Building 2
   - i. Water main shall be installed from just past multifamily Building 1 to just past multifamily Building 2 (approx. 860 feet from Franklin Court), and approved for use by WCDOH.
   - ii. Sewer service for Multifamily Building 2 (defined as sewer main by WCDOH) shall be installed and tested and approved for use by WCDOH.
   - iii. Site improvements deemed necessary for site safety to access Multifamily Building 1 shall be installed to the satisfaction of the Project Engineer and Village Engineer. This includes but is not limited to site lighting, curbing, sidewalks, confirmation of ADA accessible routes, and appropriate temporary measures (such as fencing) to ensure the useable portion of the site is separated from areas under construction.
   - iv. Provide interim as–built of completed improvements and utilities.

PHASE 1 CONSTRUCTION SEQUENCE (4.3 Ac):

1. A pre–construction meeting shall be scheduled with the Village Engineer, the Design Engineer, Building Inspector, Site Contractor, and/or other outside agencies at least 48–hours before the start of construction activities.
2. Per New York State Law, the contractor shall call DigSafely New York at 1–800–962–7962 two (2) full days prior to performing any excavation work.
3. Prior to the start of construction, property lines and overall limits of disturbance for Phase 1 shall be survey staked out.
4. Install silt fence and other erosion control practices in general locations indicated on the plan.
6. Install temporary gravel access road within limits of proposed emergency access road, and temporary parking areas as shown in Phase 1.
7. Install new Village storm sewer bypass line from Riverview Avenue, through the property, to the northwestern corner of the site.
8. Install the Phase 1 stormwater improvements shown hereon. Portions of the existing onsite storm sewer lines shall remain, as noted on the plan.
9. Install temporary diversion swale with check dams in location shown.
10. Begin clearing and grubbing operations.
11. Begin demolition of existing structures 1, 2, 3, 4 & 15 on the project site.
12. Remove existing site pavement within limits of stabilized construction entrance shown hereon and install stabilized construction entrance/anti–tracking pad.
13. Begin removal of remaining site pavement, curbing, sidewalks, utilities & any site features shown to be removed in Phase 1.
14. Strip topsoil and stockpile in locations shown in Phase 1.
15. Begin mass earthwork and rough grading operations. Stockpile material as shown in Phase 1. Install temporary gabion retaining walls, and begin rough grading of proposed road.
16. Begin construction of proposed utilities (sewer & water mains) to extents shown in Phase 1.
17. Install light pole foundations and underground electric along the eastern side of the proposed road as shown in Phase 1.
18. Begin construction of proposed retaining walls.
19. Begin construction of proposed clubhouse, and buildings 1 & 2.
20. Install proposed water service lines and sewer service lines.
21. Respread topsoil, seed and mulch lawn areas within Phase 1.
22. Once Phase 1 stabilization has been achieved and confirmed by the Qualified Professional, continue to Phase 2A.

GRAPHIC SCALE
0 20 40 80
(IN FEET)
1 inch = 40 ft.

* REFER TO DETAIL DRAWINGS IN FRANKLIN COURTS SITE PLAN SET FOR TEMPORARY CONSTRUCTION PRACTICES

NO.	DATE	REVISION	BY
3	2–20–25	REVISED PER VILLAGE COMMENTS	TSM
2	2–6–25	REVISED PER VILLAGE ENGINEER COMMENTS	RAR
1	1–24–25	REVISED PER VILLAGE COMMENTS	TSM

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PROJECT:
FRANKLIN COURTS
1–99 FRANKLIN COURT, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY, NY

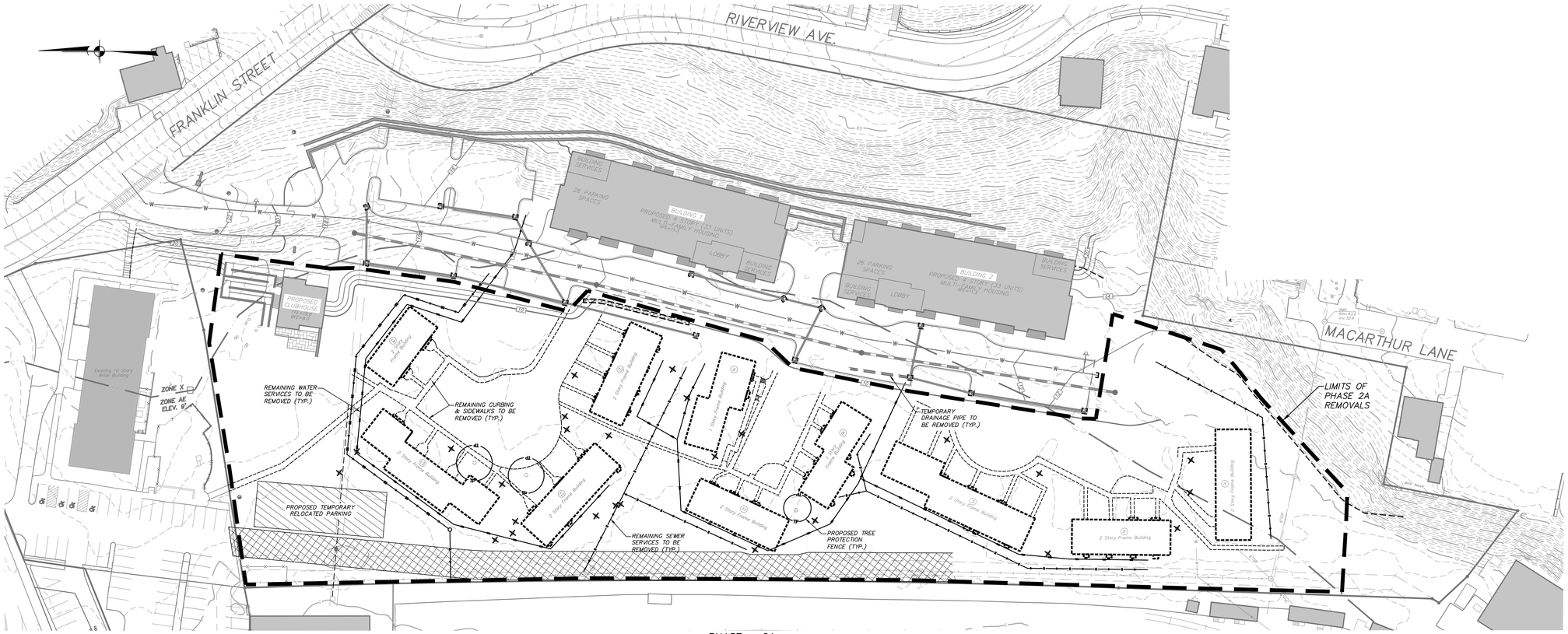
DRAWING:
PHASING PLAN – PHASE 1

STATE OF NEW YORK — RICHARD B. WILLIAMS — 095855 — LICENSED PROFESSIONAL ENGINEER

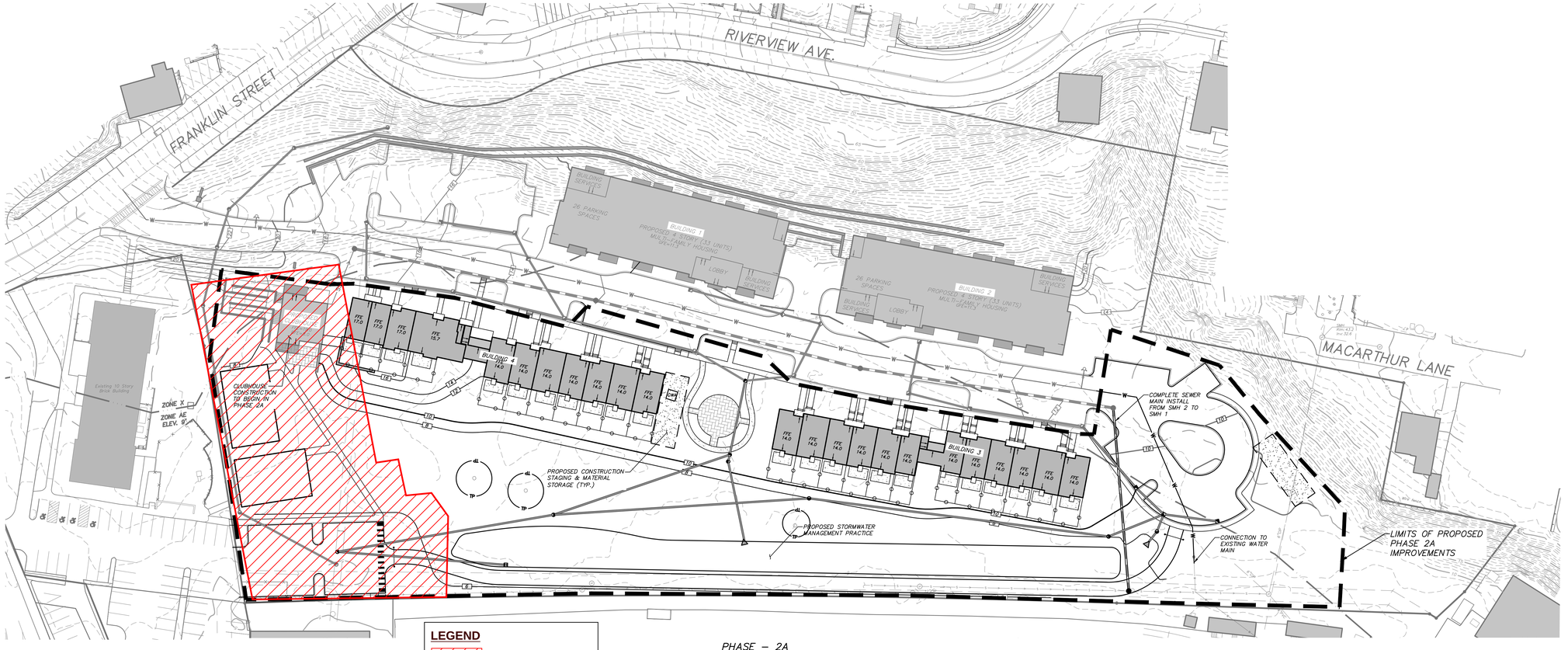
PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.
DATE	12–5–24	DRAWN BY	T.S.M.
SCALE	1" = 40'	CHECKED BY	D.L.M.

DRAWING NO. PH–1
SHEET 1 / 3

Z:\C\22\22000 WB Franklin Courts\Misc Drawing Files\Phasing Plans\22522-11-22 (Phasing Plans).dwg 2/20/2025 9:13:13 AM, dclow, 1:1



PHASE – 2A
EXISTING CONDITIONS & REMOVALS
SCALE: 1" = 40'



LEGEND

HISTORICAL COAL YARD

PHASE – 2A
OVERALL PLAN
SCALE: 1" = 40'

PHASE 2A SCOPE OF WORK AND CERTIFICATE OF OCCUPANCY CONDITIONS:

1. Scope of Work
   - i. Complete construction of the cul-de-sac.
   - ii. Complete construction of the onsite water main and connect to existing water main completing the loop.
   - iii. Complete construction of the sewer main from SMH 2 to SMH 1 and remove the temporary sewer connection installed in Phase 1 above.
   - iv. Raze the balance of the existing buildings (Buildings 5 through 14 as shown on the project phasing drawings).
   - v. Construct the two Town Home Buildings (Buildings 3 and 4).
   - vi. Construction proposed bioretention filter.
   - vii. Construct Clubhouse and other site amenities.
   - viii. Switch the Site Access from the access along the western property line to the newly constructed Franklin Court. The access along the western side of the property will be temporarily used for construction access.
2. Items to be satisfied prior to issuance of CO for first unit Town Home Building 3
   - i. Complete the installation of the cul-de-sac.
   - ii. Complete the installation and testing of the water main loop and obtain approval for use by WCDOH.
   - iii. Complete the installation and testing of the sewer mains and manholes from SMH 2 to SMH 1 and obtain approval for use by WCDOH.
   - iv. Provide interim as-built of completed improvements and utilities.

PHASE 2A CONSTRUCTION SEQUENCE (4.2 Ac):

1. Prior to the start of construction, overall limits of disturbance for Phase 2 shall be survey staked out.
2. Install silt fence and other erosion control practices in general locations indicated on the plan.
3. Remove temporary gravel access road and begin construction of emergency access road.
4. Begin clearing and grubbing operations for Phase 2
5. Begin demolition of existing structures 5, 6, 7, 8, 9, 10, 11, 12, 13 & 14 on the project site.
6. Begin removal of remaining site pavement, curbing, sidewalks, utilities & any site features shown to be removed in Phase 2.
7. Strip topsoil and stockpile in locations shown in Phase 2.
8. Construct permanent Bio-retention Filter (SMP 1.1P) and associated structures as shown in Phase 2.
9. Continue mass earthwork and rough grading operations shown in Phase 2. Stockpile material as shown on plan.
10. Begin construction of proposed utilities (drainage, sewer & water mains) to extents shown in Phase 2.
13. Install light pole foundations and underground electric along the eastern side of the proposed road as shown in Phase 2.
14. Begin construction of proposed buildings 3 & 4.
15. Install proposed water service lines and sewer service lines.
16. Respread topsoil, seed and mulch lawn areas within Phase 2.
17. Once Phase 2A stabilization has been achieved and confirmed by the Qualified Professional, continue to Phase 2B.

GRAPHIC SCALE
0 20 40 80
(IN FEET)
1 inch = 40 ft.

* REFER TO DETAIL DRAWINGS IN FRANKLIN COURTS SITE PLAN SET FOR TEMPORARY CONSTRUCTION PRACTICES

NO.	DATE	REVISION	BY
3	2-20-25	REVISED PER VILLAGE COMMENTS	TSM
2	2-6-25	REVISED PER VILLAGE ENGINEER COMMENTS	RAR
1	1-24-25	REVISED PER VILLAGE COMMENTS	TSM

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PROJECT:
FRANKLIN COURTS
1-99 FRANKLIN COURT, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY, NY

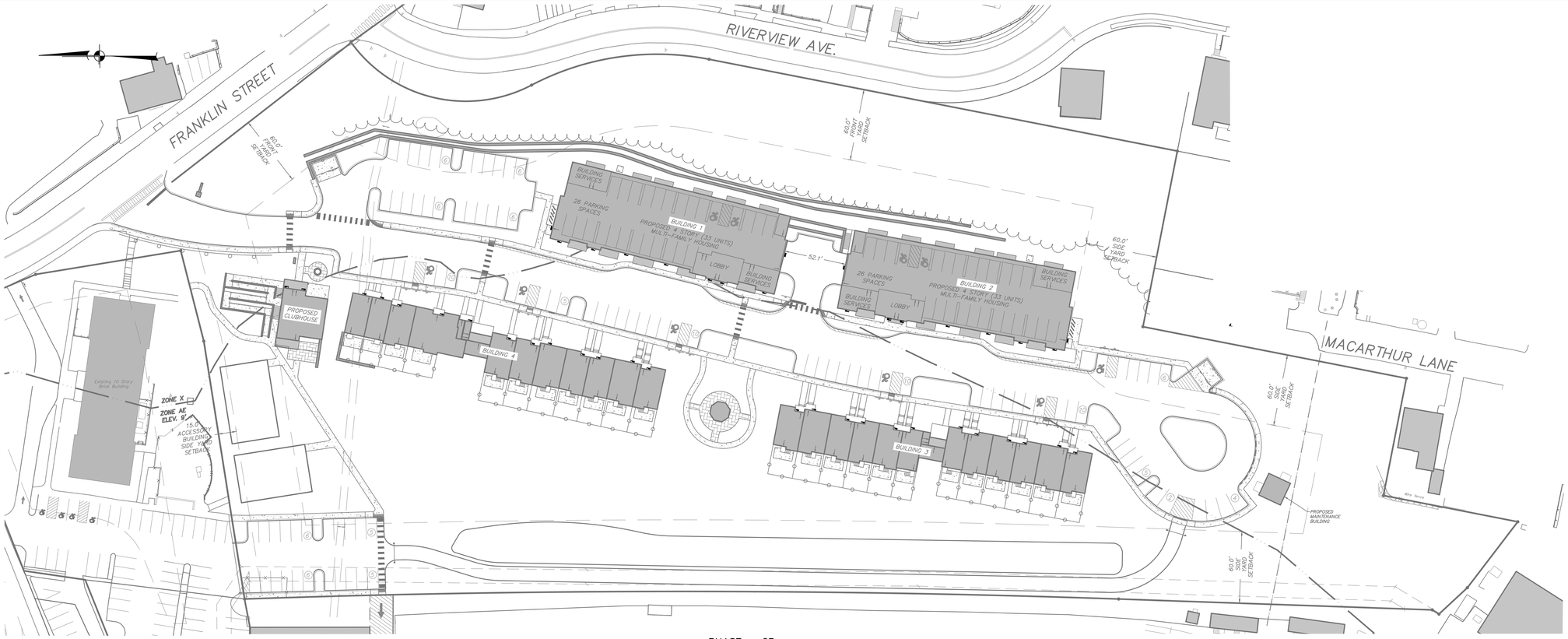
DRAWING:
PHASING PLAN – PHASE 2A

STATE OF NEW YORK · RICHARD D. WILLIAMS JR. · 085556 · LICENSED PROFESSIONAL ENGINEER

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.	DRAWING NO.	SHEET
DATE	5-9-24	DRAWN BY	T.S.M.	PH-2A	2 / 3
SCALE	1" = 40'	CHECKED BY	D.L.M.		

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Z:\E\22220100 Will Franklin Court\Misc Drawing Files\Phasing Plans\220410-22 (Phasing Plans)\PH-2A.dwg, 2/20/2025 9:33:32 AM, dklau, 1:1



PHASE – 2B
EXISTING CONDITIONS
SCALE: 1" = 40'



PHASE – 2B
OVERALL PLAN
SCALE: 1" = 40'

PHASE 2B SCOPE OF WORK AND CERTIFICATE OF OCCUPANCY CONDITIONS:

1. Scope of Work
   - i. Install landscaping and any remaining lighting.
   - ii. Install components of amenity spaces, i.e. walking paths ,exercise equipment, gazebos, benches, etc.
2. Items to be satisfied prior to issuance of last unit CO for Town Home Building 4
   - i. Complete the installation of all site plan improvements including landscaping.
   - ii. Install temporary stabilization for all disturbed areas (Note: Prior to the filing of the Notice of Termination the stormwater easement agreement will be filed and 80% vegetative growth will be established on all disturbed areas).
   - iii. Obtain final signoff from WCDOH on water and sewer.
   - iv. Ensure all easements are filed in accordance with the Easement Plan and any amendments based on construction are accounted for.
   - v. All permanent parking areas shall be completed in accordance with the approved site plan.

PHASE 2B CONSTRUCTION SEQUENCE:

1. Upon completion of all rough grading, begin construction of proposed landscaping for entire site.
2. Mount all pole mounted light fixtures and bollard lights on foundations previously installed in subsequent phases.
3. Beging construction of all proposed mulch pathways.
4. Leave surface slightly roughened and seed and mulch areas outside paved and gravel areas immediately with Rye Grass mixture.
5. All erosion and sediment control practices will be inspected by a Qualified Professional in accordance with General Permit GP-0-20-001 or superceding General Permit. Contractor is responsible for conducting inspections in accordance with the Erosion and Sediment Control Maintenance Schedule. Needed repairs will be made immediately.
6. Respread topsoil, seed and mulch lawn areas within Phase 2B.
7. Remove all temporary erosion and sediment control practices facilities once final stabilization is achieved. Final stabilization is achieved when all soil disturbance activities have ceased, and a uniform, perennial vegetation cover with a density of eighty percent (80%) or greater over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulch, rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

GRAPHIC SCALE
0 20 40 80
(IN FEET)
1 inch = 40 ft.

NO.	DATE	REVISION	BY
3	2-20-25	REVISED PER VILLAGE COMMENTS	TSM
2	2-6-25	REVISED PER VILLAGE ENGINEER COMMENTS	RAR
1	1-24-25	REVISED PER VILLAGE COMMENTS	TSM

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(845) 225-9717 fax
www.insite-enp.com

PROJECT:
FRANKLIN COURTS
1-99 FRANKLIN COURT, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY, NY

DRAWING:
PHASING PLAN – PHASE 2B

STATE OF NEW YORK · RICHARD D. WILLIAMS · 072556 · LICENSED PROFESSIONAL ENGINEER

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.
DATE	5-9-24	DRAWN BY	T.S.M.
SCALE	1" = 40'	CHECKED BY	D.L.M.

DRAWING NO. PH-2B
SHEET 3 / 3

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Z:\E\22220100 Will Franklin Court\Misc Drawing Files\Phasing Plans\220419-22 (Phasing Plans)\220419-2B.dwg, 2/20/2025 9:13:55 AM, dlalau, 1:1

Appendix D:

Ground Penetrating Radar Surveys

Coastal Environmental Solutions, Inc.

GEOPHYSICAL INVESTIGATION REPORT

1-99 Franklin Avenue, Tarrytown, NY
Date of Investigation: 3.28.2022

Prepared for:

SESI Consulting Engineers
12A Maple Avenue
Pine Brook, NJ 07058

Prepared By:

Dennis Berthold
Coastal Environmental Solutions, Inc.
PO Box 342
Medford, New York 11763

1.0 INTRODUCTION

On March 28, 2022, Coastal Environmental Solutions, Inc (Coastal) personnel performed a limited geophysical investigation at the property located at 1-99 Franklin Avenue, Tarrytown, NY. The area of interest included multiple locations in the grass adjacent to the homes within the neighborhood, proximate to suspected USTs. Surface conditions consisted of asphalt, concrete, and grass.

2.0 SCOPE OF WORK

1. Locate and mark detectable underground utilities in close proximity to client proposed soil boring locations.
2. Locate possible USTs or other subsurface anomalies in designated areas.

3.0 EQUIPMENT

ImpulseRadar PinPointR Ultra-Wide Band (UWB) Penetrating Radar System

Ground Penetrating RADAR (GPR) is a non-destructive geophysical method that produces a continuous cross-sectional profile of subsurface features in real time. GPR operates by transmitting both high and low frequency electromagnetic wave pulses down into the ground through a transmitter in the antenna. The transmitted electromagnetic waves reflect off materials with contrasting dielectric properties from surrounding medium such as underground storage tanks, utilities, distinct contacts between different earth materials, and other various subsurface objects. The antenna receiver collects the reflected electromagnetic waves which are then interpreted by the operator.

The ImpulseRadar PinPointR UWB GPR utilizes a dual band 400/800 MHz HS antenna mounted to a stroller frame which rolls over the surface. The total depth of penetration achieved with the antenna can be up to 10 feet but widely varies based on site-specific subsurface conditions. Conductive materials in the soil attenuate the GPR signal causing a decrease in effective depth of penetration and clarity.

Vivax-Metrotech vLoc3-Pro Receiver/Transmitter

The vLoc3-Pro Receiver is a hand-operated antenna capable of detecting electromagnetic (EM) fields emitted from a source. The EM antenna can detect pipes and cables in the ground at depths of up to 20 feet using active or passive tracing techniques. Passive tracing is the act of locating an underground utility through the detection of electrical or radio signals travelling along conductive utilities. Active tracing is used in conjunction with the Transmitter that is directly connected to the target utility or to a conductive rodder within a non-conductive line. A signal is sent through the utility at a specific frequency that can be detected by the Receiver. The detectability of a target utility depends on many factors including access to the target utility, grounding, depth of utility, conductivity, and other site-specific factors.

TW-6 Pipe and Cable Locator

The TW-6 Pipe and Cable locator is a handheld magnetometer which utilizes a transmitter-receiver pair attached to opposite ends of a handle and carried approximately 1-2ft from the surface. The

magnetometer induces an electromagnetic (EM) field into the ground that is generated by the transmitter. Once the induced EM field passes through a buried metallic object, it generates a secondary EM field which is detected by the receiver, generating an audible tone. Based on the calibration of the magnetometer, the audible tone reflects the strongest response as the highest pitched sound, trailing off on all sides of the peak. This piece of technology can be used to detect subsurface features such as metallic USTs, large diameter conductive pipes, and buried manholes, especially in areas in which traditional GPR methods cannot be utilized, such as overgrown or uneven surfaces.

4.0 METHODOLOGY

1. A subsurface investigation was performed in close proximity to the client proposed soil boring locations. Active and passive detection methods were utilized with the VLoc3-Pro receiver/transmitter. Coastal personnel direct connected to all accessible and traceable pipes, conduits, valve covers, and any other surface feature throughout the site. A passive scan was performed throughout the site to detect any potential underground utilities that could not be located with active scan.
2. The TW-6 was utilized to sweep accessible areas around the suspected UST location in 3-to-5-foot spacings for readings that may represent a buried metallic anomaly. Upon detection of a reading, the approximate size and shape of the anomalous area was marked on the surface to be investigated further with GPR.
3. GPR was utilized to further characterize the approximate dimensions, depth, and shape of the anomalies located with the TW-6. The remainder of the areas around the suspected UST location was scanned with GPR in 3-to-5-foot spacing to locate any anomalous features not previously detected such as non-conductive piping and former excavations.
4. All findings were marked on the surface utilizing the American Public Works Association (APWA) recommended color code, seen below:

WHITE	Proposed Excavation
PINK	Temporary Survey Markings (Approximate UST Locations, Soil Boring Locations)
RED	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Water (Domestic and Fire Lines)
PURPLE	Irrigation (Not commonly used)
GREEN	Sewers and Drain Lines

5.0 SUMMARY OF FINDINGS

Utility Locate

Coastal personnel conducted a utility locate on all accessible areas within the area of concern. Coastal identified few utilities within the areas of concern across the property and marked all based on the APWA system referenced above. The SESI representative on site permitted the soil boring locations within proximity to utilities to be moved to allow safe drilling activities to proceed.

UST/Anomaly Locate

Coastal conducted an investigation in multiple areas for possible UST's or other underground anomalies. Many UST related vents and fills were detected across the property (one typically in front of each of the residences of the row house neighborhood) but many of the lines investigated were not able to be traced to a location away from the building by direct connect induction. Coastal attempted to utilize the GPR within areas clear of shrubs and other foliage, as well as the Magnetometer in proximity to these lines without success. Based on the evidence discovered, Coastal determined either the suspected USTs were within the building (basement or within a closet in each residence) or beneath foliage preventing a complete locate of the UST to be performed.

Coastal detected the presence of one UST in front of residence 2E. The anomaly discovered measured to be approximately 4ft by 8 ft, with one endcap extending beneath an area of foliage and unable to be accurately measured. The detection was marked out on the surface with pink paint.

Limitations

The effective depth of GPR penetration was limited to 4.5 feet. The limiting factor was due to soil conductivity attenuating the GPR signal. The GPR and TW-6 was unable to be utilized within close proximity to parked vehicles and exterior walls.

Disclaimer

The subsurface investigation was performed by Coastal after considering the limits of the scope of work and the time constraint for the investigation. The investigation that is described in this report was undertaken in accordance with current accepted standards and practices of the geophysical survey industry. The results and interpretations that are presented are based on professional judgment and are as accurate as can reasonably be achieved. However, no geophysical equipment can accurately depict all subsurface features due to the geology and environmental conditions of the subsurface. Any intrusive work in proximity to identified anomalies should be carefully considered and cross-referenced with all available site-specific documentation. Coastal is not liable for the use, interpretation, or application of the data and information in this report.

PHOTOS & GPR SCREENSHOTS



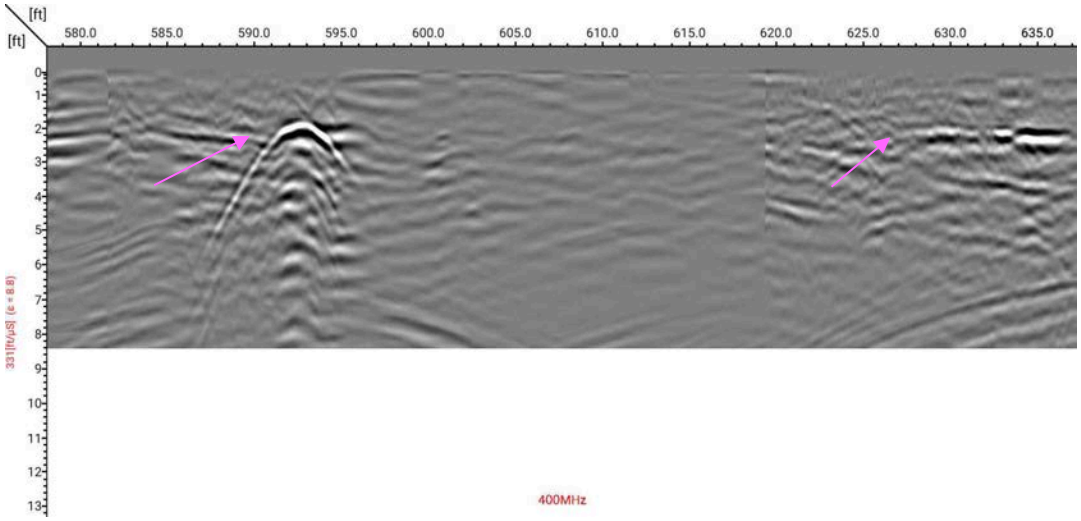


Photo 1 and GPR Screenshot 1 – Photo from in front of residence 2E showing the detected UST and the proposed location for a temporary monitoring well. The GPR screenshot shows a distinct detection at approximately 1.5-2 ft deep (showing the parabola and solid line in perpendicular scans) typical of a UST. The estimated extent of the UST was marked in the field in pink paint.



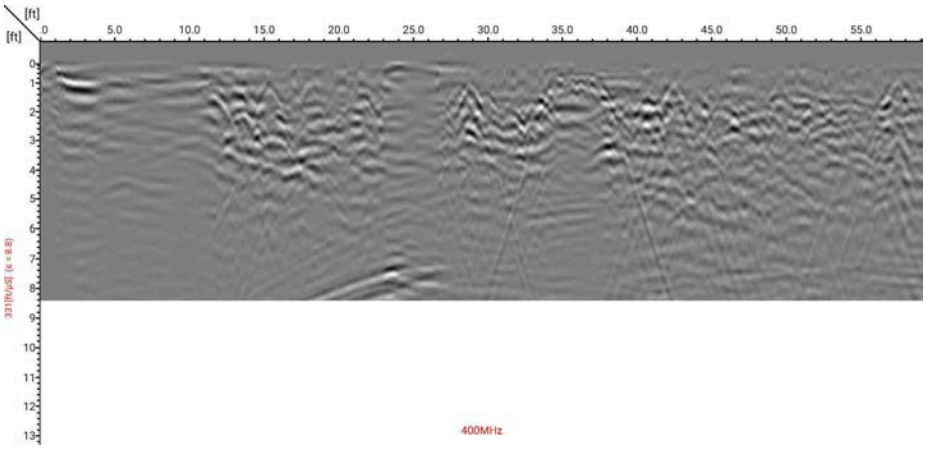


Photo 2 and GPR Screenshot 2 – View of the proposed soil boring locations within the area near residences 8A through 8D. Multiple electrical lines were detected within this area, and soil boring locations were adjusted accordingly.





Photos 3 and 4 – Additional views of the utilities detected during the geophysical survey of this property.

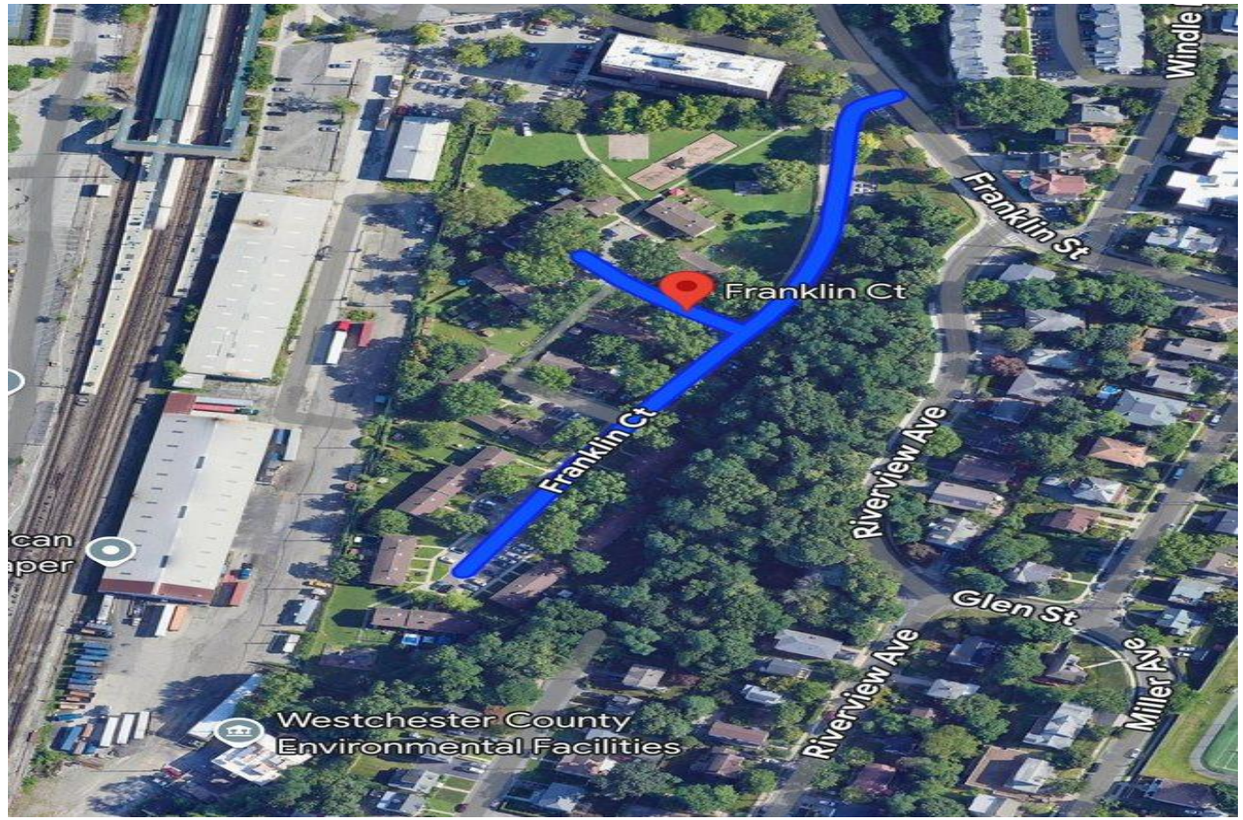
Accu-Scan GPR

UTILITY LOCATING PROJECT SUMMARY REPORT

Date: November 25, 2024

Franklin Courts

Tarrytown, NY 10591



Prepared For:

SESI Consulting
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To Whom It May Concern

RE: Utility Locating Investigation at Franklin Courts Apartments, Tarrytown, NY

I would like to thank you once again for the opportunity to work with you on the Utility Locating project at Franklin Courts Apartments; our objective was to investigate the areas around the residences for underground storage tanks. The general areas for GPR scanning were pre-selected and marked.

MATERIALS

Electromagnetic Detection Cable & Pipe Locator RD7000PL & TX-3 Transmitter for identifying buried cables/pipes. PROCEQ GS8000

METHODS

A visual inspection was performed within each area to search for utility poles, utility vaults, manholes, handholes, catch basins, drains, conduits, cleanouts, water valves, gas valves, tank pads, and vents located within or near the survey area. A visual inspection was also performed in the basement of each building surrounding each area to search for utilities exiting in the basement. The cable & pipe locator in Active Mode was performed within each area by directly applying a signal to an electrical conduit, telecommunication conduit, fire hydrants, water shut-off valves, ground wires, and metallic drain lines. A detectable duct rodder was inserted within all accessible non-metallic drains, storm sewer, and sanitary sewer lines that appeared to run through the survey area at a depth less than 6ft. Passive Mode with the Cable & Pipe Locator was performed to search for inaccessible high voltage electric & telecommunications lines. GPR scans were performed to more accurately determine the location and depth of each line and to search for non-metallic line, unknown, and abandoned utilities.

RESULTS

As requested, Accu-Scan GPR Corp. provided utility locating services using a combination of GPR and Electromagnetic Detection technology to locate underground utilities prior to excavation. Underground Utilities were marked with paint and/or flags using the standard American Public Works Association (APWA) Color Codes. Electric is marked in Red, Telecommunications is marked in Orange, Water is marked in Blue, Gas is marked in Yellow, Drains, Storm Sewer, and Sanitary Sewer is marked in Green, and Unknown lines are marked in Pink. The results of the survey will be discussed further in detail which will consist of on-site images, methods of detection, GPR data collected, and brief descriptions of findings.

Electromagnetic Detection Line Locating Techniques (Conduction): The successful detection of underground utilities is dependent primarily upon the composition and construction of the line of interest, and depth of burial. When using the EMLL techniques in the conduction mode, the utilities must be exposed at the surface or in accessible utility vaults close to the survey area. Utilities detectable with this technique include most continuously connected metal pipes, cables/wires or non-metallic utilities with tracer wires. Such utilities generally include water, electric, natural gas, telephone, and other conduits related to facility operations. Utilities that may not be detectable using these techniques include certain abandoned utilities, utilities not exposed at the ground surface, or those made of non-electrically conductive materials such as PVC, fiberglass, vitrified clay, and metal pipes with insulating joints. Pipes generally deeper than about five feet may not be detected. The detection of underground utilities using the conduction mode is also dependent upon the proximity of those utilities to other subsurface utilities and/or above ground cultural objects. Nearby buried utilities can mask or distort signals associated with the utility in questions. For example, if several utilities are buried in a common trench or in close proximity to one another, the signal applied to one utility can couple to the adjacent utility. This can lead to an error in the marked position of the utility in question, or to delineating the wrong utility altogether. In addition, when coupling of nearby utilities takes place, shallow utilities will generally produce a stronger response than adjacent deeper utilities. Therefore, shallow utilities buried over deeper utilities will generally mask effects from the deeper utilities. Besides buried utilities, above ground metal objects can also be affected by coupling of the conducted signal. These objects include rebar in concrete, railroad spurs, and above ground pipe alignments. Typically, subsurface utilities located beneath or near these features are difficult to accurately detect or delineate.

Electromagnetic Detection Line Locating Techniques (Passive): The ability to detect passive signals associated with 60 Hz electric lines is dependent upon the current flowing through the line. The passive signal strength has nothing to do with voltage. It is the current flowing through the line that produces the magnetic field, which in turn is detected by the locator. If an electric line is energized at high voltage, but the load is switched off, there is nowhere for current to flow. Without current flow, there will be no detectable power signal. This results in a line that will not be detected by the locating equipment, but still remains very dangerous if contacted by an excavator, auger, or metal pile.

Electromagnetic Detection Line Locating Techniques (Induction): The detection of buried metal utilities, using the handheld induction technique, is dependent upon the size of the utility, its depth of burial, and its proximity to above ground metal objects. As the size or diameter of the buried metal utility decreases, the depth at which it can be detected also decreases. For example, a relatively large utility such as a corrugated steel drain line, can be detected at depths of 3 to 4 feet. However, a smaller utility, such as an electric line associated with streetlights, may be detected only at depths of 1 to 2 feet. In addition, the ability to detect a buried metal utility is also based on its proximity to above ground metal objects or structure. Cultural features such as chain-link fences, buildings, debris, railroad spurs, guard rails, other utilities, etc. may produce a response that can mask effects from the nearby buried metal utility

.

Ground Penetrating Radar Limitations: As with any other geophysical technique, GPR performance is site-specific, and it is unsuitable for use at some locations. Expected subsurface conditions and the target composition, location and size should be taken into account. GPR anomalies rely on a detectable contrast in subsurface electrical properties between the target of interest and its surrounding material. In the absence of a detectable contrast, no anomaly will be evident. GPR signal cannot penetrate through highly conductive material e.g., beneath metal sheets or very wet ground or in material saturated with salt water or highly conductive fluid. Velocity – depth calibration should always be carried out to obtain satisfactory depth estimates. GPR data processing and interpretation can be complicated - specialized geophysical analysis and interpretation is often required. GPR is unsuited to absolute measurement, e.g., it can find wet areas, but cannot determine actual moisture content. GPR is an interpretive method, based on the identification of reflectors, which may not uniquely identify an object. Additional constraining information from ground truthing or other geophysical methods is important to help resolve any ambiguities. In common with all surfaces geophysical methods GPR is inherently limited by decreasing resolution with depth.

Weather Conditions: Because moisture raises the conductivity of the ground, especially clay soil and silt, deep snow and rain can be a factor in utility locating. Once the radar touches any ground holding moisture, it bounces right back. This makes it tough to read anything past that water table. Therefore, during wet weather conditions are not ideal to do any type of locating.

Surface Area Clearance of Obstacles: The surface being scanned becomes a factor for GPR data when the terrain is rough enough to cause the equipment to separate from the surface more than 2 to 3 inches. The quality of the data when this happens is then compromised. Ideally, the surface needs to be reasonably flat with a good amount of clearance. Obstacles, like trees and bushes, are main factors that can cause a delay in the time.

Limitations of Technology with Certain Materials: There are certain materials that are much more conductive and easily located than others. Metal, for example, is highly conductive, and PVC or plastic has no conductivity, which makes it more challenging to locate. PVC and other non-metallic objects do not show a signal, but rather the signal can show something inside the pipe, like air or water. The size of the PVC does impede the ability for the radar to read if it is smaller, like a 1" line. This is because the radar used for utility locating is typically one that is too large to "see" a line that is that small.

Identity of Target: GPR cannot tell the type or material of the buried utility line. Must be verified by potholing or tracing the utility line structure to structure. No excavation should take place outside of the Utility Locating Survey area specified by client. The tolerance zone is defined as A) 2ft. on either side of the designated center line of the facility if the diameter is not provided. B) 2ft. from each outside edge of the diameter is provided.

	Red	Electric power lines, cables, conduit and lighting cables
	Yellow	Gas, oil, steam, petroleum or gaseous materials
	Orange	Communication, alarm or signal lines, cables or conduit
	Blue	Potable water
	Purple	Reclaimed water, irrigation and slurry lines
	Green	Sewers and drain lines
	Pink	Temporary survey markings
	White	Proposed excavating

74-03 71st Avenue Middle Village, NY 11379 Tel: 718.569.8557 Fax: 718.575.2269

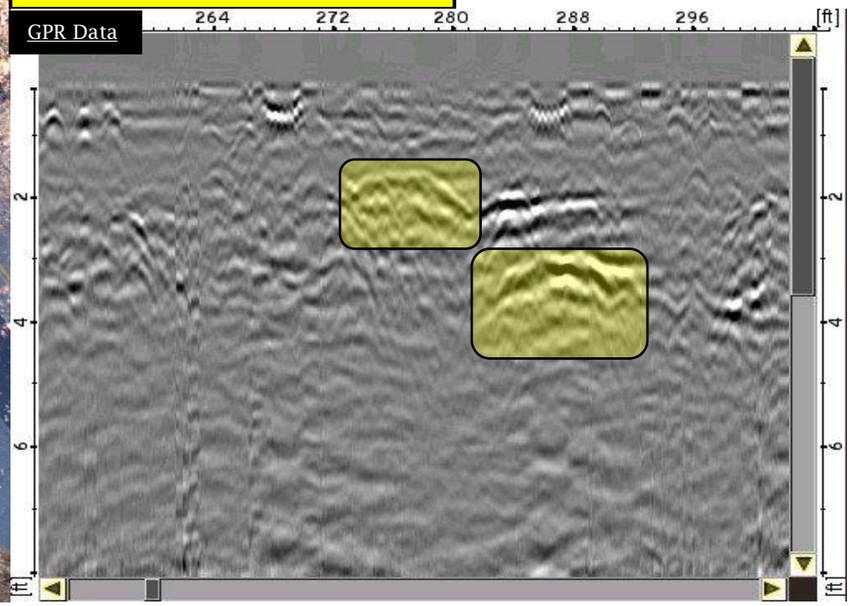
Franklin Courts Results: On the following project summary report images taken on-site, GPR data collected from each location will be shown, methods of detection, and findings will be provided below. The objective for this project was to investigate the areas in front of the residences where the oil tank vent pipes were located to confirm presence of UST. EM Transmission was used on vent lines to try and trace location of tank. GPR was limited due to proximity of the tanks to the residences as well as environmental obstructions, i.e. foliage, debris. Probing with a 4' soil probe was used to confirm physical presence of tank in most locations, as well as a pipe camera to capture and confirm visible evidence of not just the tank but oil still within the tank. Exact size and approximate location of tanks could not be determined again due to environmental restrictions. Indicators such as spray paint and flags were used on site to provide a reference as to the presence and overall location. Please use caution.

Underground Storage Tanks- Apts. 14-14C



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Fill cap was also opened and a rodder was inserted to try to approximate location and depth. Oil was physically identified, and the depth was determined with by sound of contact to tank with probe at 2 1\2'-3', as well as GPR data to confirm its presence below.

GPR Data

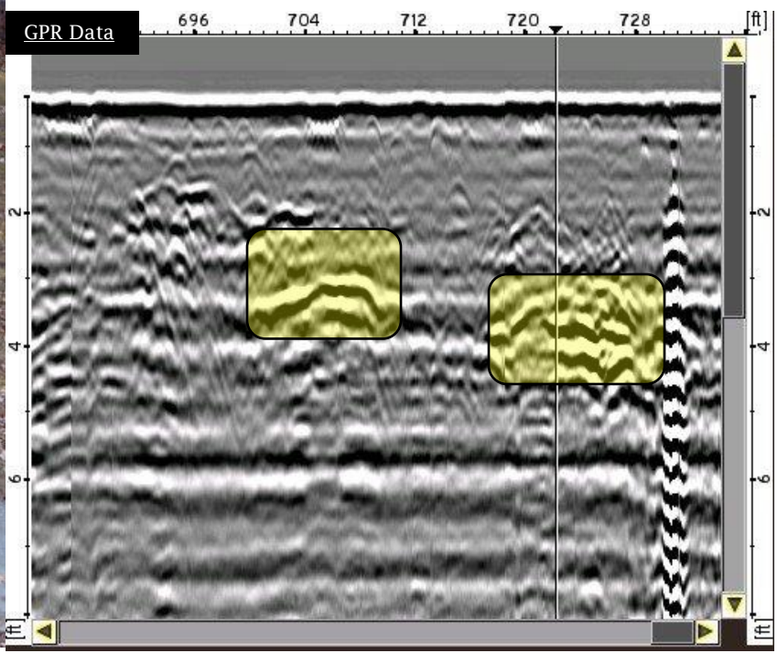


Underground Storage Tanks- Apts. 14A-14D

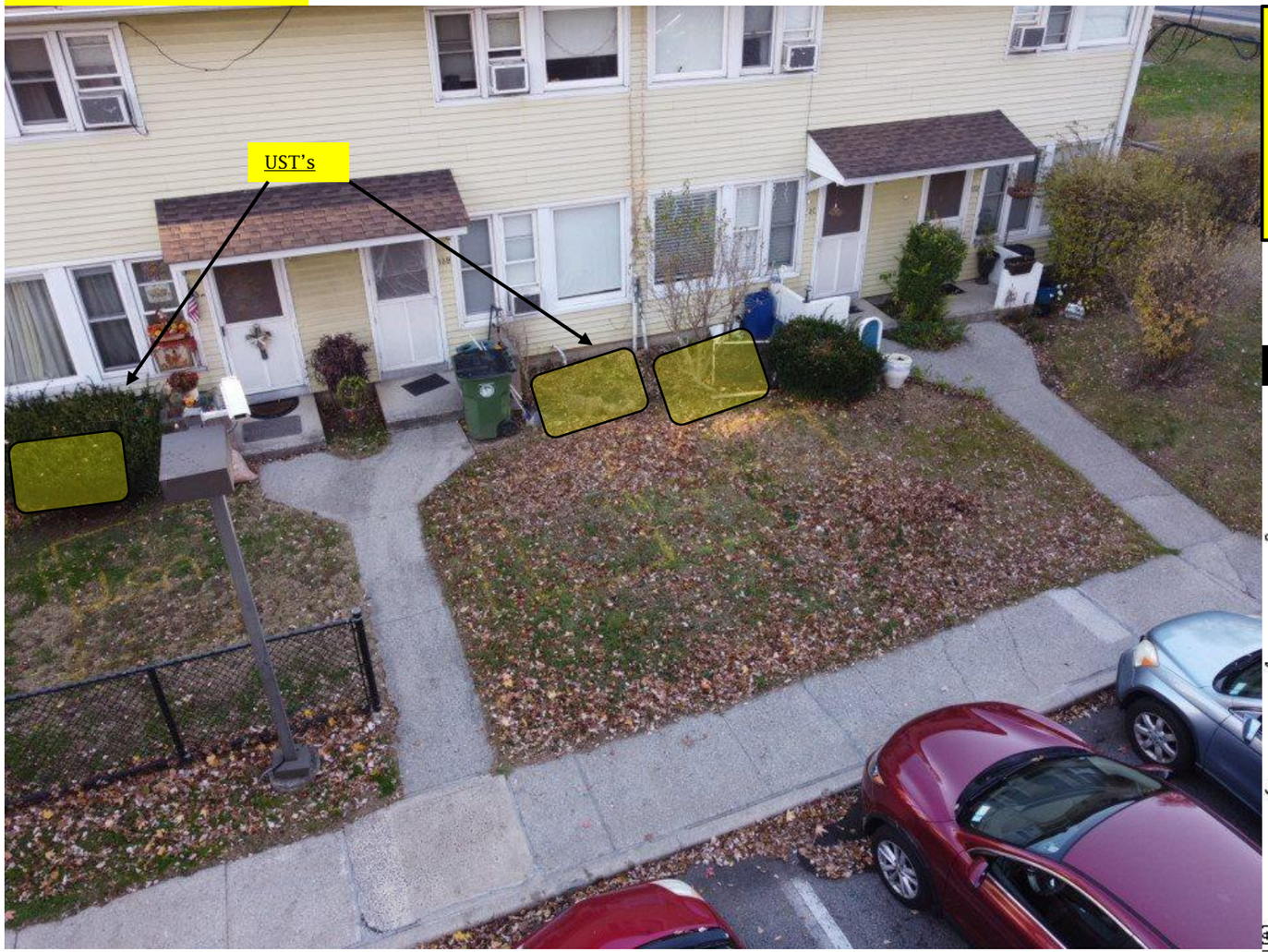


UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Fill cap was also opened and a rodder was inserted to try to approximate location and depth. Oil was physically identified, and the depth was determined with by sound of contact to tank with probe at 2 1\2'-3', as well as GPR data to confirm its presence below.

GPR Data

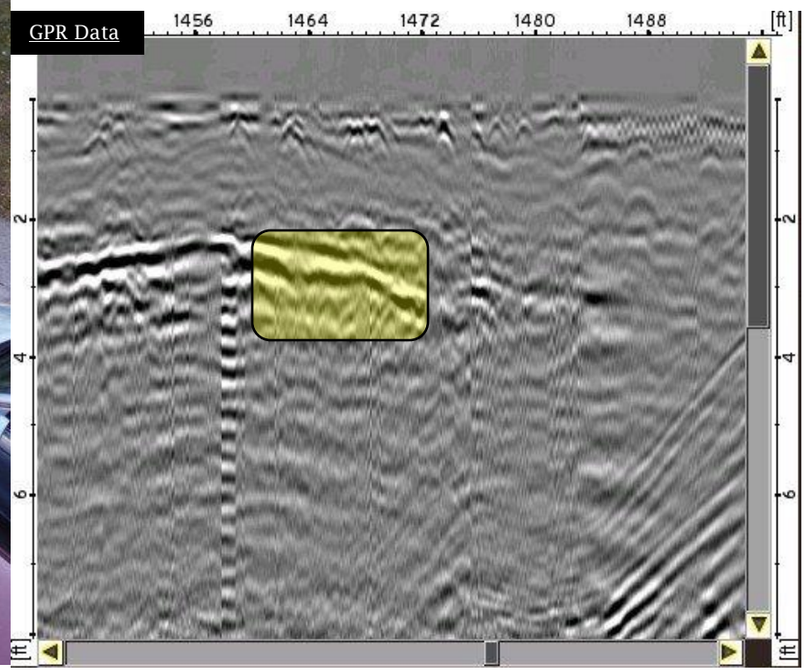


Underground Storage Tanks- Apts. 13A-13D

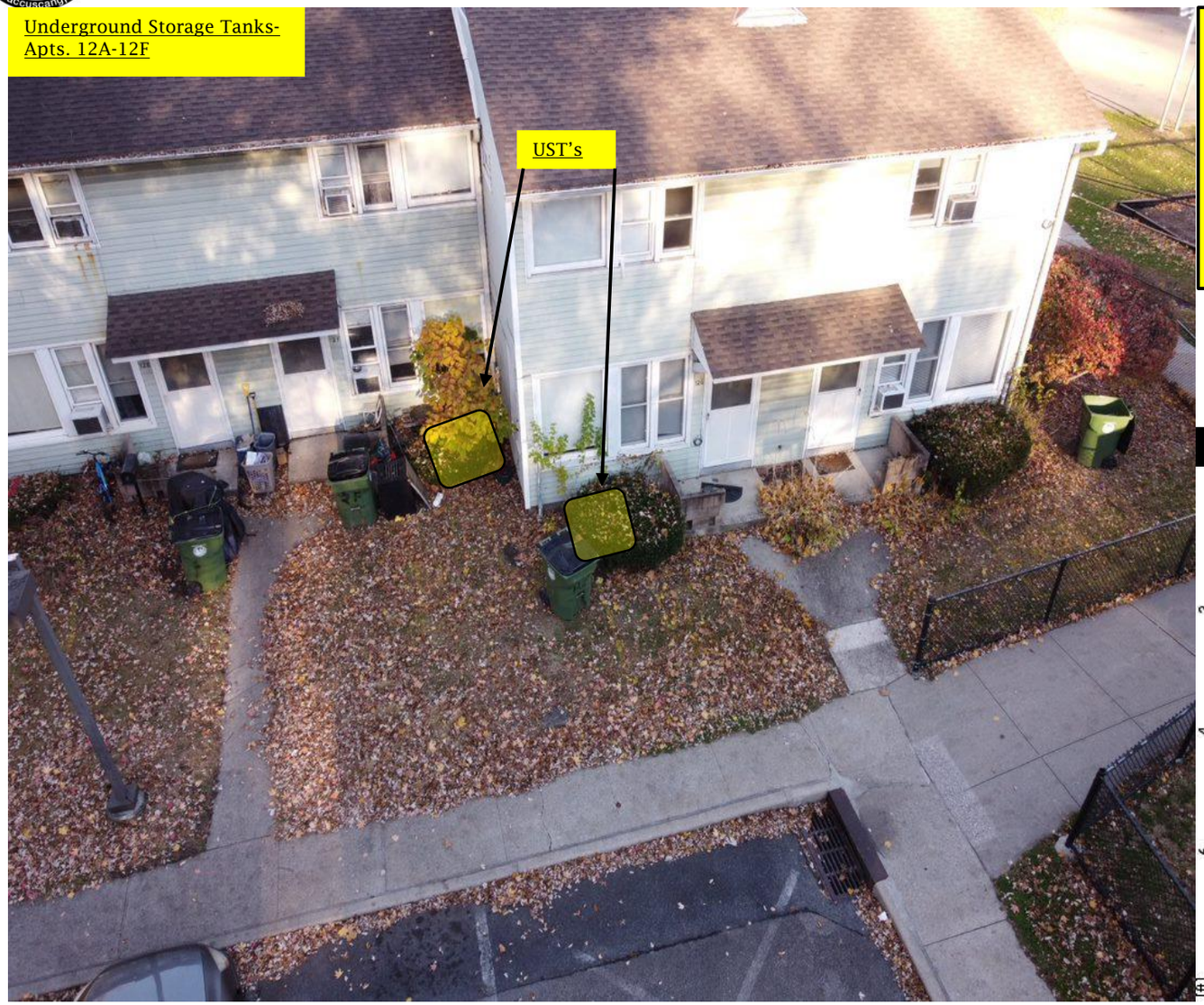


UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Fill cap was also opened and a rodder was inserted to try to approximate location and depth. Oil was physically identified, and the depth was determined with by sound of contact to tank with probe at 2 1\2'-3', as well as GPR data to confirm its presence below.

GPR Data

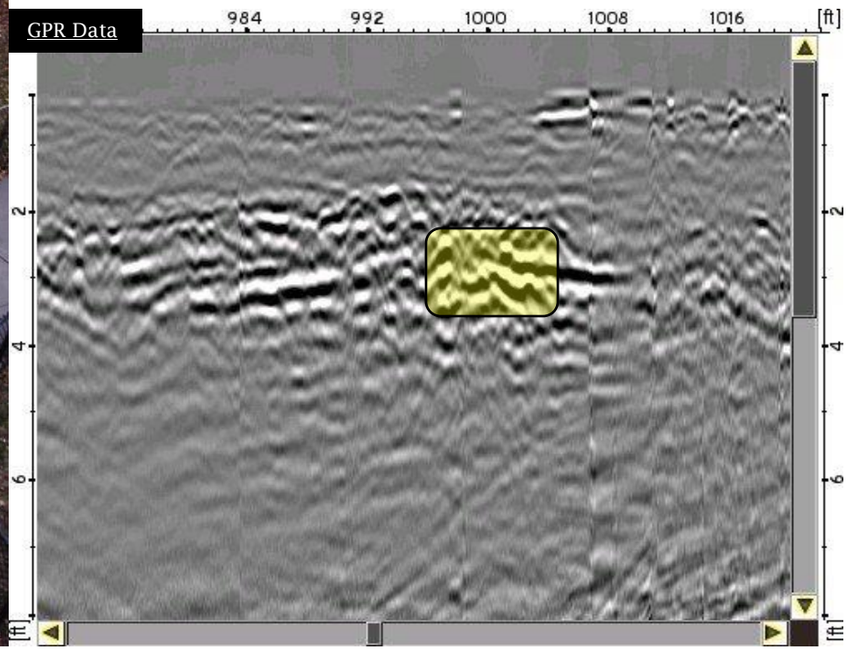


Underground Storage Tanks- Apts. 12A-12F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Data below was collected within the area but not in its entirety due to the environmental obstacles. Data shows depth of UST to confirm its presence.

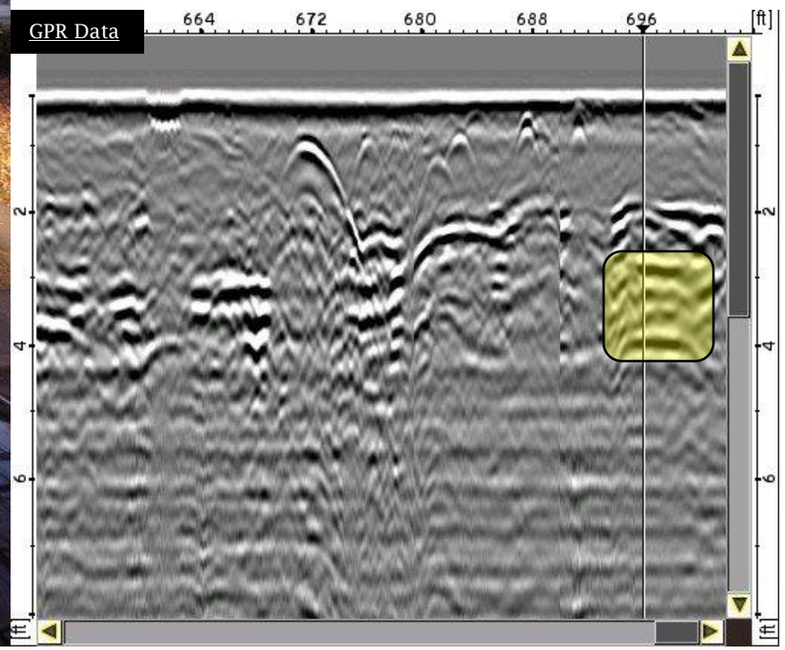
GPR Data



Underground Storage Tanks- Apts. 12A-12F



GPR Data



Underground Storage Tanks- Apts. 11A-11F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the find. GPR was partly restricted due to obstructions.

Underground Storage Tanks- Apts. 11A-11F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the find. GPR was partly restricted due to obstructions.

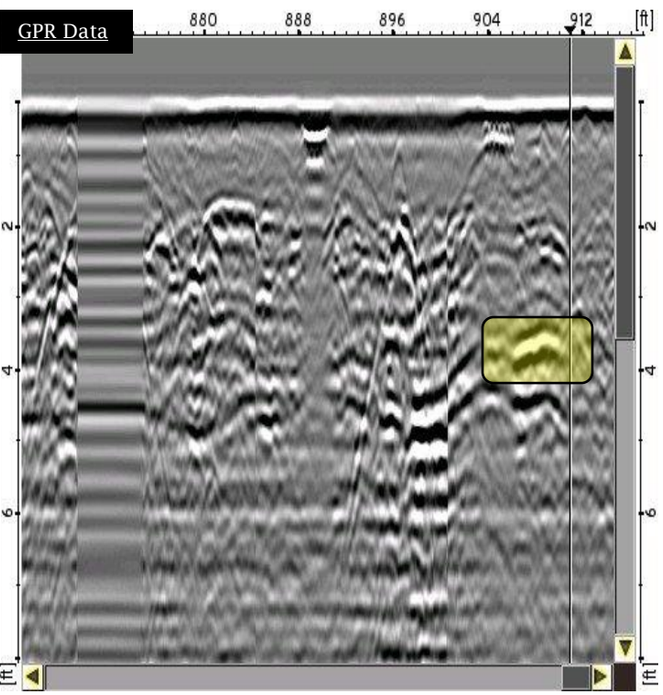
Underground Storage Tanks-
Apts. 11A-11F



Underground Storage Tanks- Apts. 10A-10F



GPR Data



Underground Storage Tanks- Apts. 9A-9F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions or no accessibility.

Underground Storage Tanks- Apts. 9A-9F



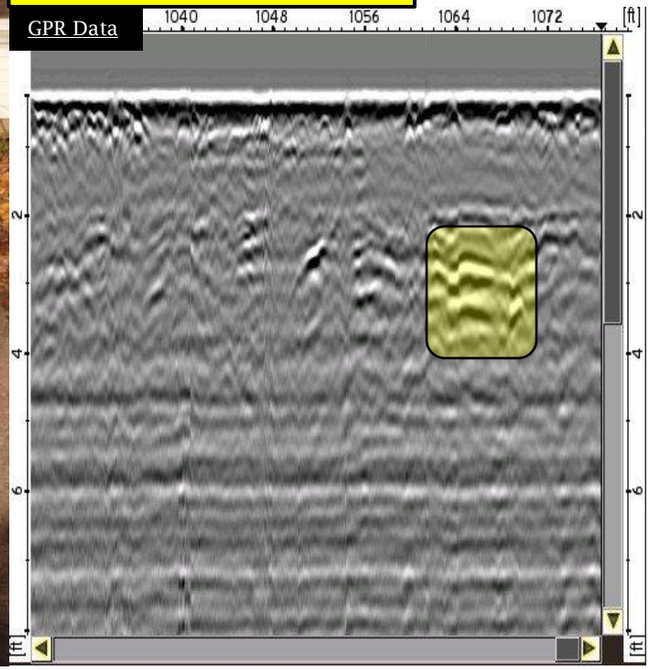
UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions or no accessibility.

Underground Storage Tanks- Apts. 8A-8F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions for second location.

GPR Data



Underground Storage Tanks- Apts. 8A-8D



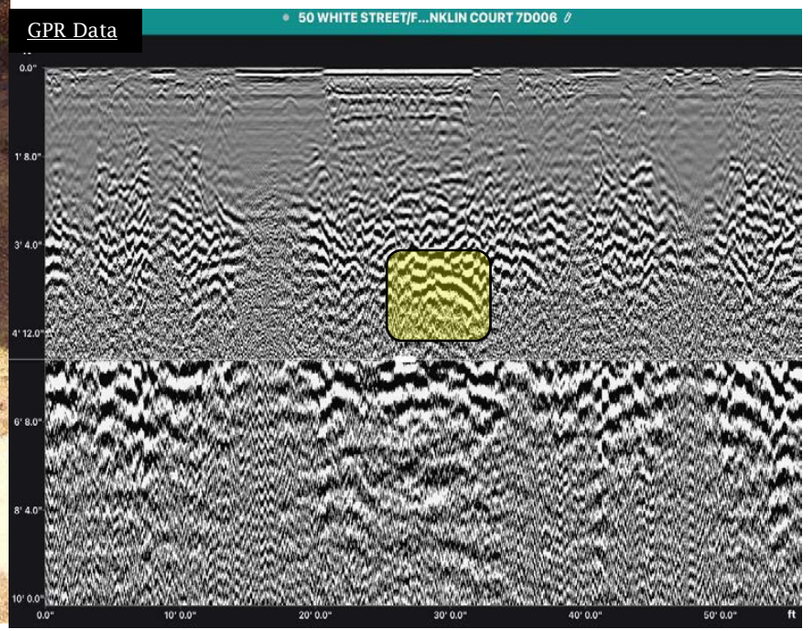
UST's: On the following location shown, the UST was not confirmed. This location had no visible fill lines and had complete obstruction of area, although there is the presence of the vent line and the oil tank feeds to the house were discovered, complete confirmation could not be done. Cautiously explore this area.

Underground Storage Tanks- Apts. 7A-7D



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Data below was collected within the area but not in its entirety due to the environmental obstacles. Data shows depth of UST to confirm its presence. Depth 3'-4'

GPR Data

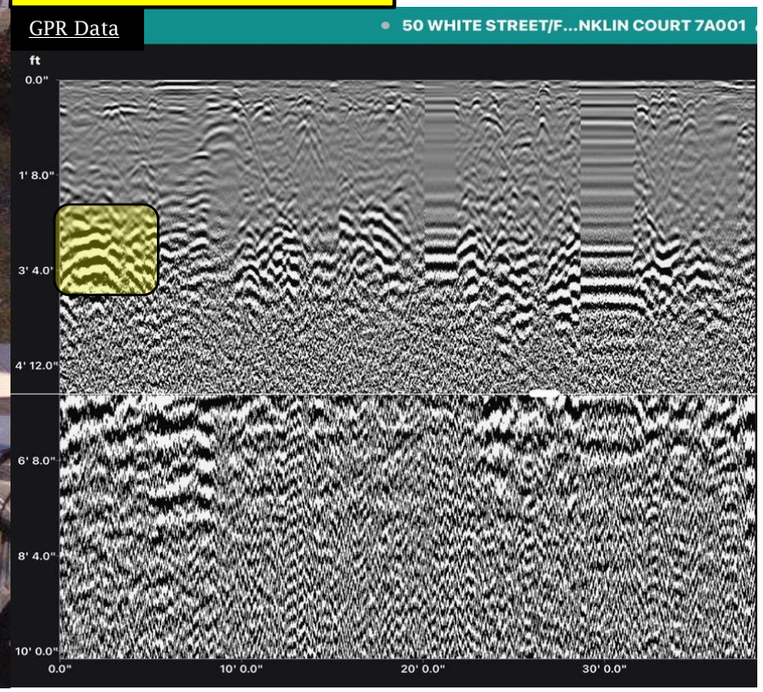


Underground Storage Tanks- Apts. 7A-7D



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Data below was collected within the area but not in its entirety due to the environmental obstacles. Data shows depth of UST to confirm its presence. Depth 3'-4'

GPR Data



Underground Storage Tanks- Apts. 6A-6F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth (2'-3'). Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions for second location.

Underground Storage Tanks- Apts. 6A-6F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth (1'-2'). Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions for second location.

Underground Storage Tanks- Apts. 6A-6F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth (2'-3'). Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions for second location.

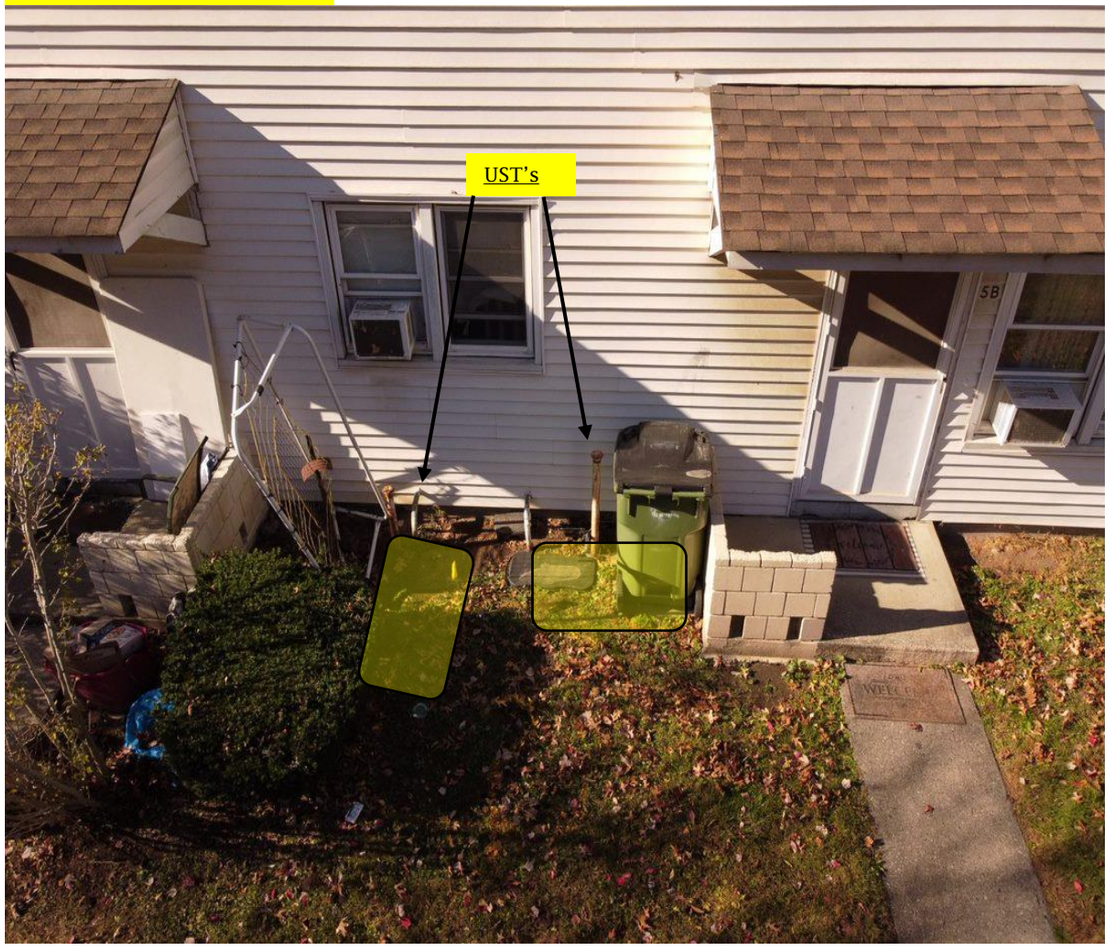
Underground Storage Tanks- Apts. 6A-6F





UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines and vent lines were discovered were definite confirmations of UST presence. Other tests such as EM Wand and soil probing contributed to the confirming of the find. GPR was restricted due to obstructions in location.

Underground Storage Tanks- Apts. 5A-5F





Underground Storage Tanks- Apts. 4A-4F





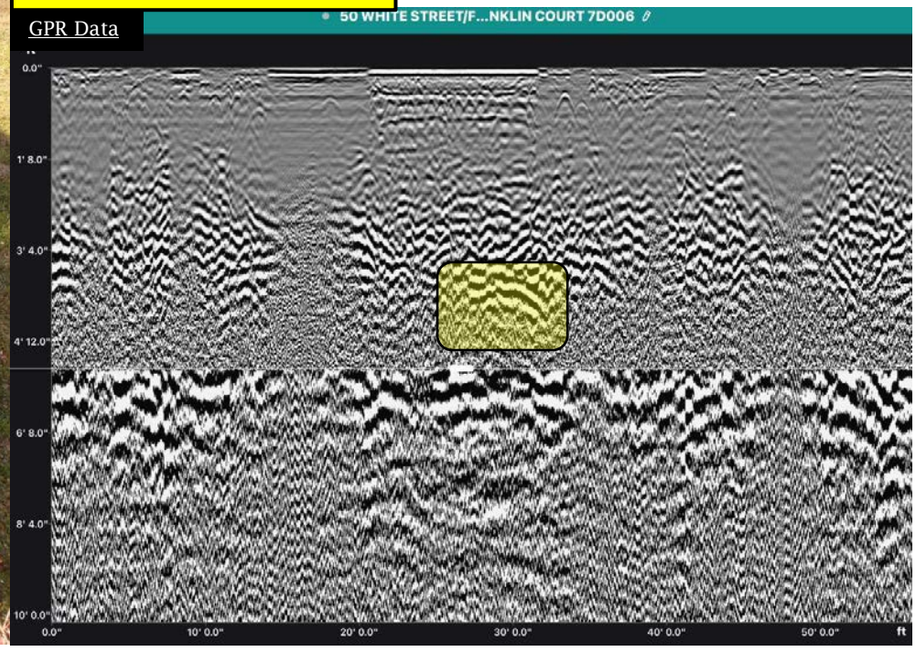
UST's: On the following location shown, the UST was not confirmed. Probing was done and there was no contact made, the location had no sign of fill lines, and the house feeds were cut. Due to the proximity of this location to the slope of land, GPR was inconclusive, and the presence of bedrock was higher in these locations.

Underground Storage Tanks- Apts. 4A-4F

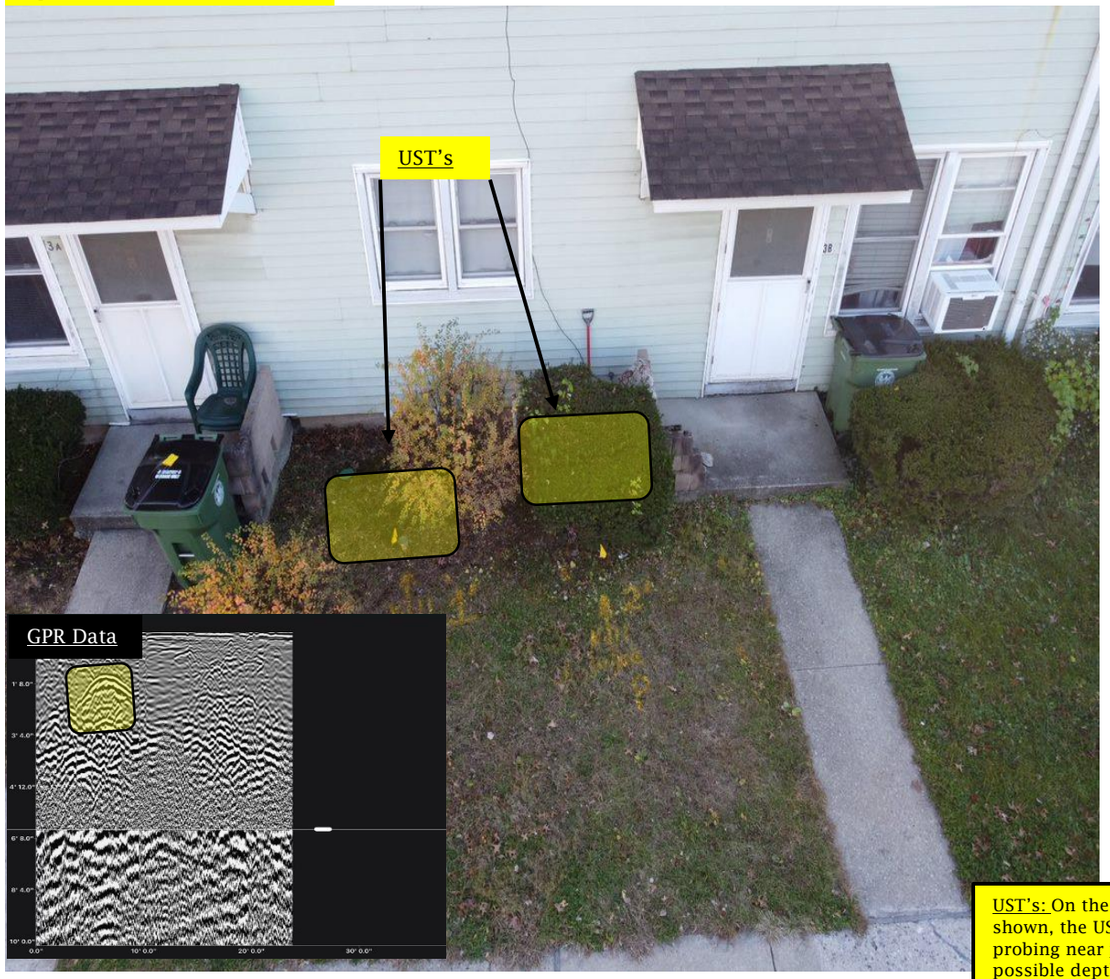


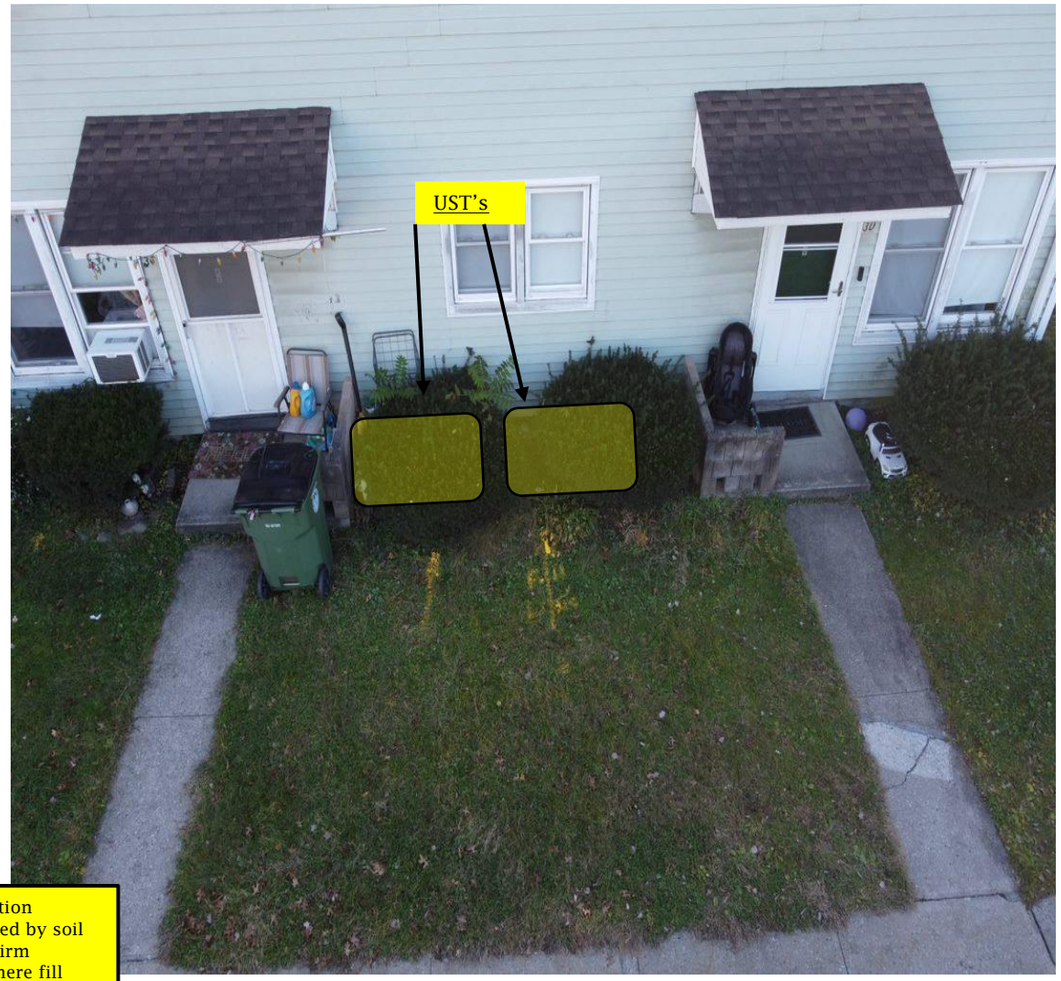
UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Data shows depth of UST to confirm its presence. Depth 3'-4'

GPR Data



Underground Storage Tanks- Apts. 3A-3D





UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Corresponding data shows depth of UST to confirmed at a depth of 1'-2'.

Underground Storage Tanks- Apts. 2A-2F





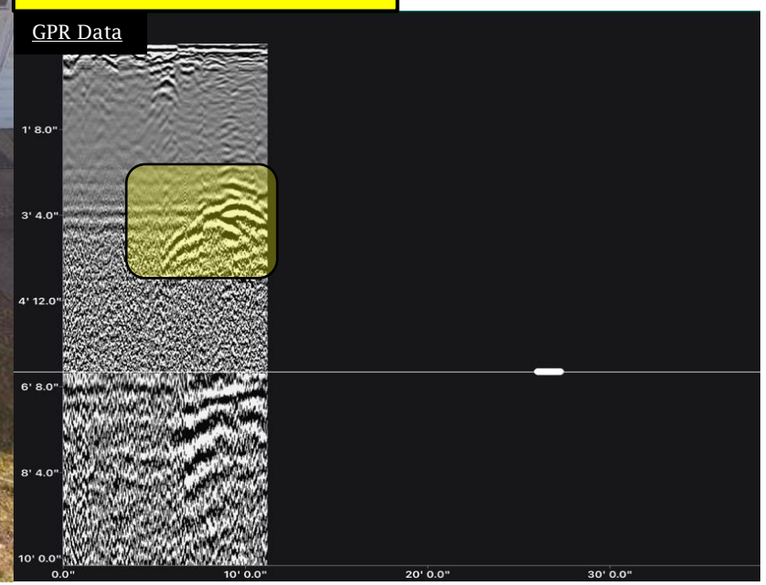
UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Depth 2'-3'.

Underground Storage Tanks- Apts. 2A-2F



UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Corresponding data shows depth of UST to confirmed at a depth of 2'-3'.

GPR Data



Underground Storage Tanks- Apts. 1A-1F





UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Depth 2'-3'.

Underground Storage Tanks- Apts. 1A-1F





UST's: On the following location shown, the UST was confirmed by soil probing near fill line to confirm possible depth. Locations where fill lines were discovered were definite confirmations of UST presence. Other tests such as GPR, EM Wand and soil probing contributed to the find. Depth 2'-3'.

Appendix E:

Health and Safety Plan (HASP)

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

Site Specific Health and Safety Plan

For

TMHA Franklin Courts
1-99 Franklin Court
Tarrytown, Westchester County, New York

Prepared for:
Franklin Courts JV Partners, L.P.

March 2026

SESI Project No:
12345

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Disclaimer: This Health and Safety Plan (HASP) is based upon information provided [and, if applicable, conditions discovered during a site visit], and is limited by the project scope.

The HASP should be periodically reviewed and updated based on a number of factors, including but not limited to: (1) changes in applicable governmental requirements; (2) changes in procedures at the site; and (3) site conditions which were unknown to SESI Consulting Engineers (SESI) as of the time the HASP was prepared.

This HASP has been prepared for the sole and exclusive use of Client listed above, and may not be relied upon by any other person without the express written consent and authorization of SESI.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

For

1-99 Franklin Court
Tarrytown, Westchester County, New York

Prepared by: _____

MaryKate Chorazak
SESI - Assistant Project Manager

Approved by: _____

Fuad Dahan
SESI - Principal

LIST OF ACRONYMS

Acronym	Definition
ACGIH	American Conference of Governmental Industrial Hygienists
COC	Contaminants(s) of Concern
CRZ	Contamination Reduction Zone
EMS	Emergency Medical Services
EZ	Exclusion Zone
FS	Field Supervisor
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HSM	Health and Safety Manager
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PFD	Personal Flotation Device
PID	Photoionization Detector
PM	Project Manager
PO	Project Officer
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
SESI	SESI Consulting Engineers
SSO	Site Safety Officer
SVOC	Semi-Volatile Organic Compound
SZ	Support Zone
TLV	Threshold Limit Value
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 PROJECT DESCRIPTION

1.1 OBJECTIVE

The objective of this Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions during activities at 1-99 Franklin Court, Tarrytown, New York (the Site). The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incidents.

The HASP was written to meet the requirements of all applicable Federal, State, and local health and safety regulations, including 29 CFR 1910.120. The HASP is based on current knowledge regarding the specific chemical and physical hazards that are known or anticipated at the Site. This HASP is a dynamic document, for which changes and/or revisions may be realized as changes in scope and/or Site conditions are encountered. Should revised documents be produced, said revised documents will refer to the specific changes and why they were made.

1.2 SITE AND FACILITY DESCRIPTION

The subject property is bounded to the north by a multi-family residential apartment building at 50 White Street, to the east by Riverview Avenue and residential developments beyond, to the south by residential development along MacArthur Avenue, and to the west by Warehouses and former railroad tracks.

1.3 POLICY STATEMENT

The policy of SESI Consulting Engineers (SESI) is to provide a safe and healthful work environment. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety management is that all injuries, illnesses, and incidents are preventable. SESI will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or incident.

This HASP prescribes the procedures that must be followed by SESI personnel during activities at the Site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM). This document will be reviewed periodically by the HSM to ensure that it is current and technically correct. Any changes in Site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan.

The provisions of this plan are mandatory for all SESI personnel and are advisory for all contractors, and subcontractors assigned to the project***. Subcontractors will be responsible for preparing their own Site-specific HASPs that meet the basic requirements outlined in this HASP.*** All visitors to SESI work areas at the Site must abide by the requirements of this plan.

1.4 REFERENCES

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and SESI health and safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, USEPA (86116, October 1985).
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH (2004).
- *Threshold Limit Values*, ACGIH (2005).
- *Guide to Occupational Exposure Values*, ACGIH (2005).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

1.5 DEFINITIONS

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-Site personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *On-Site Personnel* - All SESI and subcontractors involved with the project.
- *Project* - All on-site work performed under the scope of work.
- *Site* - The area described in Section 1.2, Site and Facility Description, where the work is to be performed by SESI personnel and subcontractors.
- *Support Zone (SZ)* - All areas of the Site except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Subcontractor* - Includes contractor personnel hired by SESI.
- *Visitor* - All other personnel, except the on-Site personnel.

Work Area - The portion of the Site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the Site that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

2.0 PROJECT SCOPE OF WORK

This HASP contains information for the following tasks that SESI is anticipated to conduct at the Site. Should additional and/or different tasks be identified, amendments to this HASP will be required to address these changed items:

- Mobilization;
- Soil Excavation;
- Soil Sampling;
- Construction Oversight;
- Monitoring Well Installation;
- Groundwater Sampling; and,
- Decontamination and Demobilization.

3.0 ROLES AND RESPONSIBILITIES

3.1 ALL PERSONNEL

All SESI project personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that conflicts with these procedures. After due warnings, the PM will dismiss from the site any SESI employee or subcontractor who violates safety procedures.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all SESI personnel will attend an initial hazard briefing prior to beginning work at the Site.

The roles of key safety personnel and subcontractors are outlined in the following sections. Key project personnel and contacts are summarized in **Table 3.1**.

3.2 KEY SAFETY PERSONNEL

3.2.1 PROJECT SAFETY OFFICER

The PO is responsible for providing resources to assure project activities are completed in accordance with this HASP, and for meeting all regulatory and contractual requirements.

3.2.2 PROJECT MANAGER (PM)

The PM is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Field Supervisor (FS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project meet the requirements established by SESI. It is also the responsibility of the PM to:

- Consult with the HSM on Site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;
- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

3.2.3 HEALTH AND SAFETY MANAGER (HSM)

The HSM or his designee has overall responsibility for the technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSM or his designee must approve changes or addenda to this HASP.

3.2.4 SITE SAFETY OFFICER (SSO)

The SSO is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The SSO will advise the PM on health and safety issues and will establish and coordinate the project air-monitoring program if one is deemed necessary (see Section 5.1, Air Monitoring). The SSO is the primary Site contact on health and safety matters. It is the responsibility of the SSO to:

- Provide on-Site technical assistance, if necessary;
- Participate in all accident/incident reports and ensure that they are reported to the HSM, client, and PM within 24 hours;
- Coordinate Site and personal air monitoring as required, including equipment maintenance and calibration;
- Conduct Site safety orientation training and safety meetings;
- Verify that project personnel have received the required physical examinations and medical certifications;
- Review Site activities with respect to compliance with this HASP;
- Maintain required health and safety documents and records; and
- Assist the FS in instructing field personnel on project hazards and protective procedures.

3.2.5 FIELD SUPERVISOR (FS)

The FS is responsible for implementing this HASP, including communicating requirements to on-Site personnel and subcontractors. The FS will be responsible for informing the PM of changes in the work plan, procedures, or Site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the SSO on Site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a Site map and determine and post routes to medical facilities and emergency telephone numbers;
- Notify local public emergency representatives (as appropriate) of the nature of the Site operations, and post their telephone numbers (i.e., local fire department personnel who would respond for a confined space rescue);
- Observe on-Site project personnel for signs of ill health effects;
- Investigate and report any incidents to the SSO;
- Verify that all on-Site personnel have had applicable training;
- Verify that on-Site personnel are informed of the physical, chemical, and biological hazards associated with the Site activities, and the procedures and protective equipment necessary to control the hazards; and

Issue/obtain any required work permits (hot work, confined space, etc.)

3.3 SUBCONTRACTORS

Subcontractors and their personnel must understand and comply with applicable regulations and Site requirements established in this HASP. Subcontractors will prepare their own Site-specific HASP that must be consistent with the requirements of this HASP.

All subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating Site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the Site. Additionally, on-Site subcontractor personnel must conduct daily Site safety meetings.

Subcontractors must designate individuals to function as the PM, HSM, SSO, and FS. In some firms the HSM to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the Site-specific HASP. A subcontractor may designate the same person to perform the duties of both the SSO and the FS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

3.4 STOP WORK AUTHORITY

Every SESI employee and subcontractor is empowered, expected, and has the responsibility to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

3.5 ALL ON-SITE PERSONNEL

All on-Site SESI personnel (including SESI subcontractors) must read and acknowledge their understanding of their respective HASPs before commencing work and abide by the requirements of the plans. All on-Site SESI personnel shall sign their HASP Acknowledgement Form following their review of their HASP.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating Site activities. In addition, all on-Site personnel will attend an initial hazard briefing provided by the SSO prior to beginning work at the Site and conduct daily safety meetings thereafter.

On-Site personnel will immediately report the following to the FS or SSO:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property; and
- Situations or activities for which they are not properly trained.

3.6 VISITORS

All SESI personnel and subcontractors visiting the Site must check in with the FS. Visitors will be cautioned to avoid skin contact with surfaces, soils, groundwater, or other materials that may impacted or be suspected to be impacted by contaminants of concern (COCs).

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit tested for a respirator within the past 12 months.

Table 3.1 – Key Safety Personnel

SESI Personnel		
Role	**Name**	**Telephone No.**
Project Principal	Fuad Dahan, P.E., PhD	973-808-9050 x249
Project Manager	MaryKate Chorazak	973-808-9050 x283
Principal Engineer	Fuad Dahan, P.E., PhD	973-808-9050 x249
Field Team Leader	TBD	973-808-9050
Quality Assurance Officer	Joe Scardino	973-808-9050 x267
Field Personnel	TBD	973-808-9050

4.0 PERSONAL PROTECTIVE EQUIPMENT

4.1 LEVELS OF PROTECTION

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the levels of COCs and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in **Table 4.1**.

4.1.1 LEVEL D PROTECTION

The minimum level of protection that will be required of project personnel at the site will be Level D, which will be worn when site conditions or air monitoring indicates no inhalation hazard exists. The following equipment will be used:

- Work clothing as prescribed by weather;
- Steel toe work boots, meeting American National Standards Institute (ANSI) Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Leather work gloves and/or nitrile surgical gloves;
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- Personal floatation device (PFD) if working on or near the water.

4.1.2 MODIFIED LEVEL D PROTECTION

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of:

- Nitrile gloves worn over nitrile surgical gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist (e.g. during Power Washing activities);
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- Tyvek® suit (polyethylene coated Tyvek® suits for handling liquids) when body contact with COC-impacted media is anticipated; and
- PFD if working on or near the water.

4.1.3 LEVEL C PROTECTION

Level C protection will be required when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit or ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with combination organic vapor/HEPA cartridges;
- Polyethylene-coated Tyvek® suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel toe boots;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

4.2 SELECTION OF PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising Site personnel and health and safety professionals. The PPE used will be chosen to be effective against the COCs present on the Site.

4.3 SITE RESPIRATOR PROTECTION PROGRAM

Respiratory protection is an integral part of employee health and safety at the Site due to potentially hazardous concentrations of airborne COCs. The Site respiratory protection program will consist of the following (as a minimum):

- All on-Site personnel who may use respiratory protection will have an assigned respirator.

- All on-Site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air-purifying respirator within the past 12 months. Documentation of the fit test must be provided to the SSO prior to commencement of work.
- All on-Site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SSO, prior to commencement of Site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All on-Site personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.

After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

4.4 USING PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of this HASP. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of COCs.

4.4.1 DONNING PROCEDURES

These procedures are mandatory only if Modified Level D or Level C PPE is used on the Site:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check (Level C);
- Put hood or head covering over-head and respirator straps and tape hood to facepiece (Level C); and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

4.4.2 DOFFING PROCEDURES

The following procedures are only mandatory if Modified Level D or Level C PPE is required for the Site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face, and neck (or shower if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 6.2, Decontamination, for detailed information on decontamination stations.

4.5 SELECTION MATRIX

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the FS and SSO of the potential for skin contact with COCs. The PPE selection matrix is presented in **Table 4.1** below. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action Levels in **Table 5.1**, Airborne Contaminant Action Levels, should be used to verify that the PPE prescribed in these matrices is appropriate.

Table 4.1 – PPE Selection Matrix

Task	Anticipated Level of Protection
Mobilization	Level D
Subsurface Intrusive Activities (Excavation, Drilling)	Modified Level D/Level C
Earthwork/Grading	Level D
Chemical Sampling / Delineation	Modified Level D/Level C
Decontamination	Modified Level D
Demobilization	Level D

5.0 AIR AND NOISE MONITORING

5.1 AIR MONITORING

Air monitoring, sampling, and testing will be conducted to determine employee exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. The SESI SSO will be responsible for defining appropriate air monitoring procedures and for utilizing the air monitoring results to determine appropriate procedures and PPE for project

personnel. Air monitoring results should be recorded in field notebooks or on an air monitoring log (see Attachment 1 for a copy of the Air Monitoring Log). Any deviations from the procedures listed here should be documented and explained in the Air Monitoring Log.

The monitoring devices to be used are a PDR1000 particulate monitor (or equivalent) and a Rae Systems MultiRAE detector (PID with a 11.7 eV lamp/oxygen/LEL/hydrogen sulfide sensors). Colorimetric detector tubes may be utilized to estimate airborne concentrations of benzene and should be onsite during any activities that may result in elevated PID readings including drilling, excavating, and groundwater sampling.

Air monitoring will be conducted continuously with the LEL/Oxygen meter during drilling in areas where flammable vapors or gases are suspect. All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the LEL at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

5.2 NOISE MONITORING

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

5.3 MONITORING EQUIPMENT MAINTENANCE AND CALIBRATION

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed health and safety documentation/forms must be reviewed by the SSO and maintained by the FS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSO must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The SSO will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

5.4 ACTION LEVELS

Table 5.1 below presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the Site.

Table 5.1 – Airborne Contaminant Action Levels

Parameter	Reading	Action
Total Hydrocarbons	0 ppm to ≤ 1 ppm	Normal operations; continue hourly breathing zone monitoring
	> 1 ppm to 5 ppm	Increase monitoring frequency to every 15 minutes and use benzene detector tube to screen for the presence of benzene
	≥ 5 ppm to ≤ 50 ppm	Upgrade to Level C PPE; continue screening for benzene
	> 50 ppm	Stop work; investigate cause of reading
	At any reading > 5 ppm	Monitor perimeter per CAMP
Benzene	≥ 1 ppm to 5 ppm	Upgrade to Level C PPE
	> 5 ppm	Stop work; investigate cause of reading
Dust	0 to .05 mg/m3	Normal operations
	0.05 to 0.1 mg/m3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 0.15 mg/m3	Stop work, fully implement dust control plan
Oxygen	≤ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	≥ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to ≤ 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Hydrogen Sulfide	0 ppm to ≤ 5 ppm	Normal operations
	> 5 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Flammable Vapors (LEL)	< 10% LEL	Normal operations
	≥ 10% LEL	Stop work, ventilate area, investigate source of vapors

6.0 WORK ZONES AND DECONTAMINATION

6.1 WORK ZONES

6.1.1 AUTHORIZATION TO ENTER

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project Site. The FS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the Site work areas.

6.1.2 SITE ORIENTATION AND HAZARD BRIEFING

No person will be allowed in the work area during Site operations without first being given a Site orientation and hazard briefing. This orientation will be presented by the FS or SSO and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the Site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings on the forms included with this plan.

6.1.3 CERTIFICATION DOCUMENTS

A training and medical file may be established for the project and kept on Site during all Site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All project personnel must provide their training and medical documentation to the SSO prior to starting work.

6.1.4 ENTRY LOG

A log-in/log-out sheet will be maintained at the Site by the FS. Personnel must sign in and out on a log sheet as they enter and leave the work area, and the FS may document entry and exit in the field notebook.

6.1.5 ENTRY REQUIREMENTS

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any SESI work area unless they are wearing the minimum PPE as described in Section 4.0.

6.1.6 EMERGENCY ENTRANCE AND EXIT

People who must enter the work area on an emergency basis will be briefed of the hazards by the FS or SSO. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a designated safe area for a head count. The FS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

6.1.7 CONTAMINATION CONTROL ZONES

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.1.8 EXCLUSION ZONE (EZ)

An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or a posted Site diagram will identify the location of each EZ.

6.1.9 CONTAMINATION REDUCTION ZONE

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on Site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the support zone discussed below.

6.1.10 SUPPORT ZONE (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to Site requirements.

6.1.11 POSTING

Work areas will be prominently marked and delineated using cones, caution tape, or a posted Site diagram.

6.2 DECONTAMINATION

6.2.1 PERSONNEL DECONTAMINATION

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1*: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.
- *Station 2*: Personnel will remove their outer garment and gloves and dispose of it in properly labeled containers. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.

- *Station 3*: Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators will be sanitized and then placed in a clean plastic bag.

6.2.2 EQUIPMENT DECONTAMINATION

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

6.2.3 PERSONAL PROTECTIVE EQUIPMENT DECONTAMINATION

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the Site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water (mixed at 2% bleach by volume), or by using a spray disinfectant.

7.0 TRAINING AND MEDICAL SURVEILLANCE

7.1 TRAINING

7.1.1 GENERAL

All on-Site project personnel who work in areas where they may be exposed to Site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of three (3) days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an eight (8)-hour refresher course within the past 12 months. The FS must have completed an additional eight (8) hours of supervisory training and must have a current first-aid/CPR certificate (See Attachment 2).

7.1.2 BASIC 40-HOUR COURSE

The following is a list of the topics typically covered in a 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;
- Medical surveillance requirements;

- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;
- Confined-space entry procedures; and
- General emergency response procedures.

7.1.3 SUPERVISOR COURSE

Management and supervisors must receive an additional eight (8) hours of training, which typically includes:

- General Site safety and health procedures;
- PPE programs; and
- Air monitoring techniques

7.1.4 SITE-SPECIFIC TRAINING

Site-specific training will be accomplished by on-Site personnel reading this HASP, and through a thorough site briefing by the PM, FS, or SSO on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

7.1.5 DAILY SAFETY MEETINGS

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. The FS or SSO should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before a daily safety meeting has been held. An additional safety meeting must also be held prior to new tasks, or if new hazards are encountered. The daily safety meetings will be logged in the field notebook.

7.1.6 FIRST AID AND CPR

At least one (1) employee current in first aid/CPR will be assigned to the work crew and will be on the Site during operations. Site records will document the presence of this individual. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

7.2 MEDICAL SURVEILLANCE

7.2.1 MEDICAL EXAMINATION

All personnel who are potentially exposed to Site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

7.2.2 PRE-PLACEMENT MEDICAL EXAMINATION

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;
- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project Site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

7.2.3 OTHER MEDICAL EXAMINATIONS

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the SSO, HSM, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials.

7.2.4 PERIODIC EXAM

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 24 months.

7.2.5 MEDICAL RESTRICTION

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the SSO. The terms of the restriction will be discussed with the employee and the supervisor.

8.0 GENERAL SAFETY PRACTICES

8.1 GENERAL SAFETY RULES

General safety rules for site activities include, but are not limited to, the following:

- At least one copy of this HASP must be in a location at the Site that is readily available to personnel, and all project personnel shall review the plan prior to starting work.
- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and ensure closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the FS or SSO immediately. If needed, medical attention should be sought.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Equipment must be stored on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Removing soil containing Site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals used for evacuation, injury, fire, etc.
- Report all injuries, illnesses, and unsafe conditions or work practices to the FS or SSO.
- Use the "buddy system" during all operations requiring Level C PPE, and when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer's directions.
- Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.
- The presence or consumption of alcoholic beverages or illicit drugs during the workday, including breaks, is strictly prohibited. Notify your supervisor if you must take prescription

or over-the-counter drugs that indicate they may cause drowsiness or, that you should not operate heavy equipment.
- Remain upwind during site activities whenever possible.

8.2 BUDDY SYSTEM

On-Site personnel must use the buddy system as required by operations. Use of the "buddy system" is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Crewmembers must also be aware of the potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

8.3 HEAT STRESS

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for six (6) to eight (8) hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

8.4 HEAT STRESS SAFETY PRECAUTIONS

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in **Table 8.1** below.

Table 8.1 – Work/Rest Schedule

Adjusted Temperature[b]	Work/Rest Regimen Normal Work Ensemble[c]	Work/Rest Regimen Impermeable Ensemble
90ºF (32.2ºC) or above	After each 45 minutes of work	After each 15 minutes of work
87.5º - 90ºF (30.8º-32.2ºC)	After each 60 minutes of work	After each 30 minutes of work
82.5º - 87.5ºF (28.1º - 30.8ºC)	After each 90 minutes of work	After each 60 minutes of work
77.5º - 82.5ºF (25.3º - 28.1ºC)	After each 120 minutes of work	After each 90 minutes of work
72.5º - 77.5ºF (30.8º - 32.2ºC)	After each 150 minutes of work	After each 120 minutes of work

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)

b. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

d. The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

In order to determine if the work rest cycles are adequate for the personnel and specific Site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period.

If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any Site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-Site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

8.5 COLD STRESS

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two (2) factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in **Table 8.2** below.

Table 8.2– Wind Chill Temperature Chart

Estimated Wind Speed (in mph)	Actual Temperature Reading (ºF)											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (ºF)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	**LITTLE DANGER** **Maximum danger of false sense of security.**				**INCREASING DANGER** **Danger from freezing of exposed flesh within one minute.**			**GREAT DANGER** **Flesh may freeze within 30 seconds.**				
	Trench foot and immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin.
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

8.6 SAFETY PRECAUTIONS FOR COLD STRESS PREVENTION

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. Wet field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

8.7 SAFE WORK PROCEDURES

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing. Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

8.8 BIOLOGICAL HAZARDS

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, spiders, and other pests.

8.8.1 TICK BORNE DISEASES

Lyme Disease - The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

Erlichiosis - The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF) - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (Rickettsia rickettsii) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

Control - Tick repellant containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

8.8.2 POISONOUS PLANTS

Poisonous plants may be present in the work area. Personnel should be alerted to its presence and instructed on methods to prevent exposure.

Control - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

8.8.3 SNAKES

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snakebite occurs, an attempt should be made to safely identify the snake via size and markings. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

8.8.4 SPIDERS

Personnel may encounter spiders during work activities.

Two spiders are of concern: the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately one inch long, and has a distinctive red hourglass marking on the underside of its body. The black widow is found throughout the United States. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. It has a distinctive violin shape on the top of its body. The brown recluse is more prevalent in the southern United States. The bite of the brown recluse is painful and the bite site ulcerates and takes many weeks to heal completely.

Control - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs, and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

8.9 NOISE

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

Control - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 5.2, Noise Monitoring.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

All personnel must take every precaution to minimize the potential for spills during site operations. All on-Site personnel shall immediately report any discharge, no matter how small, to the FS.

Spill control equipment and materials will be located on the Site at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event of a spill, the FS will follow the provisions in Section 10.0, Emergency Procedures, to contain and control released materials and to prevent their spread to off-Site areas.

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8.11 SANITATION

Site sanitation will be maintained according to OSHA requirements.

8.11.1 BREAK AREA

Breaks must be taken in the SZ, away from the active work area after Site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

8.11.2 POTABLE WATER

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited) nor may it be removed from the container by dipping.
- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

8.11.3 SANITARY FACILITIES

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels will be provided.

8.11.4 LAVATORY

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended Site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

8.12 EMERGENCY EQUIPMENT

Adequate emergency equipment for the activities being conducted on site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be on Site prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel on site; and
- Emergency eyewash and/or shower if required by operations being conducted on Site.

8.13 LOCKOUT/TAGOUT PROCEDURES

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy or material isolating device indicating that the equipment controls may not be operated until the personnel who attached the tag remove the tag.

8.14 ELECTRICAL SAFETY

Electricity may pose a particular hazard to Site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

8.15 LIFTING SAFETY

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

8.16 LADDER SAFETY

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least three (3) feet (9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

- Ladders shall be maintained free of oil, grease, and other slipping hazards.
- Ladders shall not be loaded beyond the maximum intended load for which they were built, or beyond their manufacturer's rated capacity.
- Ladders shall be used only for the purpose for which they were designed.
- Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).
- Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.
- Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent

accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

- The area around the top and bottom of ladders shall be kept clear.
- The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders shall not be moved, shifted, or extended while occupied.
- Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.
- The top, top step, or the step labeled that it or any step above it should not be used as a step.
- Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders shall be inspected by the HSM for visible defects on a daily basis and after any occurrence that could affect their safe use.
- Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective or be tagged with “Do Not Use” or similar language and shall be withdrawn from service.
- Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components; shall be withdrawn from service.
- Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- Single-rail ladders shall not be used.
- When ascending or descending a ladder, the user shall face the ladder.
- Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall.

8.17 TRAFFIC SAFETY

The project Site may be located adjacent to a public roadway where exposure to vehicular traffic is likely. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented.

Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A “Slow” or “Men Working” sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.

During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.

All Site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

The flow of traffic into and out of the adjacent business must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES

9.1 EVALUATION OF HAZARDS

The evaluation of hazards is provided as a quick reference as to the known conditions for the Site, wherein the level of detail for each of the subsections is identified.

9.1.1 HAZARD CHARACTERISTICS

Existing information for Site:

___X___ Detailed _____ Preliminary _____ None

Hazardous/Contaminated Material Form(s):

___X___ Solid __X__ Liquid _____ Sludge _____ Gas __X__ Vapor

Containment Type(s):

_____ Drum _____ Tank _____ Pit _____ Debris

_____ Pond _____ Lagoon Other: None known

Hazardous Material Characteristics:

___X___ Volatile _____ Corrosive _____ Reactive
_____ Radioactive

_____ Ignitable ___X___ Toxic ___X___ Unknown

Routes of Exposure:

___X___ Oral _____ Dermal ___X___ Eye ___X___ Respiratory

9.1.2 POTENTIAL HEALTH AND SAFETY HAZARDS

X	Heat	X	Congested areas
X	Cold	X	General Construction
	Confined space entry	X	Physical injury
	Oxygen depletion	X	Electrical hazards
	Asphyxiation	X	Handling and product transfer
X	Excavation	X	Fire
X	Cave-ins	X	Explosion
X	Falls, slippage	X	Biological Hazards
		X	Plants – Poison Ivy, Poison Oak
		X	Insects – Ticks
		X	Insects – Mosquitoes
		X	Insects – Bees and Wasps
		X	Rats and Mice
X	Heavy equipment		Non-ionizing Radiation (i.e. UV, IR, etc.)
	Other: Potential Ignition Hazard		

9.2 FIELD ACTIVITIES, HAZARDS AND CONTROL PROCEDURES

The following task-specific safety analyses identify potential health, safety, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the Site to identify hazards that may affect on-Site personnel, the community, or the environment. The FS must be aware of these changing conditions and discuss them with the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The FS will keep on-Site personnel informed of the changing conditions, and the PM will write and/or approve addenda or revisions to this HASP as necessary.

9.2.1 MOBILIZATION/CONSTRUCTION STAKEOUT

Description of Tasks

Site mobilization will include establishing excavation locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary Site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the Site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The hazards of this phase of activity are associated with heavy equipment operation, manual materials handling, installation of temporary on-site facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Installation of temporary field office and support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to the manual lifting and moving of materials. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Controls

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.2.2 DEMOLITION/SITE-CLEARING

Description of Tasks

Site clearance will involve manual or mechanical removal of objects impeding access to the construction footprint. These obstructions are both natural and man-made items and will include, but not be limited to, fabricated metal and concrete structures, trees, vegetation, rubble, and miscellaneous trash/debris.

Hazard Identification

Hazards associated with demolition and site clearance include personnel working in and around potentially unstable structures, or locations of potential contact with hazardous chemicals, utilities, and/or falling objects. This task will involve manual, as well as mechanical demolition/clearance efforts so exertion and equipment hazards exist.

Controls

PPE – Personnel shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

Preparatory Operations – Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a licensed Professional Engineer, of the structure to determine the stability of the structure. Any adjacent structure shall where personnel may be exposed shall also be similarly checked. The PO shall have in writing evidence that such a survey

has been performed. All structural instabilities shall be shored or braced, under the supervision of a licensed Professional Engineer, prior to access by an FP.

Utilities – All electric, gas, water, steam, sewer, and other service lines shall be shut off, caped, or otherwise controlled, outside the building line before demolition work is started. In each case, any utility company that is involved shall be notified in advance. If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary.

Hazardous Substances – It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

Falling Debris/Objects – No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effective protected. Access to the area where falling objects/debris may be encountered must be gated and controlled.

Structural Collapse – Structural or load supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. Walls, which are to serve as retaining walls against which debris will be piled, shall not be so used unless capable of safely supporting the imposed load. Mechanical equipment shall not be used on floors or working surfaces unless such floors or surfaces are not of sufficient strength to support the imposed load.

Rollover Guards – All equipment used in site clearing operations shall be equipped with rollover guards meeting the applicable requirements. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the applicable requirements.

Inspections – During demolition, continuing inspections by a licensed Professional Engineer shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, walls, or loosened material. No FP shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

9.2.3 EXCAVATION AND CUT/FILL OPERATIONS

9.2.3.1 EXCAVATION TRENCHING

Description of Tasks

This task includes the excavation of contaminated soils and superficial debris. Excavation depths vary across the Site.

Hazard Identification

The hazards of this activity are associated with heavy equipment operation, subsurface intrusion, manual materials handling, stockpiling, and disposal. Subsurface intrusion presents hazards associated with negotiating buried utilities, cave-ins of the excavated areas, and regress methods for personnel working inside the excavated areas. Disruption of contaminated soil also presents a health hazard.

Controls

Underground Utilities – The estimated locations of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during the excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted ("Call Before You Dig") within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by save and acceptable means. While the excavation is open, underground installations shall be protected, supported, or removed, as necessary, to safeguard site personnel.

Cave-Ins – Project personnel in an excavation shall be protected from cave-ins by an adequate protective system, except when:

- Excavations are made entirely in stable rock or excavations are less than five feet in depth and examination of the ground by the SSO provides no indication of a potential cave-in.
- Protective systems shall have the capacity to resist, without failure, all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Project personnel shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by the SSO for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the SSO prior to the start of work and as needed throughout operations. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when project personnel exposure can be reasonably anticipated.

Where the SSO finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed

personnel shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Excavation Egress – A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet or lateral travel for project personnel.

9.2.3.2 HEAVY EQUIPMENT OPERATION

Description of Tasks

Heavy equipment to be used for this task include, but are not limited to, excavators, dozers, dump trucks, and water sprayers (if required).

Hazard Identification

The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and an object gets caught between two moving parts of the equipment. Operation of the heavy construction equipment may produce harmful noise.

Controls

Equipment Inspection – All vehicles in use shall be checked prior to operation to ensure that all parts, equipment, and accessories that affect safe operations are in proper operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.

Ground Guides – No personnel shall use any motor vehicle, earthmoving, or compacting equipment having an obstructed view to the rear, unless:

- The vehicle has a reverse signal alarm distinguishable from the surrounding noise level; or
- The vehicle is backed up only when an observer signals that it is safe to do so.

Blocking – Heavy machinery, equipment, or parts thereof that are suspended or held aloft shall be substantially blocked to prevent falling or shifting before employees are permitted to work under or between them.

Noise – Control measures for noise are addressed in Section 8.9.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.3.3 DISTURBANCE/HANDLING OF CONTAMINATED MATERIAL

Description of Tasks

After the contaminated soil is excavated from below the Site's surface, the material will be stockpiled, dried, and either transported off Site or relocated and backfilled on Site.

Hazard Identification

The hazards associated with materials handling include contact of the contaminated material with project personnel, or cross contamination with other site soil.

Controls

Cross Contamination – Following excavation, contaminated soil stockpiles will be placed on a structure constructed to separate the material from the site soil and collect any groundwater leachate. The material shall be covered to prevent storm water erosion or migration of contaminants through storm water.

Air Monitoring – Air and particulate monitoring will be conducted during soil excavation activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors or particulates in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix G of this RAWP). A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.4 DRILLING/SUBSURFACE INTRUSION ACTIVITIES

Description of Tasks

Site mobilization will include establishing excavation locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary Site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the Site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The primary physical hazards for this activity are associated with the use of soil boring and grouting equipment. The equipment is hydraulically powered and uses static force and dynamic percussion force to advance sampling and penetrating tubes.

Accidents can occur as a result of improperly placing the equipment on uneven or unstable terrain or failing to adequately secure the equipment prior to the start of operations. Overhead utility lines can create hazardous conditions if contacted by the equipment. Underground installations such as electrical lines, conduit, and product lines pose a significant hazard if contacted.

Controls

Geoprobe and Drill Rig Safety Procedures - The operator of the equipment must possess required state or local licenses to perform such work. All members of the crew shall receive Site-specific training prior to beginning work.

The operator is responsible for the safe operation of the rig, as well as the crew's adherence to the requirements of this HASP. The operator must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the operator, wear all personal protective equipment, and be aware of all hazards and control procedures. The operator and crew must participate in the Daily Safety Meetings and be aware of all emergency procedures.

Equipment Inspection - Each day, prior to the start of work, the rig and associated equipment must be inspected by the operator. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all hydraulic lines;
- Fire extinguisher; and
- First aid kit.

Equipment Set Up - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

All well sites will be inspected by the driller prior to the location of the rig to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

The drill rig must be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Rules for Intrusive Activity - Before beginning any intrusive activity, the existence and location of underground pipe, conduit, electrical equipment, and other installations will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location

of the lines. "Call Before You Dig" will verify the potential for encountering subsurface utilities. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line.

Combustible gas readings of the general work area will be made regularly in areas where and/or during operations when the presence of flammable vapors or gases is suspected, such as during intrusive activities (see Section 5.1). Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the LEL in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Overhead Electrical Clearances - If equipment is operated in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances as indicated on **Table 8.2** below:

Table 8.3– Voltage versus Required Clearance

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least four (4) feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Hoisting Operations - Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations - Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked;
- Use standard visual signals only and not depend on shouting to coworkers; and
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope - When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or re-socketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Pipe/Auger Handling - Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees are not permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be secured to prevent rolling.

9.2.5 SUBSURFACE CHEMICAL SAMPLE/COLLECTION ANALYSIS

Description of Tasks

This sub-task consists of the collection of soil samples for subsequent field and laboratory analysis. The physical hazards of soil sampling are primarily associated with the sample collection methods, procedures utilized, and the environment itself.

Hazard Identification

Incidental contact with COCs is the primary hazard associated with sampling the stabilized material. This contact may occur through the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. The primary hazards associated with these sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards directly associated with sampling procedures are generally limited to strains/sprains and potential eye hazards. Potential chemical hazards may include contact with media containing Site COCs and potential contact with chemicals used for equipment decontamination.

Controls

PPE – To control dermal exposure during sampling activities, a minimum of Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during sediment sampling activities. If the results of air monitoring indicate the presence of airborne contaminants in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix G of this RAWP). A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

9.2.6 UST CLOSURE

9.2.6.1 WORKING IN CONFINED SPACES

Description of Tasks

The project may involve the closure of several underground storage tanks (USTs).

Hazard Identification

Closure activities may require the entrance into confined spaces to facilitate cleaning and removal of the USTs.

Controls

All personnel required to enter confined or enclosed spaces must be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of required protective and emergency equipment. The PO shall comply with all specific regulations that apply to work in dangerous or potentially dangerous areas. All personnel entering the confined space will have achieved the appropriate OSHA training and the operation will be permitted, as necessary.

9.2.6.2 WORKING WITH COMPRESSED AIR

Description of Tasks

The proposed method of purging the USTs includes the injection of compressed gas into the tank and attached piping network.

Hazard Identification

Uncontrolled release of the highly pressured air can cause injury to FP during this task. Cylinders must also be properly managed to ensure they are not compromised during storage and/or use.

Controls

Pressure Regulation – Compressed air used for cleaning purposes shall be reduced to less than 30 pounds per square inch and then only with effective chip guarding and personal protective equipment.

Cylinder Storage – Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved, or stored. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved. Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time when cylinders are actually being hoisted or carried. Cylinders shall be placed in a location where they cannot become part of an electrical circuit.

9.2.7 DECONTAMINATION

All equipment will be decontaminated before leaving the Site. Personnel involved in decontamination activities may be inadvertently exposed to skin contact with contaminated materials and chemicals brought from the EZ. Personnel involved in decontamination activities must wear PPE that is, at a minimum, one level below the level worn by personnel working in the EZ.

9.2.8 DEMOBILIZATION

Demobilization involves the removal of all tools, equipment, supplies, and vehicles brought to the site. The hazards of this phase of activity are associated with heavy equipment operation and manual materials handling.

Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Heavy equipment operation presents noise and vibration hazards, and hot surfaces, to operators. Personnel in the vicinity of heavy equipment operation may be exposed to physical hazards resulting in fractures, contusions, and lacerations and may be exposed to high noise levels. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat-or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.3 CHEMICAL HAZARDS

The chemical hazards associated with Site operations are related to inhalation, ingestion, and skin exposure to Site COCs. Concentrations of airborne COCs during Site tasks may be measurable and will require air monitoring during certain operations. Air monitoring requirements for Site tasks are outlined in Section 5.1. Air monitoring protocols are also presented in the Community Air Monitoring Plan (Appendix F of the RAWP).

COCs at the Site include VOCs, SVOCs, pesticides, metals, and PFAS.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing Site COCs during remedial operations is moderate. **Table 9.1** lists the primary contaminants that have been identified at the Site and the media in which they are present.

Table 9.1 – List of Primary Contaminants

SOIL		
Metals	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Cadmium	24	Not Applicable
Copper	722	Not Applicable
Iron	38,200	Not Applicable
Lead	7,190	Not Applicable
Mercury	2.2	Not Applicable
Nickel	42.9	Not Applicable
Zinc	8,410	Not Applicable
VOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Acetone	0.0931	PID
SVOCs	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Benzo(a)anthracene	14.4	PID

Benzo(a)pyrene	12.9	PID
Benzo(b)fluoranthene	15.1	PID
Benzo(k)fluoranthene	2.72	PID
Chrysene	10.5	PID
Dibenzo(a,h)anthracene	1.92	PID
Indeno(1,2,3-cd)pyrene	6.16	PID
2-Methylnaphthalene	14.2	PID
Pesticides	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Dieldrin	0.034	Not Applicable
4,4'-DDE	0.53	Not Applicable
4,4'-DDD	0.064	Not Applicable
4'4-DDT	0.22	Not Applicable

GROUNDWATER		
SVOCs	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Benzo(a)anthracene	0.23	PID
Benzo(a)pyrene	0.26	PID
Benzo(b)fluoranthene	0.22	PID
Benzo(k)fluoranthene	0.22	PID
Chrysene	0.27	PID
Indeno(1,2,3-cd)pyrene	0.27	PID
Metals	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Aluminum	322,000	Not Applicable
Antimony	22	Not Applicable
Arsenic	161	Not Applicable
Barium	2,250	Not Applicable
Beryllium	105	Not Applicable
Cadmium	21	Not Applicable
Chromium	760	Not Applicable
Copper	690	Not Applicable
Iron	639,000	Not Applicable
Lead	3,090	Not Applicable
Magnesium	192,000	Not Applicable

Manganese	9,640	Not Applicable
Mercury	1.2	Not Applicable
Nickel	517	Not Applicable
Sodium	239,000	Not Applicable
Zinc	6,690	Not Applicable
PFAS	**Maximum Concentration (ng/L)**	**Applicable Monitoring Instrument**
PFOS	68.8	Not Applicable
PFOA	50.9	Not Applicable

SOIL VAPOR		
Contaminants	**Maximum Concentration (ug/m^3)**	**Applicable Monitoring Instrument**
1,2,4-Trimethylbenzene	9.33	PID
4-Methyl-2-pentanone (MIBK)	7.57	PID
Carbon Tetrachloride	0.39	PID
Chloroform	3.21	PID
Dichlorodifluoromethane	2.54	PID
Ethanol	23	PID
Ethylbenzene	25	PID
Heptane	17.4	PID
Hexane	34.8	PID
Isopropylalcohol	8.72	PID
m,p-Xylene	106	PID
Methyl Ethyl Ketone	212	PID
o-Xylene	32.5	PID
Tetrachloroethene	3.95	PID
Tetrahydrofuran	36	PID
Toluene	273	PID
Trichloroethene	2.4	PID
Trichlorofluoromethane	1.42	PID
Acetone (2-Propanone)	226	PID
Benzene	7.73	PID

SOIL VAPOR		
Contaminants	**Maximum Concentration (ug/m^3)**	**Applicable Monitoring Instrument**
Carbon disulfide	38.6	PID
Cyclohexane	5.9	PID
Ethyl Acetate	256	PID
Isopropyl Alcohol	1.9	PID
Propylene	73.1	PID
2,2,4-Trimethylpentane	2.3	PID
Tertiary Butyl Alcohol	2.1	PID
Xylenes (total)	14	PID
Methylene Chloride	12.4	PID
1,3,5-Trimethylbenzene	3.71	PID
1,3-Butadiene	15.2	PID
4-Ethyltoluene	13.7	PID
4-Isopropyltoluene	2.78	PID
Isopropylbenzene	1.79	PID
sec-Butylbenzene	1.3	PID
Styrene	1.06	PID

10.0 EMERGENCY PROCEDURES

10.1 GENERAL

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the FS/SSO immediately.

The FS/SSO will establish evacuation routes and assembly areas for the Site. All personnel entering the Site will be informed of this route and the assembly area.

10.2 EMERGENCY RESPONSE

If an incident occurs, the following steps will be taken:

- The FS/SSO will evaluate the incident and assess the need for assistance and/or evacuation;
- The FS/SSO will call for outside assistance as needed;
- The FS/SSO will ensure the PM is notified promptly of the incident; and
- The FS/SSO will take appropriate measures to stabilize the incident scene.

10.2.1 FIRE

In the case of a fire at the Site, the FS/SSO will assess the situation and direct fire-fighting activities. The FS/SSO will ensure that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that Site personnel are unable to safely extinguish with one (1) fire extinguisher, the local fire department will be summoned.

10.2.2 CONTAMINANT RELEASE

In the event of a contaminant release, the following steps will be taken:

- Notify FS/SSO immediately;
- Evacuate immediate area of release;
- Conduct air monitoring to determine needed level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

The FS/SSO has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.

10.3 MEDICAL EMERGENCY

All employee injuries must be promptly reported to the SSO/FS, who will:

- Ensure that the injured employee receives prompt first aid and medical attention;
- In emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room); and
- If the injured person is a SESI employee, notify SESI at 973-808-9050.

10.3.1 EMERGENCY CARE STEPS

Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.

- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform CPR as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.

Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

10.4 FIRST AID GENERAL

All persons must report any injury or illness to their immediate supervisor or the FS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The FS and SSO must fill out an accident/incident report as soon as emergency conditions no longer exist and first aid and/or medical treatment has been ensured. The report must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the medical facility. If the injured person is not ambulatory or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.4.1 FIRST AID—INHALATION

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

10.4.2 FIRST AID—INGESTION

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information. If the victim is unconscious, keep them on their side and clear the airway if vomiting occurs.

10.4.3 FIRST AID—SKIN CONTACT

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

10.4.4 FIRST AID—EYE CONTACT

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ, must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

10.5 REPORTING INJURIES, ILLNESSES, AND SAFETY INCIDENTS

Injuries and illnesses, however minor, will be reported to the FS immediately. The FS will complete an injury report and submit it to the HSM, and the PM by end of shift.

10.6 EMERGENCY INFORMATION

he means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in **Table 10.1** below.

Table 10.1 – Emergency Contacts

Local Emergency Contacts	**Telephone No.**
EMERGENCY	911
Phelps Hospital	(914) 366-3000
Police Emergency	911
Fire Emergency	911
Rescue Squad	911
Ambulance	911
Miscellaneous Contacts	**Telephone No.**
N.Y. Poison Control Center	(800) 222-1222
National Response Center and Terrorist Hotline	(800) 424-8802
Center for Disease Control	(800) 311-3435
Utility Mark-Out	(800) 962-7962

10.6.1 DIRECTIONS TO HOSPITAL

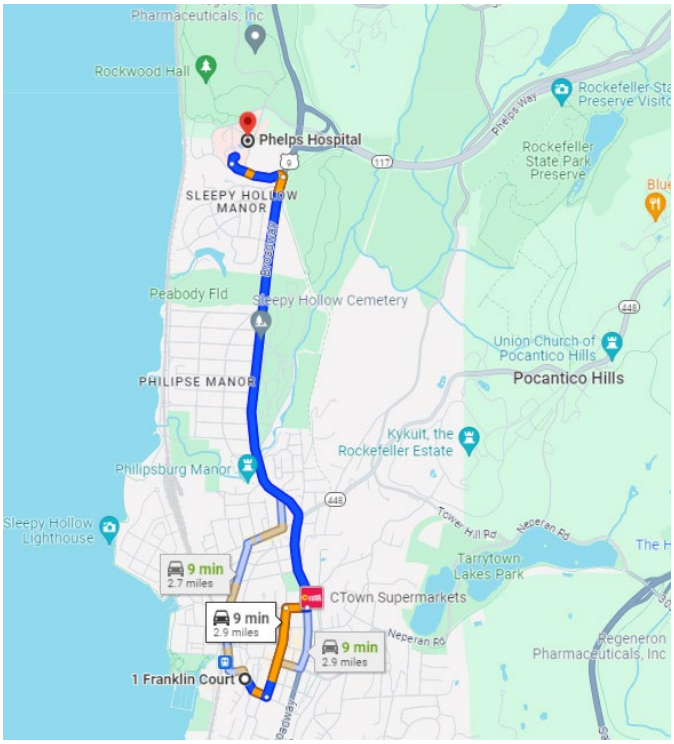
Phelps Hospital

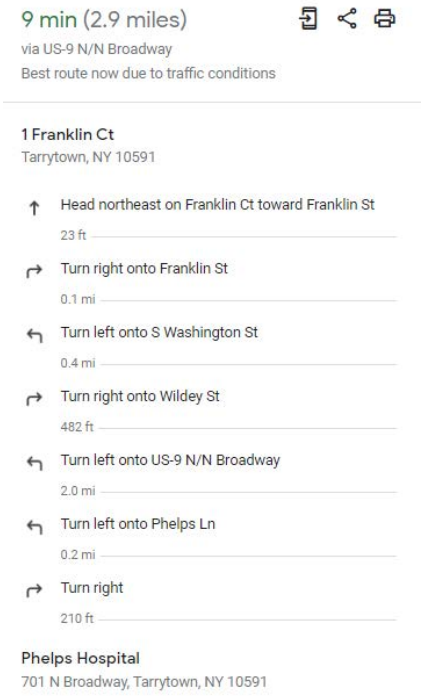
701 N Broadway, Tarrytown, NY

(914) 366-3000

Directions to Hospital:

Figure 10.1





Phelps Hospital is depicted on **Figure 10.1**

11.0 LOGS, REPORTS, AND RECORDKEEPING

11.1 HASP AND FIELD CHANGE REPORT

The following is a summary of required health and safety logs, reports, and record keeping for the operations at the subject Site. The field change request form is presented as Attachment 3.

11.2 MEDICAL AND TRAINING RECORDS

The HSM must obtain and keep a log of personnel meeting appropriate training and medical qualifications for the site work. The log will be kept in the project file. Each company's Human Resources Department will maintain medical records, in accordance with 29 CFR 1910.1020.

11.3 EXPOSURE RECORDS

Any personnel monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.1020. For SESI employees, the originals will be sent to the Human Resources Manager. For subcontractor employees, the original file will be sent to the subcontractor employer with a copy maintained in the SESI project file.

11.4 ACCIDENT/INCIDENT REPORT

Any accident/incident reports must be completed following procedures given in Section 10.5 of this HASP. The originals will be sent to the HSM for maintenance. A copy of the forms will be kept in the project file. (See Attachment 4).

11.5 OSHA FORM 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the project Site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Human Resources Manager for maintenance. Subcontractor employees must also meet the requirements of maintaining an OSHA 200 Form. The accident/incident report meets the requirements of OSHA Form 101 (Supplemental Record), which must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

11.6 ON-SITE HEALTH AND SAFETY FIELD LOGBOOK

The HSM or designee will maintain an on-Site health and safety logbook in which daily Site conditions, activities, personnel, and significant events will be recorded. Calibration records and personnel monitoring results, if available, will also be recorded in the field logbook. The original logbook will be kept in the project file.

Whenever any personnel monitoring is conducted onsite, the monitoring results will be noted in the filed logbook. These will become part of the exposure records file and will be maintained by the HSM.

A signatory page is included (See Attachment 5) and is to be signed by those working on and/or visiting the Site.

11.7 SAFETY DATA SHEETS

Safety Data Sheets (SDS) will be obtained and kept on file at the project site for each hazardous chemical brought to, use, or stored at the Site (See Attachment 6).

12.0 COVID RESPONSE ACTION PLAN

SESI is concerned with the safety and well-being of its employees, vendors, subcontractors, and others with access to its offices and job sites, with particular emphasis on the unique challenges posed by COVID-19.

SESI has established the following protocols in keeping with the recommendations of the CDC and other sources including State Governor Executive Orders for work taking place on construction sites.

We request that all SESI employees, vendors, and subcontractors help with our prevention efforts while at work.

In order to minimize the spread of COVID-19, we must all cooperate in doing the following:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. Always wash hands that are visibly soiled.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
- Discourage handshaking, avoid touching your eyes, nose, or mouth with unwashed hands.
- Limit the sharing of tools, machinery, equipment, phones, desks, and computers.
- Wear cloth face coverings on all construction sites.
- Avoid close contact with people who are sick.
- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home—DO NOT GO TO WORK.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.

The following are the specific jobsite protocols and response actions to be taken in the event someone on Site has been in contact with, or has themselves, the COVID-19 virus:

OFFICE/JOBSITE PROTOCOL

- If an employee/worker exhibits COVID-19 symptoms, the employee/worker must remain at home until he or she is symptom free for 72 hours (three [3] full days) without the use of fever-reducing or other symptom-altering medicines (e.g. acetaminophen, cough suppressants). SESI will similarly require an employee or worker that reports to work with symptoms to return home until they are symptom free for 72 hours (three [3] full days).
- Limit person to person contact, and when unavoidable, maintain CDC distancing guidelines.
- Avoid eating lunch in groups.
- Avoid in-person meetings if possible. If an in-person meeting is necessary, conduct it in a well-ventilated area with enough space for attendees to distance themselves from one another. Field jobsite meetings should be conducted in smaller group meetings (no more than five [5] persons when possible) versus one large meeting.
- Only workers necessary to the execution of the work should be at the jobsites. No non-essential visitors should be permitted at the worksite.

RESPONSE ACTION TRIGGER EVENTS:

- An employee/worker at work has tested positive for COVID-19
- An employee/worker at work has suspected, but unconfirmed, case of COVID-19
- An employee/worker self-reported that they came in contact with someone who had a presumptive positive case of COVID-19

- An employee/worker has been exposed to the virus but only found out after they have interacted with others

RESPONSE ACTIONS:

- Upon occurrence of any of the Trigger Events above, employees/subcontractors shall notify SESI Management about the suspected employee/worker infected with, or exposed to, COVID-19.
- SESI Management will investigate the incident to confirm the report is valid.
- Employees/Subcontractors shall investigate their respective infected employee(s) and report the following to SESI Management and HR:
    - Identify all individuals who worked in proximity (six feet) of the infected employee/worker,
    - Employee(s)/Worker(s) infected with the COVID-19 virus, and employee(s)/worker(s) that came in contact with the infected employee/worker shall be sent home for a period of 14 days,
    - Do not identify the infected employee/worker by name to avoid violation of privacy/confidentiality laws, and,
    - Keep SESI Management informed of progress and updates.
- If an infected person was in the office, SESI will clean and disinfect common areas and surfaces, in accordance with CDC recommendations.
- SESI Management will notify affected employees/workers of the Trigger Event and instruct them to take the response actions above.
- **SESI Management policy requires written documentation from a health care professional that confirmed infected employees can return to work.**

Except for circumstances in which SESI is legally required to report workplace occurrences of communicable disease, the confidentiality of all medical conditions will be maintained in accordance with applicable law and to the extent practical under the circumstances. When required, the number of persons who will be informed of an employee's/worker's condition will be kept at the minimum needed to appropriately notify other potentially affected employees/workers of Trigger Events and to attempt to minimize the potential for transmission of the virus.

Attachment 1:
Air Monitor Log

Air Monitoring: Sample Collection and Analysis

Date & Time of Monitoring	Task / Operation Being	Substance(s)/ Hazard(s) Being	Monitoring Location	Type/Method of Monitoring	Monitoring Results	Exposure Limits	Required Action

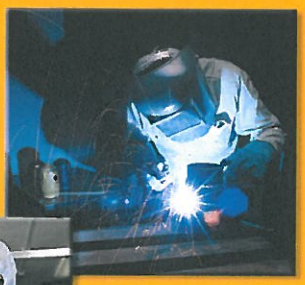
Attachment 2:
OSHA Poster

Job Safety and Health

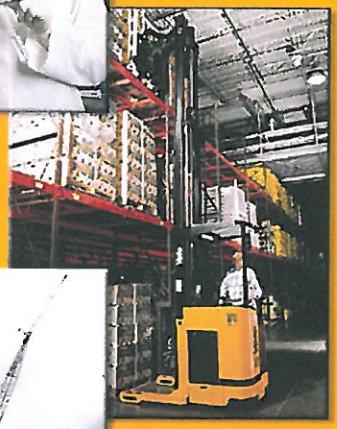
It's the law!

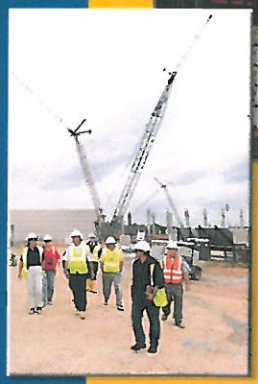
OSHA®

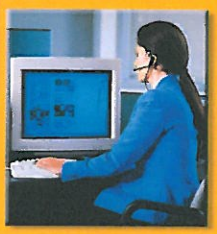
Occupational Safety and Health Administration
U.S. Department of Labor











EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA (6742)
www.osha.gov

OSHA 3165-02 2012R

Attachment 3:
Field Change Request Form

HEALTH & SAFETY PLAN
CHANGE NOTICE

Pages _____ of _____

Project: H&S-CN

1) HASP VERSION: _____ SECTION: _____ PAGE (s): _____

RE: --- Change to existing HASP Anticipated Revision Date: _____
--- Addition to existing HASP
--- Other: _____
_____CONT._____

2) PROPOSED CHANGE: _____
_____
_____
_____

3) REASON FOR PROPOSED CHANGE(s):
--- Required by SPEC or Change Order --- Other: _____
--- Disposition of Deficiency _____CONT._____
--- Change in Regulatory or Other Requirements
--- Operational Experience

4) EXHIBITS ATTACHED ____ NO ____ YES (If YES, describe) _____
_____CONT._____

5) PMK APPROVALS PROJECT MANAGER: _____ Date: _____
SITE MANAGER: _____ Date: _____
H&S MANAGER: _____ Date: _____

Client Approval Required: ____ NO ____ YES (If YES, date submitted) _____

6) CLIENT APPROVAL _____ APPROVED _____ REMANDED _____ REJECTED

Comments: _____
_____
_____ CONT._____

Client Representative: _____Date: _____

7) DISTRIBUTION AFTER APPROVAL

X HASP UPDATE LIST --- OTHER: _____
X CLIENT _____
X PROJECT FILES _____

8) PREPARED BY: _____Date: _____
Title: _____

Attachment 4:
Injury Report Form

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____-_____ Date ____/ ____/ ____

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ____/ ____/ ____

4) Date hired ____/ ____/ ____

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ____/ ____/ ____

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) ***If the employee died, when did death occur?*** Date of death ____/ ____/ ____

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work				(M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
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____			__/__ month/day			☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
Page totals ➤						____	____	____	____	____	____	____	____	____	____	____	____

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury (1) Skin disorder (2) Respiratory condition (3) Poisoning (4) Hearing loss (5) All other illnesses (6)

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

__ __ __ __

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

__ __ __ __ __ __

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

Attachment 5:
Signatory Page

Attachment 5 – Site-Specific Health and Safety Orientation Signatory Page
HEALTH AND SAFETY PLAN

Title	Name	Signature
Project Manager:	TBD	
Health and Safety Manager:	TBD	

I have read the attached Health and Safety Plan (HASP)and have received site-specific information and orientation regarding the identified physical, chemical, and biological hazards anticipated at this site. My signature certifies that I understand the procedures, equipment, and restrictions applicable to this project site and agree to abide by them.

Signature	Printed Name	Company	Date

Attachment 5– Health and Safety Orientation Signatory Page (continued)

Signature	Printed Name	Company	Date

Attachment 6:
SDS

SAFETY DATA SHEET

Version 3.21
Revision Date 08/21/2018
Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acetone

Product Number : 650501
Brand : Sigma-Aldrich
Index-No. : 606-001-00-8

CAS-No. : 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58.08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8
Registration number	:	01-2119471330-49-XXXX

Hazardous components

Component	Classification	Concentration
Acetone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Acetone	67-64-1	TWA	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Not classifiable as a human carcinogen		
		STEL	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	250 ppm 590 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000 ppm 2,400 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		STEL	750 ppm 1,780 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	3,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	500 ppm 1,200 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Acetone	25 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	33.3 mg/kg
Marine water	1.06 mg/l
Fresh water	10.6 mg/l
Marine sediment	3.04 mg/kg
Fresh water sediment	30.4 mg/kg
Onsite sewage treatment plant	100 mg/l

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -94 °C (-137 °F)
f)	Initial boiling point and boiling range	56 °C (133 °F) at 1,013 hPa (760 mmHg)
g)	Flash point	-17.0 °C (1.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13 %(V) Lower explosion limit: 2 %(V)
k)	Vapour pressure	533.3 hPa (400.0 mmHg) at 39.5 °C (103.1 °F) 245.3 hPa (184.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.791 g/mL at 25 °C (77 °F)
n)	Water solubility	completely miscible
o)	Partition coefficient: n-octanol/water	log Pow: -0.24
p)	Auto-ignition temperature	465.0 °C (869.0 °F)
q)	Decomposition temperature	No data available

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	23.2 mN/m at 20.0 °C (68.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,800 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Tremor. Behavioral:Headache. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

LC50 Inhalation - Rat - 8 h - 50,100 mg/m3
Remarks: Drowsiness Dizziness Unconsciousness

LD50 Dermal - Guinea pig - 7,426 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
- Guinea pig
Result: Does not cause skin sensitisation.

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AL3150000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence
Kidney - Irregularities - Based on Human Evidence
Skin - Dermatitis - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5,540 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 8,800 mg/l - 48 h
Toxicity to algae	Remarks: No data available

12.2 Persistence and degradability

Biodegradability	Result: 91 % - Readily biodegradable. (OECD Test Guideline 301B)

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

15. REGULATORY INFORMATION

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	1993-02-16

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acetone	67-64-1	1993-02-16

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.21 Revision Date: 08/21/2018 Print Date: 10/19/2018

SAFETY DATA SHEET

Version 6.2
Revision Date 03/12/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Antimony

Product Number : 266329
Brand : Aldrich
CAS-No. : 7440-36-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H335 May cause respiratory irritation.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

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P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Sb
Molecular weight	:	121.76 g/mol
CAS-No.	:	7440-36-0
EC-No.	:	231-146-5

Component	Classification	Concentration
Antimony		
	Acute Tox. 3; STOT SE 3; H301, H335	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

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4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Antimony oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Air sensitive. Moisture sensitive. Handle and store under inert gas. Keep in a dry place.

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Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Antimony	7440-36-0	TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Skin irritation		
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

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data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 630 °C (1166 °F) - lit.
f)	Initial boiling point and boiling range	1,635 °C 2,975 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	6.69 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances

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p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Antimony oxide
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 100 mg/kg
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

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IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CC4025000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinodon variegatus (sheepshead minnow) - 6.2 - 8.3 mg/l - 96.0 h Remarks: No data available

12.2 Persistence and degradability

Biodegradability	Result: - According to the results of tests of biodegradability this product is not readily biodegradable. Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 2871 Class: 6.1 Packing group: III
Proper shipping name: Antimony powder
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2871 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: ANTIMONY POWDER
Marine pollutant : yes

IATA
UN number: 2871 Class: 6.1 Packing group: III
Proper shipping name: Antimony powder

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Antimony	7440-36-0	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Antimony	7440-36-0	2007-07-01

	CAS-No.	Revision Date
Antimony	7440-36-0	2007-07-01

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New Jersey Right To Know Components

	CAS-No.	Revision Date
Antimony	7440-36-0	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.2 Revision Date: 03/12/2019 Print Date: 06/28/2019

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SAFETY DATA SHEET

Version 4.13
Revision Date 09/12/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H331 Toxic if inhaled.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, H350, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		

		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: light grey, black
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 817 °C (1,503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C (1,135 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	5.727 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat Exposure to air may affect product quality.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic oxides
Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Carcinogenicity

No data available

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known - Known to be human carcinogen (Arsenic)
OSHA:	OSHA specifically regulated carcinogen (Arsenic)

Reproductive toxicity

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CG0525000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbsReportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant:yes

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Arsenic	7440-38-2	2015-11-23

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Reportable Quantity D004 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2015-11-23

	CAS-No.	Revision Date
Arsenic	7440-38-2	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2015-11-23

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H331	Toxic if inhaled.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.13 Revision Date: 09/12/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Barium

Product Number : 474711
Brand : Aldrich

CAS-No. : 7440-39-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H261 In contact with water releases flammable gases.

Precautionary statement(s)
P223 Do not allow contact with water.
P231 + P232 Handle under inert gas. Protect from moisture.
P280 Wear protective gloves/ eye protection/ face protection.
P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

P402 + P404	Store in a dry place. Store in a closed container.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ba
Molecular weight	:	137.33 g/mol
CAS-No.	:	7440-39-3
EC-No.	:	231-149-1

Hazardous components

Component	Classification	Concentration
Barium		
	Water-react. 2; H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Barium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		

		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 725 °C (1337 °F) - lit.
f)	Initial boiling point and boiling range	1,640 °C (2,984 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	3.6 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Barium oxide
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableBarium
Inhalation: No data available(Barium)
Dermal: No data available(Barium)
No data available(Barium)

Skin corrosion/irritation
No data available(Barium)

Serious eye damage/eye irritation
No data available(Barium)

Respiratory or skin sensitisation
No data available(Barium)

Germ cell mutagenicity

No data available(Barium)

Carcinogenicity
This product is or contains a component that is not classifiable as to its classification.(Barium)
(Barium)
(Barium)

Reproductive toxicity
No data available(Barium)

No data available(Barium)

Specific target organ toxicity - single exposure
No data available(Barium)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Barium)

Additional Information
RTECS: CQ8370000

Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.(Barium)
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Barium)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h(Barium)
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h(Barium)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Barium)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H261 In contact with water releases flammable gases.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	0
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 5.8
Revision Date 02/02/2018
Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[*a*]pyrene

Product Number : 48564
Brand : Supelco
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H340 May cause genetic defects.
H350 May cause cancer.
H360 May damage fertility or the unborn child.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	3,4-Benzpyrene 3,4-Benzopyrene Benzo[def]chrysene benzo[pqr]tetraphene
Formula	:	$C_{20}H_{12}$
Molecular weight	:	252.31 g/mol
CAS-No.	:	50-32-8
EC-No.	:	200-028-5
Index-No.	:	601-032-00-3

Hazardous components

Component	Classification	Concentration
Benzo[a]pyrene		
	Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low		

		as possible. Suspected human carcinogen		
		Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
Benzo[a]pyrene	50-32-8	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological	Basis

				specimen	
	-	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance — Form: solid

b) Odour — No data available

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 177 - 180 °C (351 - 356 °F)
f)	Initial boiling point and boiling range	495 °C (923 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.35 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.97
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Rat - 50 mg/kg

Skin corrosion/irritation
Skin - Mouse
Result: Mild skin irritation

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
May alter genetic material.
In vivo tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene)
OSHA:	OSHA specifically regulated carcinogen (Benzo[a]pyrene)

Reproductive toxicity
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 48 h - 0.0005 mg/l
	Bioconcentration factor (BCF): 3,208

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Benzo[a]pyrene)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[a]pyrene)
Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

Benzo[a]pyrene	50-32-8	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	1990-01-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 02/02/2018 Print Date: 10/19/2018

SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[<I>b</>]fluoranthene

Product Number : 48490
Brand : Supelco
Index-No. : 601-034-00-4

CAS-No. : 205-99-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 3,4-Benzofluoranthene

Formula : C<SB>20</>H<SB>12</>
Molecular weight : 252.31 g/mol
CAS-No. : 205-99-2
EC-No. : 205-911-9
Index-No. : 601-034-00-4

Hazardous components

Component	Classification	Concentration
Benz[e]acephenanthrylene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benz[e]acephenanthrylene	205-99-2	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
TDLo Oral - Mouse - 7.57 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Benz[e]acephenanthrylene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[e]acephenanthrylene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer.	CAS-No.	Revision Date
For more information go to www.P65Warnings.ca.gov.	205-99-2	2007-09-28
Benz[e]acephenanthrylene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350 May cause cancer.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benz[*a*]anthracene

Product Number : 48563
Brand : Supelco
Index-No. : 601-033-00-9

CAS-No. : 56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	C<SB>18</>H<SB>12</>
Molecular weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Benz[a]anthracene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods
IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350	May cause cancer.
H400	Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 4.8
Revision Date 01/11/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Beryllium

Product Number : 378135
Brand : Aldrich

CAS-No. : 7440-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 2), H330
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 1), H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s)	
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/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Be
Molecular weight	:	9.01 g/mol
CAS-No.	:	7440-41-7
EC-No.	:	231-150-7

Hazardous components

Component	Classification	Concentration
Berylium foil		
	Acute Tox. 3; Acute Tox. 2; Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 1B; STOT SE 3; STOT RE 1; H301, H315, H317, H319, H330, H335, H350, H372	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization Chronic beryllium disease (berylliosis) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization Chronic beryllium disease (berylliosis)		

		Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		C	0.0005 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		PEL	0.0002 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	0.025 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an

industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,278 °C (2,332 °F) - lit.
f)	Initial boiling point and boiling range	2,970 °C (5,378 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Alkali metals

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Beryllium oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - 0.496 mg/kg
Remarks: Liver:Hepatitis (hepatocellular necrosis), zonal.

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Hamster
Lungs
Result: negative

Carcinogenicity

Carcinogenicity - Rat - Intratracheal
Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Lungs, Thorax, or Respiration:Bronchiogenic carcinoma.

Carcinogenicity - Rabbit - Intravenous
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Musculoskeletal:Tumors.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Berylium foil)
NTP:	Known - Known to be human carcinogen (Berylium foil)
	Known - Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Berylium foil)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: DS1750000

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium, powder
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1567 Class: 6.1 (4.1) Packing group: II EMS-No: F-G, S-G
Proper shipping name: BERYLLIUM POWDER

IATA
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium powder

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Berylium foil	7440-41-7	2008-10-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H301	Toxic if swallowed.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.
Skin Irrit.	Skin irritation
Skin Sens.	Skin sensitisation

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	3
Reactivity Hazard:	3

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.8 Revision Date: 01/11/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 3.18
Revision Date 08/14/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chloroform

Product Number : C2432
Brand : Sigma-Aldrich
Index-No. : 602-006-00-4

CAS-No. : 67-66-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361d
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 1), Liver, Kidney, H372
Acute aquatic toxicity (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H336 May cause drowsiness or dizziness.
H351 Suspected of causing cancer.

H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.
H402	Harmful to aquatic life.

Precautionary statement(s)

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/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Trichloromethane Methylidyne trichloride
Formula	:	$CHCl_3$
Molecular weight	:	119.38 g/mol
CAS-No.	:	67-66-3
EC-No.	:	200-663-8
Index-No.	:	602-006-00-4

Hazardous components

Component	Classification	Concentration
Chloroform		
	Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H315, H319, H331, H336, H351, H361d, H372, H402	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Chloroform	67-66-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Embryo/fetal damage Confirmed animal carcinogen with unknown relevance to humans		
		ST	2 ppm 9.78 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		C	50 ppm 240 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.		
		PEL	2 ppm 9.78 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	sweet
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -63 °C (-81 °F)
f)	Initial boiling point and boiling range	60.5 - 61.5 °C (140.9 - 142.7 °F)
g)	Flash point	- DIN 51755 Part 1does not flash
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	210 hPa (158 mmHg) at 20 °C (68 °F)
l)	Vapour density	4.12 - (Air = 1.0)
m)	Relative density	1.492 g/mL at 25 °C (77 °F)
n)	Water solubility	8.7 g/l at 23 °C (73 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 1.97 at 25 °C (77 °F) - (ECHA), Bioaccumulation is not expected.
p)	Auto-ignition temperature	> 600 °C (> 1,112 °F) at 1,013 hPa (760 mmHg) - DIN 51794
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Solubility in other solvents	organic solvent at 20 °C (68 °F) - miscible
Surface tension	27.1 mN/m at 20.0 °C (68.0 °F)
Relative vapour density	4.12 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabiliser(s):
2-Methyl-2-butene (>=0.001 - <=0.015 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
various plastics, Rubber

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 908 mg/kg
(OECD Test Guideline 401)
Remarks: Behavioral:Change in motor activity (specific assay). Behavioral:Ataxia. Lungs, Thorax, or Respiration:Respiratory stimulation.

LOEC Inhalation - Rat - male - 6 h - 500 ppm
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

LD50 Dermal - Rabbit - > 20,000 mg/kg
Remarks: (RTECS)

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes.
Remarks: (ECHA)

Respiratory or skin sensitisation
Sensitisation test: - Guinea pig
Result: negative
(Maximisation Test)
Remarks: (ECHA)

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative

reverse mutation assay
Escherichia coli
Result: negative
(ECHA)

OECD Test Guideline 474
Rat - male and female - Bone marrow
Result: negative

OECD Test Guideline 486
Rat - male - Other cell types
Result: negative

Carcinogenicity

Carcinogenicity - Rat - Oral
Tumorigenic:Carcinogenic by RTECS criteria. Leukaemia

Suspected of causing cancer.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chloroform)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Chloroform)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver, Kidney

Aspiration hazard
No data available

Additional Information
RTECS: FS9100000

Vomiting, Cough, irritant effects, Shortness of breath, respiratory arrest, narcosis, Dizziness, Nausea, agitation, spasms, inebriation, Headache, Stomach/intestinal disorders, ataxia (impaired locomotor coordination), cardiovascular disorders Drying-out effect resulting in rough and chapped skin.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Danio rerio (zebra fish) - 121 mg/l - 48 h (OECD Test Guideline 203)
	static test LC50 - Pimephales promelas (fathead minnow) - 103 - 171 mg/l - 96 h Remarks: (ECHA)
	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 18.2 mg/l - 96 h Remarks: (ECHA)
	flow-through test LC50 - Micropterus dolomieui - 51 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 79 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test ErC50 - Chlamydomonas reinhardtii (green algae) - 13.3 mg/l - 72 h Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 14 d

Result: 0 % - Not readily biodegradable.
(OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation — Cyprinus carpio (Carp) - 42 d
at 25 °C - 0.1 mg/l

Bioconcentration factor (BCF): 4.1 - 13
(OECD Test Guideline 305)

Cyprinus carpio (Carp) - 42 d
at 25 °C - 1 mg/l

Bioconcentration factor (BCF): 1.4 - 4.7
(OECD Test Guideline 305)

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform
Reportable Quantity (RQ): 10 lbsReportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1888 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: CHLOROFORM

IATA

UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform

15. REGULATORY INFORMATION

SARA 302 Components

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D022 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Chloroform	67-66-3	2011-09-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H402	Harmful to aquatic life.
Repr.	Reproductive toxicity
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.18 Revision Date: 08/14/2018 Print Date: 06/22/2019

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 13-Sep-2013 **Revision Date** 21-Jul-2015 **Revision Number** 2

1. Identification

Product Name **Chromium**

Cat No. : **C318-500**

Synonyms Chrome

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Specific target organ toxicity (single exposure) Target Organs - Respiratory system.	Category 3

Label Elements

Signal Word
Warning

Hazard Statements
May cause respiratory irritation



Precautionary Statements
Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life

3. Composition / information on ingredients

Component	CAS-No	Weight %
Chromium	7440-47-3	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects None reasonably foreseeable.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media Carbon dioxide (CO2)

Flash Point Not applicable
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air. Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Chromium oxide
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	1	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Avoid dust formation. Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Chromium	TWA: 0.5 mg/m³	(Vacated) TWA: 1 mg/m³ TWA: 1 mg/m³	IDLH: 250 mg/m³ TWA: 0.5 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Chromium	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1857.2 °C / 3375 °F

Boiling Point/Range	2640 °C / 4784 °F
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Relative Density	7.2
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Cr
Molecular Weight	51.996

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Sensitive to air.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents, Strong acids

Hazardous Decomposition Products Chromium oxide

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause irritation of respiratory tract

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Chromium	7440-47-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Chromium	Not listed	LC50: 14.3 mg/l/96 H (Pimephales promelas)	Not listed	EC50: 0.07 mg/l/48 H

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Proper technical name** Chromium
- **Hazard Class** 9
- **Packing Group** III

TDG Not regulated

- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
- **Hazard Class** 9
- **Packing Group** III

IATA

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

IMDG/IMO

- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Chromium	X	X	-	231-157-5	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Chromium	7440-47-3	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Chromium	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Chromium	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Chromium	5000 lb 10 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Chromium	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2B Toxic materials



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 13-Sep-2013
Revision Date 21-Jul-2015
Print Date 21-Jul-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 5.5
Revision Date 01/10/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chrysene

Product Number : 35754
Brand : Sigma-Aldrich
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	218-01-9
EC-No.	:	205-923-4
Index-No.	:	601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		

		NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 252 - 254 °C (486 - 489 °F) - lit.
f)	Initial boiling point and boiling range	448 °C (838 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - > 320 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chrysene)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	OSHA specifically regulated carcinogen (Chrysene)

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GC0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Chrysene	218-01-9	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 01/10/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 03/12/2019
Print Date 06/22/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Copper

Product Number : 31284
Brand : Aldrich
CAS-No. : 7440-50-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Cu
Molecular weight : 63.55 g/mol
CAS-No. : 7440-50-8
EC-No. : 231-159-6

Component	Classification	Concentration

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Copper,		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Copper oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

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6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Air sensitive.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper,	7440-50-8	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Irritation Gastrointestinal metal fume fever		
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		

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		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Wire Colour: light red
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F)
f)	Initial boiling point and boiling range	2,567 °C 4,653 °F
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	8.940 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Copper oxides
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intraperitoneal - Mouse - 3.5 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

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Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GL5325000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

New Jersey Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.1 Revision Date: 03/12/2019 Print Date: 06/22/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.0
Revision Date 03/14/2018
Print Date 07/18/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dieldrin

Product Number : 33491
Brand : Sigma-Aldrich
Index-No. : 602-049-00-9

CAS-No. : 60-57-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 2), H300

Acute toxicity, Dermal (Category 1), H310

Carcinogenicity (Category 2), H351

Specific target organ toxicity - repeated exposure, Oral (Category 1), H372

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word	Danger
Hazard statement(s)	
H300 + H310	Fatal if swallowed or in contact with skin
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
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/ vapours/ spray.
P262	Do not get in eyes, on skin, or on clothing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,7,8,8a-octahydro-6,7-epoxy-1,4:5,8-dimethanonaphthalene
Formula	:	$C_{12}H_8Cl_6O$
Molecular weight	:	380.91 g/mol
CAS-No.	:	60-57-1
EC-No.	:	200-484-5
Index-No.	:	602-049-00-9

Hazardous components

Component	Classification	Concentration
Dieldrin		
	Acute Tox. 2; Acute Tox. 1; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H300 + H310, H351, H372, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Dieldrin	60-57-1	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Reproductive effects Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.250000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	0.250000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Liver damage Reproductive effects Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.25 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	0.25 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.25 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		PEL	0.25 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber

Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 143 - 144 °C (289 - 291 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available

q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 38.3 mg/kg
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.
Limited evidence of carcinogenicity in animal studies

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: IO1750000

Discomfort, Headache, Nausea, Vomiting, Dizziness, Tremors, tonic convulsions, clonic spasms, Coma., respiratory failure, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood - Irregularities - Based on Human Evidence
Blood - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Carassius auratus (goldfish) - 1.6 µg/l - 96.0 h(Dieldrin)
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 79.5 µg/l - 48 h(Dieldrin)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Dieldrin)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Dieldrin)
Reportable Quantity (RQ) : 1 lbs

Marine pollutant: no no
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)
Marine pollutant : yes

IATA
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, organic, n.o.s. (Dieldrin)
IATA Passenger: Not permitted for transport
A5

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Dieldrin	CAS-No. 60-57-1	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H300	Fatal if swallowed.
H300 + H310	Fatal if swallowed or in contact with skin
H310	Fatal in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.0 Revision Date: 03/14/2018 Print Date: 07/18/2019

SAFETY DATA SHEET

Version 5.6
Revision Date 12/11/2017
Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco

CAS-No. : 193-39-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{22}H_{12}$
Molecular weight	:	276.33 g/mol
CAS-No.	:	193-39-5
EC-No.	:	205-893-2

Hazardous components

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

No data available

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Indeno[1,2,3-cd]pyrene	193-39-5	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the

sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	536.0 °C (996.8 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Indeno[1,2,3-cd]pyrene	CAS-No. 193-39-5	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
H351	Suspected of causing cancer.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 12/11/2017 Print Date: 11/10/2018

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 6.0 Revision Date 10.11.2016
Print Date 21.01.2019
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Iron Metal Clinical

Product Number : NIST937
Brand : Sigma-Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

2.2 Label elements

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

SECTION 4: First aid measures

4.1 Description of first aid measures

No data available

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
No data available

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
No data available

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

8.2 Exposure controls
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	No data available
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation

Germ cell mutagenicity

Carcinogenicity

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
RTECS: Not available

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability

12.3 Bioaccumulative potential

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

SAFETY DATA SHEET

Version 4.11
Revision Date 10/12/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lead

Product Number : 391352
Brand : Aldrich

CAS-No. : 7439-92-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Pb
Molecular weight	:	207.20 g/mol
CAS-No.	:	7439-92-1
EC-No.	:	231-100-4

Hazardous components

Component	Classification	Concentration
Lead		
	Acute Tox. 4; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H372, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	See 1910.1025		
Lead	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
	-	Lead	200 µg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance — Form: powder

b) Odour — No data available

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f)	Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Lead oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Lead)
NTP:	RAHC - Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Lead)
OSHA:	OSHA specifically regulated carcinogen (Lead)

Reproductive toxicity

Reproductive toxicity - Rat - Inhalation
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in numbe corpora lutea).

May damage fertility. May damage the unborn child.

Developmental Toxicity - Rat - Inhalation
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral
Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h
	mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h
	mortality NOEC - Daphnia (water flea) - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus kisutch - 2 Weeks - 150 µg/l
	Bioconcentration factor (BCF): 12

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	2015-11-23

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Lead	7439-92-1	2009-02-01

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead	7439-92-1	2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.11 Revision Date: 10/12/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.0
Revision Date 01/31/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Magnesium

Product Number : 200905
Brand : Sigma-Aldrich
Index-No. : 012-002-00-9

CAS-No. : 7439-95-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable solids (Category 1), H228
Self-heating substances and mixtures (Category 1), H251
Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H228 Flammable solid.
H251 Self-heating: may catch fire.
H261 In contact with water releases flammable gases.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P223 Keep away from any possible contact with water, because of violent

	reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P235 + P410	Keep cool. Protect from sunlight.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P407	Maintain air gap between stacks/ pallets.
P413	Store bulk masses greater than .? kg/ .? lbs at temperatures not exceeding .? °C/ .? °F.
P420	Store away from other materials.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Mg
Molecular weight	:	24.31 g/mol
CAS-No.	:	7439-95-4
EC-No.	:	231-104-6
Index-No.	:	012-002-00-9

Hazardous components

Component	Classification	Concentration
Magnesium (non pyrophoric)		
	Flam. Sol. 1; Self-heat. 1; Water-react. 2; H228, H251, H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Magnesium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas. Air and moisture sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Turnings
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 648 °C (1198 °F) - lit.
f)	Initial boiling point and boiling range	1,090 °C (1,994 °F) - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa at 621 °C (1150 °F)
l)	Vapour density	No data available
m)	Relative density	1.74 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available

o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	The substance or mixture is classified as self heating with the category 1.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Heat, flames and sparks. Exposure to moisture

10.5 Incompatible materials
Acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Magnesium oxide
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableMagnesium (non pyrophoric)
Inhalation: No data available(Magnesium (non pyrophoric))
Dermal: No data available(Magnesium (non pyrophoric))
No data available(Magnesium (non pyrophoric))

Skin corrosion/irritation
No data available(Magnesium (non pyrophoric))

Serious eye damage/eye irritation
No data available(Magnesium (non pyrophoric))

Respiratory or skin sensitisation
No data available(Magnesium (non pyrophoric))

Germ cell mutagenicity

No data available(Magnesium (non pyrophoric))

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available(Magnesium (non pyrophoric))

No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - single exposure
No data available(Magnesium (non pyrophoric))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Magnesium (non pyrophoric))

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, chills, Fever, fatigue, muscle pain, joint pain, rash, Anorexia.(Magnesium (non pyrophoric))
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Magnesium (non pyrophoric))

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence(Magnesium (non pyrophoric))

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Magnesium (non pyrophoric))

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium
Poison Inhalation Hazard: No

IMDG
UN number: 1869 Class: 4.1 Packing group: III EMS-No: F-G, S-G
Proper shipping name: MAGNESIUM

IATA
UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Magnesium (non pyrophoric)	7439-95-4	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H228	Flammable solid.
H251	Self-heating: may catch fire.
H261	In contact with water releases flammable gases.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	2

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	2

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.0 Revision Date: 01/31/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 463728
Brand : Aldrich

CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H260 In contact with water releases flammable gases which may ignite spontaneously.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232 Handle under inert gas. Protect from moisture.

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Mn
Molecular weight	:	54.94 g/mol
CAS-No.	:	7439-96-5
EC-No.	:	231-105-1

Hazardous components

Component	Classification	Concentration
Manganese		
	Water-react. 1; Aquatic Acute 3; Aquatic Chronic 3; H260, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Unsuitable extinguishing media
Water

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Moisture sensitive. Keep in a dry place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)		
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		

		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) varies		
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 Adoption varies		
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C (3,564 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Peroxides

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Manganese/manganese oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 9,000 mg/kg(Manganese)
Inhalation: No data available(Manganese)
Dermal: No data available(Manganese)
No data available(Manganese)

Skin corrosion/irritation
Skin - Rabbit(Manganese)
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit(Manganese)
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
No data available(Manganese)

Germ cell mutagenicity

No data available(Manganese)

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available(Manganese)

May cause reproductive disorders.(Manganese)

Specific target organ toxicity - single exposure
No data available(Manganese)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Manganese)

Additional Information
RTECS: OO9275000

Men exposed to manganese dusts showed a decrease in fertility. Chronic man system. Early symptoms include languor, sleepiness and weakness in the le disturbances such as uncontrollable laughter and a spastic gait with tend cases. High incidence of pneumonia has been found in workers exposed to t(Manganese)

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence(Manganese)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h(Manganese)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Manganese)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
Poison Inhalation Hazard: No

IMDG
UN number: 3208 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Manganese)

IATA
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H260	In contact with water releases flammable gases which may ignite spontaneously.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	2

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	2
Special hazard.I:	W

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling

or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Creation Date 25-Apr-2014 **Revision Date** 18-Dec-2025 **Revision Number** 8

This safety data sheet was created pursuant to the requirements of: US OSHA Hazard Communication Standard 2024 (29 CFR 1910.1200)

1. Identification

Product Name **m-Cresol**

Cat No. : **AC110580000; AC110580010; AC110580025; AC110580100; AC110580250; AC110581000; AC110585000**

CAS No 108-39-4
Synonyms 3-Hydroxytoluene; 3-Methylphenol

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous according to [US] OSHA (29 CFR 1910.1200, 2024)

Flammable liquids	Category 4
Acute oral toxicity	Category 3
Acute dermal toxicity	Category 3
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Combustible liquid
Causes severe skin burns and eye damage
May cause respiratory irritation
Toxic if swallowed or in contact with skin



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
Keep cool
Response
Immediately call a POISON CENTER or doctor
Inhalation
IF INHALED: Remove person to fresh air and keep comfortable for breathing
Skin
Take off contaminated clothing and wash before reuse
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
Rinse mouth
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam to extinguish
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

Hazards classified under paragraph (d)(1)(ii) of 1910.1200
No information available

3. Composition/information on Ingredients

Component	CAS No	Weight %
m-Cresol	108-39-4	99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

	Immediate medical attention is required.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Immediate medical attention is required.
Inhalation	Remove to fresh air. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required. If not breathing, give artificial respiration.
Ingestion	Do NOT induce vomiting. Call a physician or poison control center immediately.
Most important symptoms and effects	Difficulty in breathing. Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	No information available
Flash Point	86 °C / 186.8 °F
Method -	No information available
Autoignition Temperature	558 °C / 1036.4 °F
Explosion Limits	
Upper	No data available
Lower	1 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Corrosive material. Risk of ignition. Containers may explode when heated. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Remove all sources of ignition. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges.
Environmental Precautions	Avoid release to the environment. See Section 12 for additional Ecological Information. Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean	Remove all sources of ignition. Soak up with inert absorbent material. Keep in suitable,

Up closed containers for disposal.

7. Handling and Storage

Handling Wear personal protective equipment/face protection. Keep away from open flames, hot surfaces and sources of ignition. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Protect from direct sunlight. Corrosives area. Incompatible Materials. Acids. Bases. Strong oxidizing agents. Acid anhydrides. Chloroformates.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
m-Cresol	TWA: 20 mg/m³ Skin		IDLH: 250 ppm REL = 2.3 ppm (TWA) REL = 10 mg/m³ (TWA)	TWA: 20 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Recommended Filter type: Organic gases and vapours filter. Type A. Brown. conforming to EN14387.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance

Physical State	Liquid
Color	Clear
Odor	aromatic
Odor Threshold	No information available

Property	Values	Remarks • Method
Melting Point/Range	8 - 10 °C / 46.4 - 50 °F	
Softening Point	No data available	
Boiling Point/Range	203 °C / 397.4 °F	@ 760 mmHg
Flash Point	86 °C / 186.8 °F	**Method -** No information available

Flammability (liquid)	Combustible liquid	On basis of test data
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	**Lower** 1	
Autoignition Temperature	558 °C / 1036.4 °F	
Decomposition Temperature	No data available	
pH	5	20 g/l water
Viscosity	No data available	
Water Solubility	20 g/l (20°C)	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Component	**log Pow**	
m-Cresol	1.96	
Vapor Pressure	0.05 mbar @ 20 °C	
Density / Specific Gravity	1.030	
Bulk Density	Not applicable	Liquid
Vapor Density	No information available	(Air = 1.0)
Particle characteristics	(liquid) Not applicable	

Other Information

Molecular Formula	C7 H8 O
Molecular Weight	108.14
Explosive Properties	explosive air/vapour mixtures possible

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions. Light sensitive.

Conditions to Avoid Incompatible products. Exposure to light. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Acids, Bases, Strong oxidizing agents, Acid anhydrides, Chloroformates

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Information on expected route of exposure

Inhalation Avoid breathing vapors or mists.

Ingestion May be harmful if swallowed.

Eyes Avoid contact with eyes. Corrosive to the eyes and may cause severe damage including blindness.

Skin Avoid contact with skin. Causes burns. Prolonged skin contact may defat the skin and produce dermatitis. Harmful in contact with skin.

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
m-Cresol	LD50 = 242 mg/kg (Rat)	LD50 = 2830 mg/kg (Rabbit)	LC50 > 710 mg/m³ (Rat) 1 h

Toxicologically Synergistic No information available

Products

(b) skin corrosion/irritation; Category 1 B

(c) serious eye damage/irritation; Category 1

(d) respiratory or skin sensitization;
Respiratory Based on available data, the classification criteria are not met
Skin Based on available data, the classification criteria are not met

(e) germ cell mutagenicity; Based on available data, the classification criteria are not met

(f) carcinogenicity; Based on available data, the classification criteria are not met

The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
m-Cresol	108-39-4	Not listed	Not listed	Not listed	Not listed	Not listed

(g) reproductive toxicity; Based on available data, the classification criteria are not met

(h) STOT-single exposure; Based on available data, the classification criteria are not met

(i) STOT-repeated exposure; Based on available data, the classification criteria are not met

Target Organs None known.

(j) aspiration hazard; Based on available data, the classification criteria are not met

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

Symptoms / effects,both acute and delayed Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated.

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

Endocrine Disrupting Properties This product does not contain any known or suspected endocrine disruptors.

12. Ecological information

Ecotoxicity

Contains a substance which is:. Harmful to aquatic organisms. The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
m-Cresol	Not listed	LC50: = 8.9 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 10 - 13.6 mg/L, 96h (Lepomis macrochirus) LC50: = 15.9 mg/L, 96h static (Brachydanio rerio) LC50: = 23.12 mg/L, 96h	EC50 = 6.82 mg/L 5 min EC50 = 7.48 mg/L 15 min EC50 = 7.83 mg/L 30 min	LC50: = 18.8 mg/L, 48h (Daphnia magna)

		semi-static (Poecilia reticulata) LC50: = 55.9 mg/L, 96h flow-through (Pimephales promelas)		

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
m-Cresol	1.96

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2076
Proper Shipping Name	CRESOLS, LIQUID
Hazard Class	6.1
Subsidiary Hazard Class	8
Packing Group	II

TDG

UN-No	UN2076
Proper Shipping Name	CRESOLS, LIQUID
Hazard Class	6.1
Subsidiary Hazard Class	8
Packing Group	II

IATA

UN-No	UN2076
Proper Shipping Name	CRESOLS, LIQUID
Hazard Class	6.1
Subsidiary Hazard Class	8
Packing Group	II

IMDG/IMO

UN-No	UN2076
Proper Shipping Name	CRESOLS, LIQUID
Hazard Class	6.1
Subsidiary Hazard Class	8
Packing Group	II

15. Regulatory Information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
m-Cresol	108-39-4	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
m-Cresol	108-39-4	X	-	203-577-9	X	X	X	X	X	KE-24793

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
m-Cresol	108-39-4	99	1.0 %	-

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
m-Cresol	X	-	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
m-Cresol	X		-

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
m-Cresol	100 lb	-	100 lb 45.4 kg

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
m-Cresol	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): Y

DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
m-Cresol	108-39-4	-	Use restricted. See entry 75. (see link for restriction details)	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
m-Cresol	108-39-4	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
m-Cresol	108-39-4	Not applicable	Not applicable	Not applicable	Annex I - Y42

16. Other Information

Prepared By Product stewardship (Regulatory Affairs)
Thermo Fisher Scientific
email - begel.sdsdesk@thermofisher.com

Creation Date 25-Apr-2014
Revision Date 18-Dec-2025
Print Date 18-Dec-2025
Revision Summary Updated to the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) which published its Final Rule in the Federal Register revising the Hazard Communication Standard (HCS/HazCom), 29 CFR 1910.1200 (2024) (HCS §1910.1200, 2024), May 20, 2024, effective July 19, 2024.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 3.15
Revision Date 03/05/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : Sigma-Aldrich
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		

		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: silver, white

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	Vapour density	6.93 - (Air = 1.0)
m)	Relative density	13.55 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	6.93 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l

Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

• SAFETY DATA SHEET

Version 6.19
Revision Date 09/27/2025
Print Date 09/28/2025

SECTION 1. IDENTIFICATION

1.1 Product identifiers

Product name : Naphthalene

Product Number : 147141
Brand : Aldrich
Index-No. : 601-052-00-2
CAS-No. : 91-20-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Hazards for the product as supplied

Flammable solids : Category 2

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Carcinogenicity	:	Category 2
Short-term (acute) aquatic hazard	:	Category 1
Long-term (chronic) aquatic hazard	:	Category 1

Other hazards

None known.

GHS label elements

Hazard pictograms :



Signal Word : Warning

Hazard Statements : H228 Flammable solid.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements :

Prevention:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240 Ground and bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391 Collect spillage.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
Naphthalene	91-20-3*	>= 80 - <= 100	TSC

* Indicates that the identifier is a CAS No.
TSC- the actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice : Show this safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air. Call in physician.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact : After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed : After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

Most important symptoms and effects, both acute and delayed : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

Protection of first-aiders : For personal protection see section 8.

Notes to physician : No data available

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Water
Foam
Carbon dioxide (CO2)
Dry powder

Unsuitable extinguishing media : For this substance/mixture no limitations of extinguishing agents are given.

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Specific hazards during fire fighting	:	Combustible. Vapours are heavier than air and may spread along floors. Forms explosive mixtures with air on intense heating. Development of hazardous combustion gases or vapours possible in the event of fire.
Hazardous combustion products	:	Carbon oxides
Specific extinguishing methods	:	No data available
Further information	:	Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for fire-fighters	:	Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. Advice for emergency responders: For personal protection see section 8.
Environmental precautions	:	Do not let product enter drains. Risk of explosion.

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Methods and materials for containment and cleaning up	:	Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

Advice on protection against fire and explosion	:	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.
Advice on safe handling	:	Work under hood. Do not inhale substance/mixture.
Further information on storage conditions	:	Tightly closed. Keep away from heat and sources of ignition.
Storage class	:	4.1B, Flammable solid hazardous materials
Recommended storage temperature	:	Recommended storage temperature see product label.
Packaging material	:	Suitable material: Amber Glass Bottle/Jar, Foil Bag inside Fiber Drum

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Naphthalene	91-20-3	TWA	10 ppm	ACGIH
		TWA	10 ppm 50 mg/m3	NIOSH REL
		ST	15 ppm 75 mg/m3	NIOSH REL
		TWA	10 ppm 50 mg/m3	OSHA Z-1

Engineering measures : No data available

Personal protective equipment

Respiratory protection : required when dusts are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying

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standards relating to the used respiratory protection system.

Recommended Filter type: : Filter A-(P3)

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Hand protection

Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Full contact
Manufacturer	:	KCL 741 Dermatril® L
Material	:	Nitrile rubber
Break through time	:	480 min
Glove thickness	:	0.11 mm
Protective index	:	Splash contact
Manufacturer	:	KCL 741 Dermatril® L
Remarks	:	This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Eye protection : Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Safety glasses

Skin and body protection : Flame retardant antistatic protective clothing.

Hygiene measures : Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : flakes, granules

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Color	:	white
Odor	:	aromatic
Odor Threshold	:	No data available
pH	:	No data available
Melting point/ range	:	176 - 180 °F / 80 - 82 °C Method: lit.
Boiling point/boiling range	:	424 °F / 218 °C Method: lit.
Flash point	:	173.3 °F / 78.5 °C (990 hPa) Method: ISO 2719, closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	The substance or mixture is a flammable solid with the category 2. Method: Flammability (solids)
Burning rate	:	No data available
Self-ignition	:	979 - 1089 °F / 526 - 587 °C 1,013 hPa Method: DIN 51794
Upper explosion limit / Upper flammability limit	:	Upper explosion limit 5.9 %(V)
Lower explosion limit / Lower flammability limit	:	Lower explosion limit 0.9 %(V)
Vapor pressure	:	0.072 hPa (68 °F / 20 °C) Method: OECD Test Guideline 104
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	1.08 g/cm3 (76.5 °F / 24.7 °C) Method: OECD Test Guideline 109
Solubility(ies)		
Water solubility	:	0.0308 g/l slightly soluble (77 °F / 25 °C) pH: 7 - 7.5 Method: OECD Test Guideline 105

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Partition coefficient: n-octanol/water	:	log Pow: 3.4 (77 °F / 25 °C) pH: 7 - 7.5 Method: OECD Test Guideline 107 Bioaccumulation is not expected.
Autoignition temperature	:	979 °F / 526 °C
Decomposition temperature	:	No data available
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Explosive properties	:	Not classified as explosive.
Oxidizing properties	:	none
Surface tension	:	31.8 mN/m, 212.0 °F / 100.0 °C
Molecular weight	:	128.17 g/mol
Particle characteristics Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Forms explosive mixtures with air on intense heating. A range from approx. 15 Kelvin below the flash point is to be rated as critical. The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.
Chemical stability	:	The product is chemically stable under standard ambient conditions (room temperature) .
Possibility of hazardous reactions	:	Violent reactions possible with: Oxidizing agents chromium(VI) oxide benzoyl chloride aluminium chloride Risk of explosion with: nitrogen oxides

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Conditions to avoid	:	Heat, flames and sparks. Strong heating.
Incompatible materials	:	No data available
Hazardous decomposition products	:	In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l - vapour

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 20,000 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 24 h
Remarks: (ECHA)

Respiratory or skin sensitization
Maximisation Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: Metabolic activation
Method: OECD Test Guideline 473
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
Method: OECD Test Guideline 486
Result: negative

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Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: US-EPA
Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. (Naphthalene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Naphthalene)

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. (Naphthalene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 91 Days - No observed adverse effect level - 200 mg/kg - Lowest observed adverse effect level - 400 mg/kg

Repeated dose toxicity - Mouse - male and female - Oral - 90 Days - No observed adverse effect level - 100 mg/kg

Repeated dose toxicity - Rat - male and female - Dermal - 90 Days - No observed adverse effect level - 1,000 mg/kg

Repeated dose toxicity - Rat - male and female - inhalation (vapour) - 90 Days - No observed adverse effect level - 300 mg/kg

RTECS: QJ0525000
After absorption:

Headache
Stomach/intestinal disorders

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Tremors
Convulsions
Changes in the blood count

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Heart -

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Naphthalene:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 1.6 mg/l End point: mortality Exposure time: 96 h Test Type: flow-through test Analytical monitoring: yes Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 2.16 mg/l End point: Immobilization Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 2.96 mg/l Exposure time: 4 h Test Type: static test Analytical monitoring: yes Method: US-EPA Remarks: (ECHA)
Toxicity to fish (Chronic toxicity)	:	LC50 (Oncorhynchus kisutch (coho salmon)): 2.1 mg/l End point: mortality Exposure time: 96 h Test Type: flow-through test Analytical monitoring: yes Remarks: (ECHA) NOEC (Oncorhynchus kisutch (coho salmon)): 0.37 mg/l End point: Growth inhibition

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Exposure time: 40 Days
Test Type: flow-through test
Analytical monitoring: yes
Remarks: (ECHA)

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia pulex (Water flea)): 0.59 mg/l
End point: mortality
Exposure time: 125 d
Test Type: static test
Analytical monitoring: yes
Remarks: (ECHA)

Ecotoxicology Assessment

Acute aquatic toxicity : Very toxic to aquatic life.

Chronic aquatic toxicity : Very toxic to aquatic life with long lasting effects.

Persistence and degradability

Components:

Naphthalene:

Biodegradability : aerobic
Inoculum: activated sludge, non-adapted
Concentration: 100 mg/l
Result: Not readily biodegradable.
Biodegradation: 2 %
Exposure time: 28 d
Method: OECD Test Guideline 302C

Bioaccumulative potential

Components:

Naphthalene:

Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 36.5 - 168
Exposure time: 56 d
Temperature: 77 °F / 25 °C
Method: OECD Test Guideline 305
Remarks: Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water : log Pow: 3.4 (77 °F / 25 °C)
pH: 7 - 7.5
Method: OECD Test Guideline 107
Remarks: Bioaccumulation is not expected.

Mobility in soil

No data available

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Other adverse effects

Product:

Ozone-Depletion Potential	:	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1334
Proper shipping name	:	Naphthalene, refined
Class	:	4.1
Packing group	:	III
Labels	:	Division 4.1 - Flammable solids
Packing instruction (cargo aircraft)	:	449
Packing instruction (passenger aircraft)	:	446

IMDG-Code

UN number	:	UN 1334
Proper shipping name	:	NAPHTHALENE, REFINED
Class	:	4.1
Packing group	:	III
Labels	:	4.1
EmS Code	:	F-A, S-G
Marine pollutant	:	yes

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National Regulations

49 CFR Road

UN/ID/NA number	:	UN 1334

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Proper shipping name	:	Naphthalene, refined
Class	:	4.1
Packing group	:	III
Labels	:	Division 4.1 - Flammable solids
ERG Code	:	133
Marine pollutant	:	yes
Poison Inhalation Hazard	:	No

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Naphthalene	91-20-3	100	100

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

Naphthalene 91-20-3 >= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

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Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

Naphthalene	91-20-3	>= 90 - <= 100 %

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

Naphthalene	91-20-3	>= 90 - <= 100 %

This product contains the following toxic pollutants listed under the U.S. Clean Water Act Section 307

Naphthalene	91-20-3	>= 90 - <= 100 %

This product contains the following priority pollutants related to the U.S. Clean Water Act:

Naphthalene	91-20-3	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Naphthalene	91-20-3

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The components of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
OSHA Z-1 / TWA	:	8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response,

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Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonised System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organisation for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Revision Date : 09/27/2025

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SAFETY DATA SHEET

Version 3.15
Revision Date 03/05/2018
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : Sigma-Aldrich
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		

		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: silver, white

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	Vapour density	6.93 - (Air = 1.0)
m)	Relative density	13.55 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	6.93 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l

Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 06/28/2019

SAFETY DATA SHEET

Creation Date 09-Oct-2014 **Revision Date** 18-Dec-2025 **Revision Number** 7

This safety data sheet was created pursuant to the requirements of: US OSHA Hazard Communication Standard 2024 (29 CFR 1910.1200)

1. Identification

Product Name **p-Cresol**

Cat No. : **AC110590000; AC110590050; AC110591000; AC110595000**

CAS No 106-44-5
Synonyms 4-Hydroxytoluene; 4-Methylphenol

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous according to [US] OSHA (29 CFR 1910.1200, 2024)

Acute oral toxicity	Category 3
Acute dermal toxicity	Category 3
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes severe skin burns and eye damage
May cause respiratory irritation
Toxic if swallowed or in contact with skin



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
Immediately call a POISON CENTER or doctor
Inhalation
IF INHALED: Remove person to fresh air and keep comfortable for breathing
Skin
Take off contaminated clothing and wash before reuse
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
Rinse mouth
Do NOT induce vomiting
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects

Hazards classified under paragraph (d)(1)(ii) of 1910.1200
No information available

3. Composition/information on Ingredients

Component	CAS No	Weight %
p-Cresol	106-44-5	<=100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical

attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water mist may be used to cool closed containers. CO_2, dry chemical, dry sand, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point 89 °C / 192.2 °F

Method - No information available

Autoignition Temperature 555 °C / 1031 °F

Explosion Limits

Upper	No data available
Lower	1.1% @ 150°C
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
The product causes burns of eyes, skin and mucous membranes. Combustible material. Containers may explode when heated.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Thermal decomposition can lead to release of irritating gases and vapors.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	1	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Evacuate personnel to safe areas. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Avoid dust formation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Remove all sources of ignition.

7. Handling and Storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not ingest. If swallowed then seek immediate medical assistance. Do not breathe (dust, vapor, mist, gas). Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Keep away from heat, sparks and flame. Protect from direct sunlight. Flammables area. Store under an inert atmosphere. Air sensitive. Incompatible Materials. Acids. Bases. Strong oxidizing agents.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
p-Cresol	TWA: 20 mg/m³ Skin		IDLH: 250 ppm REL = 2.3 ppm (TWA) REL = 10 mg/m³ (TWA)	TWA: 20 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Tight sealing safety goggles. Face protection shield.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Recommended Filter type: Particulates filter conforming to EN 143. Type A. Brown.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance

Physical State	Solid
Color	Light yellow
Odor	phenolic
Odor Threshold	No information available

Property	Values	Remarks • Method
Melting Point/Range	32 - 34 °C / 89.6 - 93.2 °F	
Softening Point	No data available	
Boiling Point/Range	202 °C / 395.6 °F	@ 760 mmHg
Flash Point	89 °C / 192.2 °F	**Method -** No information available
Flammability (liquid)	Not applicable	Solid
Flammability (solid,gas)	No information available	
Explosion Limits	No data available	

Autoignition Temperature 555 °C / 1031 °F

Decomposition Temperature	No data available	
pH	Not applicable	
Viscosity	Not applicable	Solid
Water Solubility	Soluble	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Component	**log Pow**	
p-Cresol	1.94	
Vapor Pressure	0.2 hPa @ 20 °C	
Density / Specific Gravity	1.034	
Bulk Density	No data available	
Vapor Density	Not applicable	Solid
Particle characteristics	No data available	

Other Information

Molecular Formula	C7 H8 O
Molecular Weight	108.14
Explosive Properties	Dust can form an explosive mixture with air explosive air/vapour mixtures possible
Evaporation Rate	Not applicable - Solid

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Light sensitive. Hygroscopic. Air sensitive.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition. Exposure to light. Exposure to moist air or water. Exposure to air.

Incompatible Materials Acids, Bases, Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Thermal decomposition can lead to release of irritating gases and vapors

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Information on expected route of exposure

Inhalation	Not an expected route of exposure.
Ingestion	May be harmful if swallowed.
Eyes	Avoid contact with eyes. Corrosive to the eyes and may cause severe damage including blindness.
Skin	Avoid contact with skin. Causes burns. Harmful in contact with skin.

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
p-Cresol	LD50 = 207 mg/kg (Rat)	LD50 = 300 mg/kg (Rabbit)	LC50 > 710 mg/m³ (Rat) 1 h

Toxicologically Synergistic Products No information available

(b) skin corrosion/irritation; Category 1 B

(c) serious eye damage/irritation; Category 1

(d) respiratory or skin sensitization;

Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity;

The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
p-Cresol	106-44-5	Not listed	Not listed	Not listed	Not listed	Not listed

(g) reproductive toxicity; No data available

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs None known.

(j) aspiration hazard; Not applicable
Solid

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Other Adverse Effects The toxicological properties have not been fully investigated.

Endocrine Disrupting Properties This product does not contain any known or suspected endocrine disruptors.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
p-Cresol	Not listed	LC50: = 19 mg/L, 96h static (Pimephales promelas) LC50: = 7.5 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 15.9 - 17 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 160 mg/L 24 h EC50 = 2.06 mg/L 5 min EC50 = 2.31 mg/L 15 min EC50 = 2.37 mg/L 30 min	EC50: = 21.1 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
p-Cresol	1.94

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3455
Proper Shipping Name CRESOLS, SOLID
Hazard Class 6.1
Subsidiary Hazard Class 8
Packing Group II

TDG

UN-No UN3455
Proper Shipping Name CRESOLS, SOLID
Hazard Class 6.1
Subsidiary Hazard Class 8
Packing Group II

IATA

UN-No UN3455
Proper Shipping Name CRESOLS, SOLID
Hazard Class 6.1
Subsidiary Hazard Class 8
Packing Group II

IMDG/IMO

UN-No UN3455
Proper Shipping Name CRESOLS, SOLID
Hazard Class 6.1
Subsidiary Hazard Class 8
Packing Group II

15. Regulatory Information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
p-Cresol	106-44-5	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL

p-Cresol	106-44-5	X	-	203-398-6	X	X	X	X	X	KE-24794

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
p-Cresol	106-44-5	<=100	1.0 %	-

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
p-Cresol	X	-	-	-

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
p-Cresol	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
p-Cresol	100 lb	-	100 lb 45.4 kg

California Proposition 65: This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
p-Cresol	X	X	X	X	-

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant: N
DOT Severe Marine Pollutant: N

U.S. Department of Homeland Security: This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade: Slight risk, Grade 1

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
p-Cresol	106-44-5	-	Use restricted. See entry 75. (see link for restriction details)	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
p-Cresol	106-44-5	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
p-Cresol	106-44-5	Not applicable	Not applicable	Not applicable	Not applicable

16. Other Information

Prepared By
Product stewardship (Regulatory Affairs)
Thermo Fisher Scientific
email - begel.sdsdesk@thermofisher.com

Creation Date 09-Oct-2014
Revision Date 18-Dec-2025
Print Date 18-Dec-2025
Revision Summary Updated to the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) which published its Final Rule in the Federal Register revising the Hazard Communication Standard (HCS/HazCom), 29 CFR 1910.1200 (2024) (HCS §1910.1200, 2024), May 20, 2024, effective July 19, 2024.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 3.4
Revision Date 06/27/2014
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Heptadecafluorooctanesulfonic acid solution

Product Number : 77283
Brand : Aldrich

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.
H351 Suspected of causing cancer.
H360 May damage fertility or the unborn child.
H362 May cause harm to breast-fed children.
H372 Causes damage to organs through prolonged or repeated exposure.

H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : $C_8HF_{17}O_3S$

Molecular Weight : 500.13 g/mol

Hazardous components

Component		Classification	Concentration
Heptadecafluorooctane-1-sulphonic acid			
CAS-No. EC-No. Index-No.	1763-23-1 217-179-8 607-624-00-8	Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; Aquatic Acute 2; Aquatic Chronic 2; H302 + H332, H314, H351, H360, H362, H372, H411	30 - 60 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Colour: light red
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	1.250 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available

q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3265 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Heptadecafluorooctane-1-sulphonic acid)
Marine pollutant: No

IATA
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Heptadecafluorooctane-1-sulphonic acid)

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Heptadecafluorooctane-1-sulphonic acid	1763-23-1	2009-07-17

New Jersey Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Heptadecafluorooctane-1-sulphonic acid	1763-23-1	2009-07-17

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Dam.	Serious eye damage
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Lact.	Effects on or via lactation

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0

Reactivity Hazard: 0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.4 Revision Date: 06/27/2014 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 03/12/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H302 + H332	Harmful if swallowed or if inhaled.
H318	Causes serious eye damage.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.

Precautionary statement(s)

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/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Pentadecafluorooctanoic acid
Perfluorocaprylic acid
Perfluorooctanoic acid

Formula : $C_8HF_{15}O_2$
Molecular weight : 414.07 g/mol
CAS-No. : 335-67-1
EC-No. : 206-397-9

Component	Classification	Concentration
Pentadecafluorooctanoic acid		
	Acute Tox. 4; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H318, H351, H360, H362, H372	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Continue rinsing eyes during transport to hospital.Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

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operates as MilliporeSigma in the US and Canada

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	2.6 at 1 g/l
e)	Melting point/freezing point	Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.

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g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	0.69 hPa at 25 °C (77 °F)
l)	Vapour density	No data available
m)	Relative density	0.900 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride
Other decomposition products - No data available
In the event of fire: see section 5

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operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Inhalation: No data available
Dermal: No data available
LD50 Intraperitoneal - Rat - 189 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
DNA damage

Rat
DNA damage

Carcinogenicity
Suspected human carcinogens

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Pentadecafluorooctanoic acid)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Effects on or via lactation
Presumed human reproductive toxicant
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard
No data available

Additional Information
RTECS: RH0781000

Cough, Shortness of breath, Headache, Nausea, Vomiting

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

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SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic acid)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (Pentadecafluorooctanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Pentadecafluorooctanoic acid)

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SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

New Jersey Right To Know Components

Pentadecafluorooctanoic acid	CAS-No. 335-67-1	Revision Date

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 6.2
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium

Product Number : 483745
Brand : Aldrich

CAS-No. : 7440-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H260 In contact with water releases flammable gases which may ignite spontaneously.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H350 May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Na
Molecular weight : 22.99 g/mol

Hazardous components

Component		Classification	Concentration
Sodium			
CAS-No. EC-No. Index-No.	7440-23-5 231-132-9 011-001-00-0	Water-react. 1; Skin Corr. 1B; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Asp. Tox. 1; H304, H304	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Handle and store under inert gas. Air sensitive.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Paraffin oils	8012-95-1	STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation 2015 Adoption Not classifiable as a human carcinogen		
		Upper Respiratory Tract irritation 2015 Adoption Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits

Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Pieces

b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 97.8 °C (208.0 °F) - lit.
f)	Initial boiling point and boiling range	883 °C (1621 °F) - lit.
g)	Flash point	82 °C (180 °F)
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.97 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Air Do not allow water to enter container.
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sodium oxides
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
Reportable Quantity (RQ) : 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: SODIUM

IATA
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Asp. Tox.	Aspiration hazard
Eye Dam.	Serious eye damage
H260	In contact with water releases flammable gases which may ignite spontaneously.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.
Skin Corr.	Skin corrosion
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	4
Reactivity Hazard:	2
Special hazard.I:	W

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.2 Revision Date: 05/28/2017 Print Date: 06/28/2019

Appendix F:

Community Air Monitoring Plan

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

Community Air Monitoring Plan

For

TMHA Franklin Courts
1-99 Franklin Court
Tarrytown, Westchester County, New York

Prepared for:
Franklin Courts JV Partners L.P.

March 2026

SESI Project No:
12345

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LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
IRM	Interim Remedial Measure
mcg/m^3	micrograms per cubic meter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	Photoionization Detector
PM-10	Less than 10 micrometers
ppm	Parts Per Million
RA	Remedial Action
RAWP	Remedial Action Work Plan
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document presents a Community Air Monitoring Plan (CAMP) for the remedial action (RA) for the proposed development at 1-99 Franklin Court (a.k.a 50 White Street), Tarrytown, New York (the "Site").

The 6.751-acre parcel is identified as Block 29, Lot 32 on the Westchester County tax map. The Site has been developed with The Site is currently occupied by the Franklin Courts multifamily property improved with 14 residential buildings and one (1) recreational building. The subject property is bounded to the north by a multi-family residential apartment building at 50 White Street, to the east by Riverview Avenue and residential developments beyond, to the south by residential development along MacArthur Avenue, and to the west by Warehouses and former railroad tracks.

According to a Phase I Environmental Site Assessment prepared by AEI Consultants in June 2021, the Site was submerged by the Hudson River from 1897 to 1931. From 1932 to 1950 the Site appears as vacant land. In 1950 the northern portion of the Site is a coal yard with office, sheds, and an automobile garage. In 1970, the Site is developed with the current Franklin Court Apartments with 14 residential buildings and one (1) recreational building. In addition, AEI observed suspected heating oil vent pipes around the residential buildings 5 and 6 but noted that ground visibility was limited due to snow. AEI's review of Google Earth street imagery identified 20 additional suspected heating oil vent pipes throughout the Site.

SESI performed a GPR scan around the existing residential structures in November 2024. During the scan, approximately 58 anomalies were identified which are suspected to be active heating oil USTs. The identified USTs will be removed prior to site re-development. The USTs are residential heating oil tanks, which will be removed and closed per DER-10 Section 5.5, when the residences are evacuated and the remedial construction starts on the Site.

2.0 OBJECTIVES

The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that may arise during all ground intrusive activities, and potentially contaminated soil and material handling and staging. In addition, the CAMP is intended to ensure that dust and contaminants are not leaving the work zone**.**

3.0 METHODS

The CAMP will include continuous monitoring for particulate matter (e.g. airborne “dust”) and volatile organic compounds (VOCs) during the planned remedial excavation and construction activities. Due to the current occupancy of the Site, three (3) CAMP stations will be implemented throughout the Site during the remedial investigation. Daily reports with CAMP data results, locations of perimeter monitoring stations and wind direction will be provided to the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH).

Any CAMP exceedances will be reported to the NYSDEC and NYSDOH on the same business day and as soon as possible. Notification of the exceedance will be sent via email along with the reason for the exceedance, the measure(s) taken to address the exceedance, and if the exceedance was resolved.

3.1 CONTINUOUS MONITORING

Continuous monitoring for particulates and VOCs will be conducted during all ground intrusive activities including soil borings, monitoring well installations, and archaeological excavations

3.2 PERIODIC MONITORING

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection consists of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

4.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e. the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using a photoionization detector (PID) equipped with a 10.6 ev lamp. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone 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 over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
- All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

5.0 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate

monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust-suppression techniques must be employed. Work may continue with dust-suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust-suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust-suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

6.0 SPECIAL REQUIREMENTS FOR WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUAL STRUCTURES

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed one (1) ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Appendix G:

Citizens Participation Plan

NEW YORK STATE | Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
Franklin Courts Coal Storage Site

November 2025

Site # C360252
1-99 Franklin Courts, Tarrytown, New York 10591
County of Westchester, NY

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* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

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Applicant: **Franklin Courts JV Partners L.P. ("Volunteer")**
Site Name: **Franklin Courts Coal Storage Site ("Site")**
Site Address: **1-99 Franklin Courts, Tarrytown, New York 10591**
Site County: **Westchester**
Site Number: **C360252**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html .

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

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Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

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Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The

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flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.

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To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at:
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

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Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

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3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

There will be areas on the Site where soil excavation is necessary. Therefore, once the remediation commences, there may be concerns regarding odors, noise or truck traffic coming from the site. However, these impacts will be mitigated through implementation of a Health and Safety Plan and Soil Management Plan approved by NYSDEC, which will be designed to minimize these impacts. A Community Air Monitoring Plan will also be implemented to monitor dust and vapors to ensure the community is not impacted. CAMP implementation involves the placement of air monitoring stations upwind and downwind of where work is occurring to capture both dust and vapor emissions. If dust or emissions exceed a set threshold established by NYSDEC and the New York State Department of Health (NYSDOH), then work must cease and the cause of the issue must be corrected before work can proceed.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

Location: 1-99 Franklin Courts, Tarrytown, New York 10591; County of Westchester

Setting: Urban

Site Size: 7.4 Acres

Adjacent Properties: The subject property is located in an urban area, and the surrounding area is occupied by commercial and residential buildings.

History of Site Use, Investigation, and Cleanup

SESI Consulting Engineers (SESI), at the request of the Requestor, completed a Phase II Environmental Site Assessment (ESA) for the Site in May 2022. SESI's investigation was based upon the review of a Phase I ESA prepared previously by AEI Consultants in June 2021. The Phase I identified Recognized Environmental Concerns (RECs) relating to numerous underground storage tanks, contaminated groundwater from closure reports, and fill material identified on the Site. Therefore, SESI conducted Phase II activities at

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the Site in March through April 2022 to identify areas of the Site that might be impacted by the historic USTs as well as historic coal yard uses. A Supplemental Phase II ESA was conducted by SESI in December 2023 to further delineate and evaluate portions of the Site based on our initial Phase II from May 2022. Both Phase II investigations identified metals and PAHs exceeding the Residential and Restricted Residential SCOs at the Site; while groundwater contamination was found to be identified with PAHs and metals, as well as PFAS. Soil vapor points were installed during each investigation which identified petroleum-related compounds in soil-gas samples; however, no exceedances were reported.

Therefore, the soil and groundwater at the Site have been found to be impacted by the former operations and use of historic petroleum USTs, and historic coal storage activities at the Site.

There have been three (3) Investigations conducted to date as follows:

#	Consultant	Investigation Report Title	Date	Site Owner
1	SESI Consulting Engineers	Phase II Environmental Site Assessment	May 2022	Tarrytown Municipal Housing Authority
2	SESI Consulting Engineers	Supplemental Phase II Environmental Site Assessment	January 2024, Amended April 2024	Tarrytown Municipal Housing Authority
3	SESI Consulting Engineers	Geotechnical Report	January 2024	Tarrytown Municipal Housing Authority

Based on the investigations conducted to date, the primary contaminants of concern are SVOCs (PAHs) and metals in soil; metals and SVOCs (PAHs) in groundwater, as well as PFAS (PFOA and/or PFOS) in groundwater. Soil vapor testing indicates the presence of petroleum-related compounds. See Exhibit G Site Drawing Analytical Call-Outs.

The analytical results of the second Phase II and Supplemental Phase II investigations performed in December 2023 and March 2024 identified metals in exceedance of the RSCOs and RRSCOs; including lead and mercury to depths of 10 ft-bgs. The highest concentration of lead was detected in SB-109 (9.5-10') at 799 ppm. The metals in exceedance of the USCOs including arsenic, cadmium, copper, iron, lead, mercury, nickel, and zinc to depths ranging from 2.5 ft-bgs to 10 ft-bgs. The SVOCs exceedances of the RRSCOs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene to depths of 7.5 ft-bgs. The

SVOCs benzo(k)fluoranthene, and 2-Methylnaphthalene were detected at concentrations exceeding the RSCOs to depths of 7.5 ft-bgs. The pesticides 4,4'-DDE, 4,4'-DDD, and dieldrin were detected at concentrations exceeding the USCOs to depths ranging from 3.5 ft-bgs to 11 ft-bgs.

The groundwater testing results indicate AWQS exceedances of various metals: aluminum, arsenic, chromium, iron, lead, manganese, and sodium. No SVOCs exceeded the AWQS. The PFAS compounds perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were detected at concentrations exceeding the NYSDEC screening levels.

Samples taken from the soil vapor onsite indicate the presence of petroleum-related compounds such as benzene, ethylbenzene, m,p-xylene, o-xylene, hexane, heptane and trimethylbenzene; however the NYSDOH has not set standards for these compounds. The detections may be attributable to the former residential #2 fuel oil USTs and/or automobile repair activities in the northern portion of the Site.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a **Volunteer**. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for unrestricted purposes to the extent feasible to achieve this level of remediation or restricted residential use.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant will conduct an investigation of the site officially called a "remedial

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investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) identify the source(s) of the contamination;
3) assess the impact of the contamination on public health and the environment; and
4) provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant submits a draft "Remedial Investigation Work Plan" to NYSDEC for review and approval. NYSDEC makes the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at

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the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

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Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

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Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

NYSDEC – Project Manager

Michaela Cochran, E.I.T.
Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, Albany, NY 12233-7014
Michaela.cochran@dec.ny.gov

NYSDOH – Project Manager:

Kari Pollard
Project Manager
NYSDOH
Bureau of Environmental Exposure Investigation
Empire State Plaza
Corning Tower Room 1787
Albany, NY 12237
Kari.Pollard@health.ny.gov

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

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PUBLIC LIBRARY	
Jessica Pacciotti Warner Library, Director 121 North Broadway Village of Tarrytown, NY 10591 (914) 631-7734 https://warnerlibrary.org/	HOURS: Sunday,..... 1:00pm-5:00pm Monday, ... 10:00am-6:00pm Tuesday, ... 10:00am-6:00pm Wednesday, ... 10:00am-6:00pm Thursday, ... 1:00pm-9:00pm Friday,..... 10:00am-5:00pm Saturday,..... 10:00am-5:00pm

Appendix B - Site Contact List

SITE CONTACT LIST

GOVERNMENT / MUNICIPALITIES		
Charles Schumer U.S. Senator Leo O'Brien Building, Room 827 Albany, NY 12207	Kirsten Gillibrand U.S. Senator Leo O'Brien Building, Room 821 Albany, NY 12207	Hon. George Latimer Westchester County Executive 148 Martine Ave White Plains, NY 10601
Hon. Richard Hyman, Chair Westchester County Planning Board 148 Martine Ave White Plains, NY 10601	Karen G. Brown Village's Mayor Village Offices One Depot Plaza Tarrytown, NY 10591	George Latimer Westchester County Executive 148 Martine Avenue White Plains, NY 10601
Joan Raiselis, Chair Village Planning Board Village Offices One Depot Plaza Tarrytown, NY 10591	Frank Morabito, Head Chief Tarrytown Fire Department 50 Main Street, Tarrytown, NY 10591	
UTILITIES / PUBLIC WATER AUTHORITIES		
Department of Public Works One Division Street Tarrytown, NY 10591	Westchester Joint Water Works 1625 Mamaroneck Avenue Mamaroneck, NY 10543	
MEDIA		
The Hudson Independent 21 N Broadway Tarrytown, NY 10591	News 12 Westchester 6 Executive Plaza Yonkers, NY 10701	
LIBRARIES / COMMUNITY CENTERS		
Warner Library 121 N Broadway Tarrytown, NY 10591 Jessica Pacciotti (914) 631-7734		
SCHOOLS / DAYCARE CENTERS		
Tarrytown Nursery PreSchool 15 W Elizabeth Street Tarrytown, NY 10591 (914) 631-8227	New Beginnings Nursery School 42 N Broadway Tarrytown, Ny 10591 (914) 372-6377	Washington Irvington Intermediate School 103 S Broadway Tarrytown, NY 10591 (914) 631-4442

DRAFT

SITE CONTACT LIST

ADJACENT PROPERTY OWNERS		
Metropolitan Transportation Adjacent Property Owner of 2 Depot Plaza 2 Broadway, New York, NY 10004	Tarrytown Municipality Adjacent Property Owner of 50 White Street One Town Plaza, Tarrytown, NY 10591	Scott Shachter Adjacent Property Owner of 61 Riverside Avenue 61 Riverside Avenue, Tarrytown, NY 10591
Jeanette Berberich Adjacent Property Owner of 63 Riverside Avenue 63 Riverside Avenue, Tarrytown, NY 10591	Charisse Y Lu Adjacent Property Owner of 95 MacArthur Lane 95 MacArthur Lane, Tarrytown, NY 10591	Sean Scogna Adjacent Property Owner of 99 MacArthur Lane 99 MacArthur Lane, Tarrytown, NY 10591
Diana Dulin Adjacent Property Owner of 103 MacArthur Lane 103 MacArthur Lane, Tarrytown, NY 10591		

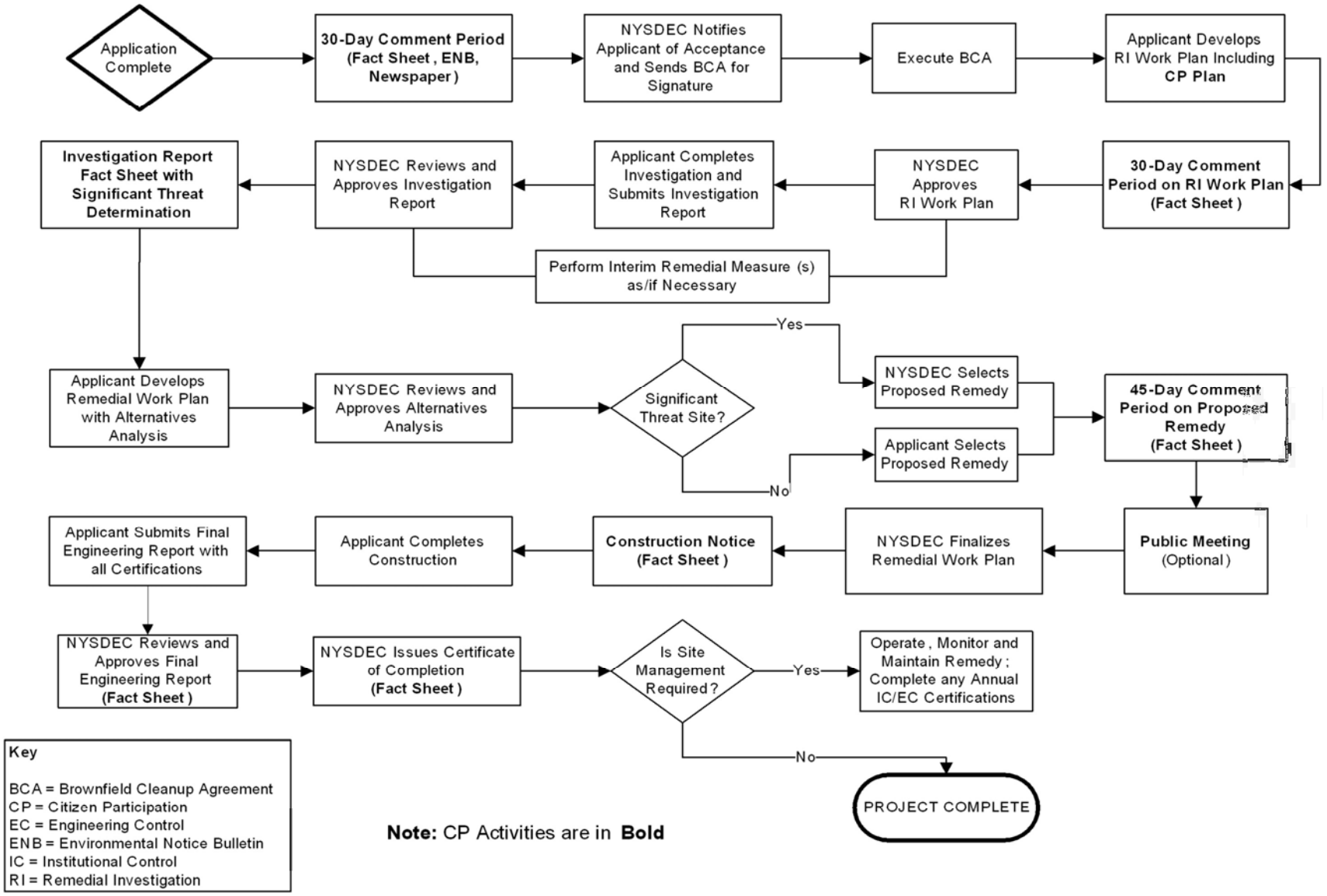
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Appendix C - Site Location Map



DRAFT

Appendix D - Brownfield Cleanup Program Process



Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern (see instructions)

Site Name: Franklin Courts Coal Storage Site

Site Number: C360252

Site Address and County: 1-99 Franklin Courts, Tarrytown, New York 10591; County of Westchester

Remedial Party: Franklin Courts JV Partners L.P.

Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.

Part 1. List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. Major issues of public concern are standards issues communities are concerned with in relation to brownfield site remediation projects.

How were these issues and/or information needs identified?
Concerns in relation to dust, noise and possible odors are standards issues of concern for communities with in relation to brownfield site remediation projects.

Part 2. List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
No information is needed at this time from the community.

How were these information needs identified?
N/A

Part 3. List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
The major issues that need to be communicated to the community are summarized in this CPP. The community will receive periodic fact sheets that will update them in relation to the work being performed on the site so they can communicate any issues they may observed or may experience to the DEC or DOH.

How were these issues and/or information needs identified?
These issues and/or information needs are standard for all brownfield sites.

Part 4. Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

a. Land use/zoning at and around site:
☒ **Residential** ☐ **Agricultural** ☐ **Recreational** ☒ **Commercial** ☐ **Industrial**

b. Residential type around site:
☒ **Urban** ☐ **Suburban** ☐ **Rural**

c. Population density around site:
☐ **High** ☒ **Medium** ☐ **Low**

d. Water supply of nearby residences:
☒ **Public** ☐ **Private Wells** ☐ **Mixed**

e. Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** ☒ **No**

Provide details if appropriate:
Click here to enter text.

f. Other environmental issues significantly impacted/impacting the affected community?
☐ **Yes** ☒ **No**

Provide details if appropriate:
Click here to enter text.

g. Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☐ **Yes** ☒ **No**

h. Special considerations:
☐ **Language** ☐ **Age** ☐ **Transportation** ☒ **Other**

Explain any marked categories in **h:**
48% Minority Population

Part 5. The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☐ **Non-Adjacent Residents/Property Owners:** Click here to enter text.

☐ **Local Officials:** Click here to enter text.

☐ **Media:** Click here to enter text.

☐ **Business/Commercial Interests:** Click here to enter text.

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

☐ **Citizens/Community Group(s):** Click here to enter text.

☐ **Environmental Justice Group(s):** Click here to enter text.

☐ **Environmental Group(s):** Click here to enter text.

☐ **Civic Group(s):** Click here to enter text.

☐ **Recreational Group(s):** Click here to enter text.

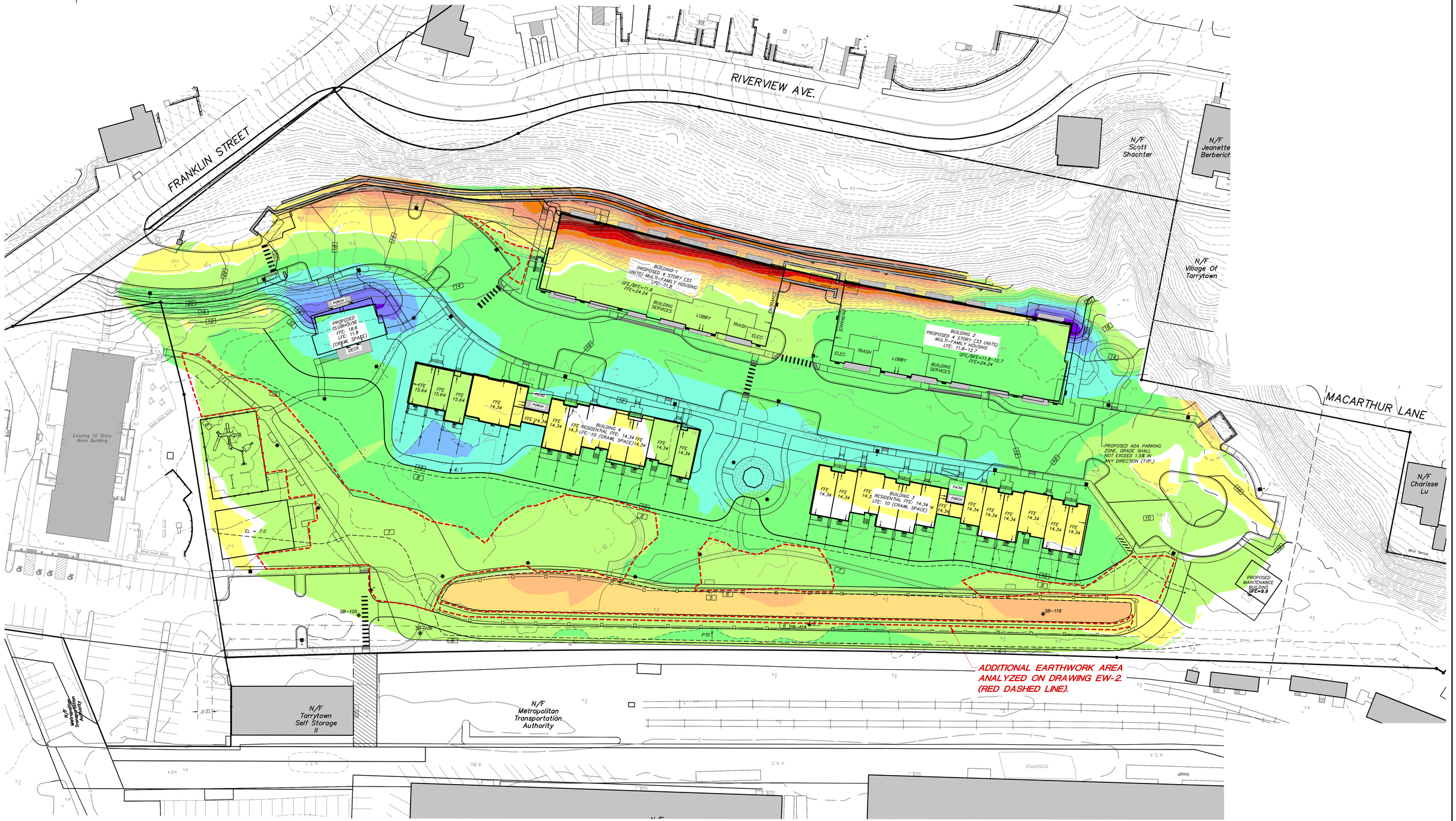
☐ **Other(s):** Click here to enter text.

Prepared/Updated By: Linda Shaw, Esq. **Date:** 10/17/23

Reviewed/Approved By: Click here to enter text. **Date:** Click here to enter text.

Appendix H:

Proposed Earthwork Model



EARTHWORK SUMMARY

1" EXISTING TOP SOIL REMOVAL	SUBGRADE CUT	SUPPLEMENTAL CUT (REFER TO EW-2)	TOTAL CUT ***	TOTAL FILL *	NET EARTHWORK **
4,150 CY	4,400 CY	750 CY	9,300 CY	19,800 CY	10,500 CY <FILL>

* Does not include topsoil to subgrade.
** Beneficial re-use onsite requires testing and NYSDEC approval.
*** Cut quantities do not include hot spot soil removals, reference excavation plan in RAWP for more information.

VOLUME OF FILL REQUIRED FOR 2' CAP

CUT	FILL	
–	8,150 CY	
HARDSCAPE AREA		157,000 SF

This volume was obtained by multiplying the total plan view area of all landscaped areas by 2'. This number does not include additional import above the 2' cap included in the overall earthwork number shown hereon.

Earthwork Table Cut Depths

Number	Minimum Cut Depth	Maximum Cut Depth	Color
1	–16.0	–14.0	
2	–14.0	–12.0	
3	–12.0	–10.0	
4	–10.0	–8.0	
5	–8.0	–6.0	
6	–6.0	–4.0	
7	–4.0	–2.0	
8	–2.0	–0.1	

Earthwork Table Fill Depths

Number	Minimum Fill Depth	Maximum Fill Depth	Color
1		2.0'	
2	2.0	4.0	
3	4.0	6.0	
4	6.0	8.0	
5	8.0	10.0	
6	10.0	12.0	

GRAPHIC SCALE
0 15 30 60
(IN FEET)
1 inch = 30 ft.

NO.	DATE	REVISION	BY

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place
Carmel, NY 10512
(845) 225-9690
(845) 225-9717 fax
www.insite-eng.com

PROJECT:
FRANKLIN COURTS
1-99 FRANKLIN COURT, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY, NY
DRAWING:
CUT AND CAP EARTHWORK PLAN

PROJECT NUMBER	22220.100	PROJECT MANAGER	R.D.W.	DRAWING NO.	SHEET
DATE	6–10–26	DRAWN BY	T.S.M.	EW–1	1 / 2
SCALE	1" = 30'	CHECKED BY	R.D.W.		

OF A LICENSED PROFESSIONAL ENGINEER, IS A VIOLATION OF SECTION 7209 OF ARTICLE 145 OF THE EDUCATION LAW.

Z:\C\22220\05 WB Franklin Court\Misc Drawing Files\Earthwork\2026-06-04 (Brandfort) Earthwork\2026-06-04 Proposed Subgrade Earthwork.dwg, 6/10/2026 5:03:57 PM, Hollis, 1:1

Appendix I:

Typical Well Construction Log

SESI CONSULTING ENGINEERS

PROJECT NAME:			MONITORING WELL NO.		
PROJECT LOCATION:			JOB NO.		
			GROUND ELEVATION:		
BORING BY:	DATE STARTED		DEVELOPMENT PERIOD		INSIDE CASING DIAMETER (in)	
INSPECTOR:	DATE COMPLETED		DEVELOPMENT METHOD		BOREHOLE DIAMETER (in)	
NJ DEP PERMIT NO.:	DATE DEVELOPED		DEVELOPMENT RATE	# gpm	INITIAL WATER LEVEL (ft):	

WELL CONSTRUCTION	DEPTH (ft)	Sample	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	P.I.D.
	0								
	5								
	10								
	15								
	20								
	25								
	30								
	35								
	40								

Depth (feet below grade)

Top of Casing: #

Ground Surface 0

Top of Riser #

Top of Seal #

Top of Sand Pack

Top of Screen

Bottom of Screen

Bottom of Boring

Remarks:

Casing Type:

Well Cap:

Grout Type:

Well Key:

Riser Pipe:

Sand/Gravel Pack Size:

Screen Size:

Approximate Change in Strata: _____ Inferred Change in Strata: _ _ _ _ _ _ _ _ _ _ _ _ _

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE #

Appendix J:

Quality Assurance Project Plan

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

959 Route 46E, Fl 3, Ste 300
Parsippany, NJ 07054
973.808.9050
www.sesi.org

QUALITY ASSURANCE PROJECT PLAN

For

TMHA Franklin Courts
1-99 Franklin Court
Tarrytown, Westchester County, New York

Prepared for:
Franklin Courts JV Partners L.P.

March 2026

SESI Project No:
12345

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LIST OF ACRONYMS

Acronym	Definition
AAS	Absorption Spectroscopy
ASP	Analytical Service Protocol
BCP	Brownfield Cleanup Program
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
GC/MS	Gas Chromatography/Mass Spectrometry
HAS	Hollow-stem Auger
HDPE	High-Density Polyethylene
LDPE	Low-density Polyethylene
LFPS	Low Flow Purging Sampling
MDL	Method Detection Limit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated Biphenyls
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PPE	Personal Protective Equipment
PTFE	Polytetrafluoroethylene
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RIWP	Remedial Investigation Work Plan
SESI	SESI Consulting Engineers, Inc.
TIC	Tentatively Identified Compound
TCL	Target Compound List
VOC	Volatile Organic Compound
USEPA	United States Environmental Protection Agency

1.0 PROJECT DESCRIPTION

This document presents the Quality Assurance Project Plan (QAPP) for the Remedial Action Work Plan (RAWP) for the proposed development at 1-99 Franklin Court (a.k.a 50 White Street), Tarrytown, New York (the "Site"). The 6.751-acre parcel is identified as Block 29, Lot 32 on the Westchester County tax map. The Site has been developed with The Site is currently occupied by the Franklin Courts multifamily property improved with 14 residential buildings and one (1) recreational building.

The subject property is bounded to the north by a multi-family residential apartment building at 50 White Street, to the east by Riverview Avenue and residential developments beyond, to the south by residential development along MacArthur Avenue, and to the west by Warehouses and former railroad tracks.

SESI Consulting Engineers (SESI) prepared the RAWP for 1-99 Franklin Court, Tarrytown, New York, dated March 2026, which describes the remedial action activities to be conducted at the Site, as part of the Site's planned remediation.

2.0 PROJECT ORGANIZATION

The RAWP activities will be conducted by SESI and their qualified subcontractors, on behalf of Franklin Courts JV Partners L.P. The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented below **(Table 2.1)** along with the names of subcontractors.

Table 2.1—SESI Personnel and Subcontractors

Role	Name	Telephone No.
Project Principal	Fuad Dahan, P.E., PhD	973-808-9050 x249
Project Manager	MaryKate Chorazak	973-808-9050 x283
Principal Engineer	Fuad Dahan, P.E., PhD	973-808-9050 x249
Field Team Leader	TBD	973-808-9050
Quality Assurance Officer	Joe Scardino	973-808-9050 x267
Field Personnel	TBD	973-808-9050
Analytical Laboratory	SGS North America - Dayton	732-329-0200
Data Validator	Amine Dahmani	860-942-2881
Driller	Coastal Environmental Solutions	631-942-9209

2.1 PROJECT PRINCIPAL

Provides technical and administrative oversight and guidance throughout the project, assist in securing company resources, participate in technical review of deliverables, and attend key meetings as needed.

2.2 PRINCIPAL ENGINEER

Provides technical guidance and review of reports, analytical data. Will have key involvement in screening and development of remedial alternatives.

2.3 PROJECT MANAGER

Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to Brownfield Cleanup Program (BCP) requirements and client expectations.

2.4 FIELD TEAM LEADER

Responsible for overseeing field work during the implementation of the RAWP, including observing subcontractors, maintaining field notes, and collecting samples of various environmental media.

2.5 QUALITY ASSURANCE OFFICER

Responsible for reviewing sampling procedures and certify that the data was collected and analyzed using the appropriate procedures.

3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

In cases where NYSDOH ELAP Certification exists for a specific group or category of parameters, the laboratory performing analysis in connection with this project will have appropriate New York State Department of Health (NYSDOH) ELAP Certification. SGS North America – Dayton (SGS) an ELAP-certified lab, will be performing the sample analyses for the project. Analytical Service Protocol (ASP, June 2000) Category B deliverables are required for all samples. All data will be sent to a third party, Amine Dahmani, a data validator, for validation in accordance with NYSDEC BCP requirements.

Detection limits set by New York State Department of Environmental Conservation (NYSDEC) ASP will be used for all sample analyses unless otherwise noted. If NYSDEC-ASP-dictated detection limits prove insufficient to assess project goals (i.e., comparison to drinking water standards or attainment of Applicable or Relevant and Appropriate Requirements [ARARs]), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

The quality assurance/quality control (QA/QC) objectives for all measurement data include completeness, representativeness, comparability, precision, and accuracy.

3.1 COMPLETENESS

The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. Data must meet QC acceptance criteria for 100 percent or more of requested determinations.

3.2 REPRESENTATIVENESS

Samples must be taken of the population and, where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where Target Compound List (TCL) volatiles are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for TCL volatile organic compounds (VOCs) along with the groundwater samples to ensure that contamination with TCL volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for TCL volatile organic compounds. The TCL compounds are identified in the United States Environmental Protection Agency (USEPA) Contract Laboratory Program dated 10/2016 or as periodically updated.

The analysis results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

3.3 COMPARABILITY

Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The NYSDEC-ASP mandated holding times for various analyses will be strictly adhered to.

3.4 PRECISION AND ACCURACY

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography, colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control. All data evaluations will be consistent with NYSDEC-ASP procedures. Data will be 100 percent compliant with NYSDEC-ASP requirements. Matrix spike and matrix spike duplicates will be collected to confirm accuracy and precision at a rate of one (1) per 20 soil and/or groundwater samples taken.

The number of duplicate, spiked and blank samples analyzed will be a minimum of one (1) duplicate for every 20 samples per each medium of groundwater and soil. The inclusion and frequency of analysis of field blanks will be on the order of one (1) per every 20 samples (soil). For the aqueous matrix field blanks will be collected at a frequency of one (1) per day. Samples to be analyzed for volatile organic compounds will be accompanied by a trip blank for each shipment and field blanks (water matrix) or field blanks (soil). An equipment blank for per- and polyfluoroalkyl substances (PFAS) will be collected once per day per matrix, regardless of whether equipment being used is disposable, at a frequency of one (1) per 20 samples taken for both soil and groundwater.

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager for each analytical procedure used. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five (5) times the detection limit. At or above this level, the determination and spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds as established by the United States Environmental Protection Agency Contract Laboratory Program dated 7/85 or as periodically updated.

The quality of results obtained for inorganic ion and demand parameters will be assessed by comparison of QC data with laboratory control charts for each test.

4.0 SAMPLING PROCEDURES

4.1 SAMPLING PROGRAM

The sampling program for this project will include soil and groundwater. Soil samples will be collected grab sampling and retrieved from excavations. Groundwater samples will be collected from groundwater monitoring wells using low flow purging techniques. A description of this method is shown on **Table 4.1**. A summary of the sample containers, bottle types, preservatives and holding times is shown on **Table 4.2.**

4.1.1 DRILLING/SAMPLING PROCEDURES

Soil and groundwater samples will be collected by means of an excavation program. Soil borings shall be completed using an excavator.

Soil samples will be collected from the excavation and analyzed in accordance with the NYSDEC-approved Work Plan. Monitoring wells damaged or removed during remedial activities will be rein-stalled using either hollow stem auger (HSA) or direct push drilling methods may be utilized for monitoring well completion.

The collected sample shall be placed in glass jars and labeled, stored on site (on ice in a cooler if necessary), and transmitted to the appropriate testing laboratory or storage facility. Chain-of-custody procedures will be practiced following Section 15, EPA-600/4-82-029, Handbook for Sampling and Sample Preservation of Water and Waste Waters.

4.1.2 MONITORING WELL COMPLETION

If necessary, monitoring wells will be re-constructed of 0.010-inch slot size PVC well screen and riser casing. Other materials utilized for completion will be washed silica sand (Q-Rock No. 4 or approved equivalent) bentonite grout, Portland cement, and a protective steel locking well casing and cap with locks. The depth of the wells will be determined based on the depth to water, type of contaminant and field conditions encountered.

The monitoring well installation method for wells installed within unconsolidated sediments shall be to place the screen and riser assembly into the casing once the screen interval has been selected. At that time, a washed silica sand pack will be placed around the well screen if required to prevent screen plugging. If a sand pack is not warranted, the auger string will be pulled back to allow the native aquifer material to collapse 2 to 3 feet above the top of the screen. Bentonite pellets will then be added to the annulus between the casing and the inside auger to insure proper sealing. Cement/bentonite grout will continue to be added during the extraction of the augers until the entire aquifer thickness has been sufficiently sealed off from horizontal and/or vertical flow above the screened interval. During placement of sand and bentonite pellets, frequent measurements will be made to check the height of the sand pack and thickness of bentonite layers by a weighted drop tape measure.

A bolt-down protective curb box will be installed, flush with the ground, or steel “stick-up” protective casing and secured by a Portland cement seal. The cement seal shall extend laterally at least 1 foot in all directions from the protective casing and shall slope gently away to drain water away from the well.

4.1.3 WELL DEVELOPMENT

All monitoring wells will be developed or cleared of all fine-grained materials and sediments that have settled in or around the well during installation so that the screen is transmitting representative portions of the groundwater. The development will be by one (1) of two (2) methods, pumping or bailing groundwater from the well until it yields relatively sediment-free water.

A decontaminated pump or bailer will be used and subsequently decontaminated after each use following procedures outlined in the Decontamination Protocol. Pumping or bailing will cease when the turbidity falls below 50 NTUs or until specific conductivity, pH, and temperature are stable (i.e., consecutive readings are within 10 percent with no overall upward or downward trends in measurements). Well development water will be containerized for future characterization and proper disposal.

4.1.4 DECONTAMINATION

All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches and any other equipment or tools that have come in contact with contaminated materials will be decontaminated before any drilling on Site begins, between each well, and prior to removing any equipment from the Site. The preferred decontamination procedure will be to scrape the equipment from any residual soils and then rinse with water and Alconox®. Every effort will be made to minimize the generation of contaminated water. Any contaminated water generated will be drummed. The contaminated water drums will be disposed of at an appropriate facility after approval and sampling in accordance with the specific facility requirements.

4.1.5 PFAS SAMPLING CONSIDERATIONS

This section contains the materials limitations for Per- and polyfluoroalkyl substances sampling in accordance with the Draft NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoralkyl Substances (April 2023).

The groundwater samples will be analyzed for PFAS using Modified USEPA Method 1633A. Reporting limits for PFOA and PFOS will not exceed 2 nanograms per liter (ng/L). Category B deliverables and an electronic data deliverable will be completed.

PFAS are very persistent in the environment and in the human body. Due to their presence in a variety of products, persistence in the environment and very low drinking water standards, care

must be used when groundwater sampling for PFAS to avoid cross contamination from the sampling equipment and personal protective equipment (PPE).

No fabric softener will be used on clothing to be worn in field. Cosmetics, moisturizers, hand cream, unauthorized sunscreen, insect repellent or other related products will not be used the morning of sampling. The field samplers will wear powder-free nitrile gloves while filling and sealing the sample bottles. The sampling equipment components and sample containers will not come in contact with material that may potentially contain PFAS such as aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials will be avoided. Food and drink packaging materials will be avoided, as well.

Sampling will be performed using certified PFAS-free sampling materials such as stainless steel, high density polyethylene (HDPE), PVC, silicone, acetate or polypropylene pump and tubing. Rinse water must be laboratory-provided certified PFAS-free distilled or de-ionized water. Standard two step decontamination using Alconox® detergent and clean certified PFAS-free water rinse will be performed for equipment that does come in contact with PFAS materials.

No waterproof field books, plastic clipboards, binders, or spiral hard cover will be used for PFAS containers. No adhesives (i.e. Post-It® Notes), sharpies, or permanent markers will be used for PFAS containers. The PFAS containers will be labeled with ballpoint pens. PFAS samples will be stored in separate cooler filled with regular ice only with no chemical (blue) ice packs.

Pre-cleaned sample bottles with closures, coolers, sample labels and a chain of custody form will be provided by the laboratory.

4.2 GROUNDWATER SAMPLING PROGRAM

4.2.1 WELL EVACUATION

Prior to sampling a monitoring well, the static water level will be recorded. All well data will be recorded on a field sampling record. The wells will be sampled in accordance with the USEPA guidelines for the Low Flow Purging Sampling (LFPS). The purpose of LFPS is to collect groundwater samples from monitoring wells that are representative of ambient groundwater conditions in the aquifer. The LFPS method reduces turbidity which is needed particularly when sampling for metals.

4.2.2 SAMPLING PROCEDURE

The wells will be sampled using the USEPA LFPS technique. A flow rate of 100 ml to 250 ml per minute is used to purge the wells. Drawdown should not exceed 0.3 feet. The pump intake will be lowered to the mid-point of the screened interval for the duration of stabilization and sampling.

At the initiation of low flow purging a water level is recorded as well as field parameters. Field parameters are then monitored every five (5) minutes during low flow purging using a flow through cell. When three (3) consecutive measurements of pH differ by 0.1 units or less, with ORP within 10 mv or less, turbidity varies 10 percent or less, conductivity differs by 3 percent or less and dissolved oxygen by 10 percent or less, sampling may begin. Flow through cells are used so continuous real time readings are made. When the parameters stabilize the flow through cell is disconnected and sample bottles are filled directly from the tubing. Low-flow sampling procedures are summarized on **Table 4.1.**

4.3 SAMPLE PRESERVATION AND SHIPMENT

Since all bottles will contain the necessary preservatives as shown in **Table 4.2**, they need only be filled. The 40 ml VOA vials must be filled brim full with no air bubbles. The other bottles should be filled to within about one (1) inch from the top.

The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen.

Final packing and shipment of coolers will be performed in accordance with guidelines outlined in the ASP.

5.0 SAMPLE CUSTODY

The program for sample custody and sample transfer is in compliance with the NYSDEC-ASP, as periodically updated. If samples may be needed for legal purposes, chain-of-custody procedures, as defined by NEIC Policies and Procedures (USEPA-330/9-78-001-R, Revised June 1988) will be used. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized.

5.1 FIELD SAMPLE CUSTODY

A chain-of-custody record accompanies the samples from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Two (2) copies of this record follow the samples to the laboratory. The laboratory maintains one (1) file copy and the completed original is returned to the site inspection team. Individual sample containers provided by the laboratory are used for shipping samples. The shipping containers are insulated and ice is used to maintain samples at approximately 4°C until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled. Samples are to be shipped to the laboratory within 24 to 48 hours of the day of collection depending on parameter holding times

Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed and a seal provided by the laboratory is affixed to the latch. This seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the site investigation team leader and the sample will not be analyzed if tampering is apparent.

5.2 LABORATORY SAMPLE CUSTODY

The site investigation team leader or Project Quality Assurance Officer notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

- The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.
- Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles.

This assessment is recorded as part of the incoming chain-of-custody procedure:

1. The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
2. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
3. A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

5.3 FINAL EVIDENCE FILES

Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

A sample or an evidence file is under custody if:

- It is in your possession; it is in your view, after being in your possession.
- It was in your possession and you placed it in a secure area.
- It is in a designated secure area.

6.0 CALIBRATION PROCEDURES

Instruments and equipment used to gather, generate or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the appropriate manufacturer's specifications or project specific requirements. The procedures for instrument calibration, calibration verification, and the frequency of calibrations are described in the ASP. The calibration of instruments used for the determination of metals will be as described in the appropriate CLP standard operating procedures.

Calibration of other instruments required for measurements associated with these analyses will be in accordance with the manufacturer's recommendations and the standard operating procedures of the laboratory.

7.0 ANALYTICAL PROCEDURES

Analytical procedures shall conform to the most recent revision of the NYSDEC-ASP (June 2005). In the absence of USEPA or NYSDEC guidelines, appropriate procedures shall be submitted for approval by NYSDEC prior to use.

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical cleanups are mandatory where matrix interferences are noted. No sample shall be diluted any more than a factor of five. The sample shall be either re-extracted, re-sonicated, re-stream distilled, etc. or be subjected to any one analytical cleanup noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

7.1 VOLATILE ORGANICS

For the analysis of water samples for Target Compound List VOCs, no sample preparation is required. The analytical procedure for volatiles is detailed in NYSDEC-ASP (Volume I, Section D-I). A measured portion of the sample is placed in the purge and trap apparatus and the sample analysis is performed by gas chromatography/mass spectrometry for the first round. USEPA Method 8260 will be used, plus tentatively identified compounds (TICs). USEPA Methods 8010 or 8020 (gas chromatography with different detectors) will be used if subsequent rounds with lower limits of detection are warranted.

7.2 SEMI-VOLATILE ORGANIC COMPUNDS

The extraction and analytical procedures used for preparation of water, soil and sediment samples for the analysis of the TCL semi-volatile organic compounds are described in NYSDEC-ASP Volume I, Section D-III. USEPA Method 8270 will be used, plus TICs.

Instrument calibration, compound identification, and quantitation are performed as described in Section 6 of this document and in the NYSDEC-ASP.

7.3 PESTICDE AND PCB COMPOUNDS

The sample preservation procedures for gas chromatography for pesticides and polychlorinated biphenyls (PCBs) will be as described in the NYSDEC-ASP methods (Section D-IV). The analysis of standard mixes, blanks and spiked samples will be performed at the prescribed frequency with adherence to the 72-hour requirement described in the method.

7.4 METALS

The detection limits for metals are as specified in the NYSDEC-ASP, Section D-V. The instrument detection limits will be determined using calibration standards and procedures specified in the NYSDEC-ASP. The detection limits for individual samples may be higher due to the sample matrix. The procedures for these analyses will be as described in the NYSDEC-ASP.

The analyses for metals will be performed by atomic absorption spectroscopy (AAS) or inductively-coupled plasma emission spectroscopy (ICPES), as specified in the ASP with regard to AAS flame analysis.

7.5 PER- AND POLYFLUOROALKYL SUBSTANCES

The NYSDEC has developed a list of 40 PFAS Analytes List on Table 7.1 for remedial programs. These are:

- Perfluorobutanesulfonic acid
- Perfluoropentanesulfonic acid
- Perfluorohexanesulfonic acid
- Perfluoroheptanesulfonic acid
- Perfluorooctanesulfonic acid
- Perfluorononanesulfonic acid
- Perfluorodecanesulfonic acid
- Perfluorododecanesulfonic acid
- Perfluorobutanoic acid
- Perfluoropentanoic acid
- Perfluorohexanoic acid
- Perfluoroheptanoic acid
- Perfluorooctanoic acid
- Perfluorononanoic acid
- Perfluorodecanoic acid
- Perfluoroundecanoic acid
- Perfluorododecanoic acid
- Perfluorotridecanoic acid
- Perfluorotetradecanoic acid
- Perfluorohexadecanoic acid
- Hexafluoropropylene oxide dimer acid
- 4,8-Dioxa-3H-perfluorononanoic acid

- Perfluoro-3-methoxypropanoic acid
- Perfluoro-4-methoxybutanoic acid
- Nonafluoro-3,6-dioxaheptanoic acid
- 4:2 Fluorotelomer sulfonic acid
- 6:2 Fluorotelomer sulfonate
- 8:2 Fluorotelomer sulfonate
- 3:3 Fluorotelomer carboxylic acid
- 5:3 Fluorotelomer carboxylic acid
- 7:3 Fluorotelomer carboxylic acid
- Perfluroroctane sulfonamide
- N-methylperfluorooctane sulfonamide
- N-ethylperfluorooctane sulfonamide
- N-methyl perfluorooctanesulfonamidoacetic acid
- N-ethyl perfluorooctanesulfonamidoacetic acid
- N-methylperfluorooctane sulfonamidoethanol
- N-ethylperfluorooctane sulfonamidoethanol
- 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)
- 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)
- Perfluoro(2-ethoxyethane) sulfonic acid

Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. Per the NYSDEC July 2023 memo on emergent contaminant sampling, the analytical procedure for soil and groundwater sampling of PFAS is Modified EPA Method 1633A. The reporting limit for PFAS in soil samples is 0.5 ug/kg. Reporting limits for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in groundwater should not exceed 2 ng/L.

7.6 SITE SPECIFICITY OF ANALYSES

Work plans prepared for remedial actions for sites contain recommendations for the chemical parameters to be determined for each site. Thus, some or all of the referenced methods will apply to the analysis of samples collected at the individual waste sites. Analyses of TCL analytes will be performed on all samples.

To ensure that the field sampling and laboratory analytical practices are acceptable, the data associated with the samples will be validated by a third party (in accordance with requirements of DER-10). The validation approach and results will be presented in a data usability summary report (DUSR) to be included in the Report.

TABLES

TABLE 4.1--SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS

Step	Description	Details
1	Record initial static water level.	**Device:** electric contact probe accurate to the nearest 0.1 foot.
2	Lower sampling device into well. Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well.	Pump intake must be no less than 2 feet from the bottom of the well to prevent disturbance and resuspension of sediments which may be at the bottom of the well.
3	Measure water level again: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.	
4	Purge Well	Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing.
5	Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.	
6	Monitor Indicator Parameters	1. During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996): a. 0.1 for pH b. 3% for specific conductance (conductivity) c. 10 mv for redox potential d. 10% for DO and turbidity
7	The pump must not be removed from the well between purging and sampling.	Dissolved oxygen and turbidity usually require the longest time to achieve stabilization.
8	Collect Samples	Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

Step	Description	Details
9	Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary.	If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Groundwater purged from the well prior to sampling can be used for this purpose.
10	Remove Pump and Tubing	After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.
11	Measure and record well depth.	
12	Close and lock the well.	
13	Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.	
14	All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.	Dedicated line is disposed of or left at well site.
15	Equipment/wash blanks are collected when non-dedicated sampling equipment is used.	
16	Chain-of-custody forms are completed in triplicate.	The original and one carbon copy are put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis. A second carbon copy is kept on file.
17	Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.	

TABLE 4.2--SAMPLE CONTAINERIZATION

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE[1]	HOLDING TIME
Aqueous Samples				
VOCs – USEPA 8260C	3	40 mL, glass vialwith septum cap	Hydrochloric Acid to pH <2 Ice to 4°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270 SIM	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
Pesticides – USEPA 8081B	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	2	1-liter amber glass bottle	Ice to 4°C	7 days (until extraction) 40 days (extracted)
Metals[2]	1	1-liter, plastic bottle	Nitric acid to pH <2 NaOH for cyanide Ice to 4°C	180 days Cyanide: 14 days Mercury: 28 days
Cyanide – USEPA 9010C/9012B	1	1-liter, plastic	Sodium Hydroxide to pH >12 Ice to 4°C	14 days
PFAS Compounds – USEPA Modified Method 1633A	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	14 days
Soil Samples:				
VOCs – USEPA 8260C	3	5-gram EnCore samplers	Chilled to 0 - 6°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D SIM if RL cannot be reached	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction, 40 days extracted)
Pesticides – USEPA 8081B	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	None
Metals[3]	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	180 days Cyanide: 14 days Mercury: 28 days
PFAS Compounds – USEPA Modified Method 1633A	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	28 days

(1) All samples will be preserved with ice during collection and shipment.

(2) Metals refers to the 24 metals and cyanide in the Target Compound List (NYSDEC-CLP 11/87). Metals will be analyzed by Method 6020B, 7470A for mercury, and 9010C/9012B for cyanide

(3) Metals refers to the 24 metals and cyanide in the Target Compound List (NYSDEC-CLP 11/87). Metals will be analyzed by Method 6010D, 7471B for mercury, and 9010C/9012B for cyanide

(4) A complete list of compounds is provided on Table 7.1.

Table 7.1 PFAS Compound List and Reporting and Method Detection Limits for Soil and Groundwater

Method: EPA 1633A by LC-MS/MS					
	PFAS Species	Groundwater		Soil	
		RL (ng/l)	MDL (ng/l)	RL (ng/g)	MDL (ng/g)
1	Perfluorobutanesulfonic acid (PFBS)	1.6	0.245	0.2	0.014
2	Perfluoropentanesulfonic acid (PFPeS)	1.6	0.204	0.2	0.015
3	Perfluorohexanesulfonic acid (PFHxS)	1.6	0.217	0.2	0.018
4	Perfluoroheptanesulfonic acid (PFHpS)	1.6	0.137	0.2	0.057
5	Perfluorooctanesulfonic acid (PFOS)	1.6	0.327	0.2	0.067
6	Perfluorononanesulfonic acid (PFNS)	1.6	0.303	0.2	0.046
7	Perfluorodecanesulfonic acid (PFDS)	1.6	0.334	0.2	0.040
8	Perfluorododecanesulfonic acid (PFDoS)	1.6	0.179	0.2	0.038
9	Perfluorobutanoic acid (PFBA)	6.4	0.330	0.8	0.401
10	Perfluoropentanoic acid (PFPeA)	3.2	0.196	0.4	0.021
11	Perfluorohexanoic acid (PFHxA)	1.6	0.318	0.2	0.020
12	Perfluoroheptanoic acid (PFHpA)	1.6	0.221	0.2	0.029
13	Perfluorooctanoic acid (PFOA)	1.6	0.302	0.2	0.037
14	Perfluorononanoic acid (PFNA)	1.6	0.221	0.2	0.086
15	Perfluorodecanoic acid (PFDA)	1.6	0.333	0.2	0.031
16	Perfluoroundecanoic acid (PFUnA)	1.6	0.264	0.2	0.033
17	Perfluorododecanoic acid (PFDoA)	1.6	0.379	0.2	0.059
18	Perfluorotridecanoic acid (PFTrDA)	1.6	0.238	0.2	0.038
19	Perfluorotetradecanoic acid (PFTeDA)	1.6	0.264	0.2	0.032
20	Hexafluoropropylene oxide dimer acid (HFPO-DA)	6.4	0.406	0.8	0.136
21	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	6.4	0.779	0.8	0.057
22	Perfluoro-3-methoxypropanoic acid (PFMPA)	3.2	0.177	0.4	0.033
23	Perfluoro-4-methoxybutanoic acid (PFMBA)	3.2	0.117	0.4	0.029
24	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	3.2	1.384	0.4	0.084
25	4:2 Fluorotelomer sulfonic acid (4:2-FTS)	6.4	2.281	0.8	0.282
26	6:2 Fluorotelomer sulfonic acid (6:2-FTS)	6.4	3.973	0.8	0.116
27	8:2 Fluorotelomer sulfonic acid (8:2-FTS)	6.4	1.566	0.8	0.225
28	3:3 Fluorotelomer carboxylic acid (3:3 FTCA)	8.0	0.721	1.0	0.060
29	5:3 Fluorotelomer carboxylic acid (5:3 FTCA)	40	5.066	5.0	0.363
30	7:3 Fluorotelomer carboxylic acid (7:3 FTCA)	40	5.942	5.0	0.308
31	Perfluorooctane sulfonamide (PFOSA)	1.6	0.227	0.2	0.068
32	N-methylperfluorooctane sulfonamide (NMeFOSA)	1.6	0.196	0.2	0.049
33	N-ethylperfluorooctane sulfonamide (NEtFOSA)	1.6	0.585	0.2	0.038
34	N-methylperfluorooctane sulfonamidoacetic acid (N-MeFOSAA)	1.6	0.586	0.2	0.030
35	N-ethylperfluorooctane sulfonamidoacetic acid (N-EtFOSAA)	1.6	0.324	0.2	0.044
36	N-methylperfluorooctane sulfonamidoethanol (NMeFOSE)	16	1.191	2.0	0.203
37	N-ethylperfluorooctane sulfonamidoethanol (NEtFOSE)	16	1.022	2.0	0.247
38	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) (9CL-PF3ONS)	6.4	0.871	0.8	0.038
39	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) (11CL-PF3OUDS)	6.4	0.819	0.8	0.071
40	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	3.2	0.137	0.4	0.018
41	Perfluorohexadecanoic acid (PFHxDA)[1]	~	~	~	~

Source: EPA Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, Second Draft Method 1633, November 2022

Data for this table are derived from the single-laboratory validation study and are only provided as examples for this draft method. The data will be updated to reflect the interlaboratory study results in a subsequent revision. Therefore, these criteria will change after interlaboratory validation.

[1] This compound was not listed in the EPA Method 1633 2nd draft and currently no known values exist