

**TABLE 1
TASK HAZARD ANALYSES**

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.20	Contaminated Soil or Groundwater- Dermal Contact	Contaminated water spills on skin, splashes in eyes; contact with contaminated soil/fill during construction activities or sampling.	Wear proper PPE; follow safe practices, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.20	Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, acetate liners, etc. with knife; cuts from sharp site objects or previously cut piles, tanks, etc.; Using tools in tight spaces	Wear proper PPE; follow safe practices	Clean wound, apply pressure and/or bandages; seek medical attention as required.
1.3.1 – 1.3.20	Contaminated Media Inhalation	Opening drums, tanks, wells; vapors for non-aqueous phase liquids or other contaminated site media; dust inhalation during excavation; vapor accumulation in excavation	Follow air monitoring plan; have quick access to respirator, do not move or open unlabeled drums found at the site, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.20	Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques; Langan employees are not to carry contractor equipment or materials	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.20	Slips, trips, and falls	Slips, trips and falls due to uneven surfaces, cords, steep slopes, debris and equipment in work areas	Good housekeeping at site; constant awareness and focus on the task; avoid climbing on stockpiles; maintain safe distance from construction activities and excavations; avoid elevated areas over six feet unless fully accredited in fall protection and wearing an approved fall protection safety apparatus	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.20	Noise	Excavation equipment, hand tools, drilling equipment.	Wear hearing protection; maintain safe distance from construction activities	Seek medical attention as required
1.3.1 – 1.3.20	Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.20	Underground/ overhead utilities	Excavation equipment, drill rig auger makes contact with underground object; boom touches overhead utility	"One Call" before dig; follow safe practices; confirm utility locations with contractor; wear proper PPE; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.20	Insects (bees, wasps, hornet, mosquitoes, and spider)	Sings, bites	Insect Repellent; wear proper protective clothing (work boots, socks and light colored pants);field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on site.	Seek medical attention as required
1.3.1 – 1.3.20	Vehicle traffic / Heavy Equipment Operation	Vehicles unable to see workers on site, operation of heavy equipment in tight spaces, equipment failure, malfunctioning alarms	Wear proper PPE, especially visibility vest; use a buddy system to look for traffic; rope off area of work with cones and caution tape or devices at points of hazard, maintain safe distance from construction activities and equipment	Seek medical attention as required

**TABLE 2
CONTAMINANT HAZARDS OF CONCERN**

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	1,1'-Biphenyl Biphenyl Phenyl benzene Diphenyl	92-52-4	None	1 mg/m ³ 100 mg/m ³	Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, throat; headache, nausea, lassitude (weakness, exhaustion), numb limbs; liver damage	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	1,2-Dichloroethane Ethylene dichloride 1,2-DCA DCE[1] Ethane dichloride Dutch liquid, Dutch oil Freon 150	107-06-2	PID	50 ppm 50 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin absorption, skin and/or eye contact	irritation to the eyes, skin, mucous membrane	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	1,2,3-Trichloropropane Allyl trichloride Glycerol trichlorohydrin Glyceryl trichlorohydrin Trichlorohydrin	96-18-4	PID	50 ppm 100 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, nose, throat; central nervous system depression; In Animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	1,2,4,5-Tetramethylbenzene	95-93-2	NA	None None	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	1,2,4-Trimethylbenzene	95-63-6	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	cis-1,2-Dichloroethene	156-59-2	PID	200 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, respiratory system; central nervous system depression	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

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1.3.1 – 1.3.20	1,3,5-Trimethylbenzene Mesitylene sym-Trimethylbenzene	108-67-8	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	1,3-Butadiene Biethylene Bivinyll Butadiene Divinyll Erythrene Vinylethylene	106-99-0	PID	1 ppm 2000 ppm	Vapor	inhalation, skin and/or eye contact (liquid)	irritation to the eyes, nose, throat; drowsiness, dizziness; liquid: frostbite; teratogenic, reproductive effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.20	1,4-Dioxane 1,4-Dioxacyclohexane [1,4]Dioxane p-Dioxane [6]-crown-2 Diethylene dioxide Diethylene ether Dioxan	123-91-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	Inhalation, ingestion, skin and/or eye contact	Irritant to eyes, skin, mucous membranes and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	2,2,4-Trimethylpentane	540-84-1	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	2-Butanone Ethyl methyl ketone MEK Methyl acetone Methyl ethyl ketone	78-93-3	PID	200 ppm 3000 ppm	Soil Groundwater Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	2-Chloronaphthalene	91.58-7	NA	NA MA	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, nose; skin	Eye: Irrigate immediately , Medical attention Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention
1.3.1 – 1.3.20	2-Hexanone Butyl methyl ketone MBK Methyl butyl ketone Methyl n-butyl ketone	591-78-6	PID	100 ppm 1600 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose; peripheral neuropathy: lassitude (weakness, exhaustion), paresthesia; dermatitis; headache, drowsiness	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	2-Methylnaphthalene β-methylnaphthalene	91-57-6	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion or skin absorption, eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract. It may also cause headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	4,4'-DDD Dichlorodiphenylchloroethane 1,1'-(2,2-Dichloroethylidene)bis (4-chlorobenzene)	72-54-8	None	NA NA	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	4-Isopropyltoluene 1-Methyl-4-(1- methylethyl)benzene 4-Isopropyltoluene; 4-Methylcumene; 1-Methyl-4-isopropylbenzene Dolcymene Camphogen Paracymene Cymene p-Cymene p-Isopropyltoluene	99-87-6	PID	NA NA	Soil Groundwater Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Acenaphthene 1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene peri-Ethylenenaphthalene Naphthyleneethylene Tricyclododecapentaene	83-32-9	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact,	irritation to the skin, eyes, mucous membranes and upper respiratory tract; If ingested, it can cause vomiting	Eye: Irrigate immediately Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.20	Acenaphthylene Cycopental(de)naphthalene, Acenaphthalene	208-96-8	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Acetone Dimethyl ketone Ketone propane 2-Propanone	67-64-1	PID	1000 ppm 2500 ppm	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Acetophenone 1-phenylethanone Methyl phenyl ketone Phenylethanone	98-86-2	None	NA NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.20	Acrylonitrile Acrylonitrile monomer AN Cyanoethylene Propenenitrile 2-Propenenitrile VCN, Vinyl cyanide	107-13-1	PID	1 ppm 85 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; asphyxia; headache; sneezing; nausea, vomiting; lassitude (weakness, exhaustion), dizziness; skin vesiculation; scaling dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Aluminum	7429-90-5	None	0.5 mg/m ³ 50 mg/m ³	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.20	Anthracene	120-12-7	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to the skin, eyes, mucous membranes and upper respiratory tract, abdominal pain if ingested.	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, Breathing: Move to fresh air, refer to medical attention; Swallow: refer to medical attention
1.3.1 – 1.3.20	Antimony	7440-36-0	None	0.5 mg/m ³ 50 mg/m ³	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Aroclor 1254	11097-69-1	None	0.5 mg/m ³ 5 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

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1.3.1 – 1.3.20	Aroclor 1260	11096-82-5	None	0.5 mg/m ³ 5 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Aroclor 1268	11100-14-4	None	0.5 mg/m ³ 5 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Arsenic	NA	None	0.5 mg/m ³ NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Asbestos	1332-21-4	NA	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air

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1.3.1 – 1.3.20	Barium	10022-31-8	None	0.5 mg/m ³ 50 mg/m ³	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Benzene Benzol Phenyl hydride	71-43-2	PID	3.19 mg/m ³ 1,595 mg/mg	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Benzo(a)anthracene Benzanthracene Benzanthrene 1,2-Benzanthracene Benzo[b]phenanthrene Tetraphene	56-55-3	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

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1.3.1 – 1.3.20	Benzo(a)pyrene	50-32-8	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately; Breathing: move to fresh air; Swallow: Induce vomiting if conscious, seek medical attention immediately
1.3.1 – 1.3.20	Benzo(b)fluoranthene	205-99-2	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	Benzo(g,h,i)perylene Benzo(ghi)perylene	191-24-2	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	NA	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

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1.3.1 – 1.3.20	Benzo(k)fluoranthene	207-08-9	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	Benzyl butyl phthalate Butyl benzyl phthalate Butylbenzylphthalate	86-66-7	None	NA NA	Groundwater Soil Vapor	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	Beryllium	7440-41- 7	None	0.002 mg/m ³ 4 mg/m ³	Soil	inhalation, skin and/or eye contact	berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation to the eyes; dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air

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1.3.1 – 1.3.20	Beta-Endosulfan Beta Endosulfan Endosulfan II (beta) Endosulfan II	33213-65-9	115-29-7	None	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; in animals: kidney, liver injury; decreased testis weight	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Bis(2-ethylhexyl)phthalate Bis(2-Ethylhexyl) Phthalate Di-sec octyl phthalate DEHP Di(2-ethylhexyl)phthalate Octyl phthalate	117-81-7	None	5 mg/m ³ 5000 mg/m ³	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, mucous membrane; in animals: liver damage; teratogenic effects; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately	
1.3.1 – 1.3.20	Cadmium	7440-43-9	None	0.005 mg/m ³ 9 mg/m ³	Soil	inhalation, ingestion	pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately	

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1.3.1 – 1.3.20	Calcium	7440-70-2	None	NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper resp tract; ulcer, perforation nasal septum; pneumonitis; dermatitis	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Carbazole 9-azafluorene Dibenzopyrrole Diphenylenimine diphenyleneimide	86-74-8	None	NA NA	Soil	inhalation, skin absorption (liquid), skin and/or eye contact	irritation to eyes and skin, respiratory irritation	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	Carbon disulfide	75-15-0	PID	20 ppm 500 ppm	Soil Groundwater Vapor	inhalation, skin or eye contact, ingestion	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support
1.3.1 – 1.3.20	Carbon tetrachloride Carbon chloride Carbon tet Freon® 10 Halon® 104 Tetrachloromethane	56-23-5	PID	10 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

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1.3.1 – 1.3.20	Chlordane Chlordan Chlordano 1,2,4,5,6,7,8,8-Octachloro- 3a,4,7,7a-tetrahydro-4,7- methanoindane	57-74-9	None	0.5 mg/m ³ 100 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Chloroform Methane trichloride Trichloromethane	67-66-3	None	50 ppm 500 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Chromium Hexavalent- Trivalent-	7440-47- 3	None	1.0 mg/m ³ 250 mg/m ³	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Chrysene Benzo[a]phenanthrene 1,2-Benzphenanthrene	218-01-9	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eye, skin, and respiratory, gastrointestinal irritation nausea, vomit, diarrhea [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately

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1.3.1 – 1.3.20	Cis-Chlordane a-Chlordane alpha Chlordane cis-Chlordan CIS-CHLORDANE Chlordane cis-;Chlordane cis;ALPHA-CHLORDAN Chlordan, cis-ALPHA-CHLORDANE alpha(cis)-chlordane α-chlordane solution	5102-71-9	None	0.5 mg/m ³ 100 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Cobalt	7440-48-4	None	0.1 mg/m ³ 20 mg/m ³	Soil	inhalation, ingestion, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp hypersensitivity, asthma	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Copper	7440-50-8	None	1.0 mg/m ³ 100 mg/m ³	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, metallic taste; dermatitis; anemia	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Cumene Cumol Isopropylbenzene 2-Phenyl propane	98-82-8	PID	50 ppm 900 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Cyanide	57-12-5	None	5 mg/m3 25 mg/m3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	Exposure to cyanide can cause weakness, headaches, confusion, dizziness, fatigue, anxiety, sleepiness, nausea and vomiting. Breathing can speed up then become slow and gasping. Coma and convulsions also occur. If large amounts of cyanide have been absorbed by the body, the person usually collapses and death can occur very quickly. Long-term exposure to lower levels of cyanide can cause skin and nose irritation, itching, rashes and thyroid changes.	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Cyclohexane Benzene hexahydride Hexahydrobenzene Hexamethylene Hexanaphthene	110-82-7	PID	300 ppm 1300 ppm	Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	DDE 4,4-DDE 1,1-bis-(4-chlorophenyl)-2,2- dichloroethene Dichlorodiphenyldichloroethyle ne	72-55-9	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Oral ingestion of food is the primary source of exposure for the general population. Acute and chronic ingestion may cause nausea, vomiting, diarrhea, stomach pain, headache, dizziness, disorientation, tingling sensation, kidney damage, liver damage, convulsions, coma, and death. 4,4' DDE may cross the placenta and can be excreted in breast milk	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	DDT 4,4-DDT p,p'-DDT Dichlorodiphenyltrichloroethan e 1,1,1-Trichloro-2,2-bis(p- chlorophenyl)ethane	50-29-3	None	1 mg/m ³ 500 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Di-N-Octylphthalate	117-84-0	None	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, upper respiratory system, stomach	Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Dibenz(a,h)anthracene	53-70-3	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support PID Swallow: Medical attention immediately
1.3.1 – 1.3.20	Dibenzofuran	132-64-9	None	NA NA	Soil	inhalation, absorption	irritation to eyes, and skin	Eyes: Irrigate immediately Skin: Soap wash promptly.
1.3.1 – 1.3.20	Dibutyl phthalate Di-n-butyl phthalate Butyl phthalate n-Butyl phthalate 1,2-Benzenedicarboxylic acid dibutyl ester o-Benzenedicarboxylic acid dibutyl ester DBP Palatinol C, Elaol Dibutyl-1,2-benzenedicarboxylate Di-n-butyl Phthalate Di-n-butylphthalate	84-74-2	None	5 mg/m ³ 4000 mg/m ³	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, upper respiratory system, stomach	Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Dichlorodifluoromethane Difluorodichloromethane, Fluorocarbon 12 Freon 12 Freon® 12 Genetron® 12 Halon® 122 Propellant 12 Refrigerant 12 Dichlorodifluoromethane	75-71-8	None	1000 pp, 15,000 ppm	Groundwater Soil Vapor	inhalation, skin and/or eye contact (liquid)	dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.20	Dieldrin HEOD 1,2,3,4,10,10-Hexachloro-6,7- epoxy-1,4,4a,5,6,7,8,8a- octahydro-1,4-endo exo-5,8-dimethanonaphthalene	60-57-1	PID	0.25 mg/m3 50 mg/m3	Groundwater Soil Water	inhalation, skin absorption, ingestion, skin and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Endosulfan sulfate 1,4,5,6,7,7-Hexachloro-5- norbornene-2,3-dimethanol, cyclic sulfate 6,7,8,9,10,10- hexachloro01,5,5a,9,9a- hexahydro-6,9-methano-2,4,3- benzodioxathiepin-3,3-dioxide	1031-07- 8	None	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	Hypersensitive to stimulation, sensation of prickling, tingling or creeping on skin. Headache, dizziness, nausea, vomiting, incoordination, tremor, mental confusion, hyperexcitable state. In severe cases: convulsions, seizures, coma and respiratory depression.	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Endrin 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,endo-5,8-dimethanonaphthalene; Hexadrin	72-20-8	None	0.1 mg/m3 2 mg/m3	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	epileptiform convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion; drowsiness, lassitude (weakness, exhaustion); anorexia; in animals: liver damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Endrin aldehyde	7421-93-4	None	0.1 mg/m3 2 mg/m3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	epileptiform convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion; drowsiness, lassitude (weakness, exhaustion); anorexia; in animals: liver damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Ethanol Absolute alcohol Alcohol cologne spirit drinking alcohol ethane monoxide ethylic alcohol EtOH ethyl alcohol ethyl hydrate ethyl hydroxide ethylol grain alcohol hydroxyethane methylcarbinol	64-17-5	PID	1000 ppm 3300 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache, drowsiness, lassitude (weakness, exhaustion), narcosis; cough; liver damage; anemia; reproductive, teratogenic effects	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Ethyl benzene Ethylbenzene Ethylbenzol Phenylethane	100-40-4	PID	435 mg/m ³ 3,472 mg/m ³	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Fluoranthene Benzo(j, k)fluorene	206-44-0	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	Fluorene	86-73-7	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Fuel Oil No. 2	68476-30-2	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Gasoline	8006-61-9	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Helium	7440-59-7	Helium Detector	NA NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.20	Heptachlor	76-44-8	None	0.5 mg/m ³ 35 mg/m ³	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: tremor, convulsions; liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Heptachlor epoxide 1,4,5,6,7,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene	1024-57-3	None	0.5 mg/m3 35 mg/m3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: tremor, convulsions; liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Heptane n-Heptane	142-82-5	PID	500 ppm 750 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	dizziness, stupor, incoordination; loss of appetite, nausea; dermatitis; chemical pneumonitis (aspiration liquid); unconsciousness	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Hexachlorobutadiene HCBD Hexachloro-1,3-butadiene 1,3-Hexachlorobutadiene Perchlorobutadiene	87-68-3	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation to the eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Indeno(1,2,3-c,d)pyrene	193-39-5	None	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately, wash mouth with water
1.3.1 – 1.3.20	Iron	7439-89- 6	None	10 mg/m ³ NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Isopropyl Acetate Isopropanol Isopropyl ester of acetic acid 1-Methylethyl ester of acetic acid 2-Propyl acetate	10821-4	PID	250 ppm 1800 ppm		inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose; dermatitis; In Animals: narcosis	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Isopropyl alcohol Iso-Propyl Alcohol Carbinol IPA Isopropanol 2-Propanol sec-Propyl alcohol Rubbing alcohol Isopropylalcohol	67-63-0	PID	400 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin; in animals: narcosis	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Lead	7439-92-1	None	0.050 mg/m ³ 100 mg/m ³	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation to the eyes; hypertension	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Magnesium	7439-95-4	None	15 mg/m ³ NA	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system; cough	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.20	Manganese	7439-96-5	None	5 mg/m ³ 500 mg/m ³	Groundwater Soil	inhalation, ingestion	aerosol is irritating to the respiratory tract	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	m-Cresol 3-methylphenol meta-Cresol 3-Cresol m-Cresylic acid 1-Hydroxy-3-methylbenzene 3-Hydroxytoluene 3-Methylphenol	108-39-4	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Mercury	7439-97-6	None	0.1 mg/m ³ 10 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Methyl Bromide Bromomethane Monobromomethane	74-83-9	PID	20 ppm 250 ppm	Soil Groundwater Vapor	inhalation, skin absorption (liquid), skin and/or eye contact (liquid)	irritation to the eyes, skin, respiratory system; muscle weak, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin vesiculation; liquid: frostbite; [potential occupational carcinogen]	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support
1.3.1 – 1.3.20	Methyl Chloride Chloromethane Monochloromethane	74-87-3	NA	100 ppm 2000 ppm	Groundwater Soil	inhalation, skin and/or eye contact	dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Methyl chloroform Chloroethene 1,1,1-Trichloroethane 1,1,1-Trichloroethane- (stabilized) 1,1,1-TCA	71-55-6	PID	350 ppm 700 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention
1.3.1 – 1.3.20	Methyl <i>tert</i> -butyl ether MTBE Methyl tertiary-butyl ether Methyl t-butyl ether <i>tert</i> -Butyl methyl ether tBME <i>tert</i> -BuOMe	1634-04- 4	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Methylene Chloride Dichloromethane Methylene dichloride	75-09-2	PID	25 ppm 2300 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	m-Xylenes 1,3-Dimethylbenzene m-Xylol Metaxylene	108-38-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Naphthalene Naphthalin Tar camphor White tar	91-20-3	PID	50 mg/m ³ 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; hematuria (blood in the urine); dermatitis, optical neuritis	Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	n-Butylbenzene	104-51-8	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	N-ethyl perfluorooctane sulfonamido acetic acid NEtFOSAA N-Ethylperfluorooctanesulfonamide	4151-50-2	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	n-Hexane Hexane, Hexyl hydride, normal-Hexane	110-54-3	PID	500 ppm 1100 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose; nausea, headache; peripheral neuropathy; numb extremities, muscle weak; dermatitis; dizziness; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	N.Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	24448-09-7	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Nickel	7440-02-0	None	NA 10 mg/m ³	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Methane Hydrogen Sulfide Carbon Monoxide Nitrogen	7782-44- 7 74-82-8 7783-08- 4 830-08-0 7727-37- 9	Multi-Gas PID	NA/NA NA/NA 10/100 ppm 50/1200 ppm NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.20	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Isobutylene Nitrogen	7782-44- 7 115-11-7 7727-37- 9	PID	NA/NA NA/NA NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.20	n-Propylbenzene Isocumene Propylbenzene 1-Phenylpropane 1-Propylbenzene Phenylpropane	103-65-1	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	o-Cresol ortho-Cresol 2-Cresol o-Cresylic acid 1-Hydroxy-2-methylbenzene 2-Hydroxytoluene 2-Methyl phenol 2-Methylphenol 2-Methylphenol	95-48-7	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately ethyhp hhhhhhhhh
1.3.1 – 1.3.20	o-Xylenes 1,2-Dimethylbenzene ortho-Xylene o-Xylol	95-47-6	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	p-Cresol para-Cresol 4-Cresol p-Cresylic acid 1-Hydroxy-4-methylbenzene 4-Hydroxytoluene 4-Methylphenol	106-44-5	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	p-Diethylbenzene 1,4-Diethylbenzene 1,4-Diethyl benzene	105-05-5	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; skin burns; in animals: central nervous system depression	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Pentachlorophenol PCP; Penta; 2,3,4,5,6-Pentachlorophenol	87-86-5	PID	0.5 mg/m3 2.5 mg/m3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorobutanesulfonic acid FC-98 Nonaflate Nonafluorobutanesulphonic acid Perfluorobutanesulfonic Acid Perfluorobutane sulfonate PFBS	375-73-5	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorobutanoic Acid Heptafluorobutyric acid Heptafluorobutanoic acid Perfluorobutyric acid PFBA	375-22-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Perfluorodecanesulfonic Acid PFDS	335-77-3	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorodecanoic acid PFDA	335-76-2	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorododecanoic acid Perfluoralauric acid Tricosafuorododecanoic acid PFDoA	307-55-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluoroheptanoic acid Perfluoroheptanoic acid Tridecafluoroheptanoic acid PFHpA	375-85-9	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Perfluoroheptane sulfonic Acid Perfluoroheptane sulfonate Perfluoroheptanesulfonic acid PFHpS	375-92-8	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorohexanesulfonic Acid perfluorohexanesulfonate perfluorohexanesulfonic acid PFHxS	355-46-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorohexanoic Acid PFHxA	307-24-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorononanoic Acid Perfluorononanoic Acid PFNA perfluoro-n-nonanoic acid perfluorononanoate	375-95-1	NA	None None	Groundwater	Groundwater	inhalation, skin or eye contact, ingestion; strong acid	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Perfluorooctanesulfonamide Erfluorocetyl sulfonamide Perfluorooctane sulfonamide Heptadecafluorooctanesulphonamide Perfluorooctanesulfonic acid amide Deethylsulfluramid FC-99 PFOSA	754-91-6	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorooctanesulfonic Acid PFOS	1763-23-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorooctanoic Acid PFOA pentadecafluorooctanoic acid perfluorooctanoate perfluorocaprylic acid	335-67-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluoropentanoic Acid PFPeA	2706-90-3	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Perfluoroundecanoic Acid PFUnA PFUnDA Perfluoroundecanoic Acid Henicosfluoroundecanoic Acid	4234-23-5	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorotetradecanoic Acid PFTA	376-06-7	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluorotridecanoic Acid PFTTrDA Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	72629-94-8	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Perfluoroundecanoic Acid FPUA	2058-94-8	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	1H,1H,2H,2H-Perfluorodecane sulfonic Acid (8:2FTS) 8:2 Fluorinated Telomer Sulfonates (8:2FTS)	27619-96-1	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) Sodium 1H,1H, 2H, 2H-Perfluorooctane Sulfonate (6:2)(6:2FTS) 6:2 Fluorinated Telomer Sulfonates (6:2FTS) Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	27619-97-2	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	p-Ethyltoluene 4-Ethyltoluene 1-ethyl-4-methyl-benzene	622-96-8	NA	NA NA	Soil	ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Phenanthrene	85-01-8	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Phenol Carbolic acid Hydroxybenzene, Monohydroxybenzene Phenyl alcohol Phenyl hydroxide	108-95-2	PID	5 ppm 250 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine, skin burns; dermatitis; tremor, convulsions, twitching	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Potassium	7440-09-7	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact inhalation, ingestion, skin and/or eye contact	eye: Causes eye burns. Skin: Causes skin burns. Reacts with moisture in the skin to form potassium hydroxide and hydrogen with much heat. ingestion: Causes gastrointestinal tract burns. inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.	Eyes: Get medical aid immediately Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Ingestion: If victim is conscious and alert, give 2-4 full cups of milk or water. Get medical aid immediately. inhalation: Get medical aid immediately.

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	p-Xylenes 1,4-Dimethylbenzene para-Xylene p-Xylol	106-42-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Pyrene benzo[def]phenanthrene	129-00-0	PID	0.2 mg/m ³ 80 mg/m ³ (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.20	sec-Butylbenzene	135-98-8	PID	10 ppm 100 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; inhalation: nausea or vomiting	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Selenium	7782-49-2	None	1 mg/m ³ 0.2 mg/m ³	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Silver	7440-22-4	None	0.01 mg/m ³ 10 mg/m ³	Soil	inhalation, ingestion, skin and/or eye contact	blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Sodium	7440-23-5	None	NA NA	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Styrene Ethenyl benzene Phenylethylene Styrene monomer Styrol Vinyl benzene	100-42-5	PID	100 ppm 700 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Tert-Butyl Alcohol Tertiary Butyl Alcohol Tert-Butanol Butyl alcohol 2-Methyl-2-propanol Trimethyl carbinol TBA	75-65-0	PID	100 ppm 1600 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; drowsiness, narcosis	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	tert-Butylbenzene t-Butylbenzene 2-Methyl-2-phenylpropane Pseudobutylbenzene	98-06-6	PID	10 ppm NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	eye, skin irritation; dry nose, throat; headaches; low blood pressure, tachycardia; abnormal cardiovascular system; central nervous system depression; hematopoietic depression	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Tetrachloroethylene Perchloroethylene Perchloroethylene PCE Perk Tetrachlorethylene Tetrachloroethene	127-18-4	PID	100 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Tetrahydrofuran Diethylene oxide 1,4-Epoxybutane Tetramethylene oxide THF	109-99-9	PID	200 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, skin and/or eye contact, ingestion	irritation to the eyes, upper respiratory system; nausea, dizziness, headache, central nervous system depression	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immedi
1.3.1 – 1.3.20	Thallium	7440-28-0	None	0.1 mg/m ³ 15 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Toluene Methyl benzene Methyl benzol Phenyl methane Toluol	108-88-3	PID	200 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, paresthesia; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Total PCBs Chlorodiphenyl (42% chlorine) Aroclor® 1242 PCB Polychlorinated biphenyl	53469-21-9	None	0.5 mg/m ³ 5 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Total Xylenes Dimethylbenzene Xylol	1330-20-7	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Trans-Chlordane gamma-Chlordane Gamma Chlordane	5103-74-2	None	0.5 mg/m ³ 100 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Trichloroethylene Ethylene trichloride TCE Trichloroethene Trilene	79-01-6	PID	100 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Trichlorofluoromethane Fluorotrichloromethane Freon® 11 Monofluorotrichloromethane Refrigerant 11 Trichloromonofluoromethane	75-69-4	PID	1000 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.20	Vanadium	7440-62-2	None	0.1 mg/m ³ 15 mg/m ³	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.20	Vinyl Chloride Chloroethene Chloroethylen Ethylene monochloride Monochloroethene Monochloroethylene VC Vinyl chloride monomer (VCM)	75-01-4	PID	1 ppm NA	Groundwater Soil Vapor	inhalation, skin and/or eye contact (liquid)	lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.20	Zinc	7440-62- 2	None	15 mg/m ³ 500 mg/m ³	Groundwater Soil	inhalation	chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Breathing: Respiratory support

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector

PEL = Permissible Exposure Limit (8-hour Time Weighted Average)

IDLH = Immediately Dangerous to Life and Health

ppm = part per million

mg/m³ = milligrams per cubic meter

500 mg/m³

TABLE 3
Summary of Monitoring Equipment

Instrument	Operation Parameters
Photoionization Detector (PID)	<p>Hazard Monitored: Many organic and some inorganic gases and vapors.</p> <p>Application: Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds is possible if more than one probe is measured.</p> <p>Detection Method: Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions.</p> <p>General Care/Maintenance: Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories.</p> <p>Typical Operating Time: 10 hours. 5 hours with strip chart recorder.</p>
Oxygen Meter	<p>Hazard Monitored: Oxygen (O₂).</p> <p>Application: Measures the percentage of O₂ in the air.</p> <p>Detection Method: Uses an electrochemical sensor to measure the partial pressure of O₂ in the air, and converts the reading to O₂ concentration.</p> <p>General Care/Maintenance: Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to expiration of the specified interval. If the ambient air is less than 0.5% C O₂, replace the detector cell frequently.</p> <p>Typical Operating Time: 8 – 12 hours.</p>
Additional equipment (if needed, based on site conditions)	
Combustible Gas Indicator (CGI)	<p>Hazard Monitored: Combustible gases and vapors.</p> <p>Application: Measures the concentration of combustible gas or vapor.</p> <p>Detection Method: A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present.</p> <p>General Care/Maintenance: Recharge or replace battery. Calibrate immediately before use.</p> <p>Typical Operating Time: Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.</p>
Flame Ionization Detector (FID) with Gas Chromatography Option <i>(i.e., Foxboro Organic Vapor Analyzer (OVA))</i>	<p>Hazard Monitored: Many organic gases and vapors (approved areas only).</p> <p>Application: In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated.</p> <p>General Care/Maintenance: Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks.</p> <p>Typical Operating Time: 8 hours; 3 hours with strip chart recorder.</p>
Potable Infrared (IR) Spectrophotometer	<p>Hazard Monitored: Many gases and vapors.</p> <p>Application: Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures.</p> <p>Detection Method: Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound.</p> <p>General Care/Maintenance: As specified by the manufacturer.</p>

Instrument	Operation Parameters
Direct Reading Colorimetric Indicator Tube	<p>Hazard Monitored: Specific gas and vapors.</p> <p>Application: Measures concentration of specific gases and vapors.</p> <p>Detection Method: The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration.</p> <p>General Care/Maintenance: Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.</p>
Aerosol Monitor	<p>Hazard Monitored: Airborne particulate (dust, mist, fume) concentrations</p> <p>Application: Measures total concentration of semi-volatile organic compounds, PCBs, and metals.</p> <p>Detection Method: Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles.</p> <p>General Care/Maintenance: As specified by the mfr. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.</p>
Monitox	<p>Hazard Monitored: Gases and vapors.</p> <p>Application: Measures specific gases and vapors.</p> <p>Detection Method: Electrochemical sensor relatively specific for the chemical species in question.</p> <p>General Care/Maintenance: Moisten sponge before use; check the function switch; change the battery when needed.</p>
Gamma Radiation Survey Instrument	<p>Hazard Monitored: Gamma Radiation.</p> <p>Application: Environmental radiation monitor.</p> <p>Detection Method: Scintillation detector.</p> <p>General Care/Maintenance: Must be calibrated annually at a specialized facility.</p> <p>Typical Operating Time: Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.</p>

**TABLE 4
INSTRUMENTATION ACTION LEVELS**

<u>Photoionization Detector Action Levels</u>	<u>Action Required</u>
Background to 5 ppm	No respirator; no further action required
> 1 ppm but < 5 ppm for > 5 minutes	<ol style="list-style-type: none"> 1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 1 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted.
> 5 ppm but < 150 ppm for > 5 minutes	<ol style="list-style-type: none"> 1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
> 150 ppm	Evacuate the work area

- Notes:**
1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
 2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for benzene for any 15 minute period.
 3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene.

**TABLE 5
EMERGENCY NOTIFICATION LIST**

ORGANIZATION	CONTACT	TELEPHONE
Local Police Department	NYPD	911
Local Fire Department	NYFD	911
Ambulance/Rescue Squad	NYFD	911
Hospital	Harlem Hospital Center	911 or 212-939-1000
Langan Incident Hotline		800-952-6426 ex 4699
Medical Treatment Hotline	Incident Intervention	888-449-7787
Langan Environmental Project Manager	Julie Leung	917-892-7234 (cell)
Langan Geotechnical Project Manager	James Delimitros	631-312-3987 (cell)
Langan Health and Safety Manager (HSM)	Tony Moffa	215-756-2523 (cell)
Langan Health & Safety Officer (HSO)	William Bohrer	410-984-3068 (cell)
Langan Field Team Leader (FTL)	To Be Determined	
Client's Representative	Azriel Mandel	973-622-0073
National Response Center (NRC)		800-424-8802
Chemical Transportation Emergency Center (Chemtrec)		800-424-9300
Center for Disease Control (CDC)		404-639-3534
EPA (RCRA Superfund Hotline)		800-424-9346
TSCA Hotline		202-554-1404
Poison Control Center		800-222-1222

Immediately following an injury, unless immediate emergency medical treatment is required, the injured employee must contact Incident Intervention® at 888-449-7787.

For all other incidents or near misses, unless emergency response is required, either the employee or a coworker must contact the Langan Incident Hotline at 1-(800)-9-LANGAN (ext. #4699).

TABLE 6**SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING
FOR FIT AND ACCLIMATED WORKERS^A**

Adjusted Temperature^b	Normal Work Ensemble^c	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature ($t_{a \text{ adj}}$) by using this equation: $t_{a \text{ adj}}^{\circ\text{F}} = t_a^{\circ\text{F}} + (13 \times \% \text{ sunshine})$. Measure air temperature (t_a) 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.

**TABLE 7
HEAT INDEX**

RELATIVE HUMIDITY	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	75	80	85	90	95	100	105	110	115	120
	APPARENT TEMPERATURE*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:

1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

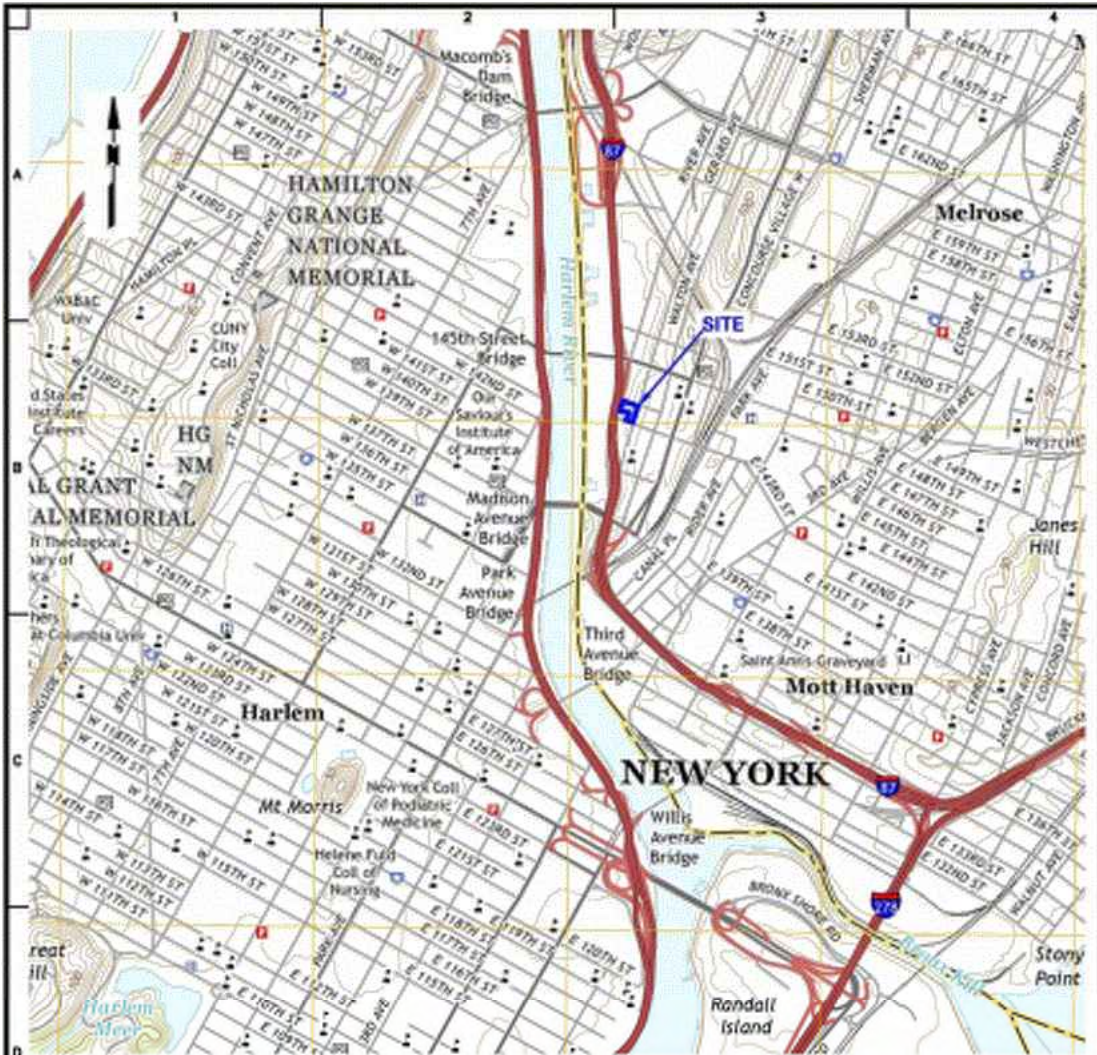
Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

FIGURES

FIGURE 1

Site Location Map



— APPROXIMATE SITE BOUNDARY

NOTE: BASE MAP IS REFERENCED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS) 7.5 MINUTE SERIES CENTRAL PARK QUADRANGLE MAP, DATED 2016

<p>LANGAN 25 Penn Plaza, 36th West 34th Street, 8th Floor New York, NY 10001 T: 212 479 8400 F: 212 479 8446 www.langan.com Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C., S.A. Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan Engineering and Environmental Services, Inc. Langan (U.K.) Ltd. Langan International LLC Collectively known as Langan</p>	<p>Project GERARD AVENUE AND EAST 146TH STREET BLOCK NO. 50N, LOT NOs. 3, 12, AND 20</p>	<p>Figure Title SITE LOCATION MAP</p>	<p>Project No. 170487001 Date 08/28/2017 Scale N.T.S. Drawn By YZ Checked By JL Submission Date</p>	<p>Drawing No. 1 Sheet 1 of 5</p>
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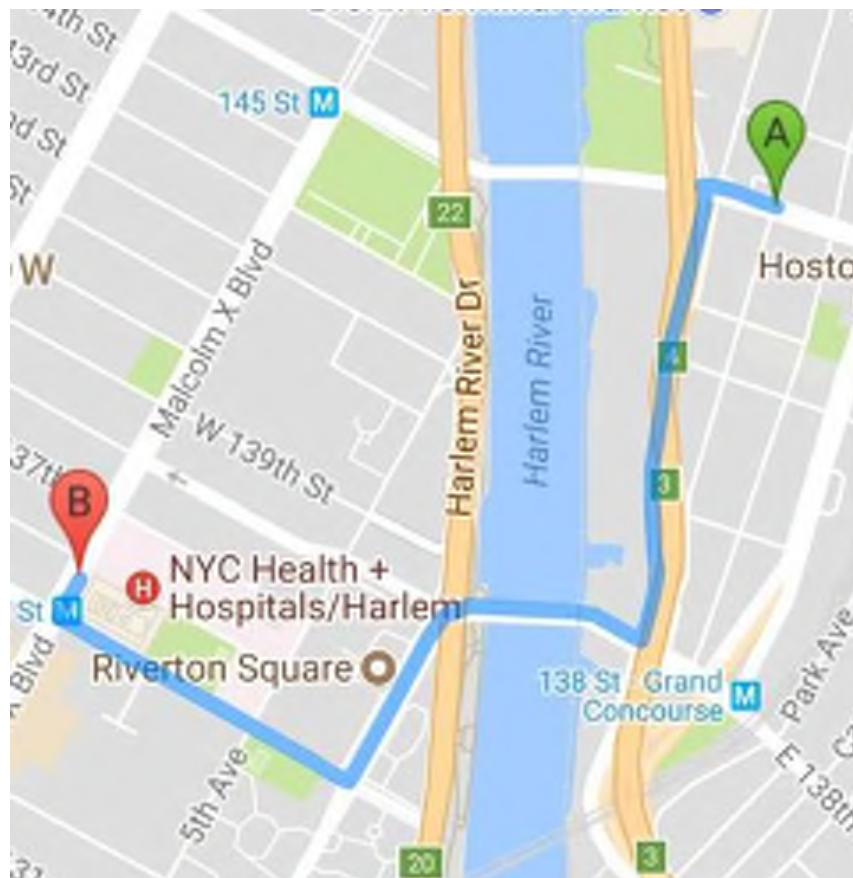
FIGURE 2 HOSPITAL ROUTE PLAN

**Hospital Location: Harlem Hospital Center
506 Lenox Avenue
New York, New York
212-939-1000**

START: Gerard Avenue and East 149th Street, Bronx, NY

1. Head west on East 149th Street toward River Avenue
2. Turn left onto Exterior Street
3. Turn right onto East 138th Street/Madison Avenue Bridge
4. Slight left onto Madison Avenue Bridge
5. Madison Avenue Bridge turns right and becomes East 135th Street
6. Turn right onto Lenox Avenue/Malcolm X Boulevard, destination will be on the right.

END: Harlem Hospital Center, 506 Lenox Avenue, New York, NY



ATTACHMENT A

STANDING ORDERS

STANDING ORDERS

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT B

DECONTAMINATION PROCEDURES

PERSONNEL DECONTAMINATION

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face piece Removal	6. Face piece is removed (avoid touching face with fingers). Face piece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoe and pumps may be decontaminated over a portable decontamination pad to contain wash water; or, wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic pail, tub, or other container. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. The PID, HNu or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

ATTACHMENT C

EMPLOYEE EXPOSURE/ INJURY INCIDENT REPORT

EMPLOYEE INCIDENT/INJURY REPORT LANGAN ENGINEERING & ENVIRONMENTAL SERVICES

(Complete and return to Tony Moffa in the Doylestown Office)

Affected Employee Name: _____

Date: _____

Incident type: Injury Report Only/No Injury
 Near Miss Other: _____

EMPLOYEE INFORMATION (Person completing Form)

Employee Name: _____

Employee

No: _____

Title: _____

Office

Location:

Length of time employed or date of hire:

Mailing address:

Sex: M F Birth date: _____

Business phone & extension: _____

Residence/cell

phone:

ACCIDENT INFORMATION

Project: _____

Project

#:

Date & time of incident: _____ Time work started & ended:

Site location:

Incident Type: Possible Exposure Exposure Physical Injury

Names of person(s) who witnessed the incident: _____

Exact location incident occurred: _____

Describe work being done: _____

Describe what affected employee was doing prior to the incident occurring: _____

Describe in detail how the incident occurred: _____

Nature of the incident (List the parts of the body affected): _____

Person(s) to whom incident was reported (Time and Date): _____

List the names of other persons affected during this incident: _____

Possible causes of the incident (equipment, unsafe work practices, lack of PPE, etc.):

Weather conditions during incident:

MEDICAL CARE INFORMATION

Did affected employee receive medical care? Yes No

If Yes, when and where was medical care received: _____

Provide name of facility (hospital, clinic, etc.):

Length of stay at the facility?

Did the employee miss any work time? Yes No Undetermined

Date employee last worked: _____ Date employee returned to work: _____

Has the employee returned to work? Yes No

Does the employee have any work limitations or restrictions from the injury? : Yes No

If Yes, please describe:

Did the exposure/injury result in permanent disability? Yes No Unknown

If Yes, please describe:

HEALTH & SAFETY INFORMATION

Was the operation being conducted under an established site specific CONSTRUCTION HEALTH AND SAFETY PLAN?

Yes No Not Applicable:

Describe protective equipment and clothing used by the employee:

Did any limitations in safety equipment or protective clothing contribute to or affect exposure / injury? If so, explain:

Employee Signature

Date

Langan Representative

Date

ATTACHMENT D
CALIBRATION LOG

ATTACHMENT E

MATERIAL SAFETY DATA SHEETS

SAFETY DATA SHEETS

All Langan Field Personnel Completing This Work Plan Are To Have Real Time Accessibility To Material Safety Data Sheet (MSDs) or Safety Data Sheet (SDSs) Through Their Smart Phone.

*The link is <http://www.msds.com/>
The login name is "drapehead"
The password is "2angan987"*

If You Are Unable To Use the Smart Phone App, You Are To Bring Printed Copies of the MSDs/SDSs to the Site

ATTACHMENT F

JOBSITE SAFETY INSPECTION CHECKLIST

Jobsite Safety Inspection Checklist

Date: _____ **Inspected By:** _____

Location: _____ **Project #:** _____

Check one of the following: **A:** Acceptable **NA:** Not Applicable **D:** Deficiency

	A	NA	D	Remark
1. HASP available onsite for inspection?				
2. Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and contractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8. Appropriate PPE being worn by Langan employees and contractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field log book?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Mark outs of underground utilities done prior to initiating any subsurface activities?				
20. Decontamination procedures being followed as outlined in HASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				

23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20 feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layer back, or boxed?				
27. Underground utilities located and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				
29. Excavated material placed more than 2 feet away from excavation edge?				
30. Public protected from exposure to open excavation?				
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
32. Confined space entry permit is completed and posted?				
33. All persons knowledgeable about the conditions and characteristics of the confined space?				
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
36. Attendant and/or supervisor certified in basic first aid and CPR?				
37. Confined space atmosphere checked before entry and continuously while the work is going on?				
38. Results of confined space atmosphere testing recorded?				
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
40. Are extension cords rated for this work being used and are they properly maintained?				
41. Are GFCIs provided and being used?				

Unsafe Acts: _____

Notes: _____

ATTACHMENT G

JOB SAFETY ANALYSIS FORM



Job Safety Analysis (JSA) Health and Safety

JSA TITLE:

DATE CREATED:

CREATED BY:

JSA NUMBER:

REVISION DATE:

REVISED BY:

Langan employees must review and revise the Job Safety Analysis (JSA) as needed to address the any site specific hazards not identified. Employees must provide their signatures on the last page of the JSA indicating they have review the JSA and are aware the potential hazards associated with this work and will follow the provided preventive or corrective measures.

PERSONAL PROTECTIVE EQUIPMENT REQUIRED: (PPE): Required As Needed

Steel-toed boots Nitrile gloves Dermal Protection (Specify)

Long-sleeved shirt Leather/ Cut-resistant gloves High visibility vest/clothing

Safety glasses Face Shield Hard hat

ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT NEEDED (Provide specific type(s) or descriptions)

Air Monitoring: Respirators: Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE OR CORRECTIVE ACTION
1.	1. 2.	1a. 1b. 2a. 2b.
2.	1.	1
Additional items identified in the field.		
Additional Items.		

If additional items are identified during daily work activities, please notify all relevant personnel about the change and document on this JSA.



Job Safety Analysis (JSA) Health and Safety

JSA Title: Subsurface Investigation

JSA Number: JSA030-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety Goggles	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input checked="" type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input checked="" type="checkbox"/> Other: Dielectric Overshoes, Sun Block				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. Transport equipment to work area	1. Back/strain 2. Slip/Trip/Falls 3. Traffic 4. Cuts/abrasions/contusions from equipment 5. Accidents due to vehicle operations	1. Use proper lifting techniques/Use wheeled transport 2. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes) 5. Observe posted speed limits/ Wear seat belts at all times
2. Traffic	1. Hit by moving vehicle	1. Use traffic cones and signage/ Use High visibility traffic vests and clothing/ Caution tape when working near active roadways.
3. Field Work (drilling, resistivity testing, and inspection)	1. Biological Hazards: insects, rats, snakes, poisonous plants, and other animals 2. Heat stress/injuries 3. Cold Stress/injuries 4. High Energy Transmission Lines 5. Underground Utilities 6. Electrical (soil resistivity testing)	1. Inspect work area to identify biological hazards. Wear light colored long sleeve shirt and long pants/ Use insect repellent as necessary/ Beware of tall grass, bushes, woods and other areas where ticks may live/ Avoid leaving garbage on site to prevent attracting animals/ Identify and avoid contact with poisonous plants/Beware of rats, snakes, or stray animals. 2. Wear proper clothing (light colored)/ drink plenty of water/ take regular breaks/use sun block 3. Wear proper clothing/ dress in layers/ take regular breaks. 4. Avoid direct contact with high energy transmission lines/ position equipment at least 15 feet or as required by PSE&G from the transmission lines/ wear proper PPE (dielectric overshoes 15 kV minimum rating). 5. Call one-call service before performing intrusive field work/ Review utility mark-outs and available utility drawings (with respect to proposed work locations)/ Follow Underground Utility Guidelines

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	6. See AGI Sting R1 operating manual for specific concerns during operating instrument 7. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 8. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 9. Wear Langan approved safety shoes 10. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 11. Wear high visibility clothing & vest / Use cones or signs to designate work area 12. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 13. Wear proper hearing protection 14. Wear hard hat / Avoid areas where overhead hazards exist. 15. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 16. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



Job Safety Analysis (JSA) Health and Safety

JSA Title: Field Sampling

JSA Number: JSA022-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input checked="" type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input type="checkbox"/> Other: _____				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Unpack/Transport equipment to work area.	6. Back Strains 7. Slip/Trips/Falls 8. Cuts/Abrasions from equipment 9. Contusions from dropped equipment	6. Use proper lifting techniques/Use wheeled transport 7. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 8. Wear proper PPE (leather gloves, long sleeves). 9. Wear proper PPE (Langan approved safety shoes).
6. Initial Site Arrival-Site Assessment	1. Traffic	1. Situational awareness (be alert of your surroundings). Secure area from through traffic.
7. Surface Water Sampling	1. Contaminated media. Skin/eye contact with biological agents and/or chemicals.	1. Wear appropriate PPE (Safety glasses, appropriate gloves). Review (M)SDS for all chemicals being.
8. Sampling from bridges	1. Struck by vehicles	1. Wear appropriate PPE (Safety Vest). Use buddy system and orange safety cones.
9. Icing of Samples/ Transporting coolers/equipment from work area.	11. Back Strains 12. Slips/Trips/Falls 13. Cuts/Abrasions from equipment 14. Pinch/Crushing Hazards.	17. Drain coolers of water. Use proper lifting techniques. Use wheeled transport. 18. Have unobstructed path from work area. Aware of surroundings. 19. Wear proper PPE (Leather gloves, long sleeves) 20. Wear proper PPE (Leather gloves, long sleeves)
10. Site Departure	1. Contaminated PPE/Vehicle	1. Contaminated PPE should be disposed of on-site. Remove boots and soiled clothing for secure storage in trunk. Wash hands promptly.
11. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	3. Foot injuries 4. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 21. Wear high visibility clothing & vest / Use cones or signs to designate work area 22. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 23. Wear hearing protection 24. Wear hard hat / Avoid areas were overhead hazards exist. 25. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 26. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		

JSA Title: Equipment Transportation and Set-Up

JSA Number: JSA012-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input type="checkbox"/> Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
12. Transport equipment to work area	10. Back Strain 11. Slips/ Trips/ Falls 12. Traffic 13. Cuts/abrasions from equipment 14. Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
13. Moving equipment to its planned location	2. Pinch Hazard 3. Slips/ Trips/ Falls	1. Wear proper PPE (leather gloves) 2. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint
14. Equipment Set-up	2. Pinch Hazard 3. Cuts/abrasions to knuckles/hands 4. Back Strain	1. Wear proper PPE (leather gloves) 2. Wear proper PPE (leather gloves) 3. Use proper lifting techniques / Use wheeled transport
15. All activities	21. Slips/ Trips/ Falls 22. Hand injuries, cuts or lacerations during manual handling of materials 23. Foot injuries 24. Back injuries 25. Traffic 26. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 27. High Noise levels 28. Overhead hazards 29. Heat Stress/ Cold Stress 30. Eye Injuries	27. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 28. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 29. Wear Langan approved safety shoes 30. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 31. Wear high visibility clothing & vest / Use cones or signs to designate work area

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)		32. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 33. Wear hearing protection 34. Wear hard hat / Avoid areas where overhead hazards exist. 35. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 36. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



Job Safety Analysis (JSA) Health and Safety

JSA Title: 55-gallon Drum Sampling

JSA Number: JSA043-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input checked="" type="checkbox"/> Safety Goggles	<input checked="" type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input checked="" type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	

Other: All Drums are required to be labeled. Langan employees do not open or move undocumented drums or unlabeled drums without proper project manager authorization.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
16. Unpack/Transport equipment to work area.	15. Back Strains 16. Slip/Trips/Falls 17. Cuts/Abrasions from equipment 4. Contusions from dropped equipment	10. Use proper lifting techniques/Use wheeled transport 11. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 12. Wear proper PPE (leather gloves, long sleeves). 4. Wear proper PPE (Langan approved safety shoes).
17. Open Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 2. Pressure from drums.	1. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 2. Open drum slowly to relieve pressure. Wear proper PPE: face shield and goggles; correct gloves; and over garments.
18. Collecting Soil/Fluid Sample	4. Irritation to eye from vapor, soil dust, or splashing 5. Irritation to exposed skin	2. Wear proper eye protection including safety glasses/ face shield/goggles and when necessary, splash guard. If dust or vapor phase is present, wear appropriate safety breathing gear (1/2 mask or full face mask with correct filter) 3. Wear proper skin protection including nitrile gloves.
19. Closing Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid.	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches.
20. Moving Drums	2. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 3. Back Strains	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 3. Use proper lifting techniques/Use wheeled transport

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
21. All activities	31. Slips/ Trips/ Falls 32. Hand injuries, cuts or lacerations during manual handling of materials 33. Foot injuries 34. Back injuries 35. Traffic 36. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 37. High Noise levels 38. Overhead hazards 39. Heat Stress/ Cold Stress 40. Eye Injuries	37. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 38. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 39. Wear Langan approved safety shoes 40. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 41. Wear high visibility clothing & vest / Use cones or signs to designate work area 42. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 43. Wear hearing protection 44. Wear hard hat / Avoid areas where overhead hazards exist. 45. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Take breaks as necessary to avoid heat/cold stress 46. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



**Job Safety Analysis (JSA)
Health and Safety**

JSA Title: Direct-Push Soil Borings
JSA Number: JSA004-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input checked="" type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input checked="" type="checkbox"/> Other: Half-face respirator, dust cartridges, PID (if applicable)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
22. Move equipment to work site	18. Back strain when lifting equipment 19. Slips/ Trips/ Falls while moving equipment 20. Traffic (if applicable) 21. Pinched fingers or running over toes during geoprobe set-up 22. Overturn drilling rig while transporting to loading dock on flat-bed tow truck	13. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 14. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 15. Wear high visibility safety vests or clothing / Exercise caution 16. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 17. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
23. Calibration of monitoring equipment	6. Skin or eye contact with calibration chemicals 7. Pinch fingers in monitoring equipment	4. Wear proper PPE (safety glasses/ goggles) 5. Wear proper PPE (leather gloves)
24. Set-up geoprobe rig	5. Geoprobe rig movement	3. All field personnel should stay clear of the geoprobe rig while moving / Use a spotter when backing up the geoprobe
25. Advance geoprobe rods below ground surface to desired depth	4. Underground utilities 5. High noise levels	4. Clean all subsurface soil borings to a minimum of 5 feet below grade 5. Wear proper PPE (hearing protection)
26. Remove and open acetate liner	41. Pinched fingers while removing macrocore 42. Cuts/lacerations when cutting acetate liner open 43. Exposure to hazardous vapors	1. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Health and Safety Plan

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Remove and open acetate liner (cont'd)	44. Skin contact with contaminated soil	4. Wear proper PPE (nitrile gloves)
27. Sample Collections a) Monitor parameters b) Prepare sample containers and labels	1. Contact with potentially contaminated soil 2. Lacerations from broken sample bottles 3. Back strain while transporting full coolers 4. Internal exposure to contaminants and metals through inhalation of dust 5. Slips/ Trips/ Falls	1. Use monitoring devices / Wear proper PPE (safety glasses, nitrile gloves) 2. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage 6. Use proper lifting techniques / Do not lift heavy loads without assistance 7. Avoid creating dust / If necessary, wear a half mask respirator with applicable dust cartridge / Inspect respirator for damage and cleanliness prior to use / Clean respirator after each use and store in a clean, secure location 8. Be alert / Follow good housekeeping procedures
28. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Cuts/lacerations from acetate liner 2. Pinched fingers/hand while opening/closing drum 3. Skin contact with contaminated soil 4. Soil debris in eyes	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (nitrile gloves) 4. Wear proper PPE (safety glasses)
8. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Back, arm or shoulder strain from moving drums 2. Pinch fingers/hand in drum cart when moving drums 3. Pinch fingers/hand when operating lift-gate on vehicle 4. Contact with potentially contaminated groundwater when moving improperly sealed drums 5. Slips when moving drums 6. Drop drum on feet/toes	47. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance 48. Wear proper PPE (cut-resistant or leather gloves) 49. Wear proper PPE (cut-resistant or leather gloves) 50. Wear proper PPE (nitrile gloves underneath work gloves) 51. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions 52. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum
9. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas where overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
9. All activities (cont'd)	10. Eye Injuries	10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



**Job Safety Analysis (JSA)
Health and Safety**

JSA Title: **Site Inspection**

JSA Number: **JSA024-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input checked="" type="checkbox"/> Rubber Boots
<input checked="" type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input checked="" type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input type="checkbox"/> Other: _____				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
29. Jobsite Pre-briefing	23. None	18. Review JSA, SOP's, and discuss hazards that may be present and control measures for present hazards while on-site.
2. Working near railroads	1. Passing Trains. 2. Slip/Trips/Falls.	1. Wear reflective vest/ Stay away from tracks/ Do not cross tracks within 10 ft. of train car or when there is a train within view/listen for train horn. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
3. Walking around site	6. Uneven terrain 7. Wildlife: Stray animals, mice/rats, vectors (i.e. mosquitoes, bees, etc.) 8. Weather: Heat/cold stress 9. Slip/Trips/Falls 10. Foot injuries 11. Eye injuries	9. Pay attention to surrounding area (puddles, wet, frozen, uneven areas); Mark with cones or spray paint. 10. Use bug spray/ Avoid stray animals/Use repellent when needed. 11. Dress for the correct weather situation/ Use sunscreen or protective clothing in sunlight, layers in cold weather/ Drink plenty of fluids/ Take breaks when needed. 4. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones. 5. Wear proper PPE (Langan approved safety shoes)/ Change wet socks during cold weather. 6. Wear proper PPE (safety glasses/goggles).
4. Working near road	1. Passing vehicles 2. Slip/Trips/Falls	1. Wear reflective vest/ Stay away from roadway/ Use buddy system/ Place signage or cones when needed. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
5. All activities	45. Slips/ Trips/ Falls 46. Hand injuries, cuts or lacerations during manual handling of materials 47. Foot injuries 48. Back injuries 49. Traffic	53. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 54. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 55. Wear Langan approved safety shoes

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	50. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 51. High Noise levels 52. Overhead hazards 53. Heat Stress/ Cold Stress 54. Eye Injuries	56. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 57. Wear high visibility clothing & vest / Use cones or signs to designate work area 58. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 59. Wear hearing protection 60. Wear hard hat / Avoid areas where overhead hazards exist. 61. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 62. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



Job Safety Analysis (JSA) Health and Safety

JSA Title: Building Construction Oversight

JSA Number: JSA006-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input checked="" type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input checked="" type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	

Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
30. Transport equipment to work area	24. Back Strain 25. Slips/ Trips/ Falls 26. Traffic 27. Cuts/abrasions from equipment 28. Contusions from dropped equipment	6. Use proper lifting techniques / Use wheeled transport 7. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 8. Wear proper PPE (high visibility vest or clothing) 9. Wear proper PPE (leather gloves, long sleeves) 10. Wear proper PPE (safety shoes)
31. Drilling/anchor bolt installation	8. Hazards associated with drilling, flying objects, heavy equipment, ground level hazards and dust 9. Slips/ Trips/ Falls 10. Hazards associated with concrete work	3. Maintain a safe distance from drilling operation / Wear proper PPE (hard hat, safety glasses, safety shoes, safety vest) 4. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint / Wear the proper PPE (safety shoes) 5. Maintain a safe distance from pouring operation
32. Steel building erection	6. Overhead hazards, falling objects 7. Pinching/crushing hazards	5. Wear proper PPE (hard hat, safety glasses, safety vest) / Be aware of overhead hazards and maintain a safe distance of at least 10 ft. 6. All personnel should make others aware of moving objects or their intent to move objects / Avoid areas where pinching and crushing hazards are possible
33. All activities	55. Slips/ Trips/ Falls 56. Hand injuries, cuts or lacerations during manual handling of materials 57. Foot injuries 58. Back injuries 59. Traffic 60. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 61. High Noise levels 62. Overhead hazards	63. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 64. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 65. Wear Langan approved safety shoes 66. Use proper lifting techniques / Consider load location, task repetition, and load weight when evaluating what is safe or unsafe to lift / Obtain assistance when possible

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)	63. Heat Stress/ Cold Stress 64. Eye Injuries	67. Wear high visibility clothing & vest / Use cones or signs to designate work area 68. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 69. Wear hearing protection 70. Wear hard hat / Avoid areas where overhead hazards exist. 71. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Take breaks as necessary to avoid heat/cold stress 72. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<u>Prepared by:</u>		
<u>Reviewed by:</u>		



**Job Safety Analysis (JSA)
Health and Safety**

JSA Title: Geotechnical Drilling

JSA Number: JSA014-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
<input checked="" type="checkbox"/> Safety Shoes	<input checked="" type="checkbox"/> Long Sleeves	<input checked="" type="checkbox"/> Safety Vest (Class 2)	<input checked="" type="checkbox"/> Hard Hat	<input checked="" type="checkbox"/> Hearing Protection
<input checked="" type="checkbox"/> Safety Glasses	<input type="checkbox"/> Safety Goggles	<input checked="" type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Nitrile Gloves	<input type="checkbox"/> PVC Gloves
<input checked="" type="checkbox"/> Leather Gloves	<input type="checkbox"/> Cut Resist. Gloves	<input type="checkbox"/> Fall Protection	<input type="checkbox"/> Fire Resistant Clothing	<input type="checkbox"/> Rubber Boots
<input type="checkbox"/> Insect/Animal Repellent	<input type="checkbox"/> Ivy Blocker/Cleaner	<input type="checkbox"/> Traffic Cones/Signs	<input type="checkbox"/> Life Vest/Jacket	
<input checked="" type="checkbox"/> Other: Nomex (as needed)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
34. Transport equipment to work area	29. Back Strain 30. Slips/ Trips/ Falls 31. Traffic 32. Cuts/abrasions from equipment 33. Contusions from dropped equipment	11. Use proper lifting techniques / Use wheeled transport 12. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 13. Wear proper PPE (high visibility vest or clothing) 14. Wear proper PPE (leather gloves, long sleeves) 15. Wear proper PPE (safety shoes)
35. Set-up HSA/SPT rig	11. Slips/ Trips/ Falls 12. Pinch Hazards 13. High noise levels 14. Clothing entanglement 15. Electrocution/falling equipment and debris from raising HSA/SPT rig mast 16. Carbon monoxide poisoning 17. HSA/SPT rig roll-over 18. HSA/SPT rig movement	6. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint 7. Wear proper PPE (leather gloves) 8. Wear proper PPE (hearing protection) 9. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 10. Wear proper PPE (hard hats) / Be aware of locations at all times / Look up, down and around before raising mast / Check HSA/SPT drill rig mast for loose objects/debris before raising 11. Stand upwind of rig engine 12. Do not move rig with mast raising / Set stabilizers prior to raising mast / Inspect work area / If area appears unstable, the boring locations should be moved. 13. All field personnel should stay clear of rig while moving / Use a spotter when backing up the rig
36. Advance HSA/SPT rods, augers and casing below ground surface	8. Strain wrist/bruise palm 9. Pinched fingers 10. Back strain 11. Clothing entanglement 12. Carbon monoxide poisoning 13. Bruised/Broken toes/feet	7. Wear proper PPE (leather gloves) / Use proper technique for preparing rods / Use second person, if necessary 8. Wear proper PPE (leather gloves) 9. Use proper lifting techniques / Obtain assistance if needed 10. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 11. Stand upwind of the rig

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
37. Advance HSA/SPT rods, augers and casing below ground surface (cont'd)	14. High noise levels	12. Wear proper PPE (safety shoes) 13. Wear proper PPE (hearing protection)
38. Remove and open split spoon	12. Pinched fingers 13. Cuts/lacerations 14. Skin contact with contaminated soil and groundwater	1. Wear proper PPE (nitrile and leather gloves) 2. Wear proper PPE (leather gloves) 3. Wear proper PPE (nitrile gloves, safety glasses)
39. Repeat steps 3 and 4 until desired depth is reached	1. See steps 3 and 4	1. See steps 3 and 4
40. Remove HSA/SPT rods, augers and casing and place in storage rack	1. Clothing entanglement 2. Back strain 3. Pinched fingers 4. Carbon monoxide poisoning 5. High noise levels	1. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 2. Use proper lifting techniques / Obtain assistance if needed 3. Wear proper PPE (leather gloves) 4. Stand upwind of rig engine 5. Wear proper PPE (hearing protection)
41. Tremie-grout borehole with a cement-bentonite grout mixture	1. Splash cement/bentonite grout on face/eyes 2. Back strain 3. Pinched fingers	1. Wear proper PPE (safety glasses) 2. Use proper lifting techniques / Obtain assistance if needed 3. Wear proper PPE (nitrile gloves, leather gloves)
42. Decontaminate equipment	1. Contact with potentially impacted material 2. Contact with sharp pieces of equipment	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (leather gloves)
43. Patch soil boring location to return to pre-existing conditions (i.e. concrete, asphalt, grass)	1. Cuts/lacerations 2. Splashed concrete on face/eyes 3. Hammer fingers/hands when patching asphalt	1. Wear proper PPE (leather gloves) / Use scissors for cutting 2. Use proper PPE (safety glasses) 3. Be aware of hands/fingers during hammering / Wear proper PPE (leather gloves)
44. All activities	65. Slips/ Trips/ Falls 66. Hand injuries, cuts or lacerations during manual handling of materials 67. Foot injuries 68. Back injuries 69. Traffic 70. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 71. High Noise levels 72. Overhead hazards 73. Heat Stress/ Cold Stress 74. Eye Injuries	73. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 74. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 75. Wear Langan approved safety shoes 76. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 77. Wear high visibility clothing & vest / Use cones or signs to designate work area 78. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellent / Use bug spray when needed 79. Wear hearing protection 80. Wear hard hat / Avoid areas where overhead hazards exist.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		81. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 82. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>Print Name</u>	<u>Sign Name</u>	<u>Date</u>
<i>Prepared by:</i>		
<i>Reviewed by:</i>		

ATTACHMENT H

TAILGATE SAFETY BRIEFING FORM

LANGAN TAILGATE SAFETY BRIEFING

Date: _____

Time: _____

Leader: _____

Location: _____

Work Task:

SAFETY TOPICS (provide some detail of discussion points)

Chemical Exposure Hazards and Control: _____

Physical Hazards and Control: _____

Air Monitoring: _____

PPE: _____

Communications: _____

Safe Work Practices: _____

Emergency Response: _____

Hospital/Medical Center Location: _____

Phone Nos.: _____

Other: _____

FOR FOLLOW-UP (the issues, responsibilities, due dates, etc.)

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

APPENDIX C

COMMUNITY AIR MONITORING PLAN (CAMP)

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required 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 might reasonably consist 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.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (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, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should 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.

1. 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 the 15-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.

2. 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.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

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.

1. 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 $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Project Plan

for

GERARD AVENUE AND EAST 146th STREET
404 Exterior Street, 417 and 445 Gerard Avenue,
440 Major Wm Deegan Boulevard
Bronx, New York
NYSDEC BCP Site No. C203111

Prepared For:

445 Gerard LLC
c/o The Domain Companies
11 Park Place, Suite 1705
New York, NY 10007

Prepared By:

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Landscape Architecture and Geology, D.P.C.
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November 2019
Langan Project No. 170487003

LANGAN

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ATTACHMENTS

Attachment A:	Résumés
Attachment B:	Laboratory Reporting Limits and Method Detection Limits
Attachment C:	Analytical Methods/Quality Assurance Summary Table
Attachment D:	Sample Nomenclature

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared on behalf of 445 Gerard LLC (the "Volunteer"), for Gerard Avenue and East 146th Street site at 404 Exterior Street, 417 and 445 Gerard Avenue, and 440 Major Wm Deegan Boulevard. The Volunteer was accepted into the New York State Brownfield Cleanup Program (BCP) on June 27, 2018. BCP Site No. C203111 was assigned to the Site by NYSDEC. This QAPP supports the Interim Remedial Measures Work Plan (IRMWP), which provides additional site information and data collected previously by Langan.

This QAPP specifies analytical methods to be used to ensure that data collected during Site management are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 PROJECT OBJECTIVES

The objective of the IRM is to remove sources of petroleum contamination and prevent additional environmental impacts to site media (soil, groundwater, and soil vapor) through the removal of the underground storage tanks (USTs), associated fuel lines, pumps, and appurtenances and surrounding petroleum-impacted soil, to the extent practical. Removal of petroleum-impacted soil under this IRMWP would facilitate removal of source material in a more timely manner than waiting until after the forthcoming RAWP is issued and approved (after the project design progresses).

1.3 SCOPE OF WORK

The scope of this IRMWP includes the following:

- Decommissioning and removal of five underground storage tanks (USTs), five aboveground storage tanks (ASTs) and four oil water separators
- Excavation and off-site disposal of historic fill and petroleum-impacted soil in the vicinity of the USTs, ASTs and oil water separators, if encountered
- Backfilling the excavation with clean soil (meeting the lower of Protection of Groundwater [PGW] and RURR SCOs), recycled concrete aggregate (RCA), or virgin crushed stone to restore the site until the RAWP is implemented

- Preparation of the site for remediation including demolition of the existing buildings and abating hazardous building materials (ACM) and lead based paint (LBP) which is required to perform the full-scale remediation
- Preparation of a Construction Completion Report (CCR) to document satisfactory implementation of this IRMWP

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objective is to investigate and characterize the nature and extent of environmental impacts on the site associated with AOCs through soil, groundwater, and soil vapor sampling. DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and QA/QC documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and/or matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil and groundwater samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. For soil vapor or air samples, analytical accuracy will be assessed by examining the percent recoveries that are added to each sample, internal standards, laboratory method blanks, and instrument calibration.

- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.
- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- **Sensitivity** – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION

The IRMWP will be overseen by Langan on behalf of the Participant. Langan will oversee the UST excavation and backfilling. Langan will perform the sample collection as described in the IRMWP Data validation services will be performed by Emily Strake; résumé attached (Attachment A). The analytical services will be performed by Alpha Analytical Laboratories, Inc. of Westborough, Massachusetts (NYSDOH ELAP certification number 11148).

Key contacts for this project are as follows:

445 Gerard, LLC:	Mr. Chris Papamichael Telephone: (212) 991-0001 Fax: (646) 285-0003
Remediation Engineer:	Mr. Jason Hayes, P.E. Telephone: (212) 479-5427
Langan Project Director:	Mr. Ryan Manderbach, CHMM Telephone: (212) 479-5582
Langan Project Manager:	Mr. Brian Gochenaur Telephone: (212) 479-5479
Langan Field Team Leader:	Ms. Julia Leung Telephone: (212) 479-5452
Langan Quality Assurance Officer (QAO):	Mr. William Bohrer Telephone: (212) 479-5533
Langan Health and Safety Manager:	Mr. Tony Moffa, CHMM Telephone: (215) 491-6500
Langan Health and Safety Officer:	Mr. William Bohrer Telephone: (410) 984-3068
Data Validator:	Emily Strake, Langan Telephone: (215) 491-6526
Laboratory Representative:	Mr. Ben Rao (Alpha) Telephone: (201) 847-2951
Field Personnel:	To Be Determined

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate the engineering controls on the Site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the Site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

4.1 PRECISION

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit (RL) meet the precision criteria if the absolute difference is less than $\pm 2x$ the RL and acceptable based on professional judgement. For results greater than 2x the RL, the acceptance criteria is a relative percent difference (RPD) of $\leq 50\%$ (soil and air), $< 30\%$ (water). RLs and method detection limits (MDL) are provided in Attachment B.

4.2 ACCURACY

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance to all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank will be evaluated against laboratory blanks (preparation or method)

and evaluated against field samples collected on the same day to determine potential for bias. Trip blanks are not required for non-aqueous matrices but are planned for non-aqueous matrices where high concentrations of VOCs are anticipated.

Laboratory accuracy is assessed by evaluating the percent recoveries of matrix spike/matrix spike duplicate (MS/MSD) samples, laboratory control samples (LCS), surrogate compound recoveries, and the results of method preparation blanks. MS/MSD, LCS, and surrogate percent recoveries will be compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

4.3 COMPLETENESS

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Air, soil vapor, soil, and groundwater data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

4.4 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed

and that specified sampling and analysis techniques are used. This is performed by following applicable standard operating procedures (SOPs) and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and are required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable EPA methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

4.5 COMPARABILITY

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data will be comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability will be controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data will be evaluated to determine whether they may be combined with contemporary data sets.

4.6 SENSITIVITY

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest. The project director will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the project director will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of

detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in DER-10, and as described in Section 5.3.

Site-specific MS and MSD samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of submitted sample volume with analytes of interest. Additional sample volume is not required by the laboratory for this purpose. An MS/MSD analysis will be analyzed at a rate of 1 out of every 20 samples, or one per analytical batch. MS/MSD samples are only required for soil and groundwater samples.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

5.1 FIELD DOCUMENTATION PROCEDURES

Field documentation procedures will include summarizing field data in field books and field data sheets, and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches will be made in the field logbook when appropriate

- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures
- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file. Samples for per- and polyfluoroalkyl substances (PFAS) will be collected in accordance with the applicable SOP.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number in accordance with the sample nomenclature guidance included in Attachment D, and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink.

5.2 EQUIPMENT CALIBRATION AND PREVENTATIVE MAINTENANCE

A photoionization detector (PID) will be used during the sampling activities to evaluate work zone action levels, collect pre- and post-sample readings for air samples, screen soil samples, and collect monitoring well headspace readings. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

A water quality meter (YSI 6820 or similar) will be used during purging of groundwater to measure pH, specific conductance, temperature, dissolved oxygen, turbidity and oxidation-reduction-potential (ORP), every ten minutes. A portable turbidity meter (LaMotte or similar) may also be used to measure turbidity. Water-quality meters should be calibrated and the results documented before use each day using standardized field calibration procedures and calibration checks.

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel.

A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 SAMPLE COLLECTION

Soil Samples

Soil samples will be collected at the base of the excavation upon completion of the Remedial Action Work Plan.

5.4 SAMPLE CONTAINERS AND HANDLING

Certified, commercially clean sample containers will be obtained from the analytical laboratory. If soil or groundwater samples are being collected, the laboratory will also prepare and supply the required trip blanks and field blank sample containers and reagent preservatives. Sample bottle containers, including the field blank containers, will be placed into plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with ice in Ziploc® bags (or equivalent) to maintain a temperature of $4^{\circ} \pm 2^{\circ} \text{C}$.

Soil and/or groundwater samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of $4^{\circ} \pm 2^{\circ} \text{C}$ while on-site and during sample shipment to the analytical laboratory. Samples collected for PFAS analysis will be kept in dedicated laboratory-supplied sample containers, separate from samples for other analyses.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.9, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.6.

5.5 SAMPLE PRESERVATION

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical

interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.6 SAMPLE SHIPMENT

5.6.1 Packaging

Soil vapor samples canisters can be stored and transported without additional packaging. Soil and groundwater sample containers will be placed in plastic coolers. Ice in Ziploc® bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc® bag (or equivalent) and placed inside the cooler. The cooler will be taped closed and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (e.g. FedEx) then laboratory address labels will be placed on top of the cooler.

5.6.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory by a laboratory-provided courier under the chain-of-custody protocols described in Section 5.9.
- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.7 DECONTAMINATION PROCEDURES

Decontamination procedures will be used for non-dedicated sampling equipment. Decontamination of field personnel is discussed in the site-specific sample Health and Safety Plan (HASP) included in Appendix B of the IRMWP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

5.8 RESIDUALS MANAGEMENT

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the Site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

Residual fluids (such as purge water) will be collected and stored in DOT-approved (or equivalent) 55-gallon drums in a designated storage area at the site. The residual fluids will be transported to the on-site wastewater treatment plant or analyzed, characterized and disposed off-site in accordance with applicable federal and state regulations. Residual fluids such as decontamination water may be discharged to the ground surface, however, if gross contamination is observed, the residual fluids will be collected, stored, and transported similar purge water or other residual fluids.

5.9 CHAIN OF CUSTODY PROCEDURES

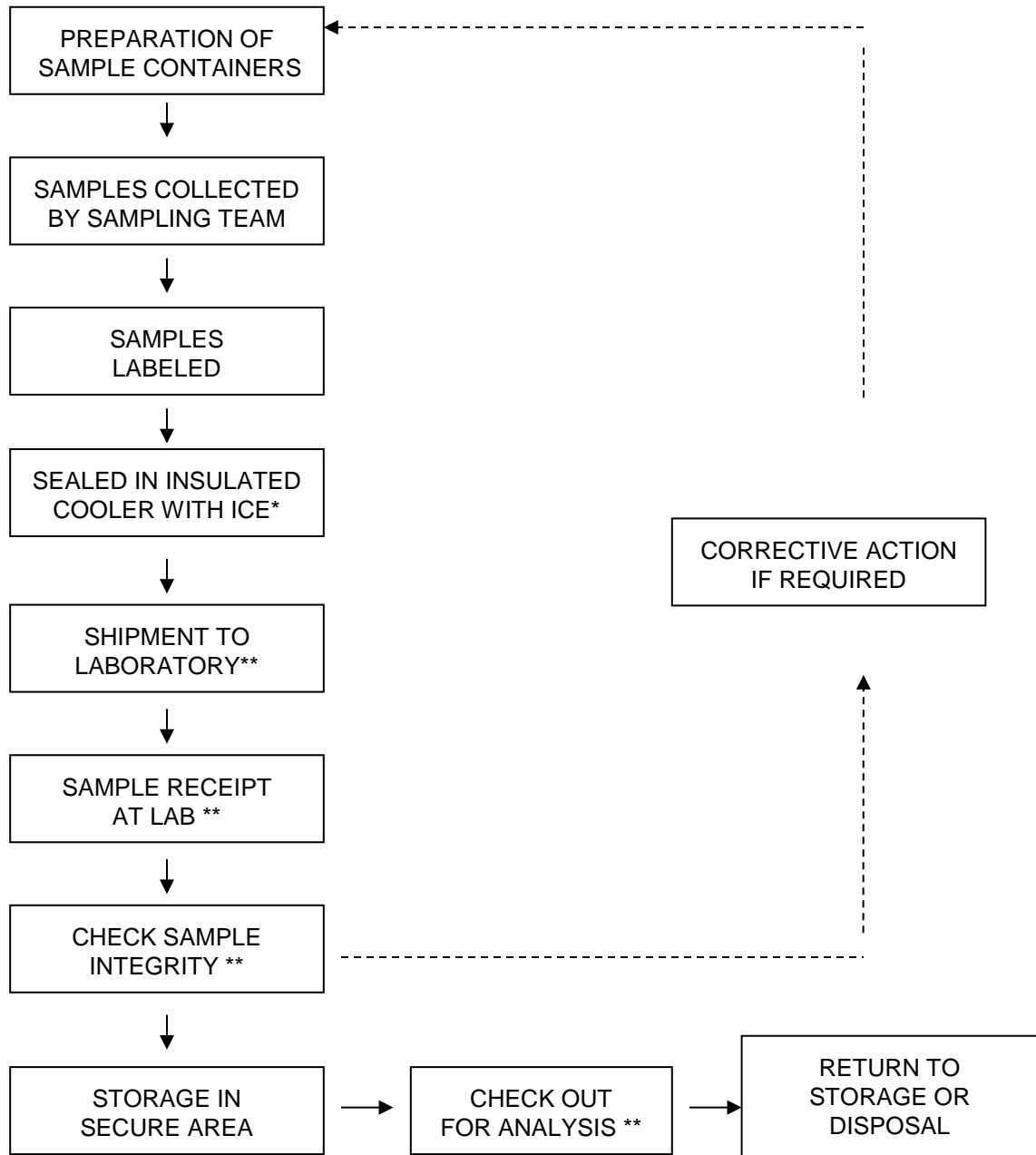
A chain-of-custody protocol has been established for collected samples that will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the sample collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. All entries will be made in waterproof, permanent blue or black ink.
- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling team leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling team leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

If soil and/or groundwater samples are collected, sample coolers will be accompanied by the chain-of-custody form, sealed in a Ziploc[®] bag (or equivalent) and placed on top of the samples or taped to the inside of the cooler lid. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form.

Samples will be packaged for shipment to the laboratory with the appropriate chain-of-custody form. A copy of the form will be retained by the sampling team for the project file and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory. A flow chart showing a sample custody process is included as Figure 5.1, and chain-of-custody forms from York are included as Figures 5.2 and 5.3.

Figure 5.1 Sample Custody



*SUMMA CANISTERS SHOULD NOT BE ICED
** REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 Sample Chain-of-Custody Form – Air Sample

YORK ANALYTICAL LABORATORIES, INC.		Field Chain-of-Custody Record - AIR		Page ____ of ____	
1200 Research Dr., Shelton, CT 06415 (203) 225-1371 Fax (203) 357-0166		NOTE: York's Std. Terms & Conditions are listed on the back side of this document. This document serves as your written authorization to York to proceed with the analysis requested and your signature binds you to York's Std. Terms & Conditions unless superseded by written contract.		York Project No. _____	
YOUR Information Company: _____ Address: _____ Phone No.: _____ Contact Person: _____ E-Mail Address: _____		Report To: Company: _____ Address: _____ Phone No.: _____ Contact Person: _____ E-Mail Address: _____		YOUR Project ID Purchase Order No. _____	
Print Clearly and Legibly. All information must be complete. Samples will NOT be logged in and the turn-around time clock will not begin until any questions by York are resolved.		DATE Validity and Other Gas Analyzers EPA TO-15 List _____ EPA TO-14A List _____ NYSDEC VTI list _____ Toxicology Identified Compounds _____ NYSDEC STEMS List _____ Air VPM _____		Turn-Around Time Report Type/Deliverables RI/SII - Same Day <input type="checkbox"/> Summary Report _____ RI/SII - Next Day <input type="checkbox"/> Summary or QA Summary _____ RI/SII - Two Day <input type="checkbox"/> CT RCF Package _____ RI/SII - Three Day <input type="checkbox"/> NY ASP A Package _____ RI/SII - Four Day <input type="checkbox"/> NY ASP B/C/T/Pkg _____ RI/SII - Five Day <input type="checkbox"/> NJDP Reduced _____ Standard 5-7 Days <input type="checkbox"/> Economic Deliverable _____ EBD (Specify Type) _____ Standard Exced _____ Regulatory Compliance Exced _____	
Air Matrix Codes AL - INDOOR Ambient Air AD - OUTDOOR Amb. Air AP - Vapor Emission Well AS - Process Gas Effluent AS- SOURCE Vapor 5A-5B		Project Specific List by TO-15 Medium NIDFP Target List CTDEP RCF Target List OTHER _____		Botulinum Toxin Detection 5.1 ng/ml _____ NYSDEC VTI Levels _____ NIDFP Low level _____ Radon Survey _____ Other _____	
Sample Identification Name (printed) _____ Samples Collected/Authorized By (Signature) _____		DATE Sampled Carrier Volumes (Prefer Sampling (in Lit)) _____ Carrier Volumes (Post Analysis) Sealed from the Main Vials and flow below		Sample Media <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag <input type="checkbox"/> 1 Liter Sorbent canister <input type="checkbox"/> Tedlar Bag	
Comments _____ _____ _____		Samples Requisitioned By _____ Date/Time _____ Samples Requisitioned By _____ Date/Time _____		Samples Received By _____ Date/Time _____ Samples Received in LAB by _____ Date/Time _____	

William Bohrer

Project Geologist
Geologist



32 years in the industry

Mr. Bohrer is an experienced geologist responsible for managing Langan's environmental standards and Health and Safety compliance for projects throughout New York City. His services include dissemination of environmental protocols, troubleshooting at project sites, in-house/field training, and maintenance of quality standards across the environmental discipline. Mr. Bohrer has a diverse and extensive background in geophysics, hydrogeology, mining and petroleum, and geotechnical engineering. He has developed conceptual site models for public, industrial and commercial facilities nationwide.

Selected Projects

NYU Poly – 122 Johnson Street, Brooklyn, NY
Con Edison of New York at Governor's Island, NY, NY
535 4th Avenue, Brooklyn, NY
27 Wooster Street, New York, NY
42 West Street, Brooklyn, NY
455 West 19th Street, New York, NY
Kings Plaza Mall, Brooklyn, NY
Hudson Yards "Terra Firma", New York, NY
Hudson Yards, Platform Special Inspection, New York, NY
PSAC II, Bronx, NY
595-647 Smith Street, Brooklyn, NY
New York University, 7-13 Washington Square North Investigation
New York, NY
New York University, 4 Washington Square Village, New York, NY
125th Street and Lenox Avenue, New York, NY
Sullivan Street Development, New York, NY
Hudson Crossing II, New York, NY
New York Aquarium, Shark Tank & Animal Care Facility, Brooklyn, NY
209-219 Sullivan Street, New York, NY
261 Hudson Street, New York, NY
460 Washington Street, New York, NY
552 West 24th Street, New York, NY
Brooklyn Bridge Park Pier 1, New York, NY
International Leadership Bronx Charter School, Bronx, NY
203 East 92nd Street, New York, NY
HighLine 28-29, New York, NY
539 Smith Street Bulkhead, Brooklyn, NY
Willets Point, Corona, NY
Plume Migration and Fracture Flow Aquifer Investigation, Brunswick, MD
Plume Migration and Fracture Flow Aquifer Investigation, Fallston, MD

Education

Post Graduate Studies in Geophysics
Cornell University

B.S., Geology
Tufts University

Professional Registration

40 Hour OSHA HazWOPER

OSHA Construction Safety & Health

OSHA Supervisory Certification
Credential (TWIC)

Transportation Worker Identification

NYS DEC- Protecting New York's
Natural Resources with Better
Construction Site Management"

Affiliations

American Association of Petroleum
Geologists

National Groundwater Association

Geological Society of America

PA Council of Professional Geologists

LANGAN

William Bohrer

Emergency Response Site Investigation & Remediation,
Wappingers Falls, NY

Emergency Response Site Investigation & Remediation, Allentown, PA

Emergency Response Site Investigation & Remediation, Shamokin, PA

Bermuda International Airport, Jet Fuel Release Investigation, Bermuda

Little Missouri River Basin, Geotechnical Site Evaluation (Horizontal Drilling
Pipeline Install), ND

Seismic Susceptibility Evaluation (Class 2 Injection Wells), Litchfield, OH

Bedrock Mapping, Bradford and Sullivan Counties, PA

Soil Solidification, Carteret, NJ

JULIA LEUNG, PE

PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING & WATER RESOURCES

Ms. Leung is an environmental engineer working in the New York Metro area. Her projects involve the investigation and assessment of environmental systems including physical/chemical processes, water chemistry, environmental system analysis, solid waste and water resources engineering, stormwater design and hydrology.

SELECTED PROJECTS

Phase I ESA, Various Locations, NYC and Westchester County, NY – Senior Staff Engineer. Service provided for construction site, a recreational center, and undeveloped forested land.

Phase II ESI, 412 East 90th Street, New York, NY – Senior Staff Engineer. Phase II ESI. Waste classification investigation. Geotechnical sub-surface investigation.

420 Kent Avenue, Brooklyn, NY – Senior Staff Engineer. Provided services for a Phase II ESI, waste classification investigation, hazardous lead delineation, remedial investigation, and Brownfield Cleanup Program Application.

West and Watts Development, New York, NY – Staff Engineer. Performed construction oversight for a Brownfield Cleanup Program site. Drafted final engineering report and soil management program.

Mixed-Use Building (203 East 92nd Street), New York, NY – Staff Engineer. Provided construction oversight.

BAM North Tower, Brooklyn, NY – Staff Engineer. Performed Phase II investigation in active parking lot.

Phase II ESI, FedEx Distribution Facility (830 Fountain Avenue), Brooklyn, NY – Staff Engineer. Performed Phase II investigation for 7.35-acre site.

Waste Classification and Lead Delineation Investigation (261 Hudson Street), New York, NY – Staff Engineer. Performed waste classification investigation and lead delineation investigation. Drafted waste classification report and lead delineation report.

Waste Classification Investigation (41-43 East 22nd Street), New York, NY – Staff Engineer. Performed waste classification investigation in a low ceiling basement.

Columbia University, Manhattanville Campus, New York, NY – Staff Engineer. Provided construction oversight of large-scale excavation project.

Riverside Building 5, New York, NY – Staff Engineer. Performed subsurface investigation and Phase II investigation.



EDUCATION

M.E., Environmental Engineering
Cornell University

B.S., Biological Engineering
(Environmental Studies Concentration)
Cornell University

PROFESSIONAL REGISTRATION

Professional Engineer (PE)
in NY

10-Hour OSHA

AFFILIATIONS

American Society of Civil Engineers (ASCE)

JULIA LEUNG, PE

Condominium at 200 East 79th Street, New York, NY – Staff Engineer. Provided construction oversight of non-hazardous waste removal, waterproof installation, tieback installation and support of excavation installation.

Mercedes Benz of Manhattan (536 West 41st Street), New York, NY – Staff Engineer. Performed subsurface investigation. Oversaw repair of damaged vapor barrier.

Phase II ESI (627 Smith Street), Brooklyn, NY – Staff Engineer. Performed supplemental Phase II ESA investigation. Delineation of subsurface DNAPL plumes.

340 Court Street, Brooklyn, NY – Staff Engineer. Provided construction oversight including overseeing the closure of a 4,000 gallon UST; performed waste classification investigation.

Anthony Moffa Jr, CHMM

**Corporate Health and Safety Manager
Health & Safety Coordinator, Contingency Planning,
Compliance Auditing**



19 years in the industry ~ 12 years with Langan

Mr. Moffa has over nineteen years experience in providing environmental compliance assistance to both commercial and industrial facilities. His compliance auditing experience includes facility and process specific including the areas of waste management, stormwater and wastewater issues and air emissions. He has an extensive background in the areas of hazardous, non-hazardous and universal waste management. His level of experience includes working with federal, state and local authorities to ensure clients environmental compliance status on all levels. His compliance reporting includes federal and state specific reports. Completed federal reports include the Tier II, Toxic Chemical Release Inventories under SARA Title III and Biennial Hazardous Waste Reporting. Completed state specific reporting includes the Pennsylvania Form 26R and the New Jersey Release Pollution Prevention Report. He is experienced in the preparation, submittal and compliance monitoring of NPDES & stormwater applications and permits. He has developed site specific contingency plans for both industrial and commercial facilities for facilities throughout Pennsylvania and New Jersey.

Selected Projects

Verizon - Pennsylvania, Inc. Philadelphia Naval Yard, PA
Confidential Client, Philadelphia, PA
Penn Color, Doylestown, PA
Verizon - Pennsylvania, Inc., Phase I Environmental Assessment,
Lansdowne, PA
Verizon - Pennsylvania, Inc. (formerly Bell Atlantic Corporation),
Various Locations, PA
Kinder Morgan Bulk Terminals, Inc. Fairless Hills, PA
PP&L – Martins Creek, Bangor, PA
Concord Beverage Company, Concordville, PA
Penn Color, Hatfield, PA
National Starch & Chemical Company, Bloomfield, NJ
Air Products and Chemicals, Inc., Middlesex, NJ
PSEG Services Corporation, Jersey City, NJ
Sampson Coatings, Richmond, VA
Custom Chemicals Corporation, Elmwood Park, NJ

Education

M.E., Science
Penn State University

B.S., Physics
West Chester University

Professional Registration

Certified Hazardous Material Manager
(CHMM)

Professional Affiliations

Pennsylvania Chamber of Business &
Industry

Chemical Council of New Jersey

New Jersey Business & Industry
Association

Professional Training

OSHA 40-Hour Hazardous Waste Site
Training Course

National Safety Council – CPR,
Bloodborne Pathogen and First Aid
Training

Steel Tank Institute Certified AST
Inspector

PADEP Pollution Prevention & Energy
Efficiency Qualified Assessor

LANGAN

Emily G. Strake

**Project Chemist/ Risk Assessor
Environmental Engineering**



15 years in the industry ~ 2 years with Langan

Ms. Strake has fifteen years of environmental chemistry, risk assessment, auditing, and quality assurance experience. Most recently, she has focused her efforts on human health risk assessment, and has been the primary author or key contributor of risk assessment reports and screening evaluations for projects governed under RCRA, CERCLA, SWRCB, DTSC, DNREC, PADEP, NJDEP, CTDEEP, ODEQ, NYSDEC and MDE. She has experience in site-specific strategy development, which has enabled her to perform assessments to focus areas of investigation and identify risk-based alternatives for reducing remediation costs. Ms. Strake is a member of the Interstate Technology and Regulatory Council Risk Assessment Team responsible for the development and review of organizational risk assessment guidance documents and serves as a National Trainer in risk assessment for the organization.

Ms. Strake has ten years of experience assessing potential adverse health effect to humans from exposure to hazardous contaminants in soil, sediment, groundwater, surface water, ambient and indoor air, and various types of animal, fish, and plant materials. She understands and applies environmental cleanup guidance and policies associated with multiple federal and state agencies. Additionally, she has broad experience in the development of preliminary remediation goals and site-specific action levels. She is proficient with the USEPA and Cal/EPA Johnson and Ettinger Model for Subsurface Vapor Intrusion into Buildings, USEPA's Adult Lead Methodology, DTSC's Leadsread 7 and 8, and statistical evaluation of data using USEPA's ProUCL software.

Ms. Strake has extensive experience in environmental data validation, focused on ensuring laboratory deliverables follow specific guidelines as described by regulatory agencies and the analytical methods employed. In addition, she has experience in EQUS chemical database management. She also has a broad range of environmental field experience and maintains current OSHA HAZWOPER certification.

Ms. Strake is experienced in auditing laboratory and field-sampling activities for compliance with Quality Assurance Project Plans (QAPPs), the National Environmental Laboratory Accreditation Conference Standards Quality Systems manual, and applicable USEPA Guidance. Ms. Strake has also audited on-site laboratories in support of groundwater treatment operations and implemented corrective actions. Her responsibilities include writing reports on the value of laboratory work, writing/editing QAPPs for clients and project-specific sites, peer reviewing colleague's work, and mentoring staff within the office. She has also served as the Quality Assurance officer for several long-term projects, responsible for the achievement of all forms of Quality Control/Quality Assurance by onsite personnel relating to sampling, analysis, and data evaluation.

Ms. Strake has several years' experience analyzing investigative samples, writing laboratory Standard Operating Procedures (SOPs), and managing all

Education

MBA, Business Administration
The University of Scranton

B.S., Chemistry
Cedar Crest College

Training

40 hr. OSHA HAZWOPER Training/Nov 2002

8 hr. HAZWOPER Supervisor/June 2004

8 hr. OSHA HAZWOPER Refresher/Oct 2012

American Red Cross First Aid & CPR certified

Emily G. Strake

aspects of procedures and analyses for Optical Emission Spectrometry, X-Ray Fluorescence, Ignition analysis, and Atomic Absorption. Her experience also includes operating and performing routine instrument maintenance for GC/MS and IR. Ms. Strake has worked extensively on developing rapid soil characterization programs for PCB and pesticide analyses utilizing enzyme-linked immunosorbent assays, and was also involved in efforts to develop new instrumentation to quantify microbial nitrification of ammonium.

Selected Project Experience

Human Health Risk Assessment

- Major League Soccer's San Jose Earthquakes Stadium – Utilized the Johnson and Ettinger advanced soil gas model to calculate risk and hazard associated with inhalation of chlorinated solvents for the redevelopment of a public soccer stadium. Soil gas data was modeled assuming three soil stratum and site-specific soil, building, and exposure parameters. The Earthquakes' stadium is set to open in 2015.
- Exelon - Developed a human health risk assessment for a utility-owned former Manufactured Gas Plant (MGP) site in Pennsylvania, under Pennsylvania's Act 2 Program. Used ProUCL 4.0 statistical software to determine upper limits for full data sets and non-detect data. Conducted vapor intrusion modeling (via the Johnson & Ettinger model) and prepared vapor intrusion reports showing that risks to volatile organic compounds in soils and groundwater were not impacting indoor air quality.
- Texas Instruments – Participated in a collaboration with Robert Ettinger and Geosyntec Consulting to develop comments to USEPA Region IX and the San Francisco Regional Water Quality Control Board regarding vapor intrusion at South Bay Superfund Sites. The focus of the response was to outline scientific and policy objections to EPA's recommended TCE interim short-term indoor air response action levels and guidelines, and to clarify the use of California-modified indoor air screening levels for assessing and responding to TCE and PCE subsurface vapor intrusion into indoor air.
- Regency - Conducted vapor intrusion modeling for a dry cleaning facility in the Philadelphia area. Predictive modeling using the Johnson and Ettinger approach indicated that estimated contaminant levels would not adversely affect human receptors.
- Veteran's Affairs - Completed a human health risk evaluation of the potential future risk associated with inhalation of indoor air for the Veteran's Administration. Soil, soil gas, and groundwater samples were collected as part of the site characterization. Achieved DTSC approval of the risk assessment approach and conclusions.
- DOW Chemical - Calculated Medium Specific Concentrations (MSCs) for unregulated contaminants using the PADEP protocols to assist in the clean-up of a monomer tank explosion in Bristol, Pennsylvania. Selected appropriate surrogate toxicity data and evaluated novel on-site constituents by analogy.
- Santa Clara Landfill – Developed a risk assessment for the characterization of landfill gas at the Santa Clara All Purpose Landfill, requested by the San Francisco Regional Water Quality Control Board. The purpose of the landfill gas characterization is to evaluate specific compounds in landfill gas, their concentrations,

spatial patterns, and extent throughout the site, and to perform a vapor intrusion risk assessment for proposed future development.

- Avon - Completed a human health risk assessment in accordance with NYSDEC guidance for a redevelopment property located in Rye, New York. The objective of the evaluation was to characterize the risks associated with potential future human exposures to soil and groundwater affected by a release from the Site's former No. 2 fuel oil UST. The intended future use of the Site was a playground to be utilized by the general public for open play on commercial recreational equipment.
- Golden Gate National Parks Conservancy – Peer reviewed a Preliminary Endangerment Assessment Report for the Battery East Trail. The assessment included a human health risk evaluation that estimated carcinogenic risk from exposure to PAHs and dioxin/furans in soil using toxic equivalency to benzo(a)pyrene and 2,3,7,8-TCDD.
- Sunoco Refineries – Derived site-specific soil PRGs for lead using the EPA's adult lead model for two former Sunoco refineries. Completed receptor evaluations in accordance with USEPA risk assessment guidance to develop exposure parameters under current and reasonably anticipated future land use scenarios.
- Honeywell - Completed a focused human health risk evaluation of PAH contaminants for under NJDEP's Site Remediation Program. Applied a blended approach of qualitative risk characterization and quantitative risk calculation to propose closure of AOCs following the remedial investigation.
- Delaware City Refinery - Performed comprehensive human health risk assessment for a petroleum refinery in Delaware City, Delaware. The risk assessment was the basis for a thorough characterization and assessment of potential risks posed by site-specific conditions. Developed various human exposure scenarios by using both Federal and State-Specific guidance for soil, groundwater, and surface water exposure.
- Occidental Chemical - Completed multiple AOC-specific risk assessments utilizing and applying the guidance set forth by the DTSC's Human Health Risk Assessment Note 1 (Default Exposure Factors for Use in Risk Assessment), Note 3 (Recommended Methodology for Use of USEPA Regional Screening Levels, and Note 4 (Screening Level Human Health Risk Assessments).
- Floreffe Terminal - Performed human health risk assessment for contamination resulting from a 3.9 million gallon diesel oil tank collapse along the Monongahela River. Evaluated potential impacts to human health via exposure to soil, groundwater, and surface water. Calculated site-specific standards for soil remediation.
- Ryder – Developed Alternative Direct Exposure Criteria for PAH-impacted fill material at a commercial facility. Site-specific soil screening levels for incidental ingestion of soil were calculated following a forward risk evaluation for current on-site receptors.
- Rohm and Haas - Prepared an Act 2 site-specific human health risk assessment for the oldest industrial facility in the United States, located in southeast Philadelphia. The objective of the risk assessment was to determine achievable possible future land-use options under Pennsylvania's Land Recycling Program. The risk assessment included evolution of multiple site-COPCs and

Emily G. Strake

constituent suites: VOCs, SVOCs, PCBs, pesticides, and metals (including lead). Evaluated the potential for indoor air inhalation through J&E modeling of soil gas and groundwater.

- DuPont - Worked as a key participant in the human health risk evaluation of mercury associated with legacy contamination of the South River located in Waynesboro, Virginia.

Chemical Data Quality

- Audited multiple accredited laboratories in New Jersey and Pennsylvania on behalf of clients using USEPA Guidance on Technical Audits and Related Assessments for Environmental Data Operations. The audits included full-suite USEPA and SW-846 methodology; and included reviewing staff experience and training records, equipment and facilities, policies, practices, procedures, and documentation for sample receipt, analysis, instrument maintenance, standard preparation, calibration and traceability, control charting, corrective actions, data reduction and review, report generation, and waste disposal.
- Reviewed and validated data packages for RCRA Facilities Investigation at a Philadelphia-area chemical site; issued data validation reports to project personnel and regulatory agencies. The reviews included evaluation of quarterly groundwater, soil, and soil vapor matrices. Participated in RCRA groundwater sampling, developed and executed the investigation's QAPP, and coordinated with the laboratory to schedule and perform field-sampling events.
- Completed Data Usability Summary Reports in accordance with NYSDEC DER-10 guidance for soil, groundwater, sediment surface water, soil gas, ambient air and indoor air analytical results.
- Acted as the Quality Assurance Officer for several long-term projects in Pennsylvania, Maryland, and New Jersey, Delaware, responsible for the achievement of all forms of QA/QC as it related to sampling, analysis, and data evaluation.
- Participated in a CERCLA site investigation; assessed the usability of sample results for numerous matrices including dust, sediment, soils, and various aqueous matrices for a remedial investigation under the Contract Laboratory Program. Implemented an on-site pesticide immunoassay program to delineate soil contamination in real-time.
- EQUIS data manager for database migration of historical groundwater results associated with remediation activities; assisted with natural attenuation data evaluation and gained experience in geochemical trends associated with intrinsic biodegradation.
- Coordinated the collection of fish tissue samples and determined the validity of the analytical results associated with CERCLA and RCRA site characterizations. Assessed duck blood analytical results for the Connecticut Department of Energy and Environmental Protection Bureau of Natural Resources.

ATTACHMENT B

Laboratory Reporting Limits and Limits of Quantitation

QuantitationLimits

Quantitation Limits						
Method	Analysis	Matrix	Analyte	LOQ	MRL	Units
			Volatile Organics			
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,1,1-Trichloroethane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	1,1,2,2-Tetrachloroethane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon)	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	1,1-Dichloroethane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,1-Dichloroethylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,2,3-Trichloropropane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,2,4-Trichlorobenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,2,4-Trimethylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	1,2-Dichlorobenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,2-Dichloroethane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,3,5-Trimethylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	1,3-Dichlorobenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDEC Part375List	Soil	1,3-Dichloropropane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	1,4-Dichlorobenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	1,4-Dioxane	50	100	ug/kg
EPA8260C	VolatileOrganics,NYSDEC Part375List	Soil	2-Butanone	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	4-Methyl-2-pentanone	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Acetone	5.0	10	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Benzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Carbondisulfide	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Carbontetrachloride	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Chlorobenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Chloroethane	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Chloroform	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	cis-1,2-Dichloroethylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	EthylBenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Isopropylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Methyltert-butylether(MTBE)	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Methylenechloride	5.0	10	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Naphthalene	2.5	10	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	n-Butylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	n-Propylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	o-Xylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	p- & m-Xylenes	5.0	10	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	p-Isopropyltoluene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	sec-Butylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	tert-Butylbenzene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Tetrachloroethylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Toluene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	trans-1,2-Dichloroethylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart 375List	Soil	Trichloroethylene	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	VinylChloride	2.5	5.0	ug/kg
EPA8260C	VolatileOrganics,NYSDECPart375List	Soil	Xylenes,Total	7.5	15	ug/kg
			Semi-VolatilesOrganics			
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart 375 List	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Anthracene	83.5	167	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Anthracene	20.9	41.7	ug/kg

QuantitationLimits

EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Benzoicacid	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Benzylbutylphthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Chrysene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Diethylphthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Dimethylphthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Di-n-butylphthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Di-n-octylphthalate	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Fluorene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Isophorone	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Naphthalene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDECPart375List	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Phenol	20.9	41.7	ug/kg
EPA8270D	Semi-Volatiles,NYSDEC Part 375 List	Soil	Pyrene	20.9	41.7	ug/kg
			PCBs			
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1016	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1221	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1232	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1242	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1248	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1254	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1260	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1262	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	Aroclor1268	0.0167	0.0167	mg/kg
EPA8082A	PolychlorinatedBiphenyls(PCB)	Soil	TotalPCBs	0.0167	0.0167	mg/kg
			Pesticides			
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	4,4'-DDD	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	4,4'-DDE	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	4,4'-DDT	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	Parathion	1.32	1.32	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	Aldrin	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	alpha-BHC	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	alpha-Chlordane	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	beta-BHC	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	delta-BHC	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	Dieldrin	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	EndosulfanI	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	EndosulfanII	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	Endosulfansulfate	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	Endrin	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	gamma-BHC (Lindane)	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	gamma-Chlordane	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375TargetList	Soil	Heptachlor	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	Heptachlorepoide	0.330	0.330	ug/kg
EPA8081B	Pesticides,NYSDECPart 375Target List	Soil	Methoxychlor	0.330	0.330	ug/kg
			Herbicides			
EPA8151A	Herbicides,NYSDECPart375TargetList	Soil	2,4,5-T	20.0	20.0	ug/kg
EPA8151A	Herbicides,NYSDECPart375TargetList	Soil	2,4,5-TP (Silvex)	20.0	20.0	ug/kg
EPA8151A	Herbicides,NYSDECPart 375TargetList	Soil	2,4-D	20.0	20.0	ug/kg
			Inorganics			
EPA6010C	Metals,NYSDECPart 375	Soil	Arsenic	1.00	1.00	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Barium	1.00	1.00	mg/kg

QuantitationLimits

EPA6010C	Metals,NYSDECPart 375	Soil	Beryllium	0.100	0.100	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Cadmium	0.300	0.300	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Chromium	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Cobalt	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Copper	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Iron	2.00	2.00	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Lead	0.300	0.300	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Manganese	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Nickel	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Selenium	1.00	1.00	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Silver	0.500	0.500	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Vanadium	1.00	1.00	mg/kg
EPA6010C	Metals,NYSDECPart 375	Soil	Zinc	1.00	1.00	mg/kg
EPA7473	Mercuryby7473	Soil	Mercury	0.0300	0.0300	mg/kg
EPA9014/9010C	Cyanide,Total	Soil	Cyanide,total	0.500	0.500	mg/kg
EPA7196A	Chromium, Hexavalent	Soil	Chromium, Hexavalent	0.350	0.500	mg/kg
Calculation	Chromium,Trivalent	Soil	Chromium,Trivalent	0.250	0.500	mg/kg
*Limitsareadvisoryonly						

ATTACHMENT C

Analytical Methods/Quality Assurance Summary Table

Quality Control Limits for Soil Samples										
Method	Analysis	Matrix	Analyte	Surrogate %	Duplicate	MS %	MSRPD	LCS %	LCSRPD	PS
Volatile Organics										
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,1-Trichloroethane	-	-	42-145	30	71-137	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2,2-Tetrachloroethane	-	-	16-167	56	79-129	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	-	-	11-160	31	58-146	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethane	-	-	46-142	36	75-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,1-Dichloroethylene	-	-	30-153	31	64-137	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,3-Trichloropropane	-	-	38-155	48	81-126	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trichlorobenzene	-	-	10-151	52	80-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2,4-Trimethylbenzene	-	-	10-170	242	84-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichlorobenzene	-	-	10-147	52	85-122	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichloroethane	-	-	48-133	32	71-133	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3,5-Trimethylbenzene	-	-	10-150	62	82-126	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichlorobenzene	-	-	10-144	51	84-124	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,3-Dichloropropane	-	-	43-142	36	83-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dichlorobenzene	-	-	10-160	52	84-124	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,4-Dioxane	-	-	10-191	196	10-228	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	2-Butanone	-	-	10-189	67	58-147	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	4-Methyl-2-pentanone	-	-	10-166	47	72-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Acetone	-	-	10-196	150	36-155	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Benzene	-	-	43-139	64	77-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon disulfide	-	-	10-131	36	10-136	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Carbon tetrachloride	-	-	35-145	31	66-143	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chlorobenzene	-	-	21-154	32	86-120	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroethane	-	-	15-160	40	51-142	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chloroform	-	-	47-142	29	76-131	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	cis-1,2-Dichloroethylene	-	-	42-144	30	74-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Ethyl Benzene	-	-	11-158	42	84-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Isopropylbenzene	-	-	10-162	57	81-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methyl tert-butyl ether (MTBE)	-	-	42-152	47	74-131	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Methylene chloride	-	-	28-151	49	57-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Naphthalene	-	-	10-158	95	86-141	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Butylbenzene	-	-	10-162	96	80-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	n-Propylbenzene	-	-	10-155	56	74-136	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	o-Xylene	-	-	10-158	51	83-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p- & m- Xylenes	-	-	10-156	47	82-128	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p-Isopropyltoluene	-	-	10-147	60	85-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	sec-Butylbenzene	-	-	10-157	56	83-125	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	tert-Butylbenzene	-	-	10-160	79	80-127	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Tetrachloroethylene	-	-	30-167	33	80-129	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Toluene	-	-	21-160	50	85-121	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	trans-1,2-Dichloroethylene	-	-	29-153	30	72-132	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Trichloroethylene	-	-	24-169	30	84-123	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Vinyl Chloride	-	-	12-160	35	52-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Xylenes, Total	-	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichloroethane-d4	77-125	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Toluene-d8	85-120	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	p-Bromofluorobenzene	76-130	-	70-130	30	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Fluorobenzene	-	-	70-130	30	70-130	30	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	Chlorobenzene-d5	-	-	-	-	-	-	-
EPA 8260C	Volatile Organics, NYSDEC Part 375 List	Soil	1,2-Dichlorobenzene-d4	-	-	-	-	-	-	-
Semi-Volatiles Organics										
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4,6-Trichlorophenol	-	-	12-138	30	27-122	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dichlorophenol	-	-	16-144	30	23-133	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4-Dinitrophenol	-	-	10-132	30	10-149	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,6-Dinitrotoluene	-	-	36-124	30	30-125	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Chlorophenol	-	-	28-114	30	25-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylnaphthalene	-	-	10-143	30	16-127	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Methylphenol	-	-	10-160	30	10-146	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitroaniline	-	-	33-122	30	24-126	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Nitrophenol	-	-	12-127	30	17-129	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3- & 4-Methylphenols	-	-	16-115	30	20-109	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	3-Nitroaniline	-	-	24-128	30	23-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Chloroaniline	-	-	10-124	30	10-117	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	4-Nitrophenol	-	-	10-141	30	10-136	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Acenaphthene	-	-	13-133	30	17-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Acenaphthylene	-	-	25-125	30	16-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Aniline	-	-	10-112	30	10-111	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Anthracene	-	-	27-128	30	24-124	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(a)anthracene	-	-	20-147	30	25-134	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(a)pyrene	-	-	18-153	30	29-144	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(b)fluoranthene	-	-	10-163	30	20-151	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(g,h,i)perylene	-	-	10-157	30	10-153	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Benzo(k)fluoranthene	-	-	10-157	30	10-148	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzoic acid	-	-	10-130	30	10-116	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Benzyl butyl phthalate	-	-	10-129	30	10-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Bis(2-ethylhexyl)phthalate	-	-	10-138	30	10-141	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Chrysene	-	-	18-133	30	24-116	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Dibenzo(a,h)anthracene	-	-	10-146	30	17-147	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dibenzofuran	-	-	26-134	30	23-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Diethyl phthalate	-	-	30-119	30	23-122	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Dimethyl phthalate	-	-	34-120	30	28-127	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-butyl phthalate	-	-	20-128	30	19-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Di-n-octyl phthalate	-	-	10-133	30	10-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Fluoranthene	-	-	10-155	30	36-125	30	-

EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Fluorene	-	12-150	30	16-130	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Hexachlorobenzene	-	16-142	30	10-129	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Indeno(1,2,3-cd)pyrene	-	10-155	30	10-155	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Isophorone	-	14-127	30	14-131	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Naphthalene	-	15-132	30	20-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Nitrobenzene	-	18-125	30	20-121	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pentachlorophenol	-	10-160	30	10-143	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenanthrene	-	10-151	30	24-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenol	-	11-124	30	15-123	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Pyrene	-	13-148	30	24-132	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2-Fluorophenol	20-108	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	Phenol-d5	23-114	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Nitrobenzene-d5	22-108	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	2-Fluorobiphenyl	21-113	-	-	-	-	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	Soil	2,4,6-Tribromophenol	19-110	30-130	30	30-130	30	-
EPA 8270D	Semi-Volatiles, NYSDEC Part 375 List	SOIL	Terphenyl-d14	24-116	-	-	-	-	-
PCBs									
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1016	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1221	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1232	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1242	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1248	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1254	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1260	-	40-140	50	40-130	25	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1262	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1268	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Total PCBs	-	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Tetrachloro-m-xylene	30-140	-	-	-	-	-
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Decachlorobiphenyl	30-140	-	-	-	-	-
Pesticides									
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDD	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDE	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	4,4'-DDT	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Parathion	-	-	-	-	-	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Aldrin	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-BHC	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	alpha-Chlordane	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	beta-BHC	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	delta-BHC	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Dieldrin	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan I	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan II	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endosulfan sulfate	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Endrin	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-BHC (Lindane)	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	gamma-Chlordane	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Heptachlor epoxide	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Hexachlorocyclopentadiene	-	30-150	30	40-140	30	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Tetrachloro-m-xylene	30-140	-	-	-	-	-
EPA 8081B	Pesticides, NYSDEC Part 375 Target List	Soil	Decachlorobiphenyl	30-140	-	-	-	-	-
Herbicides									
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-T	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-TP (Silvex)	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-D	-	30-150	35	40-140	30	-
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-Dichlorophenylacetic acid (DCAA)	30-150	-	-	-	-	-
EPA 6010C	Metals, NYSDEC Part 375	Soil	Arsenic	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Barium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Beryllium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cadmium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Chromium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Cobalt	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Copper	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Iron	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Lead	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Manganese	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Nickel	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Selenium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Silver	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Vanadium	-	35	75-125	35	80-120	75-125
EPA 6010C	Metals, NYSDEC Part 375	Soil	Zinc	-	35	75-125	35	80-120	75-125
EPA 7473	Mercury by 7473	Soil	Mercury	-	35	75-125	67.6-131	-	-
EPA 9014/9010C	Cyanide, Total	Soil	Cyanide, total	-	15	79.6-107	72.9-112	-	-
EPA 7196A	Chromium, Hexavalent	Soil	Chromium, Hexavalent	-	35	75-125	3.9-150	-	-
Calculation	Chromium, Trivalent	Soil	Chromium, Trivalent	-	-	-	-	-	-
* Limits are advisory only									

Sampling and Analytical Method Requirements

Parameter	Matrix	Preparation Method	Analytical Method*	Containers per Sample			Preservation Requirements			Holding Time	Frequency
				No.	Size	Type	Temp.	Light Sensitive	Chemical		
VOCs by GC/MS	SOIL	5035A	SW-846 Method 8260C	3 vials, 1 jar for moisture	40 ml vials, any size jar	glass vials clear glass jar	2-6° C	No	MeOH/ NaHSO4/ freeze unpreserved	14 days	1 per sample
SVOCs by GC/MS	SOIL	3546	SW-846 Method 8270D	1	8 oz	amber glass jar	2-6° C	Yes	NA	14 days	1 per sample
Trace metals by ICP-AES	SOIL	3050B	SW-846 Method 6020A	1	8 oz	clear glass jar	NA	No	NA	6 months	1 per sample
Mercury by Cold Vapor AAS	SOIL		SW-846 Method 7471B	1	8 oz	clear glass jar	NA	No	NA	28 days	1 per sample
Trace Metals by AAS and Direct Aspiration	SOIL	3050B	SW-846 Method 7000 series	1	8 oz	clear glass jar	NA	No	NA	6 months	1 per sample
Herbicides	SOIL	3545A/3550B	SW-846-8151A	1	8 oz	clear glass jar	2-6° C	Yes	NA	14 days	1 per sample
PCBs by GC	SOIL	3545A	SW-846 Method 8082A	1	8 oz	clear glass jar	2-6° C	No	NA	14 days*	1 per sample
Chlorinated Pesticides by GC	SOIL	3545A	SW-846 Method 8081B	1	8 oz	clear glass jar	2-6° C	No	NA	14 days	1 per sample
PFAS via LCMSMS-Isotope Dilution	SOIL	537	537-Isotope	1	8 oz	clear glass jar	2-6° C	No	NA	28 days	1 per sample
Quality Assurance / Quality Control Samples											
Trip Blanks	WATER	5035A	SW-846 Method 8260C	2 vials	40 ml vials	glass vials	2-6° C	No	HCl	14 days	1 per day of sampling
Field Blanks	WATER	varies	SW-846 Method 8260C, SW-846 Method 8270D, SW-846 Method 6020A, SW-846	12	varies	varies	2-6° C	varies	varies	varies	1 per 20 samples
Matrix Spike / Matrix Spike Duplicate	SOIL	varies	Method 7471B, SW-846 Method 7000 series, SW-846-8151A, SW-846	24	varies	varies	2-6° C	varies	varies	varies	1 per 20 samples
Duplicates	SOIL	varies	Method 8082A, SW-846 Method 8081B, 537-Isotope	12	varies	varies	2-6° C	varies	varies	varies	1 per 20 samples

*The US EPA has revised holding times for PCB to one year in the latest revision of EPA SW-846.

Method and SOP Reference Tables

Analytical Method Reference

SOP Ref.	Analytical Method	Document Title	Rev. No	Date	SO P Ref	Document Title	Date	Revision Number	SOP Reference Number
1A	SW-846 Method 8260C	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	3.0	July 2006	1B	Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry in Aqueous and Soil Samples by EPA SW-846 8260C, and EPA Method 624	05/06/15	3.3	GCMS VOC 011700
2A	SW-846 Method 8270D	Semivolatile Organic Compounds by 8270C,SW-846 by(GC/MS)"	2.0	July 2006	2B	Analysis of <u>Semivolatile Organics (BNAs)</u> by Gas Chromatography/Mass Spectrometry in Aqueous and Soil Samples by EPA SW-846 8270D	01/30/15	3.0	GCMS SVOC
3A	SW-846 Method 6010C	DeterminationofTrace Metals By SW-846Method6010 Inductively CoupledPlasma-AtomicEmission Spectrometry"	2.0	July 2006	3B	Analysis of Metals in Digestates Using Inductively Coupled Plasma-Atomic Emission Spectrometry by EPA Method 200.7 and SW-846 6010C	10/09/15	1.7	M ICP 031195
4A	SW-846 Method 6020A	DeterminationofTrace Metals By SW-846Method6020 Inductively Coupled Plasma-Mass Spectrometry"	2.0	July 2006	4B	Analysis of Metals in Digestates Using Inductively Coupled Plasma/Mass Spectrometry by EPA Method 200.8 and SW-846 Method 6020A	09/24/14	1.5	M ICPMS
5A	SW-846 Method	Determination of Mercury By SW-846 Methods 7470/7471 Cold Vapor Atomic Absorption Spectroscopy	2.0	July 2006	5B	Analysis of Mercury in Aqueous, Soil, and Sludge Samples by EPA SW-846 Methods 7470A, 7471B, and EPA Methods 245.1 and 245.2	05/01/13	1.7	M Hg 120998

	7470A/7471B								
6A	Method 200.7	Trace Elements in Water, solids, and biosolids by Inductively coupled plasma-atomic emission spectrometry	5	January 2001	6B	Analysis of Metals in Digestates Using Inductively Coupled Plasma-Atomic Emission Spectrometry by EPA Method 200.7 and SW-846 6010C	10/09/15	1.7	M ICP 031195
7A	SW-846 Method 8082A	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	1	February 2007	7B	Analysis of Polychlorinated Biphenyls by Gas Chromatography Using EPA SW-846 Method 8082A	12/01/14	1.7	GC PCB011799
8A	SW-846 Method 8081B	Organochlorine Pesticides by Gas Chromatography	2	February 2007	8B	Analysis of Chlorinated Pesticides by Gas Chromatography Using EPA SW-846 Method 8081B	12/15/15	1.7	GC Pest 011799
9A	SW-846 Method 8151A	Chlorinated Herbicides by GC using methylation or pentafluorobenzoylation derivatization	1	December 1996	9B	Analysis of Chlorinated Herbicides by Gas Chromatography Using EPA SW-846 8151A and SM 6640B	12/19/14	1.6	GC Herb
10A	EPA TO-15	Volatile Organics by Method T0-15	2.0	December 2006	10B	Determination of Volatile Organic Compounds in Air Matrices using Whole Air Sampling with Analysis by GC/MS by EPA Compendium Methods TO-14A and TO-15	12/19/14	1.6	GCMSAIR1116 92

Laboratory Equipment Calibration and Corrective Action

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
8260C	GC/MS	Initial calibration - 5 levels- one \leq quantitation limit	Prior to sample analysis	Response Factor (RF) $>$ 0.05 and %RSD $<$ 15%	Service instrument.	1B
8260C	GC/MS	Continuing calibration - mid-level standard	Once every 12 hours prior to sample analysis	RF %D $<$ 30% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	1B
8270D	GC/MS	Initial calibration - 5 levels- one \leq quantitation limit	Prior to sample analysis	Response Factor (RF) $>$ 0.05 and %RSD $<$ 15%	Service instrument.	2B
8270D	GC/MS	Continuing calibration - mid-level standard	Once every 12 hours prior to sample analysis	RF %D $<$ 30% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	2B
6010C	ICP-AES	Initial calibration - per instrument manufacturer's specifications - 1 level and a blank (Low-level calibration standard at quantitation limit must be analyzed if not included in initial calibration.)	Prior to sample analysis	Per manufacturer's specifications and method requirements	Run new calibration curve and/or service instrument.	3B

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
6010C	ICP-AES	Continuing calibration - midlevel standard	Every 10 samples and at end of the analytical run	90-110%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	3B
6020A	ICP/MS	Initial calibration	Daily	≤ 0.995	Recalibrate and reanalyze	4B
6020A	ICP/MS	Continuing calibration - midlevel standard	Every 10 samples and at end of the analytical run	90-110%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	4B
7470A/ 7471B	CVAA	Initial calibration - 5 levels and a blank (one level must be at quantitation limit)	Prior to sample analysis.	$r > 0.995$	Run new calibration curve and/or service instrument.	5B
7470A/ 7471B	CVAA	Continuing calibration - mid-level standard	Every 10 samples and at the end of the analytical run.	80-120%	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	5B
8082A	GC/ECD	Continuing calibration - mid-level standard	1 standard per 20 samples or every 12 hours, whichever is more frequent.	CF %D < 15% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	7B
8081B	GC/ECD	Initial calibration - 5 levels - one \leq quantitation limit	Prior to sample analysis.	Calibration Factor CF %RSD	Run new calibration curve and/or service instrument.	8B

Method	Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
				<20% or r >0.99		
8081B	GC/ECD	Continuing calibration - mid-level standard	1 standard per 20 samples or every 12 hours, whichever is more frequent.	CF %D < 15% from initial calibration	Reanalyze continuing calibration standard. If still outside limits, recalibrate and reanalyze all samples since last compliant calibration standard.	9B

TO-15	GC/MS	Initial calibration minimum 5 standards 0.05/0.10 to 20 ppbv	As needed	≤30% RSD Allow 2 excursions	If the daily calibration technical acceptance criteria are not met, inspect the system for problems. it will be necessary to rerun the daily calibration sample.	10B
TO-15	GC/MS	Continuing calibration - mid-level standard, LCS and mid-level QC	Every 24 hours duplicate	70-130% D for compounds on compendium list; 50-150% for others	Recalibrate and report non-conforming compounds in case narrative	10B

Sample Handling and Custody Requirements

At the laboratory, the samples will be relinquished to the Sample Custodian with the signing of the COC, and fill out the sample receipt check list form. The samples will be inventoried and visually inspected for damage. Each sample is assigned a unique laboratory sample number. Samples are logged into the LIMS system. The login includes the lab number, client, date, matrix, preservation, parameters, and laboratory batch ID. This information along with the login date and time, submitter ID, laboratory due date and priority, date sampled, date received, receiver, and any other appropriate laboratory information is then input into the Laboratory Information Management System (LIMS). A form is generated by LIMS and the original COC is attached. Samples are transferred for preservation if necessary and refrigeration until analysis. The appropriate analyst or supervisor then performs analysis. After analysis is complete, water samples are held for 30 days and then samples are transferred to disposal; soil samples are held for 30 days, and then sent to storage for an additional 60 days in case further testing is requested. Samples are appropriately characterized and disposed in accordance with Federal, State, and Local regulations.

NA = Not Applicable

NE = Not Established

The Reporting Limits (RL) are based upon the lowest calibration standard used for calibration.

Methanol multiplier: York takes 0.1 ml to 10.0 ml for a 100x dilution of the methanol-preserved soil VOC samples.

Prepared by York Analytical Laboratories, Inc. 01/24/2011.

Reporting Limit (RL) for individual compounds maybe elevated due to poor calibration performance at the RL. RL's may also be elevated for individual samples due to matrix interferences. MDL's vary instrument to instrument. The enclosed list represents typical limits for methods.

Laboratory Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
VOA Reagent/Method Blank	Batch	<RL Except for methylene chloride and acetone <25 ppb	Locate source of contamination & correct. Re-analyze MB
Reagent/Method Blank, Trip Blank, Field Blank	Batch	<RL	Locate source of contamination & correct. Re-analyze MB. Re- extract samples if MB is contami- nated
Duplicate	5% of Batch	≤30%	Re-analyze and narrate
Laboratory Con- trol Sample (LCS)	5% of Batch	Per method	Recalculate the percent recoveries. Locate & correct problem, re- extract/re-analyze associated sam- ples
MS/MSD pair, if requested	5% of Batch	Per method	Compare to LCS recoveries. Nar- rate any non-conformances
Other: Surrogate Spike	Per Sample	Per method	Re-extract per SOP

The following deliverables will be provided by the laboratory:

1. Client's Name
2. Project Number
3. Laboratory Sample ID
4. Client Sample ID
5. Collection Date
6. Sample Matrix
7. Analyses
8. Analytical Results
9. Reporting Limits (MDL and RL)
10. Reporting Units
11. Dilution Factor
12. Date Analyzed
13. Method Blank Results (if QA report requested)
14. Surrogate Recoveries and Acceptance Limits (if QA report requested)
15. Matrix Spike/Matrix Spike Duplicate Results and Acceptance Limits (if QA report requested)
16. Spike/ Duplicate Results and Acceptance Limits (if QA report requested)
17. Laboratory Control Sample Results and Acceptance Limits (if QA report requested)
18. Project Narrative which contains all non-

conformances if RCP or Category B-like deliverables

requested The following will be maintained by the

laboratory:

- All raw data including chromatograms
- Copies of Instrument Logbooks
- Analytical Benchsheets
- Other pertinent data

ATTACHMENT D

Sample Nomenclature

SAMPLE NOMENCLATURE

The sample nomenclature outlined below provides consistency between sample events and projects but, most importantly, establish unique sample IDs that will avoid confusion months or years after the sample has been collected. Furthermore, unique sample IDs are required for any data submitted to the NYSDEC in EDD format or being uploaded to an EQiS database.

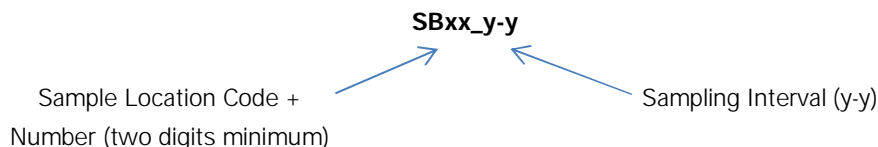
1.0 INVESTIGATION LOCATION CODES

SB	Soil Boring	SV	Soil Vapor Point
WC	Waste Characterization Boring	IA	Indoor Air
TP	Test Pit	AA	Ambient Air
EPSW	Endpoint Location (Sidewall)	SVE	Vapor Extraction Well
EPB	Endpoint Location (Bottom)	DS	Drum
MW	Monitoring Well	IDW	Investigation Derived Waste
TMW	Temporary Monitoring Well	SL	Sludge
SW	Surface Water	FP	Free Product

2.0 SAMPLE NOMENCLATURE

Each sample at a site must have a unique value.

- Soil/Sediment Samples:**

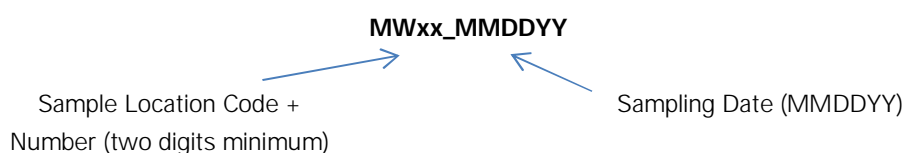


Sample Type	Sample Location Code	Sampling Depth or Interval (feet bgs or approx. elevation)	Sample Name
Phase II/Remedial Investigation			
Grab Soil Sample	SB01	2 to 4	SB01_2-4
	SB02	4	SB02_4
Waste Characterization			
Grab Soil Sample	WC01	2 to 4	WC01_2-4
	WC02	4	WC02_4
Composite Soil Sample from one or more locations	COMP01 or COMP02 + COMP03	0 to 10 (Fill)	COMP01_0-10

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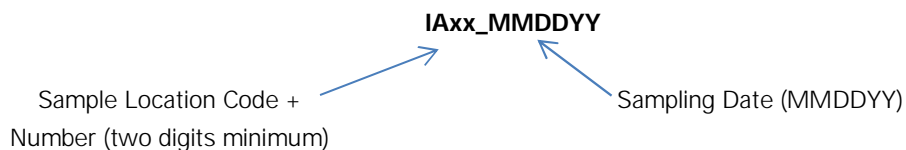
Sample Type	Sample Location Code	Sampling Depth or Interval (feet bgs or approx. elevation)	Sample Name
Endpoint Sampling			
Grab Soil Sample	EPSW01_N	5	EPSW01_N_5
	EPSW01_S	5	EPSW01_S_5
	EPSW01_E	5	EPSW01_E_5
	EPSW01_W	5	EPSW01_W_5
	EPB01	6	EPB01_6

- Groundwater/Surface Water Samples:**



Sample Type	Sample Location Code	Sampling Date	Sample Name
Groundwater Sample	MW01	02/21/2013	MW01_022113

- Air/Soil Vapor Samples:**



Sample Type	Sample Location Code	Date	Sample Name
Air Sample	IA01	02/21/2013	IA01_022113
Soil Vapor Sample	SV01	02/21/2013	SV01_022113
Vapor Extraction Well Sample	SVE01 (INLET/MIDPOINT/OUTLET)	02/21/2013	SVE01_IN_022113 SVE01_MID_022113 SVE01_OUT_022113

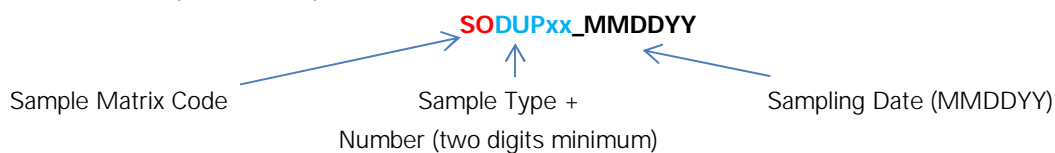
- QA/QC Samples:**

Sample Matrix Codes

SO	Soil	AS	Air
SE	Sediment	SV	Soil Vapor
GW	Groundwater	SL	Sludge
SW	Surface Water	FP	Free Product

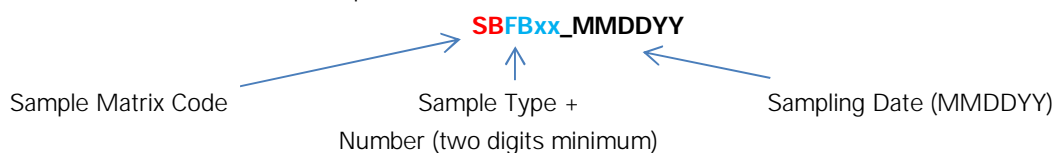
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- o Duplicates Samples



Sample Type	Parent Sample Code	Date	Sample Name
Groundwater Duplicate Sample (DUP)	MW01_022113	02/21/2013	GWDUP01_022113
Soil boring Duplicate Sample (DUP)	SBP01_022113	02/21/2013	SODUP01_022113
Grab Waste Characterization	WC01	02/21/2013	WCDUP01_022113
Composite Waste Characterization	COMP01	02/21/2013	COMPDUP01_022113

- o Field Blanks and Trip Blanks



Sample Type	Date	Sample Name
Groundwater Field Blank (FB)	02/21/2013	GWFB01_022113
Groundwater Trip Blank (TB)	02/21/2013	GWTB01_022113
Soil Field Blank	02/21/2013	SOFB01_022113
Soil Trip Blank	02/21/2013	SOTB01_022113

- o Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Parent Sample Name_MS or MSD

Sample Type	Sample Location	Parent Sample Name	Sample Name
Matrix Spike Soil (MS)	SB01	SB01_2-4	SB01_2-4_MS
Matrix Spike Soil Duplicate (MSD)	SB01	SB01_2-4	SB01_2-4_MSD
Matrix Spike GW (MS)	MW01	MW01	MW01_MS
Matrix Spike GW Duplicate (MSD)	MW01	MW01	MW01_MSD

3.0 NOTES

1. The sample location code should not exceed 20 characters and the sample name should not exceed 40 characters.
2. Sample location code (**SB01, MW01, etc.**) is a sequential number (starting with 01) and should be a minimum of two digits.
3. Sample Interval (**SB01_0-5**) is separated from the sample location code with an underscore, and the top and bottom interval with a dash. Soil and sediment sample intervals should always be in

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- feet. Soil and sediment sample intervals should contain no "/" or "()" or unit.
4. Sample date (MW01_022113) is separated from the sample location code with an underscore and should be provided in MMDDYY format [the date should contain no "/" or "-"].
 5. If groundwater samples are collected from multiple intervals within one well, you may assign a letter designation (in lower case) to the well ID to differentiate between intervals (i.e., MW01a_022113, MW01b_022113, and MW01c_022113). The letter "a" would indicate the shallowest interval and "c" the deepest. The actual depth intervals should be documented in the project field book or field sheets and the letter designations should be used consistently between sampling events.
 6. According to USEPA's Contract Laboratory Program (CLP) Guidance for Field Samplers (January 2011), field duplicate samples should remain "blind" to the laboratory (i.e., they should have separate CLP Sample numbers). Assign two separate (unique) CLP sample numbers (i.e., one number to the field sample and one to the duplicate). Submit blind to the laboratory. (<http://www.epa.gov/superfund/programs/clp/download/sampler/CLPSamp-01-2011.pdf>)