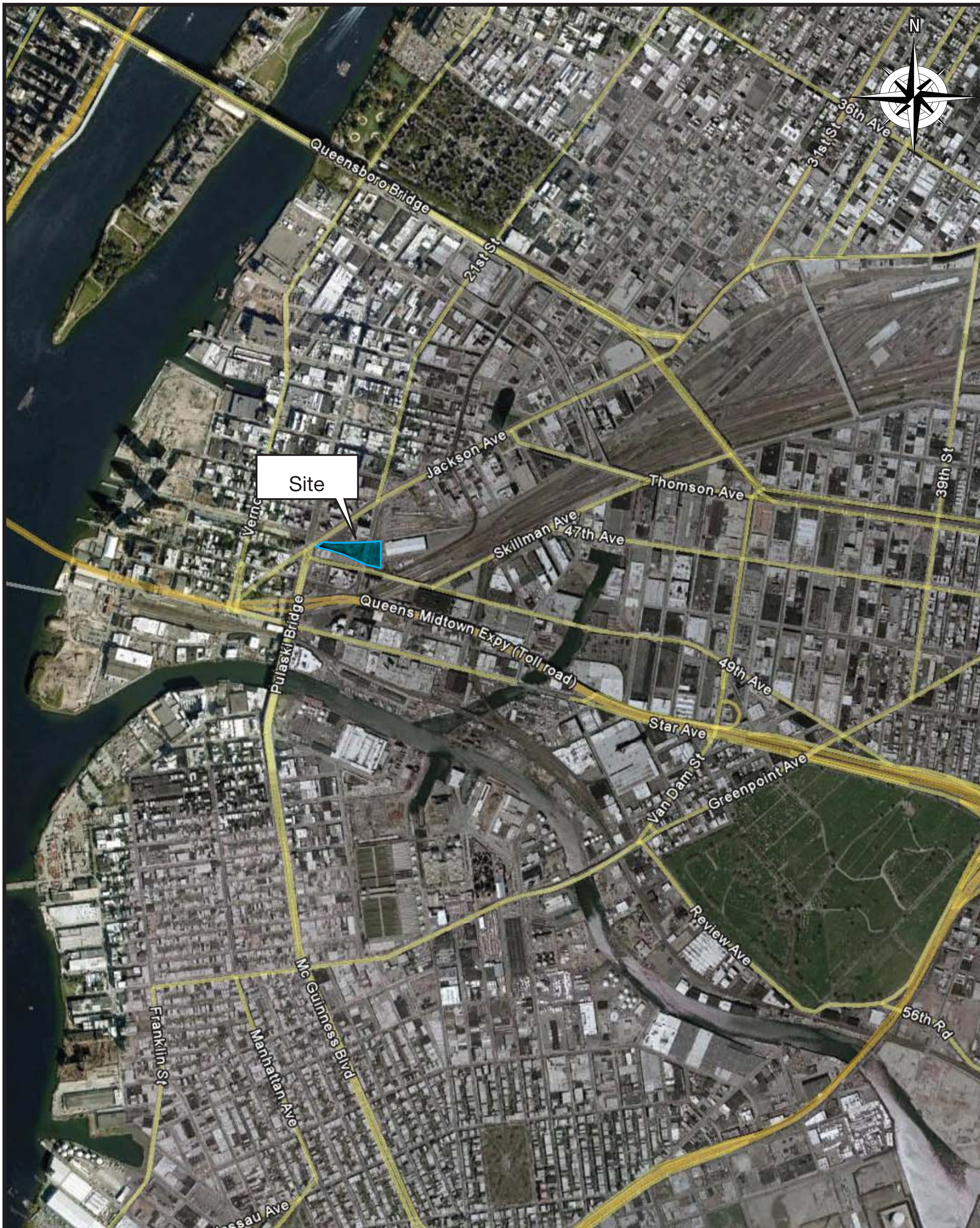
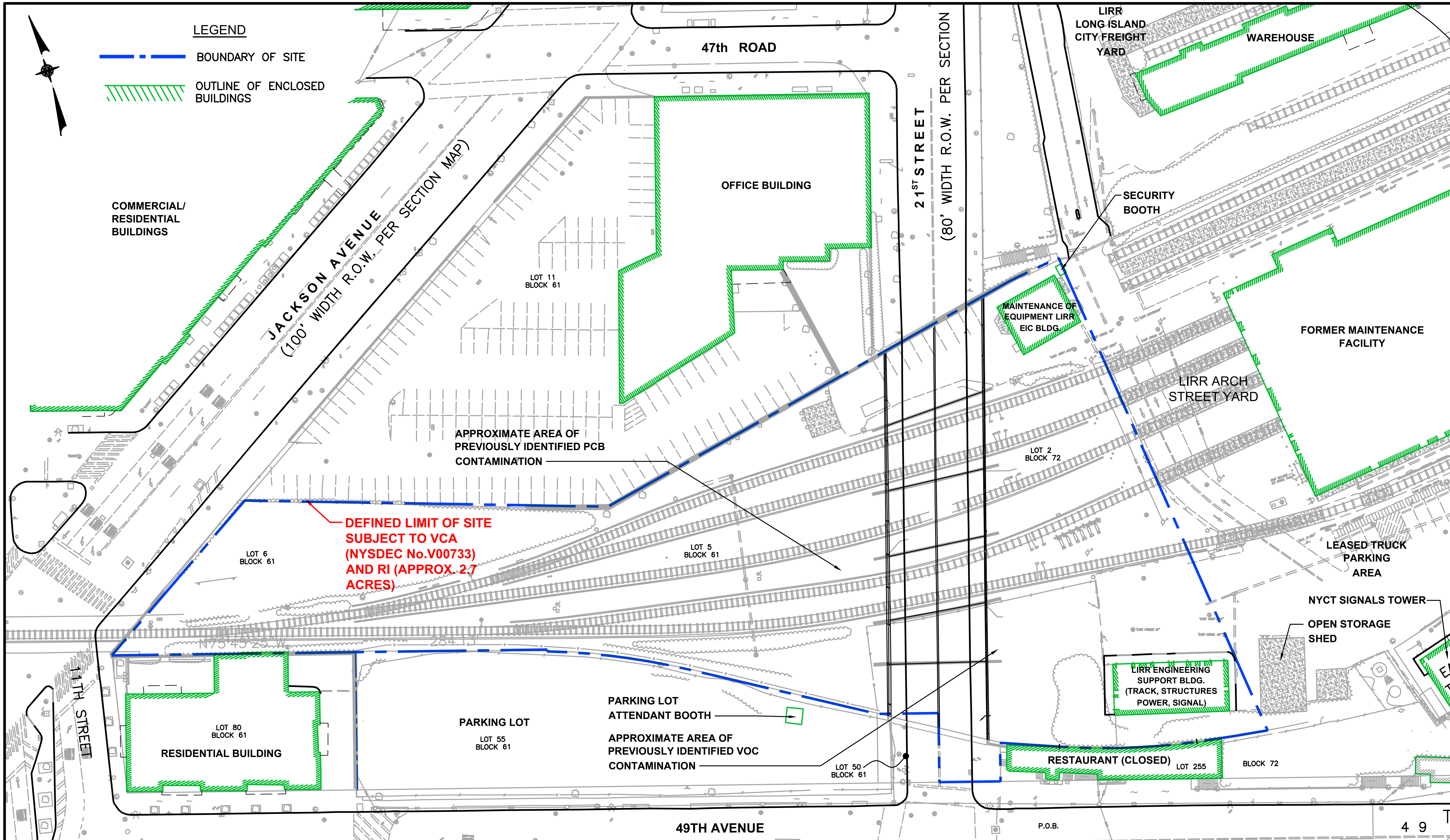


D&B ENGINEERS AND ARCHITECTS, P.C.

LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Long Island City, Queens, New York

SITE LOCATION MAP

FIGURE A-1



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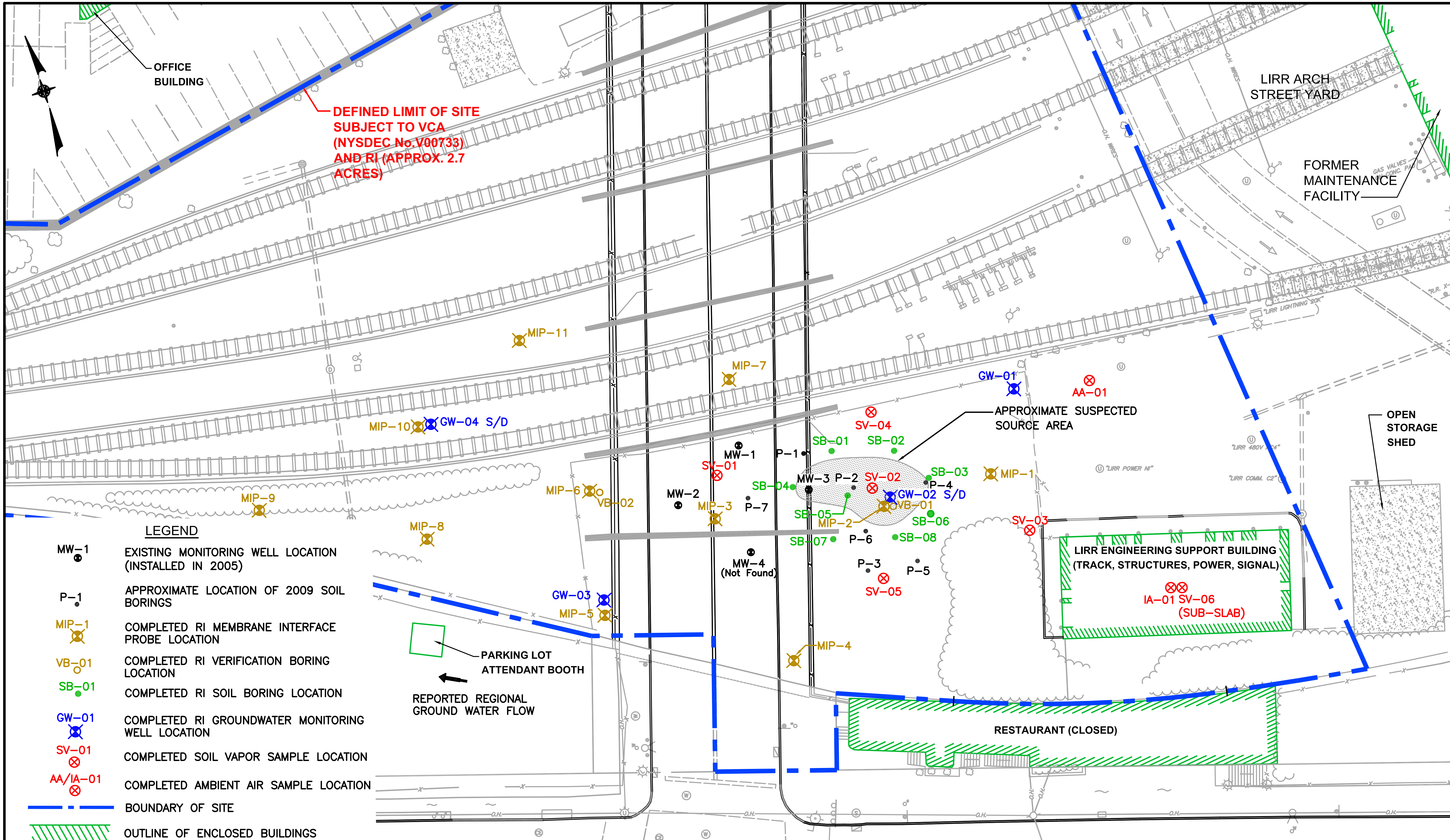
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY

SITE PLAN SHOWING DEFINED BOUNDARIES OF PROJECT SITE

SCALE: 1"=60'

FIGURE A-2



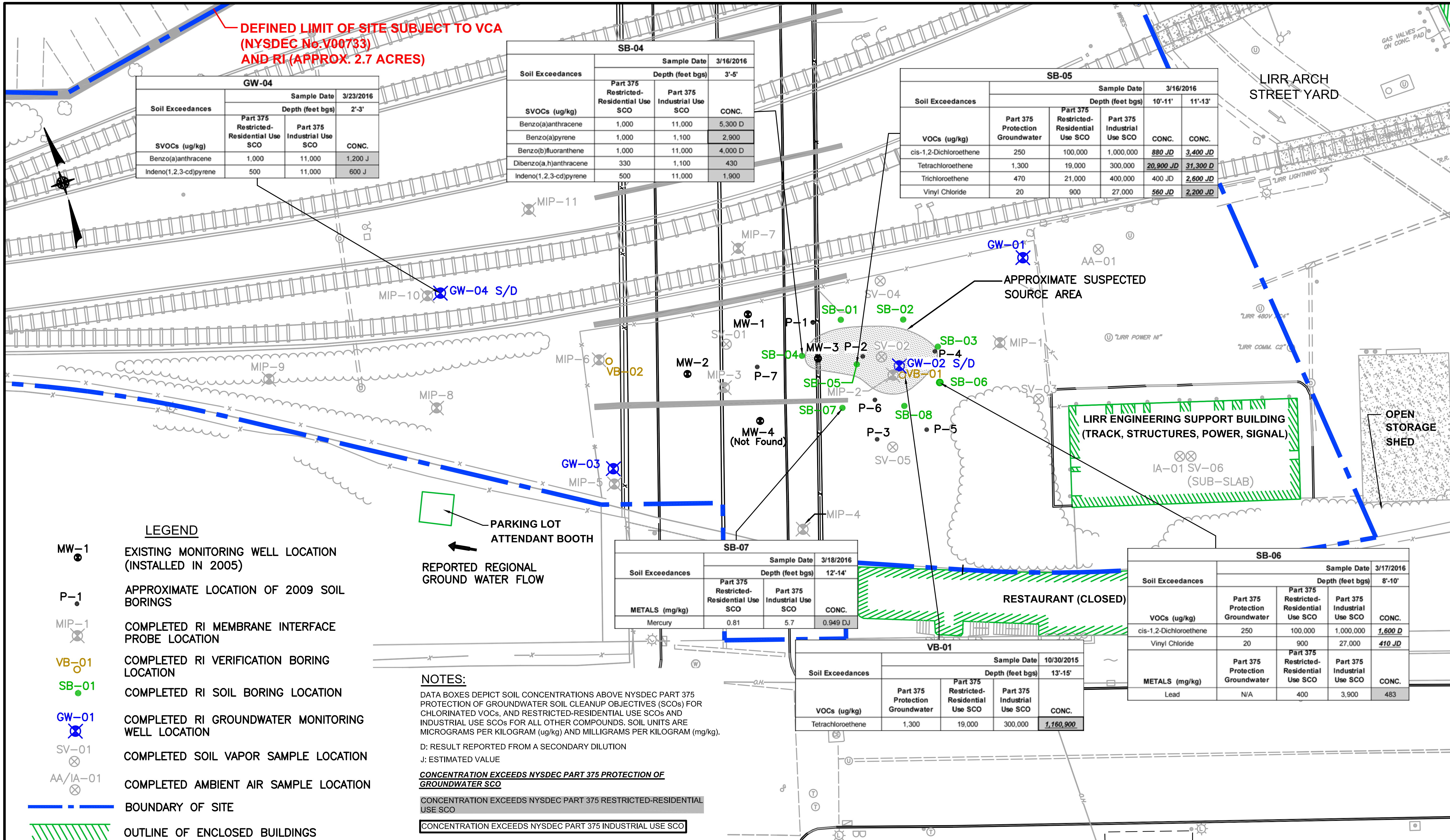
D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY

SAMPLE LOCATION MAP

SCALE: 1"=30'

FIGURE A-3



GW-04			
Soil Exceedances		Sample Date	3/23/2016
		Depth (feet bgs)	2'-3'
SVOCs (ug/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Benzo(a)anthracene	1,000	11,000	1,200 J
Indeno(1,2,3-cd)pyrene	500	11,000	600 J

SB-04			
Soil Exceedances		Sample Date	3/16/2016
		Depth (feet bgs)	3'-5'
SVOCs (ug/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Benzo(a)anthracene	1,000	11,000	5,300 D
Benzo(a)pyrene	1,000	1,100	2,900
Benzo(b)fluoranthene	1,000	11,000	4,000 D
Dibenzo(a,h)anthracene	330	1,100	430
Indeno(1,2,3-cd)pyrene	500	11,000	1,900

SB-05					
Soil Exceedances			Sample Date	3/16/2016	
			Depth (feet bgs)	10'-11'	11'-13'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.	CONC.
cis-1,2-Dichloroethene	250	100,000	1,000,000	880 JD	3,400 JD
Tetrachloroethene	1,300	19,000	300,000	20,900 JD	31,300 D
Trichloroethene	470	21,000	400,000	400 JD	2,600 JD
Vinyl Chloride	20	900	27,000	560 JD	2,200 JD

SB-07			
Soil Exceedances		Sample Date	3/18/2016
		Depth (feet bgs)	12'-14'
METALS (mg/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Mercury	0.81	5.7	0.949 DJ

SB-06				
Soil Exceedances			Sample Date	3/17/2016
			Depth (feet bgs)	8'-10'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
cis-1,2-Dichloroethene	250	100,000	1,000,000	1,600 D
Vinyl Chloride	20	900	27,000	410 JD
METALS (mg/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Lead	N/A	400	3,900	483

VB-01				
Soil Exceedances			Sample Date	10/30/2015
			Depth (feet bgs)	13'-15'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Tetrachloroethene	1,300	19,000	300,000	1,160,900

LEGEND

MW−1	EXISTING MONITORING WELL LOCATION (INSTALLED IN 2005)
P−1	APPROXIMATE LOCATION OF 2009 SOIL BORINGS
MIP−1	COMPLETED RI MEMBRANE INTERFACE PROBE LOCATION
VB−01	COMPLETED RI VERIFICATION BORING LOCATION
SB−01	COMPLETED RI SOIL BORING LOCATION
GW−01	COMPLETED RI GROUNDWATER MONITORING WELL LOCATION
SV−01	COMPLETED SOIL VAPOR SAMPLE LOCATION
AA/IA−01	COMPLETED AMBIENT AIR SAMPLE LOCATION
	BOUNDARY OF SITE
	OUTLINE OF ENCLOSED BUILDINGS

NOTES:

DATA BOXES DEPICT SOIL CONCENTRATIONS ABOVE NYSDEC PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVES (SCOs) FOR CHLORINATED VOCs, AND RESTRICTED-RESIDENTIAL USE SCOs AND INDUSTRIAL USE SCOs FOR ALL OTHER COMPOUNDS. SOIL UNITS ARE MICROGRAMS PER KILOGRAM (ug/kg) AND MILLIGRAMS PER KILOGRAM (mg/kg).

D: RESULT REPORTED FROM A SECONDARY DILUTION

J: ESTIMATED VALUE

CONCENTRATION EXCEEDS NYSDEC PART 375 PROTECTION OF GROUNDWATER SCO

CONCENTRATION EXCEEDS NYSDEC PART 375 RESTRICTED-RESIDENTIAL USE SCO

CONCENTRATION EXCEEDS NYSDEC PART 375 INDUSTRIAL USE SCO

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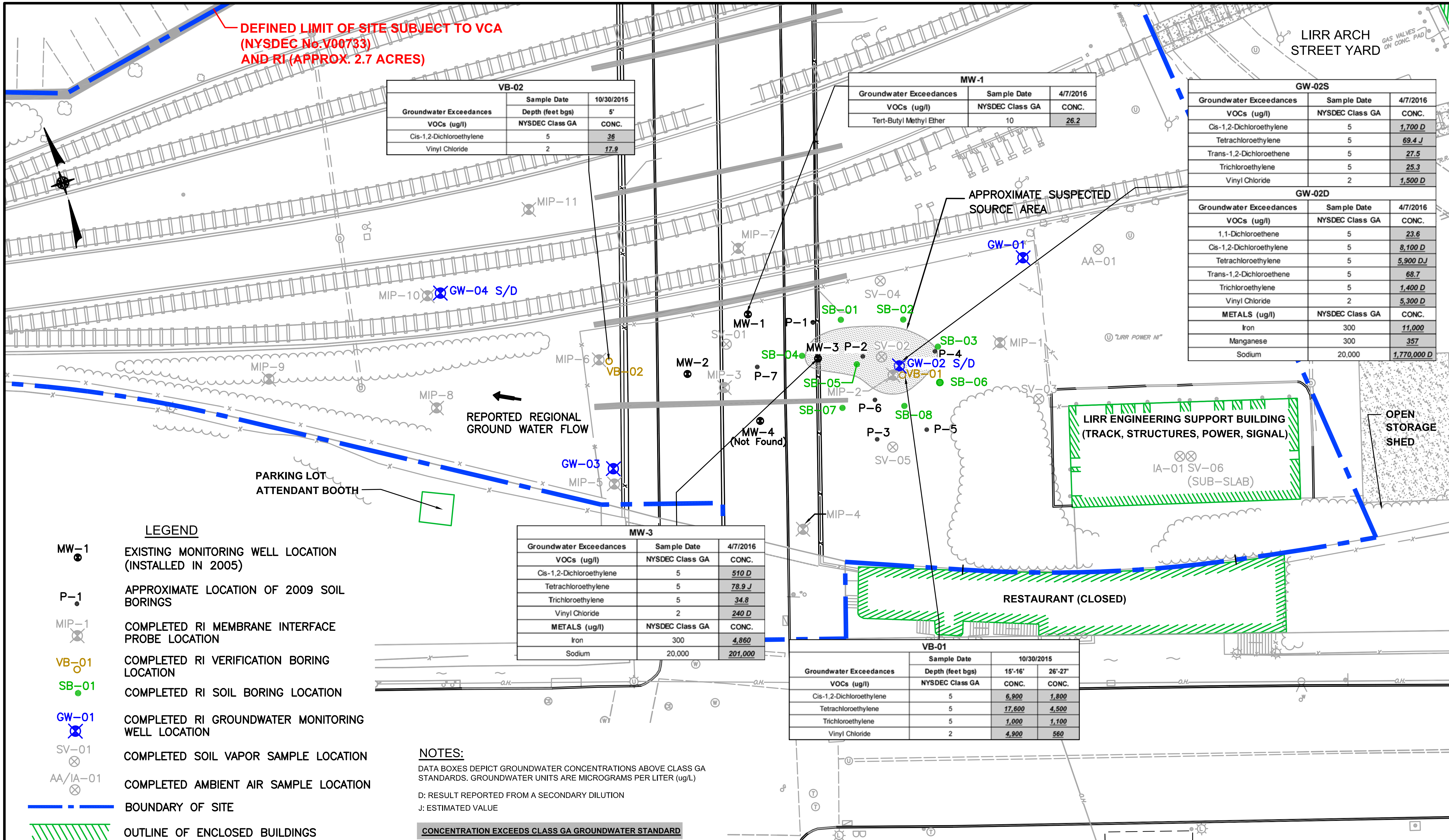
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY

SUMMARY OF RI SOIL SAMPLE EXCEEDANCES

SCALE: 1"=30'

FIGURE A-4



VB-02		
	Sample Date	10/30/2015
Groundwater Exceedances	Depth (feet bgs)	5'
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	***36***
Vinyl Chloride	2	***17.9***

MW-1		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Tert-Butyl Methyl Ether	10	***26.2***

GW-02S		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	***1,700 D***
Tetrachloroethylene	5	***69.4 J***
Trans-1,2-Dichloroethene	5	***27.5***
Trichloroethylene	5	***25.3***
Vinyl Chloride	2	***1,500 D***

GW-02D		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
1,1-Dichloroethene	5	***23.6***
Cis-1,2-Dichloroethylene	5	***8,100 D***
Tetrachloroethylene	5	***5,900 DJ***
Trans-1,2-Dichloroethene	5	***68.7***
Trichloroethylene	5	***1,400 D***
Vinyl Chloride	2	***5,300 D***
METALS (ug/l)	NYSDEC Class GA	CONC.
Iron	300	***11,000***
Manganese	300	***357***
Sodium	20,000	***1,770,000 D***

MW-3		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	***510 D***
Tetrachloroethylene	5	***78.9 J***
Trichloroethylene	5	***34.8***
Vinyl Chloride	2	***240 D***
METALS (ug/l)	NYSDEC Class GA	CONC.
Iron	300	***4,860***
Sodium	20,000	***201,000***

VB-01			
	Sample Date	10/30/2015	
Groundwater Exceedances	Depth (feet bgs)	15'-16'	26'-27'
VOCs (ug/l)	NYSDEC Class GA	CONC.	CONC.
Cis-1,2-Dichloroethylene	5	***6,900***	***1,800***
Tetrachloroethylene	5	***17,600***	***4,500***
Trichloroethylene	5	***1,000***	***1,100***
Vinyl Chloride	2	***4,900***	***560***

LEGEND

MW-1	EXISTING MONITORING WELL LOCATION (INSTALLED IN 2005)
P-1	APPROXIMATE LOCATION OF 2009 SOIL BORINGS
MIP-1	COMPLETED RI MEMBRANE INTERFACE PROBE LOCATION
VB-01	COMPLETED RI VERIFICATION BORING LOCATION
SB-01	COMPLETED RI SOIL BORING LOCATION
GW-01	COMPLETED RI GROUNDWATER MONITORING WELL LOCATION
SV-01	COMPLETED SOIL VAPOR SAMPLE LOCATION
AA/IA-01	COMPLETED AMBIENT AIR SAMPLE LOCATION
	BOUNDARY OF SITE
	OUTLINE OF ENCLOSED BUILDINGS

NOTES:

DATA BOXES DEPICT GROUNDWATER CONCENTRATIONS ABOVE CLASS GA STANDARDS. GROUNDWATER UNITS ARE MICROGRAMS PER LITER (ug/L)

D: RESULT REPORTED FROM A SECONDARY DILUTION

J: ESTIMATED VALUE

CONCENTRATION EXCEEDS CLASS GA GROUNDWATER STANDARD

D&B ENGINEERS AND ARCHITECTS, P.C.

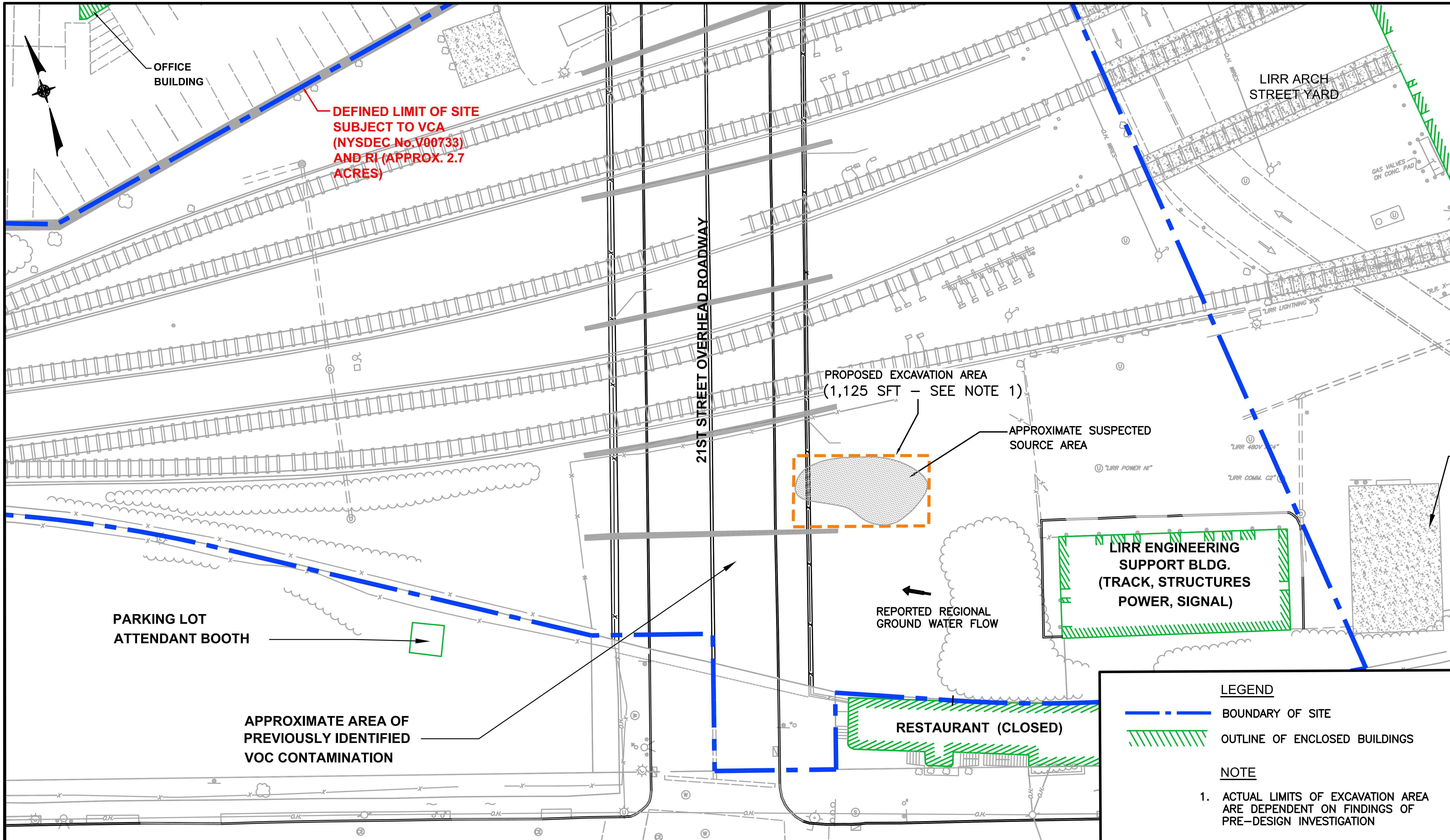
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY

SUMMARY OF RI GROUNDWATER SAMPLE EXCEEDANCES

SCALE: 1"=30'

FIGURE A-5

F:\3455\MTA\Dwg\FIGURES\3455-COMP SAMPLE CONC MAP_GW.dwg, 3/29/2018 11:13:27 AM, Adobe PDF



D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

PROPOSED EXCAVATION AREA MAP

SCALE: 1"=30'

FIGURE A-6

F:\3455\MTA\Dwg\FIGURES\3455-Prop Exc Area and EP Samp.dwg, 3/27/2018 2:10:05 PM, Adobe PDF.pc3

LONG ISLAND RAIL ROAD
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

QUALITY ASSURANCE PROJECT PLAN
FOR
REMEDIAL ACTION WORK PLAN

Prepared for:

METROPOLITAN TRANSPORTATION AUTHORITY
LONG ISLAND RAIL ROAD

Prepared by:

D&B ENGINEERS AND ARCHITECTS. P.C.
WOODBURY, NEW YORK

MAY 2018
Revised August and September 2018

LIRR – ARCH STREET YARD
QUALITY ASSURANCE PROJECT PLAN FOR
REMEDIAL ACTION WORK PLAN

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1.0 QUALITY ASSURANCE PROJECT PLAN

1.1 Objective and Scope

The Long Island Railroad (LIRR) entered into a Voluntary Cleanup Agreement (NYSDEC Index Nos. W1-0993-04-04 and W2-0994-04-04) with the New York State Department of Environmental Conservation (NYSDEC) and Metropolitan Transportation Authority (MTA) in order to investigate and remediate the LIRR Arch Street Yard (the Yard). The Yard is currently owned by the LIRR and is approximately eight acres in size. The area of the Yard that is subject to the VCA, is an approximately 2.7-acre portion of the Yard designated as NYSDEC Site No. V00733 (herein referred to as "the Site").

A Remedial Action Work Plan (RAWP) dated May 2018 was developed for the Site to address a residual area of "hot-spot" of chlorinated VOC contaminated subsurface soil and groundwater in a discrete area of the Yard to the south of the tracks. As discussed in detail in the May 2018 RAWP, remedial activities to be completed at the Site will include the removal via excavation, to the extent practical, all soil material exhibiting contaminant concentrations that exceed the NYSDEC 6 NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (SCOs) from the "hot-spot" source area, replacement with clean fill, installation of a cover system consisting of either a demarcation layer and minimum of 2 feet of clean fill meeting the requirements set forth in NYSDEC 6 NYCRR Part 375-6.7(c) and/or placement of asphalt throughout the excavation area, as well as the implementation of institutional controls.

A pre-design investigation is recommended to be completed prior to implementation of the remedy to further delineate the vertical extent of contamination and refine the proposed excavation area, if necessary. The pre-design investigation will include the installation and associated sampling of soil borings and if necessary, the installation and/or sampling of groundwater probes and existing monitoring wells, for delineation and waste characterization purposes. However, details associated with the pre-design investigation will be developed as part of a separate Pre-Design Investigation Work Plan. It should be noted that confirmatory endpoint and sidewall soil samples may be collected as part of the pre-design investigation proposed to be completed at the

Site, as sheeting/shoring installed within the excavation area may limit access to the excavation sidewalls.

Following the completion of excavation activities, confirmatory endpoint and sidewall soil samples will be collected from the bottom and sidewalls of the excavation to characterize the remaining soil prior to restoration.

Upon the completion of remedial excavation activities at the Site, post-remediation groundwater sampling will be conducted at the Site. It should be noted that the implementation of a chemical injection program may be necessary after the completion of remedial excavation activities in the event that post-remediation groundwater sampling indicates that dissolved-phase chlorinated VOC concentrations are not decreasing at an acceptable rate.

In addition, one round of groundwater sampling for emerging contaminants will be completed prior to implementation of the remedy at the request of NYSDEC, as detailed in the scope of work letter dated, August 30, 2018. Groundwater samples will be collected for 1,4-dioxane and full Target Analyte List (TAL) Per- and Poly-fluoroalkyl substances (PFAS).

The purpose of this Quality Assurance Project Plan (QAPP) is to develop and describe the detailed sample collection and analytical procedures that will ensure high quality data for the environmental sampling that will be completed by D&B throughout implementation of the remedy, including during the pre-design investigation, as well as during post-remediation groundwater sampling.

1.2 Data Usage

The data generated from the sampling covered by this QAPP will be utilized for various purposes depending on the type of sampling performed. The summary below provides a brief description of the sampling activities that may be undertaken in support of the remedial activities to be completed at the Site. Additional details on the remedial activities to be completed at the Site are provided in the May 2018 RAWP.

Groundwater Sampling for Emerging Contaminants

One round of groundwater sampling for emerging contaminants will be completed prior to implementation of the remedy at the request of NYSDEC as detailed in the scope of work letter dated, August 30, 2018. Groundwater samples will be collected from three existing monitoring wells (MW-1, MW-2 and MW-3) for emerging contaminants 1,4-dioxane and full TAL PFAS. Quality Assurance/Quality Control (QA/QC) samples consisting of a matrix spike (MS), matrix spike duplicate (MSD), a blind duplicate and a field (equipment) blank will be collected during the sampling round.

Following completion of the groundwater sampling and receipt of analytical results, a Groundwater Monitoring Report will describe the completed sampling and provide tabulated groundwater analytical results, including all non-detects, a comparison to the Class GA Groundwater Standards and Guidance Values, as applicable, and a Data Usability Summary Report (DUSR). The analytical and usability processes will be conducted in conformance with the NYSDEC ASP dated July 2005 and NYSDEC's DER Technical Guidance for Site Investigation and Remediation (DER-10), as well as USEPA National Functional Guidelines for Data Validation and USEPA Region 2 Data Validation SOPs.

Pre-Design Investigation

A pre-design investigation is recommended to be completed prior to implementation of remedial activities at the Site. The data generated from sampling during the pre-design investigation will primarily be used to identify and delineate any areas containing residual chlorinated VOC soil contamination exceeding 6 NYCRR Part 375 Protection of Groundwater SCOs at depths greater than 16 feet bgs, in order to further delineate the extent of vertical contamination and if necessary, refine the extent of the proposed remedial excavation area. In addition, as sheeting/shoring will be utilized during remedial excavation activities, collection of sidewall/endpoint soil samples from the excavation may not be feasible. As such, it is anticipated that confirmatory sidewall/endpoint soil samples may be collected during the pre-design investigation from the proposed excavation limits in the event these cannot be collected upon completion of excavation activities.

A scope of work detailing the sampling activities to be completed as part of the pre-design investigation will be developed as part of a separate Pre-Design Work Plan.

Confirmation Endpoint and Sidewall Soil Sampling

The data generated from confirmation endpoint and sidewall soil sampling will be used to determine the quality of soil remaining at the Site upon the completion of remedial excavation and to determine whether additional soil removal is required after the proposed excavation limits shown in the May 2018 RAWP have been reached. It should be noted that the extents of the proposed excavation area may be modified depending on the findings of the pre-design investigation. The limits of the proposed excavation area will be included in the plans and specifications developed during the remedial design phase. The quantity of confirmation endpoint and sidewall soil samples will be dependent upon the size of the completed excavation area. Confirmation endpoint and sidewall soil samples will be collected in accordance with the NYSDEC's DER-10, dated May 3, 2010.

Post-Remediation Groundwater Sampling

Post-remediation groundwater sampling will be conducted upon completion of remedial excavation activities in order to evaluate changes in groundwater contaminant concentrations and to ascertain the level of any natural attenuation which may occur. Data generated from the post-remediation groundwater sampling will be used to evaluate if additional groundwater treatment or remediation is warranted at the Site. Details regarding post-remediation groundwater sampling requirements will be included in the Site Management Plan (SMP) that will be prepared for the Site upon completion of the remedy.

1.3 Sampling Program Design and Rationale

The following presents a general discussion of the sampling that may be conducted in support of remedial activities to be conducted at the Site.

- Subsurface Soil – Subsurface soil samples will be collected on-site from borings as part of the pre-design investigation to: determine the extent of impacted subsurface soil, and to obtain confirmation endpoint/sidewall soil samples, if necessary. In addition, subsurface endpoint and sidewall soil samples will be collected from the excavation utilizing the bucket of the excavation equipment.

- Groundwater – Groundwater samples will be collected from existing monitoring wells for emerging contaminants prior to implementation of the remedy. If deemed necessary, groundwater samples may be collected from groundwater probes installed during the pre-design investigation, or existing monitoring wells at the Site, to further characterize groundwater quality. In addition, groundwater samples will be collected from existing groundwater monitoring wells as part of post-remediation groundwater sampling in order to assess groundwater quality and evaluate the effectiveness of the remedy.

1.4 Analytical Parameters

Soil samples collected from the Site will be analyzed for volatile organic compounds (VOCs) utilizing United States Environmental Protection Agency (USEPA) Methods 5035 and 8260 (using the En Core sampling method). Groundwater samples collected from the Site will be analyzed for VOCs utilizing USEPA Method 8260.

In addition, one round of groundwater samples will be collected from three existing monitoring wells (MW-1, MW-2 and MW-3) for emerging contaminants 1,4-dioxane via Method 8270 SIM and full TAL PFAS via Method 537 Modified. In accordance with the NYSDEC's July 2018 Groundwater Sampling for Emerging Contaminants guidance document, the above-listed methods will achieve a method detection limit (MDL) of 0.35 micrograms per liter (ug/l) for 1,4-dioxane and a reporting limit (RL) of 2 nanograms per liter (ng/l) for PFAS. The full PFAS TAL list of 21 compounds is as follows:

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	**Perfluorobutanesulfonic acid**	**PFBS**	**375-73-5**
	Perfluorohexanesulfonic acid	**PFHxS**	**355-46-4**
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	**PFOS**	**1763-23-1**
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	**PFHpA**	**375-85-9**
	Perfluorooctanoic acid	**PFOA**	**335-67-1**
	Perfluorononanoic acid	**PFNA**	**375-95-1**
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid N-ethyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA N-EtFOSAA	2355-31-9 2991-50-6

Bold entries depict the 6 original UCMR3 chemicals

Table 1-1 presents a summary of the parameters/sample fractions to be analyzed with the typical sample location, type of sample, sample matrix, type of sample container, method of preservation, holding time and analytical method.

1.5 Data Quality Requirements

Data quality requirements and assessment are provided in the 7/05 NYSDEC ASP, which includes the detection limit for each parameter and sample matrix. Note that quantification limits, estimated accuracy, accuracy protocol, estimated precision and precision protocol are determined by the laboratory and will be in conformance with the requirements of the 2005 NYSDEC ASP, where applicable. Table 1-2 presents a summary of the data quality requirements.

Table 1-1

SUMMARY OF MONITORING PARAMETERS/SAMPLE FRACTIONS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Subsurface Soil Samples	Grab	Soil	TCL VOCs	En Core Sampler/3 or equivalent	Cool to 4°C	2 days after VTSR for prep/10 days for analysis	7/05 NYSDEC ASP, USEPA Methods 5035 and 8260
Groundwater Monitoring Wells/Groundwater Probes	Grab	Groundwater	TCL VOCs	Glass/clear/40 ml/3 ICHEM 300 series or equivalent	Cool to 4°C	7 days after VTSR for analysis	7/05 NYSDEC ASP, USEPA Method 8260
Groundwater Monitoring Wells	Grab	Groundwater	1,4-dioxane	Glass, amber/ 1L/1 ICHEM 300 series or equivalent	Cool to 4°C	5 days after VTSR for extraction. 40 days after extraction for analysis.	2005 NYSDEC ASP, USEPA SW846 Method 8270/SIM
Groundwater Monitoring Wells	Grab	Groundwater	PFAS	HDPE with HDPE screw cap/ 250 mL/1 ICHEM 300 series or equivalent	Cool to 4°C	14 days after collection for extraction. 28 days after extraction for analysis.	USEPA/600/R08/092 Method 537 Modified

VTSR - Verified time of sample receipt at the laboratory.
Most recent versions of the analytical methods will be utilized.
QA/QC samples will be collected based upon the frequency of sampling and the final number and schedule of samples collected. Details regarding sampling frequency for the pre-design investigation will be defined in a Pre-Design Work Plan to be prepared prior to implementation of the pre-design investigation. Confirmation subsurface soil samples will be collected in accordance with DER-10 and will be dependent upon the size of the completed excavation area. Post-remediation groundwater sampling frequency will be defined in a Site Management Plan to be prepared for the Site.

Table 1-2

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY

Parameter	Sample Matrix	CRDL*	Estimated Accuracy	Accuracy Protocol**	Estimated Precision	Precision Protocol**
Volatile Organics	Liquid Solid	5-10 ug/l 5-10 ug/kg	0.87 – 2.48 ug/l	Vol. IB, Chapter 4, Method 8260, Table 7	0.11 – 4.00 ug/l	Vol. IB, Chapter 4, Method 8260, Table 7
Base Neutrals	Liquid	10-50 ug/l	0.29 – 1.23 ug/l	Vol. IV, Part XIX Method 8270, Table 7	0.13 – 1.05 ug/l	Vol IV, Part XIX Method 8270, Table 7
Acid Extractables	Liquid	10-50 ug/l	0.29 – 1.23 ug/l	Vol. IV, Part XIX Method 8270, Table 7	0.13 – 1.055 ug/l	Vol. IV, Part XIX Method 8270, Table 7
PFAS	Liquid	0.002 ug/l	70% – 130% of recovery	EPA/600/R-08/092 Method 537, Tables 6-9	+/- 30%	EPA/600/R-08/092 Method 537 Tables 6-9

*Contract Required Detection Limits.
**Reference: NYSDEC 7/05 ASP and EPA/600/R-08/092

Table 1-2 (continued)

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY

Matrix/Parameter	Precision %	Accuracy %
Groundwater		
VOCs[a]	See Table 1-2a	See Table 1-2a
SVOCs	See Table 1-2a	See Table 1-2a
PFAS	See Table 1-2a	See Table 1-2a
Soil		
VOCs[a]	See Table 1-2a	See Table 1-2a

Notes:

(a) Accuracy will be determined as percent recovery of surrogate spike compounds and matrix spike compounds. Surrogate and matrix spike compounds for VOCs are listed in Table 1-2a. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.

Source: NYSDEC ASP

Table 1-2a

DATA QUALITY REQUIREMENTS
ACCURACY AND PRECISION REQUIREMENTS FOR VOCs

	Water		Low/Medium Soil	
	Spike Recovery Limits (%)	Precision %	Spike Recovery Limits (%)	Precision %
Surrogate Compound				
Toluene-d8	88 – 110	--	84 – 138	--
4-Bromofluorobenzene	86 – 115	--	59 – 113	--
1,2-Dichloroethane-d4	76 – 114	--	70 – 121	--
Matrix Spike Compound				
1,1-Dichloroethene	61 – 145	≤ 14	59 – 172	≤ 22
Trichloroethane	71 – 120	≤ 14	62 – 137	≤ 24
Chlorobenzene	75 – 130	≤ 13	60 – 133	≤ 21
Toluene	76 – 125	≤ 13	59 – 139	≤ 21
Benzene	76 – 127	≤ 11	66 – 142	≤ 21

Source: NYSDEC ASP

Table 1-2a (continued)

**DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY
OF EXTRACTABLE COMPOUNDS
BASED UPON RECOVERY OF SURROGATE AND
MATRIX SPIKE COMPOUNDS***

Surrogate Compounds	Matrix	Precision	Accuracy %
d5-Nitrobenzene	Water	≤ 20	35-114
2-Fluorobiphenyl	Water	≤ 20	43-116
d14-Terphenyl	Water	≤ 20	33-141
d5-Phenol	Water	≤ 20	10-110
2-Fluorophenol	Water	≤ 20	21-110
2,4,6-Tribromophenol	Water	≤ 20	10-123
2-Chlorophenol-d4 (Advisory)	Water	≤ 20	33-110
1,2-Dichlorobenzene-d4 (Advisory)	Water	≤ 20	16-110

Table 1-2a (continued)

DATA QUALITY REQUIREMENTS
ACCURACY AND PRECISION REQUIREMENTS FOR PFAS

Surrogate Compounds (PFAS Analysis)	Matrix	Precision	Accuracy %
13C-PFOA	Water	≤ 30	70 - 130
13C-PFDA	Water	≤ 30	70 - 130
D5- NEtFOSAA	Water	≤ 30	70 - 130

The methods of analysis will be in accordance with SW-846 and 7/05 NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this QAPP, but will be available upon request from the laboratory selected to perform the analyses. The laboratory will be New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified for organic and inorganic analyses.

1.5.1 Data Representativeness

Representative samples will be collected as follows:

- Subsurface Soil (Boring) – Samples will be collected using a decontaminated macrocore sampler and disposable acetate liner.
- Confirmation Soil Samples – If not collected from soil borings completed during the pre-design investigation, subsurface soil samples will be collected from the excavation utilizing the bucket of the excavation equipment.
- Groundwater (Probe) – Samples will be collected immediately upon installation of the probe using dedicated tubing equipped with a bottom check valve.
- Groundwater (Monitoring well)– Samples will be collected using either a bladder or peristaltic pump equipped with clean, disposable tubing. Samples will be collected after the monitoring well location has been purged using low-flow purging techniques and until field measurements for pH, conductivity, temperature and turbidity have stabilized, or until the well location is purged dry (whichever comes first) and the well location has been allowed to recharge. For PFAS sampling, the equipment utilized will include a peristaltic pump equipped with PFAS-free silicon and high-density polyethylene tubing. PFAS-containing products will not be utilized during sampling.

1.5.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP certified laboratory and the 7/05 NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

1.5.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for this project. The acceptability of less than 100% complete data, meeting all laboratory Quality Assurance/Quality Control (QA/QC) protocols/standards, will be evaluated on a case-by-case basis.

The laboratory utilized to perform the analyses on the soil and groundwater samples will provide NYSDEC ASP Category B Deliverables. All data will be provided in the NYSDEC EQuIS format.

1.6 Detailed Sampling Procedures

Environmental samples will be collected from different locations throughout the Site as part of activities completed in support of the remedy. These may include subsurface soil and groundwater samples. Sample locations may consist of soil borings, subsurface grab samples, groundwater probes and groundwater monitoring wells.

General sampling approaches and equipment are described in this section. A summary of the sampling program for the Pre-Design Investigation will be detailed in a Pre-Design Investigation Work Plan that will be prepared prior to implementation of the Pre-Design Investigation. A summary of the sampling program for post-remediation groundwater sampling will be detailed in a Site Management Plan to be prepared for the Site as part of the remedy.

When collecting the samples, care will be taken to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (i.e., decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Every effort will be made to ensure that the sample is a proper representation of the matrix from which it was collected. The sample will be transferred into the sample container as quickly as possible. Soil samples to be analyzed for VOCs will be collected using the En Core sampling method in accordance with USEPA Method 5035.

The materials involved in groundwater sampling are critical to the collection of high quality monitoring information, particularly where the analyses of volatile, pH sensitive or reduced chemical constituents are of interest. Bailers and pump parts will be constructed of PTFE (e.g., Teflon), stainless steel and/or polyethylene. When collecting groundwater samples for PFAS analysis, a peristaltic pump equipped with PFAS-free silicon and high-density polyethylene tubing. will be utilized. In addition, common materials prohibited for use during sampling for PFAS include, but are not limited to the following: Teflon, adhesives, low-density polyethylene (LDPE) products, waterproof materials including waterproof field books, clothing containing Gore-Tex, Tyvek, and cosmetics and moisturizers, etc. Given the very low reporting limit, and the fact that PFAS are found in numerous commonly used products, great care will be taken to avoid cross-contamination during the sampling process.

Several steps will be taken after the transfer of the soil or water sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sample material. The container will not be submerged in water in an effort to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

The sample container will be properly labeled. Information such as the sample identification number, location, collection time and sample description will be recorded in the field log book. Associated paper work (e.g., Chain of Custody forms) will then be completed and will stay with the sample. The samples will be packaged in a manner that will allow the appropriate storage temperature to be maintained during transportation to the laboratory. Samples will be delivered to the laboratory within 48 hours of collection.

Proper personal protective equipment and monitoring equipment (if determined to be necessary) will be used at all times during sample collection to further maintain sample integrity and protection of worker health and safety.

1.6.1 Sample Identification

All samples collected will be labeled with a sample identification code. The code will identify the sample type (sample matrix), sample location, sample depth and collection date, as appropriate. Samples will be labeled according to the following system:

Sample Location Type:	– Soil Boring "SB"
	– Endpoint Soil Sampling "EP"
	– Sidewall Soil Sample "SW"
	– Monitoring Well "MW" or existing well identification number
	– Groundwater Probe "GP"
Sample Number:	– Each sample location will be designated with a number. For soil samples, a depth will be provided which will correspond to the depth in feet at which the sample was collected below grade (e.g., 0-2). This number will likely be recorded in parentheses.
Collection Date:	– The date of collection will be included in the sample identification as an eight-digit number as follows (year-month-day).
Quality Assurance/ Quality Control (QA/QC):	– A "MS" for Matrix Spike, "MSD" for Matrix Spike Duplicate, "FB" for Field Blank or "TB" for Trip Blank, as appropriate, will be attached to the end of the sample identification name

Based on the above sample identification procedures, an example of a sample label may be:

Sample Location Type — Sample Depth

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Sample Number — Collection Date

1.6.2 Sample Handling, Packaging and Shipping

All analytical samples will be placed in the appropriate sample containers as specified in 7/05 NYSEC ASP. The holding time criteria identified in the ASP will be followed, as specified in Table 1-1.

Prior to packaging any samples for transportation to the laboratory, the sample containers will be checked for proper identification and compared to the field log book for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler (or laboratory shuttle) with a sufficient quantity of bagged ice to maintain the samples at 4°C until arrival at the laboratory.

All necessary documentation required to accompany the samples during transportation will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with fiber (duct) tape or clear packing tape, and custody seals will be placed in such a manner that any opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped to ensure receipt at the laboratory within 48 hours of sample collection in accordance with ASP requirements. The laboratory will be notified prior to the shipment of the samples.

1.6.3 Soil (Boring)

The following procedure will be utilized for the collection of soil samples from soil borings:

- Be certain that the sample location is noted on Location Sketch.
- Remove laboratory-supplied precleaned sample container from sample cooler, label container with an indelible marker and fill out Chain of Custody Form.
- Drive the probe to the desired sampling depth.

- Retrieve the soil core and immediately after opening it, obtain an organic vapor measurement with a PID.

- Samples for VOC analysis will be collected immediately using the En Core sampling method in accordance with USEPA Method 5035. If warranted, for any remaining analyses, remove a sample aliquot from the soil probe using a disposable scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.

- Return the sample container to the cooler.

- If reusable, decontaminate the sampling equipment according to the procedures described in Section 1.7.

- Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum or other approved container for disposal.

1.6.4 Soil (Directly from Excavation)

The following procedure will be utilized for the collection of soil samples directly from the excavation area:

- Be certain that the sample location is noted on Location Sketch.

- Be certain that the sampling equipment, including the backhoe/excavator bucket, is decontaminated utilizing the procedures outlined in Section 1.7.

- Remove laboratory precleaned sample containers from sample cooler, label container with an indelible marker, fill out Sample Information Record and Chain of Custody Form.

- The bucket of the excavation equipment will be used to retrieve a sample from the desired sampling depth. Lower the bucket of the excavation equipment into the excavation and remove soil from the appropriate location.

- Immediately upon retrieval of the soil, obtain an organic vapor measurement with a PID.

- Samples for VOC analysis will be collected immediately using the En Core sampling method in accordance with USEPA Method 5035. If warranted, for any remaining analyses, remove a sample aliquot from the soil material using a disposable scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.

- Return the sample container to the cooler.

- If reusable, decontaminate the sampling equipment according to the procedures described in Section 1.7.

- Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum or other approved container for disposal.

1.6.5 Groundwater (Probe)

The following procedure will be utilized for the collection of groundwater samples from groundwater probes:

- Be certain sample location is noted on Location Sketch.

- Remove the laboratory-supplied precleaned sample container from sample cooler, label container with an indelible marker and fill out Chain of Custody Form.

- Obtain a sample by using dedicated polyethylene tubing equipped with a bottom check valve.

- Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing. This is done by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.

- After sample collection, obtain field measurements including pH, conductivity, temperature and turbidity.

- Return sample containers to sample cooler.

- If reusable, decontaminate the sampling equipment according to the procedures described in Section 1.7.

- Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum or other approved container for disposal.

1.6.6 Groundwater (Monitoring Well)

The following procedure will be utilized for the collection of groundwater samples from monitoring wells:

- Groundwater sampling following this procedure shall be performed using non-dedicated bladder or peristaltic pumps fitted with disposable polyethylene discharge tubing.

- The sample pump intake shall be positioned within the well's screened section. For wells screened across the water table, the pump intake should be set in the lower one-third of the screened interval.

- New, clean, disposable nitrile gloves shall be worn when handling any dedicated or decontaminated sampling equipment, sample containers, and during the collection of samples.

- All nondedicated sampling and measuring equipment must be decontaminated before use. At a minimum, equipment should be disassembled (when appropriate) and scrubbed in a nonphosphate, laboratory-grade detergent and distilled water solution, then rinsed with copious amounts of distilled water.

- All sample vials and containers shall be stored in a clean carrying case. Remove the sample containers only when needed.

- Field analysis equipment used for the measurement of field parameters, including pH, conductivity, temperature, turbidity and dissolved oxygen probes, shall be calibrated in accordance with the manufacturer's procedures. All calibration methods, procedures and results shall be documented in the calibration log and field notebook.

- Document the date, well identification and any unusual occurrences in the field log. Document all field measurements in the field log.

- Inspect the protective casing and general well condition and document any items of concern in the field log.

- Unlock the protective casing. Refer to the Health and Safety Plan for air monitoring or other health and safety requirements.

- Measure the depth to water (DTW) and depth to bottom of the well (DTB) from the measuring point (MP) located on the well (inner) casing using an electronic fluid-level measuring device. Record the DTW and DTB measurements in the field log. As required, the water level measuring device can be left to monitor changes in DTW during well purging.

- Purge Volume Determination:
  - Minimum Purge Volume: A minimum of two times the volume of the discharge tubing shall be purged prior to the sampling of the well. The calculation for determining this volume of water to be removed from the pump and tubing is as follows:

    $$PV_{min} = (TL \times TF) \times 2$$

    where:

PV_{min} =	The minimum volume of water to be purged from a well
TL =	Tubing Length
TF =	Tubing Factor which is 0.0102 gal/ft (39 ml/ft) for tubing diameter of 3/8 inch, or 0.0159 gal/ft (60 ml/ft) for tubing diameter of 5/8 inch

  - Maximum Purge Volume: The maximum purge volume for most wells will be 0.25 (1/4) of one well casing volume. For some shallow wells, the PV_{min} may be greater than 0.25 casing volume. In these cases, the PV_{min} shall be purged followed by the measurement of field water quality parameters and collection of samples. The maximum purge volume (PV_{max}) is calculated as follows:

    $$PV_{max} = (DTB_{LS} - DTW_{LS})\, F_c \times 0.25$$

    where:

PV_{max} =	One quarter of one well casing volume (gal)
DTB_{LS} =	Depth to Bottom from Land Surface (feet)
DTW_{LS} =	Depth to Water from Land Surface (feet)
F_c =	Casing factor (gal/ft) which is 0.16 for a 2-inch diameter well and 0.65 for a 4-inch diameter well

- Begin purging the well according to the manufacturer's instructions for operating the pump. The purge rate should be kept to less than 500 milliliters per minute (ml/m). Variation of the purge rate should be minimized. Note: Purged water will be containerized in DOT-approved 55-gallon drums.

- Following the removal of the minimum purge volume, begin monitoring the field water-quality indicator parameters (i.e., temperature, conductivity, pH, dissolved oxygen and turbidity). It is recommended that the water quality meter be attached to a flow-through cell to allow for continuous readings. Monitor the indicator parameters approximately once every 5 minutes and record the results in the field log. (Note: A minimum of 500 ml of purge water is required to fully exchange the water in the flow-through cell between measurements.) The well shall be considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings.

If one or more key indicator parameters fail to stabilize after purging 0.25 well casing volume (the maximum purge volume), purging will be discontinued, and sampling will be initiated. In cases where the calculated minimum purge volume is greater than 0.25 casing volume, monitor the indicator parameters following the removal of PV_{min} approximately every 2 minutes (approximately every 0.5 gallon) for a maximum of 6 minutes (i.e., three sets of readings). Any parameters that fail to achieve stabilization should be noted in the field log. Turbidity should be less than 50 NTUs prior to collection of a sample for metals analysis.

- Turn pump off and disconnect the flow through cell. Turn pump on and reduce the pump discharge rate to the minimum capabilities of the pump (approximately 100 milliliters per minute or less). Collect the appropriate samples from the pump discharge hose.
- Gently pour the sample into the sample container taking care not to spill on the outside of the container or overfill container and replace the cover on the sample container. Samples for volatile organic analyses will have no air space in the sample vial prior to sealing. This is done by filling the vial such that there is a meniscus on top. Carefully slide the septum, Teflon side down, onto the top of the vial and cap the vial. Check for bubbles by turning the vial upside down and tapping it lightly. If bubbles appear, reopen the vial, remove the septum and add more sample (or resample). Replace the septum, recap and check for bubbles. Continue until vial is bubble-free.
- Return sample container to sample cooler.
- If reusable, decontaminate the sampling equipment according to the procedures described in Section 1.7.
- Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum or other approved container for disposal.
- Secure and lock the well.

1.7 Decontamination Procedures

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling location. In instances where this is not possible, a field cleaning/decontamination procedure will be used in order to mitigate cross-contamination between sample locations. A decontamination station/pad will be established for all field activities if field decontamination is necessary. This will be an area located at some distance from the sampling locations so as not to adversely impact the decontamination procedure while still allowing the sampling teams to keep equipment handling to a minimum after decontamination.

1.7.1 Field Decontamination Procedures

All non-disposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling interval or location, and prior to leaving the site). Different decontamination procedures are used for the various types of equipment utilized to collect the samples. When designing a field decontamination program, it is advisable to initiate environmental sampling in the area of the site with the lowest contaminant probability and proceed through to the areas of highest suspected contamination.

1.7.2 Decontamination Procedure for Drilling/Probing Equipment

All equipment such as drill rigs and other mobile equipment will receive an initial cleaning prior to use at the Site. The frequency of subsequent cleanings while on-site will depend on how the equipment is actually used in relation to collecting environmental samples. All wash/rinse solutions will be collected and contained on-site in DOT-approved 55-gallon drums for proper off-site disposal.

1.7.3 Decontamination Procedure for Sampling Equipment

All Teflon, polyethylene and stainless steel sampling equipment will be decontaminated utilizing the following procedure:

- Wash thoroughly with non-residual detergent (e.g., Alconox) and clean potable tap water using a brush to remove particulate matter or surface film.
- Steam clean (if necessary).
- Rinse thoroughly with tap water.
- Rinse thoroughly utilizing distilled or deionized water and air dry.

The first step, a soap and water wash, is designed to remove all visible particulate matter and residual oils and grease. Pressure washing will be utilized followed by a steam cleaning, if necessary. This step will be followed by a tap water rinse and a distilled/deionized water rinse to remove detergent.

1.7.4 Decontamination Procedure for Excavation Equipment

All equipment such as excavators and other mobile equipment will receive an initial cleaning prior to use at the site. The frequency of subsequent cleanings while on-site will depend on how the equipment is actually used in relation to collecting environmental samples. All wash/rinse solutions will be collected in 55-gallon drums for off-site disposal.

After the initial decontamination, cleaning may be reduced to those areas that are in close proximity to materials being sampled. The bucket of the excavator will be cleaned between sample locations.

The bucket of the excavator will be decontaminated in the following manner:

- Wash thoroughly with nonresidual detergent (Alconox) and tap water using a brush to remove particulate matter or surface film. Pressure washing will be utilized, if necessary, to remove any oil and/or tar accumulations on probe rods, bucket of the excavator, etc. Any loose paint chips, paint flakes and rust must also be removed.
- Once decontaminated, remove all items from the decontamination area.

1.8 Laboratory Sample Custody Procedures

A NYSDOH ELAP certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used. The Standard Operating Procedures of the laboratory selected to undertake the analysis of environmental samples for this program will be available upon request.

1.9 Field Management Documentation

Proper management and documentation of the field activities is essential to ensure that all necessary work is conducted in accordance with this QAPP in an efficient and high quality manner. Field management procedures will include maintaining a daily Field Log Book, following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if required), preparing a location sketch for sampling points in the field log, recording sample information in the field log and completing Daily Equipment Calibration Logs. Boring and well construction logs, if necessary, will be completed in the office. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly.

1.9.1 Location Sketch

For each sampling point, a location sketch will be completed in the field log using permanent references and distances to the sampling point noted, if possible. Photographs may also be utilized.

1.9.2 Sample Information

At each sampling location, sample information will be recorded in the field log including, but not limited to, the following information:

- Sample location identification;
- Field sample identification number;
- Date and time of sample collection;
- Sample matrix;
- Method of sample collection and any factor that may affect its quality adversely;
- Well information (groundwater only);

- Field test results; and
- Analysis to be performed.

1.9.3 Chain of Custody

A Chain of Custody (COC) form will be completed and is initiated at the laboratory with container preparation and transportation to the Site. The COC remains with the samples at all times and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and proper handling of the containers and samples. When the form is complete, it should indicate that there were no lapses in sample accountability.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession; or
- It is in the individual's view after being in his or her physical possession; or
- It is secured by the individual so that no one can tamper with it; or
- The individual puts it in a designated and identified secure area.

In general, COC forms are provided by the laboratory contracted to perform the analytical services. At a minimum, the following information shall be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Sample collection date
- Sample collection time
- Sample location

- Sample type/matrix
- Analysis requested
- Number of containers and volume collected
- Remarks (e.g., preservation, special handling, etc.)
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

For this particular project, COC forms provided by the laboratory will be utilized.

The COC form is completed and signed by the person performing the sampling activities. The original form travels with the samples and will be signed and dated each time the samples are relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler maintains a copy of the COC form and a copy is retained for the project file. Each sample container will also be labeled with an indelible marker with a minimum of the following information:

- Sample number
- Analysis to be performed
- Date and time of collection
- Sampler's initials

A copy of the completed COC form is returned by the laboratory with the analytical results.

1.9.4 Field Log Book

Field log books will be bound and should have consecutively numbered, water resistant pages. All pertinent information regarding the Site and sampling procedures will be documented. Notations will be made in log book fashion, noting the time and date of all entries. Information recorded in the log book should include, but is not limited to, the following:

The first page of the log book will contain the following information:

- Project name and address
- Name, address and phone number of field contact
- Waste generator and address, if different from above
- Type of process (if known) generating waste
- Name, address and phone number of subcontractors and contact persons

Daily entries are made for the following information:

- Weather conditions
- Purpose of sampling
- Location of sampling points
- Number(s) and volume(s) of sample(s) collected
- Description of sample location and sampling methodology
- Date and time of sample collection and personnel arrival and departure
- Geologic description of each sample interval, if applicable
- Collector's sample identification number(s)
- Sample distribution and method of storage and transportation
- References, such as sketches of the sample location or photographs of sample collection with dimensions
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance, etc.), water levels, drilling logs, and organic vapor and dust readings
- Signature of personnel responsible for completing log entries.

1.9.5 Field Changes and Corrective Actions

Whenever there is a required or recommended sampling change or correction, it will be noted in the field log by the Field Operations Manager, with approval by the D&B Project Manager.

1.10 Calibration Procedures and Preventive Maintenance

The following information regarding equipment will be maintained at the Site:

- Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be completed daily at the sampling site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.

- A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals that will be carried out to minimize down time of the equipment.

- Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventative maintenance, in accordance with the NYSDEC 7/05 ASP, for laboratory equipment, will be contained in the laboratory's standard operating procedures (SOP) which will be made available upon request.

1.11 Performance of Field Audits

During field activities, if determined to be necessary, the QA/QC Officer may accompany sampling personnel into the field, verify that the Site sampling program is being properly implemented and detect and define problems so that resolutions can be determined and implemented. All findings will be documented and provided to the Field Operations Manager.

1.12 Control and Disposal of Contaminated Material

During sampling activities, contaminated waste, soil and water may be generated from drill cuttings, drilling fluids, decontamination water and purge water. In addition, contaminated materials may include spent protective clothing, spent disposable sampling equipment and wastes generated as a result of equipment decontamination.

Any contaminated materials generated as a result of the field program will be contained in U.S. Department of Transportation (DOT) 55-gallon drums, or an approved equivalent container, and staged in a designated area for subsequent waste characterization. Each drum will be identified by the type of material contained.

DOT-approved 55-gallon drums will be available for disposal of spent protective clothing and disposable sampling equipment, if any. These drums will be marked and labeled as containing personnel protective and sampling equipment. These drums will not be sampled. All drums will be sealed and staged on-site to await proper off-site disposal.

1.13 Documentation, Data Reduction and Reporting

A NYSDOH ELAP-certified laboratory meeting the New York State requirements for documentation, data reduction and reporting will be used for all laboratory analysis. All data will be cataloged according to sampling locations and sample identification nomenclature that is described in this QAPP. The laboratory analysis will be reported in the NYSDEC ASP Category B deliverables format, as well as Electronic Data Deliverables (EDDs in EQuIS format). The EDDs will be submitted to the NYSDEC.

NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for organic and inorganic analysis, if deemed necessary) will be completed and included with each data package. The sample tracking forms are required and supplied by the 7/05 NYSDEC ASP.

1.14 Data Validation

Summary documentation regarding data validation will be completed by the laboratory using NYSDEC forms contained in the 7/05 NYSDEC ASP and submitted with the data package.

A Data Usability Summary Report (DUSR) will be prepared in lieu of a full data validation. The analytical and usability processes will be conducted in conformance with the NYSDEC ASP dated July 2005 and NYSDEC DER-10, as well as USEPA National Functional Guidelines for Data Validation and USEPA Region 2 Data Validation SOPs.

The DUSR will be prepared by reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with analytical method protocols include all chain of custody forms, holding times, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicates and sample data. If available, field sampling notes will also be reviewed, and any quality control problems will be evaluated as to their effect on the usability of the sample data.

The DUSR will describe the samples and analytical parameters reviewed. Data deficiencies, analytical protocol deviations and quality control problems will be described and their effect on the data discussed. Resampling and reanalysis recommendations will be made, if necessary.

The DUSR shall be prepared by a data validator who meets the NYSDEC personnel requirements in DER-10.

The following is a description of the two-phased approach to data validation which will be used for evaluation of the data. The first phase is called checklisting and the second phase is the analytical quality review, with the former being a subset of the latter.

- Checklisting - The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.

- Analytical Quality Review - The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Data Usability Summary Report section will be prepared by the data validator and included in the final report submitted to the NYSDEC.

1.15 Performance and System Audits

A NYSDOH ELAP certified laboratory, which has satisfactorily completed performance audits and performance evaluation samples, shall be used to perform sample analyses on this project.

1.16 Corrective Action

A NYSDOH ELAP certified laboratory shall meet the requirements for corrective action protocols, including sample "cleanup" to attempt to eliminate/mitigate "matrix interference." Sample "cleanup" is not required for samples to be analyzed for volatile organic compounds.

1.17 Trip Blanks

The primary purpose of a trip blank is to detect other sources of contamination that might potentially influence contaminant values reported in actual samples, both quantitatively and qualitatively. The following have been identified as potential sources of contamination:

- Laboratory reagent water;
- Sample containers;

- Cross contamination in shipment;
- Ambient air or contact with analytical instrumentation during preparation and analysis at the laboratory; and
- Laboratory reagents used in analytical procedures.

A trip blank will consist of a set of 40 milliliter (ml) sample vials filled at the laboratory with laboratory demonstrated analyte free water. Trip blanks will be handled, transported and analyzed in the same manner as the samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, these sample containers only travel with the sample cooler. The temperature of the trip blanks will be maintained at 4°C while on-site and during shipment. Trip blanks will return to the laboratory with the same set of bottles they accompanied in the field.

The purpose of a trip blank is to control sample bottle preparation and blank water quality as well as sample handling. Thus, the trip blank will travel to the Site with the empty sample bottles and back from the Site with the collected samples in an effort to simulate sample handling conditions. Contaminated trip blanks may indicate inadequate bottle cleaning or blank water of questionable quality. Trip blanks will be implemented only when collecting water samples, including field blanks, and analyzed for volatile organic compounds only.

1.18 Method Blanks/Holding Blanks

A method blank is an aliquot of laboratory water or soil which is spiked with the same internal and surrogate compounds as the samples. The purpose of the method blank is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the 7/05 NYSDEC ASP. A holding blank is an aliquot of analyte-free water that is stored with the environmental samples in order to demonstrate that the samples have not been contaminated during laboratory storage. This blank will be analyzed using the same analytical procedure as the samples.

1.19 Matrix Spikes/Matrix Spike Duplicates and Field Duplicates

Matrix spike samples are quality control procedures, consistent with 7/05 NYSDEC ASP specifications, used by the laboratory as part of its internal Quality Assurance/Quality Control program. The matrix spikes (MS) and matrix spike duplicates (MSD) will be aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. These QA/QC samples will be used to evaluate the matrix effect of the sample upon the analytical methodology, as well as to determine the precision of the analytical method used. A matrix spike blank will be an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The matrix spike blank (MSB) will be subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedure and frequency regarding the MS, MSD and MSB samples are defined in the 7/05 NYSDEC ASP.

Field blind duplicate samples will be collected to demonstrate the accuracy of field screening and unvalidated laboratory data with limited analytical deliverables. One blind duplicate sample will be collected for every 20 soil and groundwater samples. The location to be sampled in duplicate will be selected at random and the sample identification will be coded to show the sample as a blind duplicate.

1.20 Field Blank (Field Rinsate Blank)/Equipment Blank

If necessary, field blank samples may be collected. The field blank will consist of an aliquot of analyte-free water, supplied by the laboratory, which is opened in the field and is generally poured over or through a sample collection device after it has been decontaminated, collected in a sample container and returned to the laboratory as a sample for analysis. In this manner, it is a check on sampling procedures and cleanliness (decontamination) of sampling devices. Generally, a field blank will be collected for a "batch" of sample matrices collected in the same manner (such as water and soil/sediment) up to a maximum of 20 samples. Field blanks will be analyzed for the same suite of chemicals analyzed for in the environmental samples collected in that "batch." Field blanks will not be analyzed when using dedicated or disposable (one use only) sampling equipment unless directed otherwise.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

LONG ISLAND RAIL ROAD

ARCH STREET YARD

LONG ISLAND CITY, NEW YORK

Prepared for:

METROPOLITAN TRANSPORTATION AUTHORITY

LONG ISLAND RAIL ROAD

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.

WOODBURY, NEW YORK

MAY 2018

SITE-SPECIFIC HEALTH AND SAFETY PLAN
ARCH STREET YARD

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1.0 GENERAL

1.1 Introduction

The purpose of this Site-Specific Health and Safety Plan (HASP) is to establish personnel protection standards and mandatory safety practices and procedures that will be implemented during the field activities completed at the Long Island Rail Road (LIRR) Arch Street Yard (the Yard) in support of the scope of work provided in the May 2018 Remedial Action Work Plan (RAWP). The Yard is located south of Jackson Avenue, under the 21st Street Bridge at 49th Avenue, in Long Island City, Queens, New York. The Yard is currently owned by the LIRR and is approximately eight acres in size, but the portion of the Yard that is subject to the Voluntary Cleanup Agreement (VCA) is an approximately 2.7-acre area of the Yard, herein referred to as “the Site”. This HASP was developed based on the scope of work provided in the May 2018 RAWP. This plan must be re-evaluated should the project conditions change from those that are discussed below.

The procedures and protocols presented in this plan have been established to ensure that a mechanism is in place to assist project personnel in the event that hazards from site contamination are encountered. This plan addresses typical on-site activities such as surveying, drilling, excavation, and sampling that may be completed by D&B and its subcontractors. The Remedial Contractor will be required to prepare their own HASP to cover their project personnel. This HASP is not designed to replace existing procedures or to address each and every health and safety scenario that could be encountered during the implementation of the field work. However, this HASP addresses the special and/or unique health and safety situations resulting from actual or potential contact with contaminated materials consistent with the requirements pursuant to OSHA 1910 General Industry Standards, OSHA 1926 Construction Standards, and specifically, the OSHA Standard for Hazardous Waste Operations and Emergency Response (29 CFR 1910.120), where applicable.

Compliance with this HASP is required for all authorized D&B project personnel, project support personnel and visitors who enter the work areas of this project. Under no circumstances will any person enter an established restricted area or exclusion zone without first complying with the requirements of this HASP.

The contents of this HASP may change or undergo revision based upon field monitoring results, modifications to the technical scope of work or additional information made available to health and safety personnel. Any proposed changes must also be reviewed and approved by designated D&B personnel.

1.2 Project Location

Site Name:	LIRR Arch Street Yard
Site Location:	Long Island City, New York
Project Objectives:	The objective of the project is to remediate soil and groundwater contamination associated with the Site (NYSDEC VCA Site No. V00733).

1.3 Project Personnel

This section specifically refers to D&B operations personnel, project management personnel, and project support personnel. Project Personnel are divided into three categories including Contact Project Personnel, Non-contact Project Personnel and Project Support Personnel.

Contact Project Personnel - Refers to project personnel who have a reasonable potential to come into contact with contaminated soil, groundwater and/or soil gas. The specific job tasks will be evaluated to determine personnel classifications. The Health & Safety Coordinator (HSC) or his/her designee (i.e., Field Operations Manager [FOM]), will assist with this determination.

Non-contact Project Personnel - Refers to Project Personnel who are not reasonably expected to come into contact with contaminated soil, groundwater and/or soil gas. The specific job tasks will be evaluated to determine personnel classifications. The HSC or his/her designee (i.e., FOM), will assist with this determination.

Project Support Personnel - Refers to all other persons who may enter the project work zone such as truck drivers, utility workers, and emergency crews (police, fire, ambulance) as well as any other personnel designated as a project visitor by D&B.

1.3.1 Project Personnel Assignments

D&B Engineers and Architects, P.C.

Title	Name	Phone Number
Project Director	Thomas P. Fox	(516) 364-9890, x. 3068
Project Manager	Lindsay Peppe	(516) 364-9890, x. 3095
Field Operations Manager	Paul Barusich	(516) 364-9890, x. 3092
Corporate Health and Safety Coordinator	Brian Werner	(516) 364-9890, x. 3093
On-Site Health and Safety Representative	Paul Barusich	(516) 364-9890, x. 3092

Long Island Rail Road

Title	Name	Phone Number
Project Director	Gloria G. Russo	(347) 494-6034
Project Manager	Kathleen Green	(347) 494-6927
Movement Bureau	--	(718) 558-8204
Corporate Safety Department	--	(347) 494-6027

1.3.2 Other Project Support Organizations

Health and Safety Consultant

Emilcott	Bruce Groves	(973) 765-0991

Survey Company

[To be Determined]

Drilling and Geoprobe Services

[To be Determined]

Remedial Contractor

[To be Determined]

Laboratory Services

[To be Determined]

Corporate Physician

Dr. Sara Mendelsohn (516) 682-9142

1.4 Emergency Phone Numbers

Detailed emergency information is found in Section 13.0. Written hospital directions and accompanying maps can be found in Section 1.5.

Organization	Telephone No.
Ambulance	911
Fire Department (FDNY Engine 258 Ladder 115)	911 or (718) 999-5555
Police Department (NYPD 108th Precinct)	911 or (718) 784-5411
MTA Police	(718) 558-3300
National Response Center Desk	(800) 424-8802
Poison Control Center	(800) 222-1222
NYSDEC (Spills Hotline)	(800) 457-7362
Mt. Sinai Hospital of Queens	(718) 932-1000

1.5 Hospital Route Map and Directions

The driving directions from the Site to Mt. Sinai Hospital of Queens are provided below.

1. Exit the Site and take Arch Street (service road) north to Jackson Avenue.
2. Turn right and head east on Jackson Avenue.

3. Turn left onto 23rd Street.

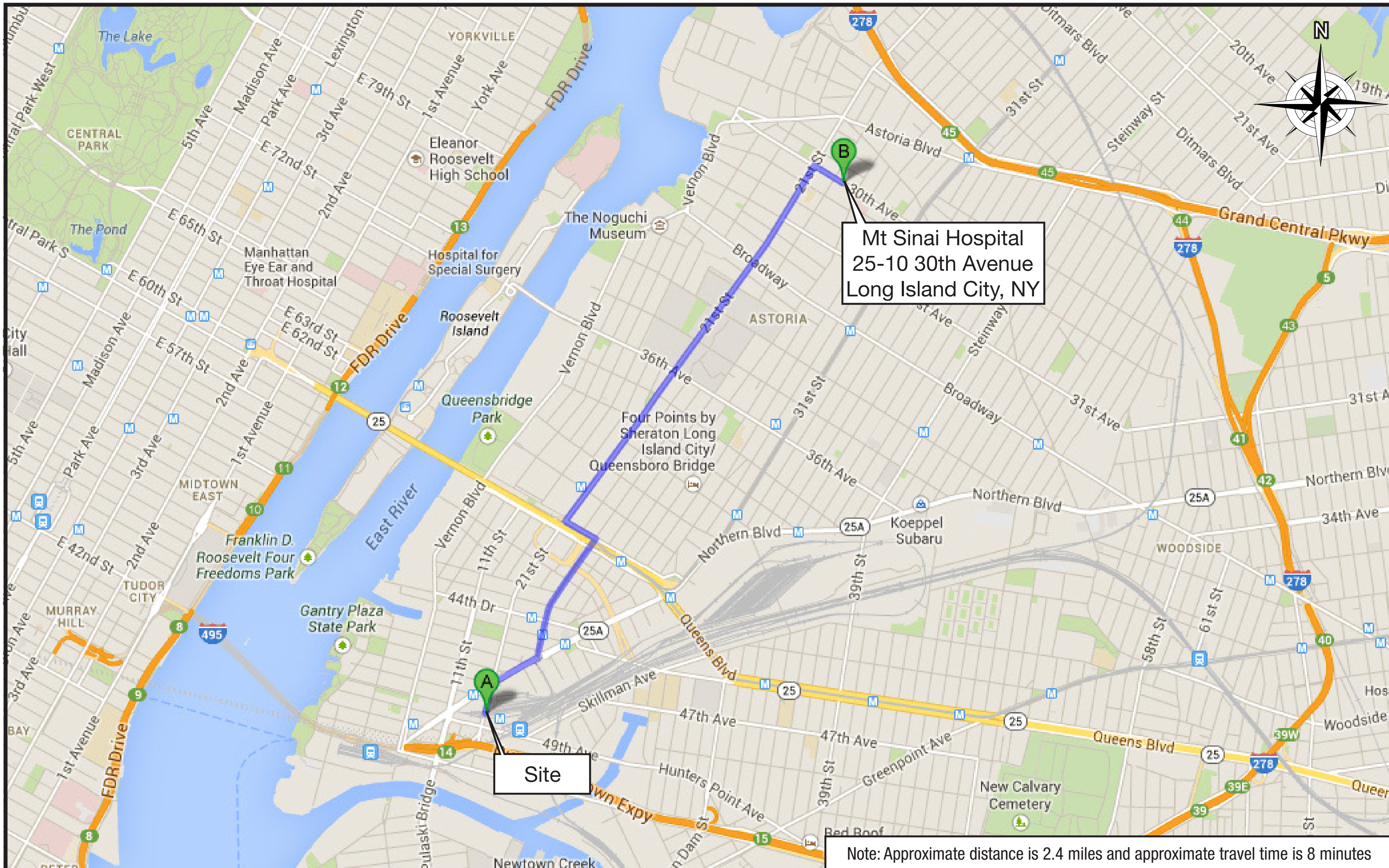
4. Turn left onto Queens Plaza north.

5. Turn right on to 21st Street.

6. Turn right on to 30th Avenue.

7. Mt. Sinai Hospital will be on the right side at 25-10 30th Avenue, Long Island City, New York.

Total travel distance is approximately 2.4 miles and travel time is approximately 8 minutes. A Hospital Route Map is provided on Figure 1-1.



D&B ENGINEERS AND ARCHITECTS, P.C.

Long Island Rail Road
Arch Street Yard (NYSDEC VCA Site No. V00733)
Site-Specific Health and Safety Plan

HOSPITAL ROUTE MAP

FIGURE 1-1

2.0 HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety designations and general responsibilities for this project.

2.1 Project Director (PD) - D&B

The D&B Project Director (PD) will have overall executive responsibility for all activities and personnel on-site during all project activities described in this HASP.

2.2 Project Manager (PM) - D&B

The D&B Project Manager (PM) will ensure that all elements of this HASP are implemented where applicable and that all project staff are protected and working in a safe manner.

2.3 Corporate Health and Safety Coordinator (HSC) - D&B

The Health and Safety Coordinator (HSC) or designee (i.e., the Field Operations Manager [FOM]) has overall responsibility for the development, implementation and enforcement of this HASP. He/she will also approve any changes to this plan due to modification of procedures or newly proposed site activities.

The HSC or designee is responsible for the development of safety protocols and procedures, consistent with the hazardous waste aspects of this project, and will also be responsible for the resolution of any outstanding health and safety issues that arise during the conduct of site work. Health and safety-related duties and responsibilities will be assigned only to qualified individuals by the HSC.

The HSC or designee will provide technical assistance for high hazard or other project tasks as required. He/she may periodically conduct audits of the health and safety procedures implemented on site. Before personnel may work in designated exclusion zones, status of medical clearance and applicable health and safety training must be presented to the HSC or his/her designee, pursuant to those requirements specified in OSHA 29 CFR 1910.120.

2.4 On-Site Health and Safety Representative (HSR) – D&B

The HSR or designee will be on-site for all site activities that have the reasonable potential for bringing workers into contact with contaminated materials. The HSR will obtain and review applicable health and safety training and medical surveillance documents for personnel who may work in designated exclusion zones. The HSR has “stop-work authorization,” which he/she will execute upon determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation, such as extreme weather conditions. Authorization to proceed with work will be issued by the HSR after such action. The HSR or designee will initiate and execute all contact with support facilities, such as hospitals and emergency response organizations, when this action is appropriate.

2.5 Health and Safety Consultants

A health and safety consultant (Emilcott) will be available to provide health and safety consulting services on an as needed basis for this project. If required, the designated Health and Safety Consultant will review the HASP prior to implementation.

2.6 LIRR Project Manager

The LIRR Project Manager will be responsible for providing existing documents of all known hazards and facility related information to the D&B FOM. Should LIRR personnel become involved with investigative work of the project, the LIRR Project Manager shall provide LIRR personnel with the Site-Specific HASP, as well as any other information concerning chemical or other safety concerns.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Description

The LIRR Arch Street Yard (the Yard) is located south of Jackson Avenue, under the 21st Street Bridge in Long Island City, Queens, New York. The Yard is currently owned by the LIRR and is approximately eight acres in size. As previously discussed, the area of the Yard subject to the VCA is an approximately 2.7-acre portion of the Yard (the Site). The Yard was previously utilized by LIRR to perform maintenance on passenger rail cars, however, these activities ceased in December 2009. In September 2016, the Maintenance Facility located east of the Site was leased to Metro North Railroad (MNR) and Bombardier to install Positive Train Control in their trains. The LIRR currently uses the Yard (and the Site) for storage, and operation of an electric substation located east of the Site, which is not regularly occupied.

Buildings currently located at the Yard include a Maintenance of Equipment building on the northern end of the Yard near the entrance to the Yard, and an Engineering Support Building on the southern end of the Yard. These buildings are utilized for storage and are not occupied on a regular basis. The northern building on-site was leased to MNR and Bombardier as part of the September 2016 agreement. A security booth is also located on the northern end of the Yard, which is occupied during regular business hours. In addition, several sets of train tracks traverse the Yard and under the 21st Street Bridge. These tracks are not currently active, and since the closing of the maintenance facility in 2009, no activities have occurred at the Yard.

3.2 Site History and Background

In December 2003, a LIRR contractor discovered contaminated soil while excavating a utility trench under the 21st Street Bridge at the Yard. The NYSDEC was notified and NYSDEC Spill No. 0310802 was opened. In April 2004, the LIRR's East Side Access Department (ESA) performed an environmental investigation of the impacted area in an attempt to delineate the extent of the contamination. Based on the results of this investigation, it was determined that the majority of the impacted surface/shallow subsurface soil had been excavated and removed during the utility trenching. Note there are no records available concerning the details of the utility trenching such as the quantities of soil excavated or the limits of excavation. However, additional follow-up investigations were completed in the vicinity of the excavation.

In 2005, ESA installed four groundwater monitoring wells, which were sampled three to four times per year during the time period from 2005 through 2009. In 2009, ESA advanced seven groundwater probes throughout the impacted area, in order to further define the extent of the contamination. Based on the investigation findings, it was determined that further horizontal and vertical delineation of groundwater contamination was required. In September 2011, the LIRR requested to add the 2.7-acre parcel of the Yard (i.e., the Site) to an existing VCA with the MTA LIRR. The NYSDEC approved the addition of the Site to the existing VCA Index Nos. W1-0993-04-04 and W2-0994-04-04.

Under this VCA, the Site was designated as NYSDEC Site No. V00733. Several investigations have been completed at the Yard following the initial identification of contaminated soil in December 2003. Details associated with these investigations are provided in the May 2018 RAWP and the October 2016, Revised May 2017 Remedial Investigation Report.

The most recent and notable investigation with respect to the current conditions of the Site was a Remedial Investigation (RI) completed by D&B between October 2015 and August 2016. D&B completed the RI field activities in three phases, in accordance with the July 2015 NYSDEC-approved RIWP and subsequent work plan modifications.

Based on the completed RI, a localized source area or “hot-spot” of chlorinated volatile organic compound (VOC) contamination is present in a discrete area south of the tracks within the Site, at a depth of approximately 8 to 16 feet below ground surface (bgs) immediately above and within the uppermost portion of the clay-rich unit. Based on the results of the RI and previous investigations, this “hot spot” encompasses approximately 680 square feet. Chlorinated VOCs identified at concentrations exceeding the Class GA New York State Ambient Water Quality Standards and Guidance Values as defined in the Division of Water Technical and

Operational Guidance Series (1.1.1) in groundwater are consistent with the discrete residual source area or “hot-spot”.

Due to its discrete location under the bridge and the fact that there is no evidence that the LIRR has utilized, disposed or accidentally spilled chlorinated VOCs at the Yard, the chlorinated VOCs may have been dumped onto the Site by an outside party during a “one-time event” or over a limited period of time. In addition, the results of the RI showing the presence of fill material and limited shallow impacts by chlorinated VOCs are consistent with previous reports indicating that the majority of impacted surface/shallow subsurface soil was excavated and removed during the utility trenching.

It should be noted that an investigation conducted in 2000 identified elevated levels of polychlorinated biphenyls (PCBs) at the Site; however, the RI results did not confirm the presence of PCB contamination within surface and shallow subsurface soil in the track area to the northwest of the chlorinated VOC contamination area. Given that the tracks and the approximately one to two feet of bluestone now present in the area were installed following the initial discovery of the elevated PCB concentrations in 2000, it is likely that the majority of the PCB contaminated soil was previously removed.

3.3 Scope of Work

Field activities to be completed at the Site include the removal, via excavation, to the extent practical, all soil material exhibiting contaminant concentrations that exceed the NYSDEC 6 NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (SCOs) from the source area, replacement with clean fill, installation of a cover system, and implementation of institutional controls. Under the current remedial plan, it is estimated that an approximate 1,125 square foot area will be excavated up to maximum depths of 25 feet bgs to 30 feet below ground surface, or top of bedrock. However, the total depth of the excavation may be modified depending on the results of a pre-design investigation, as discussed below.

Groundwater is anticipated to be encountered at depths as shallow as 3 feet bgs. As such, dewatering of the excavation area will be necessary during the completion of remedial excavation activities. Liquids generated from dewatering activities will either be temporary staged on-site for treatment for subsequent discharge in accordance with State Pollutant Discharge Elimination System (SPDES) regulations and/or all applicable state and federal regulations, or disposed of as a hazardous liquid. In addition, due to the high concentrations of chlorinated VOCs in the subsurface soil within the source area, it is anticipated that subsurface soil beyond 8 feet bgs may be characterized as hazardous and disposed of in accordance with all applicable local, state and federal regulations.

Following the completion of excavation activities, confirmatory endpoint and sidewall soil samples will be collected from the excavation to characterize the remaining soil prior to restoration. Upon the receipt of confirmatory endpoint and sidewall soil samples verifying levels of contaminants are below respective SCOs to the extent practicable, the excavation will be backfilled with clean fill from an off-site approved source and a cover system will be installed throughout the excavation area.

A pre-design investigation is recommended to be completed prior to implementation of the remedy to further delineate the vertical extent of contamination and refine the proposed excavation area, accordingly. The pre-design investigation will include the installation and associated sampling of soil borings for delineation and waste characterization purposes, as well as an evaluation on the feasibility of completing excavation activities immediately adjacent to the overhead roadway of 21st Street. The confirmatory endpoint and sidewall soil samples for the remedial excavation may be collected as part of the pre-design investigation proposed to be completed at the Site, as sheeting/shoring installed within the excavation area may limit access to the excavation sidewalls.

The implementation of a chemical injection program may be necessary after the completion of remedial excavation activities in the event that post-remediation groundwater sampling indicates that dissolved-phase VOC concentrations are not decreasing at an acceptable rate. Should a chemical injection program be implemented at the Site following remedial excavation activities, this HASP may be updated, as necessary.

Additional information on the scope of work and can be found in the May 2018 RAWP.

4.0 HAZARD ASSESSMENT

At the Site, there may be areas where contaminated soil, groundwater and/or soil gas is encountered. The probability of worker exposure to a chemical hazard varies with the job task. The job tasks that involve contact with potentially contaminated soil and groundwater are expected to have a greater potential for exposure than job tasks that do not involve contact with soil and groundwater. Site workers may be exposed to chemicals by inhalation, ingestion, and/or dermal contact. To protect potentially exposed personnel, the Site may be divided into zones by degree of contamination. Dust control measures may be implemented, respirators and personal protective equipment may be worn, real-time and instantaneous air monitoring may be conducted, and proper decontamination procedures will be followed.

The following is a general discussion of the hazards that may be encountered at the Site.

4.1 Task Specific Hazard Assessment

Potential exposure to contamination is dependent principally on the type of activity being undertaken. Those work tasks that involve significant disturbance and contact with subsurface soil and groundwater (e.g., drilling, sampling or excavation) have the highest project personnel exposure potential. As such, this plan has established two categories of work tasks based on worker exposure to potential site constituents:

- **Non-contact -**Work activities that have little or no reasonable potential for contact or exposure to hazardous site constituents.
- **Contact** -Work activities that have some reasonable potential for contact or exposure to hazardous site constituents.

4.1.1 Non-Contact Personnel

It is anticipated that the following activities involve minimal soil and groundwater contact, and should not result in contact with potentially contaminated soil, groundwater, or soil gas and vapors. These activities should not require additional H&S considerations beyond those H&S practices already in place for this type of project. These tasks will include:

- Site preparation;
- Surveying;
- Surface restoration;
- Air monitoring activities; and
- Project administration.

Potential exposure to contaminated soil, groundwater, or soil gas and vapors is not anticipated; however, the operations will be evaluated and monitored as necessary. In the event that contaminated materials are encountered, all project personnel involved in such areas will stop work until further instructions from the HSC.

Initially, exclusion zones will not be established for such activities. However, exclusion zones will be established if visual evidence of contamination is observed, and/or instrument readings exceed the action levels detailed in Section 7.0.

4.1.2 Contact Personnel

It is anticipated that personnel performing the following tasks have some reasonable potential to come into contact with contaminated soil, groundwater, or soil gas and vapors. These activities include:

- Excavation/trenching
- Advancement of soil borings/groundwater probes;
- Collection of soil samples;
- Groundwater sampling;
- Handling of drill cuttings and fluids;

- Equipment and personnel decontamination;
- Liquid transfer activities; and
- Material handling.

These activities will be evaluated and monitored by the HSR or designee.

A hazard analysis was developed for the work activities that involve potential exposure to contamination at the Site (contact work). The analysis was based on the potential for the hazard regardless of the contaminant concentrations. For example, the potential for an individual to come in contact with liquids or sediments during equipment decontamination is moderate to high. However, the actual hazard may be low if the liquids or sediments are not contaminated. Table 4-1 outlines the hazard analysis for the Contact Work Activities.

The following is a general discussion of the hazards that may be encountered on-site. Additional information regarding any contaminants encountered during this project may be found in standard health and safety references, such as the NIOSH "Pocket Guide to Chemical Hazards."

4.2 Chemical Hazards

Activities associated with excavation/trenching, drilling, and soil and water handling for sampling or disposal present a potential for personnel chemical exposure. In addition, when conducting operations close to the roadways, the nearby passing traffic may also cause an increase in airborne contaminants. Precautions should be taken to continuously assess the workplace environment by observation and use of direct-reading instruments during site operations where there exists a potential for contact with contaminants. Measures must be taken to prevent an uncontrolled release or exposure to vapor, liquid or solid contaminants by workers and/or the general public. Assessment and prevention strategies are discussed in other sections of this HASP and must be practiced on a continual basis by all on-site personnel throughout this project.

Table 4-1

HAZARD ANALYSIS FOR CONTACT WORK ACTIVITIES

Potential Hazard	Excavation/ Trenching	Soil Boring and Groundwater Probe Installation	Sample Collection	Waste Handling (soil, groundwater)	Equipment Decontamination
Inhalation of volatiles	moderate to high	low to moderate	low to moderate	low to moderate	Low
Skin & eye contact	moderate to high	moderate to high	moderate to high	moderate to high	moderate to high
Ingestion	low	low	low	low	low to moderate
Inhalation of dust	moderate to high	low	low	low	low to moderate
Heat stress	depends on temperature	depends on temperature	depends on temperature	depends on temperature	depends on temperature
Cold stress	depends on temperature	depends on temperature	depends on temperature	depends on temperature	depends on temperature
Confined Space/ Excavation	not expected/not allowed	not expected/not allowed	not expected/not allowed	not expected/not allowed	not expected/ not allowed
Heavy equipment	moderate to high	moderate to high	moderate to high	moderate to high	low to moderate
Noise	moderate	moderate	low	low	moderate
Tripping	low to moderate	low	low	low	low
PPE	low	low	low	low	low to moderate
Utilities	high	high	low	low	low
Other Physical hazards	moderate	moderate	moderate	moderate	moderate
Biological hazards	low	low	low	low	low
Flammable hazards	low	low	low	low	low

4.2.1 Site-Specific Known and Potential Contaminants

Based on previous investigations, potential contaminants that may be encountered while conducting intrusive activities at the Site include:

- Volatile organic compounds (VOCs), particularly chlorinated VOCs such as tetrachloroethene (PCE) and trichloroethene (TCE);
- Semivolatile organic compounds (SVOCs), particularly polycyclic aromatic hydrocarbons (PAHs);
- Select heavy metals.

The source of these potential contaminants of concern is assumed to be unknown historical release(s), as well as the highly industrialized nature of the Site and surrounding area.

The primary potential chemical health hazards of concern to workers from contaminants are from the inhalation of vapors and dust, and skin exposure to chemicals or skin absorptive poisons. Potential for these exposures would exist during the excavation activities to be performed, as well as soil and groundwater sampling activities. OSHA Permissible Exposure Limits (PEL) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) may be exceeded during certain activities. These activities will be closely monitored and evaluated to determine potential for exceeding standards and the need to implement control measures to protect personnel and the environment. Potential exposures can be mitigated through appropriate investigation procedures, work practices, air monitoring, and personal protective equipment. All personnel related to the field work should keep upwind of all excavation and soil disturbance activities when possible.

4.2.2 Exposure Limits

Table 4-2 lists the Permissible Exposure Levels (PEL) for contaminants of concern and their primary health hazards. In the event that buried drums or underground storage tanks are encountered during the work activities at the Site, project personnel will cease work activities and contact the HSC. Because the potential for coming into contact with hazardous substances will vary with each job task, the probability of exposure will be assessed for each task as discussed below.

4.3 Biological Hazards

The specific location of the Yard is such that a limited number of biological hazards may exist. These hazards may include, but are not limited to: ticks; mosquitoes; wasps; spiders; microbiological agents (molds and fungi); improperly disposed medical waste, such as syringes, sharps or materials contaminated with human blood or bodily fluid; improperly disposed household waste; plants such as poison ivy, oak and sumac; and animals and rodents that may inhabit the Yard. Personnel shall avoid contact with these hazards and frequently wash potentially exposed skin. Insect repellent should be used in infested areas.

4.4 Physical Hazard Analysis

Potential hazards that are most likely to be encountered during field operations include, but are not limited to:

- Weather conditions (lightning, rain, excessive heat, excessive cold, and high winds, etc.);
- Slips, trips, falls on uneven/overgrown surfaces;
- Heavy equipment traffic;
- Active rail and street traffic;
- Striking and struck-by (heavy equipment);
- Moving or rotating machinery;
- Flying debris from drilling; and
- Overhead power lines and underground utilities (water, gas, sewer and electric) and related equipment.

Table 4-2

EXPOSURE LIMITS AND HEALTH HAZARDS OF CONTAMINANTS OF CONCERN

Potential Contaminant	Exposure Limits	Primary Health Hazard and Symptoms of Overexposure (Target Organs)
Select Polycyclic Aromatic Hydrocarbons (PAHs)	OSHA PEL: TWA 0.2 mg/m^3 NIOSH REL: Ca 0.1 mg/m^3 IDLH: Ca 80 mg/m^3	Respiratory system, skin, bladder, kidneys
1,1-dichloroethene	OSHA PEL: None NIOSH REL: Ca IDLH: Ca	Eyes, skin, respiratory system, central nervous system (CNS), liver, kidneys
1,2-dichloroethene	OSHA PEL: TWA 200 ppm (790 mg/$m^{3)}$ NIOSH REL: TWA 200 ppm (790 mg/m^3) IDLH: 1,000 ppm	Eyes, respiratory system, CNS
Tetrachloroethene (PCE)	OSHA PEL: TWA100 ppm C 200 ppm* NIOSH REL: Ca – minimize workplace exposure concentrations IDLH: Ca 150 ppm	Eyes, skin, respiratory system, liver, kidneys, central nervous system
Trichloroethene (TCE)	OSHA PEL: TWA 100 ppm C 200 ppm, 300 ppm (5-minute maximum peak in any 2 hours) NIOSH REL: Ca IDLH: 1,000 ppm	Eyes, skin, kidneys, liver, CNS, cardiovascular system
Lead	OSHA PEL: TWA 0.05 mg/m^3 NIOSH REL: TWA 0.05 mg/m^3 IDLH: 100 mg/m^3 (as Pb)	Eyes, skin, gastrointestinal (GI) tract, CNS, kidney, blood, gingival tissue
Manganese Compounds and fume	OSHA PEL: C 5 mg/m^3 NIOSH REL: TWA: 1 mg/m^3 ST 3 mg/m^3 IDLH: 500 mg/m^3 (as Mn)	Respiratory system, CNS, blood, kidneys
Mercury Compounds	OSHA PEL: 0.1 mg/m3 NIOSH REL: Hg Vapor TWA 0.05 mg/m^3 (skin) Other -C 0.1 mg/m^3 (skin) IDLH: 10 mg/m^3 (as Hg)	Eyes, skin, respiratory system, CNS, kidneys
Vinyl Chloride	OSHA PEL: TWA 1 ppm, C 5 ppm (15-minute) NIOSH REL: Ca IDLH: Ca (Not Determined)	Liver, CNS, blood, respiratory system, lymphatic system

Table 4-2 (continued)

PERMISSIBLE EXPOSURE LIMITS AND HEALTH HAZARDS OF CONTAMINANTS OF CONCERN

Notes:

* - For 5-minutes, in any 3-hour period, with a maximum peak of 300 ppm
C – Ceiling Concentration
Ca – Carcinogen
IDLH – Immediately Dangerous to Life and Health
LEL – Lower Explosive Limit
PEL – Permissible Exposure Limit
REL – Recommended Exposure Limit
ST - Short-Term Exposure Limit
TWA – Time-Weighted Average

Please refer to the NIOSH "Pocket Guide to Chemical Hazards" for details regarding the above-listed contaminants of concerns and their associated exposure limits.

A brief discussion of potential pathways of exposure and exposure control methods is presented below.

Inhalation - An inhalation exposure to volatile organic compounds and other gases and vapors would typically occur from exposure to gases/vapors present in the interstitial soil via excavation or the installation of boreholes.

Contact with Skin and Eyes - Contaminated groundwater, soil and sediments may come into contact with skin and eyes during work activities. Cotton coveralls, work gloves, and eye protection will be used, as necessary, to minimize and/or prevent skin and eye exposures.

Ingestion - Ingestion of contaminated materials may occur as a result of a hand-to-mouth contact (eating, drinking, and smoking) in contaminated areas or prior to appropriate personal decontamination. Frequent and thorough washing of hands and face, restriction of food items and smoking in the work area, proper use of work clothing and personal decontamination will control the potential for ingestion of contaminants.

Below is a summary of guidelines that may be used to eliminate/reduce the potential risk of physical hazards. The appropriate D&B SOP is referenced where necessary.

4.4.1 Weather

If severe weather occurs that may affect the safety of site workers, the HSC or designee will stop affected field operations. The HSC or designee will resume operations when weather conditions improve.

4.4.2 Heat and Cold Stress

Depending on the time of year and weather conditions, cold or heat stress may present a potential problem. The HSC or HSR will ensure that the heat and cold stress programs are implemented, and that adequate rest breaks and liquid consumption is maintained.

Proposed work/rest schedules will be dependent upon the weather conditions encountered and the level of personal protective equipment being utilized by on-site personnel. The HSC will use his judgment to establish and adjust work/rest schedules.

Please refer to D&B SOP Nos. C11 and C12 provided in Appendix A for more detailed requirements and procedures on preventing and controlling heat and cold stress.

4.4.3 Noise

Excessive noise can be a problem during certain activities on-site, such as excavation. If necessary, as designated by the HSC, ear plugs, or other hearing protection equipment will be made available for personnel use.

4.4.4 Illumination

If work activities occur before sunrise and/or after sunset, lighting will be provided at each work area to meet the requirements of 29 CFR 1910.120(m). The Standard states that while any work is in progress, the general site areas shall be lighted to not less than 5 foot-candles. In addition, any areas of excavation, waste management areas, access ways, active storage areas, loading platforms, and field maintenance areas shall be lighted to not less than 3 foot-candles, if necessary. The first aid stations should be lighted to not less than 30 foot-candles.

4.4.5 Slip, Trip and Fall Hazards

As in any work area, it is expected that the ground may be uneven, the surface may be unreliable due to settling, surface debris may be present, and wet or muddy areas may exist. Therefore, the potential for slipping, tripping, and falling is present, especially considering that safety equipment may be used which can impede vision. Severe trip hazards will be identified in site meetings and demarcated by flags or caution tape.

A Fall Protection Program has been established to protect site workers from injuries associated with falls from elevated surfaces. Protection from these hazards is achieved using a combination of fall hazard elimination, fall prevention systems, and personal fall arrest systems. Components of the Fall Protection Program include:

- Responsibilities for fall control and protection;
- Fall Assessment Checklist;
- Hazard Control Analysis;
- Equipment list and inspection;
- Associate training; and
- Applicable OSHA regulations.

Please refer to D&B SOP No. C13 provided in Appendix A for more detailed requirements and procedures regarding fall protection guidelines.

4.4.6 Confined Space Entry

Confined space entry is not anticipated during this project. If an entry is required into a Permit Required Confined Spaces (PRCS), as defined by 29 CFR Part 1910.146, the HSC or HSR will be responsible for implementation of the standard procedures for confined space operations, which includes permit entry system, pre-entry monitoring, and a buddy system.

Please refer to D&B SOP No. C25 provided in Appendix A for more detailed requirements and procedures regarding permit required confined space entry.

4.4.7 Electrical and Other Utility Hazards

Above and underground utilities may be present in areas where intrusive activities will take place. A minimum of 72 hours prior to the initiation of work, the One-Call Center will be contacted by the excavation or drilling contractor for utility markouts. The HSR or designee will review with LIRR all available site drawings and other information regarding the location of underground utilities and third rail locations on LIRR property.

To control the potential for electrical hazards, operating heavy equipment will not be allowed within 15 feet of any live overhead electrical wires/equipment or third rail locations. Ground fault circuit interrupters shall be used on portable electric-powered hand tools and gasoline generators. The FOM will be responsible for ensuring that all activities meet the appropriate electrical requirements outlined in the OSHA standards.

Please refer to D&B SOP No. C10 provided in Appendix A for more detailed requirements and procedures regarding electrical hazards and safety guidelines.

4.4.8 Lockout/Tagout

A Lockout/Tagout Program, if needed, will be established to protect site workers from injuries that could result from the unexpected or unplanned start-up or movement of machinery or equipment during maintenance, installation, adjustment or servicing operations. This policy sets forth procedures, which will be used to ensure that employees are provided with the information and equipment they need to perform these tasks safely.

Please refer to D&B SOP No. C17 provided in Appendix A for more detailed requirements and procedures regarding lockout/tagout.

4.4.9 Dust Control

During all intrusive activities, control measures will be implemented if dust at the construction exclusion zone exceeds the action level described in Section 7.0. Dust control measures may include wetting the soil and/or covering stockpiled soil.

4.4.10 Train/Traffic/Highway Safety

Regardless of the fact that the railroad tracks at the Site (and the entire Yard) are not active, all personnel working on-site must comply with the requirements of the Roadway Worker Protection Act (49 CFR 214) and be trained accordingly. LIRR provides this 4-hour training, which is required on an annual basis. All on-site workers will have current Roadway Worker Training.

Project personnel are required to wear safety vests and hard hats at all times while working at the Site and must comply with all applicable rules and regulations for traffic safety.

Please refer to D&B SOP No. C08 provided in Appendix A for more detailed requirements and procedures regarding traffic/highway safety.

4.4.11 Excavation/Trenching

D&B has established safe operating procedures for site personnel working adjacent to excavation or trenching operations conducted as part of construction and dewatering. The safety requirements for each excavation must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are hazardous or dangerous to employees. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

Soil excavation will be conducted with excavators operated by the remedial contractor. The remedial contractor may be required to enter the excavation area. However, the remedial contractor will be required to prepare their own HASP to cover their project personnel.

D&B employees will not enter an excavation unless the D&B site supervisor has coordinated with the contractor/subcontractor/sub-contractor competent person to verify that the excavation has been inspected is safe. All samples associated with open excavations will be collected from outside the excavation with hand tools or via the bucket of the excavator.

The following are general requirements for work activities in and around excavations:

- Prior to initiation of any excavation activity, the location of underground utilities will be determined through One-Call and utility mark outs. The one-call center will be contacted by the remedial contractor a minimum of 72 hours prior to excavation activities.
- All excavations will be inspected daily and documented by the competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees.
- Materials or equipment that could fall or roll into the excavation shall be placed at least 5 feet from the edge of open excavations.

Please refer to D&B SOP No. C15 provided in Appendix A for more detailed requirements and procedures regarding excavation and trenching.

4.4.12 Heavy Equipment Operation

Maintain safe clearances for personnel/equipment not directly involved with the heavy equipment operation. Use proper guarding where feasible, prohibit loose clothing, long hair and jewelry in the vicinity of operating equipment. On unstable or inclined surface, use outrigger pads and do not exceed maximum safe inclines. Use diligent housekeeping and other techniques to minimize tripping hazards.

Please refer to D&B SOP No. C09 provided in Appendix A for more detailed requirements and procedures regarding heavy equipment operation.

4.4.13 Drum/Container Handling

Use proper container handling equipment and proper lifting techniques. Drums and containers should be handled only if necessary.

Please refer to D&B's SOP No. C21 provided in Appendix A for more detailed requirements and procedures regarding drum and container handling.

4.4.14 Odor Control

Odors are not expected to be a significant issue during field activities. However, in the event that odors of significance are detected, work activities will be halted temporarily. The area identified as emanating the odors of significance will be temporarily covered with plastic and air monitoring will be performed as per Section 7.0. In the event that air monitoring action levels presented in Section 7.0 are exceeded, appropriate actions will be taken. Work will resume in this area after the air monitoring levels indicate acceptable conditions and any odors of significance are mitigated via work method changes and/or the application of foaming agents.

5.0 SITE CONTROL

A Site Control plan has been established to restrict access to work areas where potential contamination may be present, to select appropriate Personal Protection Equipment (PPE) for personnel working in each control zone and to prevent the accidental spread of contaminated material. As part of this plan, a number of separate zones may be established at the Yard. These zones are identified as:

- The Construction Work Zone (CWZ);
- The Construction Exclusion Zone (CEZ);
- The Contamination Reduction Zone (CRZ) and
- The Construction Support Zone (CSZ).

Zone classifications may change as circumstances warrant. The CWZ is the project work area. The CEZ may be established within the CWZ if air monitoring levels exceed the action levels established for this project (refer to Section 7.0). If established, the CRZ zone will be constructed within the CWZ between the CEZ and the CSZ as determined by the HSR.

5.1 Construction Work Zone (CWZ)

The CWZ is the project work area or immediate construction area. All physical project work activities will be conducted within the CWZ. This zone is restricted to project (contact and non-contact) personnel and project support personnel and visitors as defined in this document. Access to the Site will be controlled by fencing or caution tape and/or safety cones around the equipment and work area. In addition, open excavations and equipment will be secured at the end of each shift. Only authorized personnel will be permitted to enter this zone.

All personnel including project personnel, project support personnel and visitors entering the construction work zone will be briefed by the HSC or HSR prior to their initial entry. All Contact Project Personnel entering the CWZ must meet the training and medical requirements as outlined in Sections 8.0 and 9.0 of this HASP. The protective work clothing and equipment to be worn is defined in Section 6.0 or as required by the HSC or HSR. All Contact Project Personnel and equipment exiting the construction work zone must be adequately cleaned before leaving the yard or as required by the HSC or HSR or his/her designee. The HSR will monitor non-contact activities performed within the construction work zone

5.2 Construction Exclusion Zones (CEZ)

A Construction Exclusion Zone (CEZ) may be established at active work sites where contamination is anticipated. The HSR will make the determination to establish a CEZ based upon work activities, work conditions, visual evidence of contamination, air monitoring or sample results and/or other knowledge of the Site that indicates an increase in the probability of worker exposure.

Typically, the CEZ will consist of an area with a 15 to 20-foot buffer area around the excavation or activity area. However, the HSR will determine the extent of the CEZ, depending on the potential hazards and Site activities. The area will be marked using a physical barrier (i.e., flagging tape) or other means to readily identify the boundary of the zone.

Access to a CEZ will be limited to contact project personnel that meet the training and medical requirements as outlined in Sections 8.0 and 9.0 of this HASP. All contact project personnel entering the construction exclusion zones will be briefed by the HSR prior to initial entry.

Appropriate protective work clothing and equipment will be worn, as defined in Section 6.0 of this HASP, or as required by the HSR. All personnel and equipment exiting the CEZ will be decontaminated (see Section 11.0) in the CRZ or as the HSC or HSR determines is necessary. Once the operations have been completed, the CEZ will be removed by the HSR.

5.3 Contamination Reduction Zone (CRZ)

The CRZ is the area just outside of the construction exclusion zone where Contact Project Personnel undergo decontamination. If established, this zone will be contiguous with the construction exclusion zone. The area will be marked using flagging tape or other means to readily identify the boundary of the zone. Access to this zone will be limited to Contact Project Personnel exiting the CEZ and personnel assisting with decontamination. A separate equipment decontamination area will be established as determined by the HSC, HSR or a designee.

5.4 Construction Support Zone (CSZ)

The CSZ is the location in which administrative and other support functions essential to site operations are conducted. Any function that need not or cannot be performed in a hazardous or potentially hazardous area is performed here. Personnel may wear normal work clothes within this zone because any potentially contaminated clothing, equipment, and samples must remain in the CRZ until decontaminated.

6.0 WORK CLOTHING AND LEVELS OF PERSONNEL PROTECTION

6.1 Work Clothing

The HSC or HSR will recommend appropriate levels of protective clothing to be worn in the event that hazardous materials are encountered. In general, typical work clothing will be worn throughout the project.

6.2 Levels of Protection

The level of protection to be worn by field personnel will be defined and controlled by the HSC or HSR. Table 6-1 provides a list of tasks and the respective levels of protection when working inside a project exclusion zone.

6.3 Donning and Doffing

Manufacturers recommended procedures for donning and doffing PPE ensembles will be followed in order to prevent damage to PPE, reduce or eliminate migration of contaminants from the work area and reduce or eliminate transfer of contaminants to the wearer or others.

6.4 Storage and Inspection

Since storage facilities will not be readily available, only minimal quantities of protective equipment will be maintained on site. Items such as gloves, protective suits, and hearing protection will be kept within a suitable storage area. Respirators will be stored in plastic bags when not in use.

Employees are responsible for inspecting personal protective equipment prior to donning, during use and at the end of the shift. Defective equipment shall be removed from service and reported to the HSC or HSR. All reusable equipment will be maintained in a sanitary condition, in accordance with the manufacturer’s recommendations.

Table 6-1

PERSONAL PROTECTION LEVELS

TASK	LEVEL OF PROTECTION			
Construction Activities	**Respirators**		**Personal Protective Equipment**	
	Initial	**Contingent**	**Initial**	**Contingent**
Excavation/Trenching of Soil	D	C	D	C
Soil Boring/Groundwater Probe Advancement	D	C	D	C
Soil and Groundwater Sample Collection	D	C	D	C
Waste Handling	D	C	D	C
Decontamination	D	C	D	C

Definition of Levels of Protection:

***Respirators*:**

Level D: A respirator is not required.

Level C: Full face, Air Purifying Respirator (APR) with combination HEPA-P,O,N 100 series (dusts, fumes, aerosols) and organic vapor cartridges.

***PPE*:**

Level D:
- Long pants and/or work coveralls or Tyvek
- Gloves
- Appropriate work boots
- Hardhat
- Reflective safety vest
- Safety glasses with side shields as needed

Level C: Polycoated Tyvek disposable coveralls or equal substitute
Vinyl, neoprene, nitrile rubber or butyl rubber outer gloves
Surgical inner gloves
Appropriate leather work boots with chemically resistant outer boots or chemically resistant rubber boots
Hardhat
Reflective safety vest
Safety glasses with side shields as needed

Please refer to D&B SOP Nos. C14 and C23 proved in Appendix A for more detailed requirements and procedures regarding personal protective equipment and respiratory protection guidelines, respectively.

7.0 AIR MONITORING PROCEDURES

7.1 Air Monitoring During Site Operations

The Remedial Contractor will be required to prepare their own HASPs to cover their project personnel. The Remedial Contractor's HASP will include an Air Monitoring Program (AMP) to determine that the proper level of personnel protective equipment is used, to document that the level of work protection is adequate and to assess the migration of contaminants to off-site receptors as a result of site operations. If necessary, the Remedial Contractor will be required to include real-time and documentation air monitoring in its AMP and establish action levels for organic vapors and dust.

In addition, air monitoring during site operations will be completed by the D&B HSR in accordance with this HASP. Air monitoring results will be used by the HSR to evaluate the need for establishing additional site controls/work zones and upgrading levels of personal protective equipment. For each instrument there are site-specific action level criteria that are used by the HSR as guidelines in making field health and safety determinations. Other data, such as the visible presence of contamination or odors are used by the HSR in making field health and safety decisions. Therefore, it is possible that the HSC and HSR may establish Exclusion Zones and/or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established action levels.

A Community Air Monitoring Program (CAMP) consistent with NYSDOH guidance will be implemented during intrusive activities as a precaution to monitor for the potential migration of harmful substances to off-site locations. The NYSDOH Generic CAMP is provided as Appendix B. A PID and a dust monitor to detect dust particles will be utilized as part of the CAMP. Further details on the CAMP are provided below. Personal air sampling for specific airborne contaminants may be performed at the direction of and under the supervision of the HSC. The types of instruments that may be used and the contaminants they can detect are presented in Table 7-1.

Table 7- 1

AIR MONITORING INSTRUMENTATION

Air Monitoring Instrumentation	Acronym	Contaminant(s) Monitored
Combustible Gas Indicator	CGI	Combustible Gas, Oxygen, Hydrogen Sulfide (LEL, O_2, H_2S)
Photoionization Detector	PID	Organic Vapors
Handheld Aerosol Monitor	HAM	Dust, Particulate Material
Real-time Aerosol Monitor	RTAM	Dust, Particulate Material

Exclusion Zone Monitoring

It is important to ensure that the location and maintenance of the CEZ boundaries are adequate to protect non-Construction Exclusion Zone personnel. The frequency of real-time monitoring in exclusion zone work areas will be determined by the HSC and/or according to the task being conducted and whether potentially contaminated soil or groundwater will be contacted/disturbed. Real-time monitoring in the exclusion zone work areas will be conducted daily under the following conditions:

- Before any field activities commence, the general background levels of total volatiles and total dust concentrations (when needed) will be measured upwind and in the work area;
- During an activity which would have the highest probability of worker exposure as determined by the HSR;
- If visible contamination is observed; and
- At the discretion of the HSR.

Construction Work Zone (Restricted Area)

The frequency of real-time monitoring in restricted zone work areas will be determined by the HSC. Real-time monitoring in restricted work zone areas will be conducted under the following conditions:

- Prior to the beginning of any new job task;
- Prior to the beginning of a job task in any new area;
- Periodically for a long-term job task;
- During an activity which would have the highest probability of worker exposure as determined by the HSC;
- If visible presence of contamination is observed; and
- At the discretion of the HSR.

Community Air Monitoring Program

To protect the downwind community from a potential airborne contaminant release, a Community Air Monitoring Plan (CAMP) requiring real-time, continuous monitoring at the downwind perimeter of each designated work zone during intrusive activities such as excavation will be established. The CAMP will include monitoring for particulates (i.e., dust) and VOCs, and will be consistent with NYSDOH guidance. The NYSDOH generic CAMP is provided as Appendix B.

Particulate concentrations will be monitored in real-time downwind of intrusive activity. Monitoring equipment will be capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level, and will be equipped with an alarm to indicate exceedance of that level. Real-time monitoring will be conducted under the following conditions:

- If the downwind real-time aerosol monitor (RTAM) particulate level exceeds the upwind (background) level by 100 ug/m^3 for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed;
- Work will continue using dust suppression techniques as long as the downwind RTAM particulate level remains less than 150 mg/m^3 greater than the background level. If the level exceeds this value, work will be stopped and site work will be re-evaluated; and
- All readings will be recorded.

Upwind VOC concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously downwind of intrusive activity. Monitoring will be conducted with a PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations.

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the downwind perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.

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

- If the downwind total organic vapor level is 25 ppm above the upwind concentration, activities will be shut down.

- All readings will be recorded.

Background Monitoring

Background levels will be established prior to conducting air monitoring in any work area. Background monitoring for VOCs and particulates will occur at a location upwind of the work zone prior to the initiation of work.

Instrument Calibration and Maintenance

All air monitoring equipment will be calibrated at the beginning of each work day and as needed during the day, if applicable. All calibration results will be recorded. Monitoring equipment will be maintained on a schedule corresponding to the manufacturer's suggested maintenance schedule.

7.2 Air Monitoring and Action Level Criteria

The primary areas to be monitored during the project are the work zones established around drilling and sampling locations. Air monitoring will be conducted within and at the perimeter of these work zones.

Air monitoring conducted at the sampling locales will focus on workers' breathing zones and thus may include personal breathing zone samples. Air monitoring just outside of these locations will consist of instruments attempting to quantify the types and degrees of emissions originating from sampling sites.

The action levels specified in Table 7-2 are guidelines used by the HSC or HSR in making health and safety decisions in the field. Such decisions include use of respiratory protection, placement of zone boundaries, stopping and resuming work.

7.3 Monitoring of Personnel

Personal or area monitoring for time weighted average (TWA) measurements may be performed during some operations and activities to qualitatively detect the presence of VOCs, SVOCs or metals. Personal monitoring will be performed as directed by the HSC or HSR. Sampling collection and analysis will be conducted according to the procedures set forth in either the NIOSH Manual of Analytical Methods or the OSHA Analytical Methods Manual. An American Industrial Hygiene Association (AIHA) accredited laboratory will be used for sample analysis.

7.4 Quality Assurance and Control

All monitoring instruments will be protected from surface contamination during use to allow easy decontamination. All instrumentation shall be calibrated before and after use and operational checks conducted periodically in the field over the duration of the day's field activities.

The following data shall be recorded by the HSR:

- Date and time of monitoring;
- Air monitoring location;
- Instrument, model number, serial number.

Table 7-2

SUMMARY OF AIR MONITORING PROGRAM AND ACTION LEVELS

Action Level*	Action to be Taken
INTRUSIVE ACTIVITIES	
Starting intrusive activities	Work shall be initiated in Level D. If any instrument indicates concentration above respective action levels for a particular contaminant, halt work and consult the HSR for further action. Upgrade to Level C if work is to continue.
PID	
Background (BKGD) to 5 ppm	Continue working with the current level of protection.
5 units above BKGD at breathing zone and below 20 ppm	If Level D or Modified Level D is used, halt work and consult the HSR for further action.
>20 ppm above BKGD	If Level C is used, proceed with caution and monitor continuously. Should levels above 20 units persist, HSC, D&B PM or FOM will halt work and evaluate conditions.
DIGITAL DUST INDICATOR	
Respirable dust 150 ug/m^3 over an integrated period of 15 minutes	Halt work, evacuate area and allow ventilating prior to resuming work. Should levels persist, upgrade to Level C using combination cartridges (particulate/organic vapor cartridges).
COMBUSTIBLE GAS METER	
>10% LEL scale	Halt work, evacuate area and allow ventilating to below 10% LEL prior to resuming work. Contact HSC and FOM.
OXYGEN	
< 19.5%	Evacuate work area. Institute ventilation and engineering controls. Maintain site condition for at least 10 min. before proceeding. Notify HSC and FOM.
> 22%	Continuous monitoring. Identify combustion sources.
> 23.5%	Evacuate. Institute engineering controls as necessary before proceeding. Explosive condition may be present. Notify HSC and FOM.
HYDROGEN SULFIDE	
< 10 ppm at breathing zone (1/2 PEL)	Continue monitoring.
> 10 ppm at breathing zone	Halt work, evacuate area and allow area to ventilate below 10 ppm. Contact the HSC and FOM.

Table 7-2 (continued)

SUMMARY OF AIR MONITORING PROGRAM AND ACTION LEVELS

Action Level*	Action to be Taken
OTHER	
Any worker experiences symptoms of chemical exposure	Stop work, evacuate the area, seek medical attention and notify HSC and FOM for proper incident reporting and follow-up.

*Reading sustained for one minute or longer if not otherwise noted.

- Calibration/background levels;
- Results of monitoring; and
- HSR signature.

Interpretation of the data and any further recommendations shall be made by the HSC and HSR. Air monitoring results shall be given verbally to the D&B FOM following each site scan that indicates contaminant concentrations in excess of the action levels. Results may then be documented in writing and provided to the D&B FOM by the end of that workday.

8.0 TRAINING

8.1 Initial Site Training

The initial site briefing will be provided on-site by the HSC or designee for all Project Personnel (Contact and Non-Contact) and Project Support Personnel prior to initial entry onto the Construction Work Zone of the site. Site training will also be provided on an as needed basis to address the specific activities, procedures, monitoring, and equipment for the site operations. Such training will include site and facility layout, hazards, and emergency services at the Site, and will detail all provisions contained within this HASP.

8.2 Contact Project Personnel Training

All Contact Project Personnel designated to work in the Construction Exclusion Zone, as outlined in Section 5.0, are required to have successfully completed the initial and refresher hazardous waste operations and emergency response (HAZWOPER) training courses pursuant to OSHA 29 CFR 1910.120(e).

8.3 Roadway Worker Protection Training

All personnel working on-site must comply with the requirements of the Roadway Worker Protection Act (49 CFR 214) and be trained accordingly. LIRR provides this 4-hour training, which is required each year.

9.0 MEDICAL SURVEILLANCE

All Contact Project Personnel engaged in on-site activities associated with this project must have baseline physical examinations and participate in their employer's medical surveillance program. This program must satisfy the requirements of 29 CFR 1910.120(f). Medical procedures beyond baseline physical and routine medical surveillance are not planned for this project. Medical records for employees are maintained at the corporate office and by the company's medical group. Medical records are maintained in accordance with the record keeping requirements of 29 CFR 1910.120. In addition, any employee required to wear a respirator will be approved by a licensed health care provider for respirator use as defined in the OSHA Respiratory Standard 29 CFR 1910.134 and be fit-tested for the particular respirator to be used.

In the unlikely event of an exposure, the affected employee will be sent for an evaluation and any treatment that may be needed to either the Corporate Medical Group, or to the designated hospital. See Figure 1-3 for a hospital route map and Section 1.5 for written directions to the designated hospital.

Please refer to D&B SOP No. C24 provided in Appendix A for more detailed requirements and procedures regarding the Medical Surveillance Program.

10.0 COMMUNICATIONS

10.1 Hazard Communication

The HSC or HSR is responsible for site-specific training, assuring adequate labeling, obtaining and maintaining MSDS and notifying employees and contractors of the hazards associated with non-routine tasks. The HSC shall inform site personnel of the potential hazards that may be encountered in the area where he/she will be working, should the HSC have such knowledge of these hazards.

Please refer to D&B SOP No. C01 provided in Appendix A for more detailed requirements and procedures regarding hazard communication.

10.2 General Communication

A means of communication will be provided at the Yard. This may include two-way radios or cellular telephones. Project personnel will be informed of the communication procedures during briefings.

11.0 DECONTAMINATION PROCEDURES

11.1 General

All personnel and equipment that have been within established exclusion zones shall be decontaminated as necessary. All decontamination facilities will be under the control of the HSC, HSR or his/her designee. Cleanup activities may also occur for operations outside the established exclusion zones.

11.2 Personnel Decontamination

Personnel field decontamination equipment, supplies and/or facilities will exist at the exits to all established exclusion zones in the contamination reduction zones (CRZs). If possible, these field decontamination facilities should be located upwind of the exclusion zone. The field decontamination facilities will be under the control of the HSR. Based on the extent of personnel contamination, the HSR will establish site-specific decontamination procedures.

If warranted, full field decontamination procedures (Generally Level C) will require all personnel exiting exclusion zones to undergo a wash and a rinse process and remove their PPE. Personnel exiting the exclusion zone(s) will be required to wash their outer boots, outer gloves and protective clothing at the first decontamination station. This will be accomplished with an Alconox water solution and scrub brushes. Personnel will then proceed to the next two decontamination stations, each of which consisting of a rinse tub containing clean water and a water sprayer. Personnel will stand in the tub and spray off their gloves, boots, and protective clothing with clean water from the sprayer. After the double rinse, personnel will then remove their outer boots, outer gloves, protective clothing and respiratory protection, if worn.

Once removed, disposable PPE will be collected at the field decontamination site in DOT approved 55-gallon drums. The drums will be secured in order to prevent the accidental spread of contamination. Disposable PPE that has been worn in an exclusion zone must be removed and placed in the drums before leaving the CRZ. Disposable PPE may not be reused.

Contaminated wash water will be collected in DOT-approved 55-gallon drums at the field decontamination area.

Cold weather field decontamination procedures, if applicable, will require the prevention of decontamination liquids (e.g., soap and water) from freezing. This may be accomplished by adding salt or other equivalent substance to the soap solution. The plastic decontamination pad may be covered with gravel or salt or other equivalent material to prevent slips, trips or falls during freezing temperatures.

11.3 Wash-up Facility

Portable wash-up materials, apparatus and/or facility may exist in the main support area of the Construction Work Zone, if warranted. The facility will be under the control of the HSR.

After exiting a field decontamination facility, personnel may now use the “wash-up” materials. All personnel working at the yard must wash their hands and faces prior to eating, drinking or smoking and practice good personal hygiene. Potable water will be available at the Site.

11.4 Instrument Decontamination

Instruments will be decontaminated whenever they have come into contact with soil or dust. Instrument decontamination will occur in the same area for personnel decontamination and will consist of the removal of any dust or soil from the surface of the instruments.

11.5 Equipment Decontamination

Anticipated on-site equipment for this project is summarized below:

- Support trucks for intrusive activities;

- Geoprobe rigs or drill rigs;
- Guzzler units or vacuum trucks;
- Excavators;
- Groundwater and soil sampling equipment; and
- Pumps.

Equipment decontamination will take place prior to use and between sample locations, if warranted. Decontamination water generated as part of decontamination will be containerized for characterization and disposal. All field equipment that has been on-site will be decontaminated before leaving the project site. The HSC, HSR or designee will be responsible for ensuring that equipment is decontaminated as needed.

12.0 DISPOSAL PROCEDURES

Soil waste generated during the completion of excavation activities will either be stored in lined roll-off containers, stockpiled in a secure on-site location or contained in DOT-approved 55-gallon drums. Soil waste will be staged daily in a central, secure location and appropriately marked for proper disposal pending sampling results.

Liquid waste generated during the completion of excavation activities will either be stored in an on-site storage tank or contained in DOT-approved 55-gallon drums. Liquid waste will be staged daily in a central, secure location and appropriately marked for proper treatment and/or disposal pending sampling results.

As necessary, personal protective equipment will be drummed, classified and segregated for temporary storage on-site for proper disposal.

Please refer to D&B SOP No. C22 provided in Appendix A for more detailed requirements and procedures regarding containment and disposal.

13.0 EMERGENCY PLAN

Emergency situations can be characterized as a fire or explosion, an environmental release, business interruption, or accident or injury to the field personnel. For incidents other than minor injuries to on-site personnel, evacuation of the area will be conducted. The PD, PM and HSC will be notified immediately in the event of an evacuation.

Emergency phone numbers are listed in Section 1.0 of this HASP. In case of an emergency, it is important that the following Incident Reporting Procedure be observed:

It is important to assure the rapid and accurate transfer of information to appropriate personnel in the event of an emergency situation. To simplify the procedure, emergency situations can be reported by dialing 911. This includes incidents requiring police assistance, fire department, or medical emergencies.

Be sure to provide the following information to the dispatcher:

1. Caller full name
2. The nature of the incident (i.e., “Fire”)
3. The location of the incident (i.e., “Street location and nearest intersection”) The more specific the better.
4. What you need (i.e., “Fire Department and First Aid”)
5. If you are able, where you will meet emergency responders
6. If applicable, a call back number (e.g., “I’ll be at the scene; my cell phone number is 123-4567”)
7. Status of the situation. (e.g., is the situation stabilized or “I have the fire under control”)
8. If anyone is injured or in need of emergency assistance (e.g., “A mechanic working on a pump was burned.”)

13.1 Site Emergency Coordinator

Site Emergency Coordinator:	Paul Barusich, Field Operations Manager
Alternate Site Emergency Coordinator:	Brian Werner, Corporate Health and Safety Coordinator

13.2 Evacuation

In the event of an emergency situation, all personnel will evacuate and assemble at a designated meeting area. For efficient and safe area evacuation and assessment of the emergency situation, the HSC, HSR or FOM will have the authority to initiate proper action if outside services are required. The access to emergency equipment will be provided and all combustion apparatus (i.e., operating machinery) will be shut down once an emergency situation has been identified.

13.3 Personnel Injury

In the event of an emergency situation, the local emergency response group will be called. In case of a life-threatening situation, emergency first aid may be applied on-site as deemed necessary. If possible, the individual should be cleaned up and/or decontaminated and then transported to the nearest medical facility if needed.

The local rescue squad shall be contacted for transport, as necessary, in an emergency. Since some situations may require transport of an injured party by other means, transportation by automobile may be required.

13.4 Personnel Exposure Treatment

SKIN CONTACT:	Use copious amounts of soap and water. Wash and/or rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.

INHALATION:	Move to fresh air and, if necessary, decon/transport to hospital.
INGESTION:	Decontaminate and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate, if possible, and transport to emergency medical facility.

13.5 Hospital Route

A map depicting the route to the hospital along with written directions is provided in Section 1.5.

13.6 Safety Equipment

Basic emergency and first aid equipment will be made available at the Project Work Zone and/or the CRZ, as appropriate. This shall include a first aid kit, eye wash station, fire extinguisher and other safety-related equipment.

13.7 Spill Procedures

Spills and/or leaks are expected to be limited to heavy equipment, or containers of generated soil or liquid waste. Spill cleanup material such as absorbent pads and booms will be available to protect storm sewers or otherwise contain the spill.

Spilled material may be manually collected and placed in an intact 55-gallon drum pending disposal.

Leaking liquid drums will be positioned to prevent them from leaking further. After positioning, they will be patched and placed in an over-pack drum or the liquid will be transferred to an intact drum pending disposal. Soil that was contaminated by the liquid will manually be collected in a separate 55-gallon drum for analysis and disposal.

Other spill cleanup material such as absorbent pads and booms will be available to protect storm sewers or otherwise contain the spill.

14.0 RECORD KEEPING

The HSC, HSR or designee will maintain health and safety information records for the sites. The following information will be recorded as needed:

- Weather conditions (temperature, wind speed and direction);
- Air monitoring equipment calibration records;
- Air monitoring results (date, time, location, data, instrument, person conducting sampling);
- Training Records;
- Medical Surveillance Records;
- Health and Safety Audit records;
- Description of operation(s);
- Description of accident(s), if any; and
- Non-compliance with the HASP, if any.

Please refer to D&B SOP No. C05 provided in Appendix A for more detailed requirements and procedures regarding record keeping.

15.0 AUTHORIZATIONS

The HSC, HSR or designee must approve all personnel authorized to enter the project work zones and exclusion zones. Authorization will involve completion of appropriate training courses and medical examination requirements as outlined by this HASP, as well as the signature of the individual on the Acknowledgement Form recognizing a complete understanding of this HASP (see Appendix C).

APPENDIX A

D&B STANDARD OPERATING PROCEDURES (SOPs)

D&B H&S SOP Name	SOP Number
Heat Stress Control	C11
Cold Stress Prevention Guidelines	C12
Fall Protection Guidelines	C13
Confined Space Operations Guidelines	C25
Electrical Safety Guidelines	C10
Lockout/Tagout Guidelines	C17
Highway Safety Guidelines	C08
Excavation/Trenching Operations Guidelines	C15
Heavy Equipment Safety	C09
Handling/Sampling of Drums/Containers	C21
Personal Protective Equipment Guidelines	C14
Respiratory Protection Guidelines	C23
Medical Surveillance Guidelines	C24
Hazard Communication Guidelines	C01
Containment and Disposal of Contaminated Material	C22
Record Keeping Guidelines	C05

HEAT STRESS PREVENTION GUIDELINES

Table of Contents

1.0 PURPOSE

To establish procedures for the implementation and monitoring of a heat stress prevention program.

To describe symptoms which characterize excessive exposure to heat. Recognition of these symptoms necessitates prompt corrective action to prevent injury or death.

2.0 SCOPE

This guideline applies to D&B personnel who may be exposed to environments which may contribute to heat stress, especially when PPE is required.

HEAT STRESS PREVENTION GUIDELINES

3.0 DEFINITIONS

Acclimatization - Acclimatization is the process of the body becoming accustomed to extremes in temperature.

ACGIH TLV Heat Stress and Heat Strain - Heat Stress TLV is intended to protect workers from the severest effects of heat stress and injury and to describe exposures to hot working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body core temperature from exceeding 38°C (100.4°F).

Work-Rest Regimen - This is a ratio of time spent working versus time spent resting. The ratio applies to one-hour periods. For example, a work-rest regimen of 75% work, 25% rest corresponds to 45 minutes work and 15 minutes of rest each hour.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for establishing procedures to identify heat stress conditions and prevent heat related injuries.

Site Personnel - Site personnel must be alert to signs and symptoms of heat stress for themselves or those working with them. Personnel must also be aware of appropriate emergency corrective actions.

5.0 GUIDELINES

Acclimatization to heat involves a series of physiological and psychological adjustments that occur in an individual during the first weeks of exposure to hot environmental conditions.

5.1 Effects of Heat Stress

Hot weather can cause physical discomfort, a decrease in work efficiency, and personal injury. Wearing personal protective equipment puts a worker at considerable risk of developing heat stress since protective clothing increases retention of heat within the body.

HEAT STRESS PREVENTION GUIDELINES

A number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker contribute to heat stress. Heat stress is one of the most common (and potentially serious) illnesses at hazardous waste sites. Therefore, heat stress evaluation procedures, including regular monitoring and other preventive measures, is essential to the H&S of personnel conducting field work.

Early symptoms of heat stress may include fatigue, irritability, anxiety, and decreased concentration, dexterity or movement. If not recognized or treated, heat stress may become a serious medical condition.

Heat-related problems include:

- Heat Rash: Caused by continuous exposure to hot and humid air and aggravation of the skin by chafing clothes. This decreases the ability to tolerate heat as well as being a nuisance.

- Heat Cramps: Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle cramps and pain in the extremities and abdomen.

- Heat Exhaustion: Caused by increased stress on various organs to meet increased demands for body cooling. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; or fatigue.

- Heat Stroke: Heat stroke, the most severe form of heat stress, is considered a life threatening condition and, as such, must be treated as an emergency. Any person suffering from heat stroke must be cooled down immediately and brought to a hospital. Decontamination procedures, if warranted, should not be implemented prior to treatment. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma.

It is important to note that individuals vary in their susceptibility and their reactions to heat-related conditions. Factors that may predispose someone to a heat condition include:

- Lack of physical fitness.

- Lack of acclimatization.

- Age.

- Dehydration.

- Obesity.
- Alcohol and drug use.
- Infection.
- Sunburn.
- Diarrhea.
- Chronic disease.

5.2 First Aid/Medical Treatment

The following first aid and medical treatments are recommended:

- Heat Rash: Apply mild drying lotions and recommend wearing clean, dry clothing between heat exposures.
- Heat Cramps: Administer commercially available electrolyte-balanced liquids (e.g., Gatorade). Seek medical attention if serious.
- Heat Exhaustion: Remove to cooler environment, rest in reclining position. Drink plenty of fluids.
- Heat Stroke: Immediate and rapid cooling by immersion in water with massage, or wrapping in a wet sheet and fanning. Avoid overcooling. These steps are to be taken while waiting for emergency response to arrive, or while transporting the victim to an emergency medical facility. This is a ***LIFE-THREATENING*** situation.

5.3 Heat Stress Prevention

One or more of the following can help prevent or reduce heat stress:

- Drinking water will be available to the workers to encourage frequent small drinks, i.e., one cup every 15-20 minutes (about 150 ml or 1/4 pint).

- The water will be kept reasonably cool (55-60°F) and will be stored outside any suspected or identified contaminated areas.

- Workers will be encouraged to maintain well balanced diets. If workers are unacclimatized, a commercially available product such as Gatorade® or Exceed® may be used for electrolyte replacement.

- Cooling devices may be used to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency.

- Provide air-conditioned shelter or shaded areas to protect personnel during rest periods.

- Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.

- Conduct operations in the early morning or evening.

- Rotate shifts of workers.

- Add additional personnel to work teams to allow for work-rest regimes.

- Mandate work slowdowns in extreme heat conditions.

5.4 Heat Stress Monitoring

In some cases where employees may be required to wear PPE that will increase the potential for heat related illnesses, heat index measurements or biological monitoring, such as body temperature or weight monitoring, may be needed. In these cases, a heat alert will be developed and written into the site-specific HASP for the project. The specifics of the plan will be described in the HASP since each site will have specific needs.

The HSO is responsible for determining the monitoring methods, coordinating the monitoring, and setting appropriate action levels for heat stress prevention.

HEAT STRESS PREVENTION GUIDELINES

6.0 Training

The workers will be instructed in hot weather procedures. The orientation program will include as a minimum, instruction in:

- Proper cooling procedures and appropriate first aid treatment.
- Proper clothing practices.
- Proper eating and drinking habits.
- Recognition of impending heat exhaustion.
- Recognition of signs and symptoms of impending heat stroke.
- Safe work practices.

7.0 REFERENCES

- ACGIH TLV Booklet.

COLD STRESS PREVENTION GUIDELINES

Table of Contents

1.0 PURPOSE

To establish procedures for the implementation and monitoring of a cold stress prevention program and to describe symptoms which indicate excessive exposure to cold temperatures.

2.0 SCOPE

These guidelines apply to D&B personnel who may be exposed to environments which could create cold stress injuries.

3.0 DEFINITIONS

ACGIH TLV Cold Stress - Cold Stress Threshold Limit Values (TLVs) are intended to protect workers from the most severe effects of cold stress and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body core temperature from falling below 36°C (96.8°F) and to prevent cold injury to body extremities.

Deep Body Temperature - The core temperature of the body as determined by rectal temperature measurements. For a single, occasional exposure to a cold environment a drop in core temperature to no lower than 35°C (95°F) is permissible.

Equivalent Chill Temperature (ECT) - An index describing the effect of the cooling power of moving air on exposed flesh, commonly referred to as "wind chill." The effect of wind velocity at a certain temperature is expressed as the equivalent cooling effect of a lower temperature with still air.

Frostbite - Local tissue damage caused by exposure to cold temperatures. Severe occurrence may lead to deep tissue damage, gangrene or possible loss of the affected area.

Hypothermia - Lowering of the body core temperature due to exposure to cold. Severe hypothermia may result in death.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO or his/her designee is responsible for establishing procedures to identify cold stress conditions and determining control methods to prevent cold-related injuries.

Site Personnel - Site personnel will be alert to signs of development of cold stress symptoms in themselves and in those working with them, and will be aware of emergency corrective action.

COLD STRESS PREVENTION GUIDELINES

5.0 GUIDELINES

5.1 Introduction

If properly protected, personnel can work efficiently in cold environments. Cold injuries are classified as either localized, as in frostbite or generalized, as in hypothermia. Physical conditions that worsen the effects of cold include allergies, vascular disease, excessive smoking and drinking and specific drugs and medications.

5.2 Contributing Factors

Factors contributing to cold injury include exposure to humidity and high winds, duration of exposure, contact with wetness or metal, inadequate clothing, age and general health of the individual, including circulation and diet. Wind-chill temperature or the combination of wind speed and air temperature is a better indicator of thermal condition than temperature alone. The wind increases the rate of cooling. The table below shows the cooling power of wind on exposed flesh.

Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (ECT) (°F)											
0	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-64	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
	LITTLE DANGER				INCREASING			GREAT DANGER				

COLD STRESS PREVENTION GUIDELINES

Wind speed greater than 40mph have little additional effect	in <1 hr with dry skin. Maximum danger of false sense of security	DANGER Danger from freezing of exposed flesh within one minute	Flesh may freeze within 30 seconds
	Trenchfoot and immersion foot may occur at any point on this chart		

The greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. In addition, water conducts heat 240 times faster than air; thus, the body cools suddenly when chemical-protective equipment is removed and the clothing underneath is wet from perspiration.

5.3 Frostbite

Local injury resulting from the cold is called frostbite. Frostbite of the extremities can be categorized by degrees of damage:

- Frostnip or incident frostbite - This condition is characterized by a sudden blanching or a whitening of the skin.
- Superficial frostbite - The skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient.
- Deep frostbite - Tissues are cold, pale, and solid; extremely serious injury.

Factors that contribute to frostbite include handling solvents, tight footwear, use of alcohol, wet clothing, high altitudes and race. African-Americans are three to six times more likely to get frostbite than Caucasians.

The skin of a potential frostbite victim should never be rubbed. The rubbing action can result in permanent tissue damage. For frostnip, the skin should be warmed by applying firm pressure with a hand or other warm body part.

Professional medical help should be sought for frostbite cases since it is difficult to assess the degree of damage. First aid responders can begin to warm the affected part by skin to skin contact or by submerging in warm water. Care should be taken, because the skin is easily burned due to loss of feeling in the affected part. It is important to note that pain will occur when the thawing begins.

5.4 Hypothermia

Hypothermia is the general lowering of the body temperature. It can occur from exposure to conditions well above freezing. This condition can occur when a worker is immersed in cold water or is exposed to cool, high winds. Individuals who are in a state of physical exhaustion, or have had insufficient food are particularly susceptible to hypothermia.

The first symptoms of hypothermia are uncontrollable shivering and the sensation of cold. The heartbeat then slows and sometimes becomes irregular, the pulse weakens and the blood pressure changes. Other symptoms are slurred and slow speech, memory lapses, incoherence, drowsiness, poor judgment, mental confusion and apparent exhaustion. See table below for additional clinical symptoms of hypothermia.

Core Temperature		Clinical Signs
°C	°F	
37.6	99.6	"Normal" rectal temperature
37	98.6	"Normal" oral temperature
36	96.8	Metabolic rate increases in an attempt to compensate for heat loss
35	95.0	Maximum shivering
34	93.2	Victim conscious and responsive, with normal blood pressure
33	91.4	Severe hypothermia below this temperature
32 31	89.6 87.8	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated but react to light; shivering ceases
30 29	86.0 84.2	Progressive loss of consciousness; muscular rigidity increases; pulse and blood pressure difficult to obtain; respiratory rate decreases
28	82.4	Ventricular fibrillation possible with myocardia irritability
27	80.6	Voluntary motion ceases; pupils nonreactive to light; deep tendon and superficial reflexes absent
26	78.8	Victim seldom conscious
25	77.0	Ventricular fibrillation may occur spontaneously

COLD STRESS PREVENTION GUIDELINES

24	75.2	Pulmonary edema
22 21	71.6 69.8	Maximum risk of ventricular fibrillation
20	68.0	Cardiac standstill
18	64.6	Lowest accidental hypothermia victim to recover

When a person is mildly hypothermic, he/she should be moved indoors where it is warm, wet clothing removed and a warm beverage provided. The body must be rewarmed slowly. In a more severe case, emergency medical services should be requested immediately. While transporting the person, or awaiting the arrival of the emergency unit, the following steps should be taken to try to prevent further heat loss:

Actions to take:

- Keep the person dry, remove wet clothing.
- Apply external heat.
- Have person breathe warm moist air.
- Handle the person gently.
- Remain alert of any complications.

Actions to avoid:

- Do not give hot liquids.
- Do not allow person to exercise.

6.0 COLD STRESS PREVENTION

The best protection against hypothermia and frostbite is prevention. Prevention includes proper work practices, protective clothing and proper diet.

COLD STRESS PREVENTION GUIDELINES

6.1 Work Procedures

The following is recommended to prevent cold related injuries:

- Temperature and wind monitoring at the site.
- Work periods with frequent breaks for rewarming.
- Supply of warm beverages.
- Bare skin should not contact metal objects.
- The buddy system should always be in use.
- Clothing that becomes damp or wet should be changed.
- Shelter when working outside for prolonged periods.

If work is performed continuously at 20°F ECT or below, heated warming shelters should be made available for use by employees during warm-up breaks. A work-warming regimen can be established using the TLV booklet. This table assumes that workers are properly clothed for periods of work at temperatures below freezing.

For work at or below 10°F ECT, the following should apply:

- The worker will be under constant protective observation (buddy system or other direct supervision).
- The work rate should not be so high as to cause sweating that will result in wet clothing; if heavy work must be done, rest periods must be taken in heated shelters and the opportunity for changing into dry clothing will be provided.
- Provisions will be made to allow employees to become accustomed to the required protective clothing as well as to their working environment.

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- The working conditions and weight and bulkiness of clothing will be included in estimating the required work performance and weights to be lifted by the worker.

- The work will be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats will not be used. The worker should be protected from drafts to the greatest extent possible.

6.2 Personal Protective Equipment Requirements

Clothing should be worn loosely, in layers, and selected for the type of work to be performed. The loose clothing and layers provide maximum protection because layers of warm air are trapped between the clothing layers. This method of dressing also allows the outer layer to be removed during heavy manual work, or if the weather warms up. The layer closest to the skin should keep the skin dry and allow the perspiration to escape.

The outer layers of clothing are for insulation and should be made of wool, goose down, or synthetic fiber-filled materials. Wool absorbs significant amount of body moisture before losing its ability to insulate, making it preferable to cotton. Gore-Tex® and polypropylene are often recommended for use next to the skin.

If clothing becomes damp or wet from the work activity or perspiration, it should be changed. Waterproof outerwear should be worn if there is precipitation.

Up to 50% of heat loss occurs through the head, ears and back of the neck. For this reason, appropriate head covering are an important clothing item.

Hands should be protected. The hands and fingers are susceptible to frostbite if unprotected.

Footwear should be waterproof and reach well up the leg when working outside in snow or wet areas. The soles and upper part of the boots should provide good insulation as well. A combination of working boots and rubber overboots is a cost-effective method of providing insulation. The footwear should not be too constricting and the socks should allow evaporation of perspiration.

7.0 TRAINING

The workers will be instructed in cold weather procedures. The training program will include at a minimum instruction in:

- Proper rewarming procedures and appropriate first aid treatment.
- Proper clothing practices.
- Proper eating and drinking habits.
- Recognition of impending frostbite.
- Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
- Safe work practices.

8.0 REFERENCES

- ACGIH TLV Booklet.

FALL PROTECTION GUIDELINES

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FALL PROTECTION GUIDELINES

1.0 PURPOSE

This Fall Protection Standard Operating Procedure (SOP) serves as a guideline to protect D&B personnel from injuries associated with falls from elevations, pursuant to OSHA 29 CFR 1926.500, 1926.502 and 1926.503. Protection from fall hazards is achieved using a combination of fall hazard elimination, fall prevention and personal fall arrest systems.

2.0 SCOPE

This SOP applies to D&B personnel who are exposed to fall hazards of six feet or greater. Fall elimination, prevention, or protection is also required at heights less than six feet if work or activities are performed above dangerous equipment such as open vessels, moving equipment, or objects which pose hazards. This SOP applies to construction work activities only. It does not apply to non-construction work activities, work on scaffolds, or the use ladders.

3.0 DEFINITIONS

Aerial Lifts - Mechanical devices such as articulated boom personnel lifts, manlifts, scissor lifts and bucket trucks used for access to heights.

Anchorage - A secure point of attachment for lifelines, lanyards or deceleration devices.

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Body Harness - Multiple straps which are secured about the wearer in a manner which distributes the fall arrest forces over the thighs, pelvis, waist, chest and shoulders, with a means for attaching it to other components of a personal fall arrest system.

Buckle - Any device for holding the body belt or body harness closed around the employee's body.

Connector - A device which is used to couple (connect) parts of the personal fall arrest system and positioning device system together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

Competent Person - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate the hazard.

Controlled Access Zone - An area in which certain work may take place without the use of guardrail systems, personal fall arrest systems or safety net systems, and access to the zone is controlled.

Dangerous Equipment - Equipment which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

Deceleration Device - Any mechanism, such as a rope grab, rip-stitch lanyard, specially woven lanyard, tearing or deforming lanyards, self-retracting lifelines, etc.,

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which serve to slow the fall and limit the amount of force experienced by an employee during a fall arrest.

Deceleration Distance - The vertical distance a falling person travels, excluding lifeline elongation and free-fall distance, from the point at which the deceleration device begins to operate until the fall is stopped. It is measured as the distance between the location of a person's body belt or body harness attachment point at the moment of activation and the location of the attachment point after the person comes to a complete stop.

Designated Access Zone - An area or space which is defined by a perimeter barrier erected to warn employees when they approach an unprotected side or edge, and serves to designate areas where work may be performed without additional fall protection.

Different Level Fall - An accident in which an employee falls below the level on which he/she was standing or walking on (e.g., a fall below foot level).

D-Ring - Attachment point(s) on a belt or harness for a device or lanyard.

Fall Arrest System - A system of anchorage, body support (body harness) and connecting means (lanyard, lifeline, harness) that are designed and tested to function together in preventing injuries or deaths from falls. Fall arrest systems generally assume a maximum weight of 310 pounds per person, including tools and equipment.

Fall Elimination - Planning a task or activity in a manner which avoids exposure to heights and fall hazards.

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Fall Prevention - The provision of same-level barriers, such as guardrails and warning lines, which prevent falls from occurring.

Free Fall - The act of falling prior to activation of the personal fall arrest system.

Free Fall Distance - The vertical distance between the body harness attachment point at the time of a fall and the attachment point at activation of the personal fall arrest system.

Guardrail System - A barrier erected to prevent employees from falling to lower levels.

Hole - a gap or void of two inches or more in its least dimension, in a floor, roof or other walking/working surface.

Infeasible - Work that it is impossible to perform using a conventional fall protection system (i.e. guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

Lanyard - A flexible line of rope, wire rope, or strap which has a connector at each end for connecting the body harness to a deceleration device, lifeline or anchor point. A shock-absorbing lanyard has a "built-in" deceleration device.

Leading Edge - The edge of a floor, roof, or framework for a floor or other walking/working surface which changes location as additional floor, roof, or decking is constructed. The leading edge is considered to be an unprotected side and edge during periods when it is not actively and continuously under construction.

Lifeline - A flexible line for connection to an anchor point at one end which hangs vertically (vertical lifeline) or for connection to anchorage's at both ends to stretch horizontally (horizontal lifeline), which serve as a means for connecting other components of a personal fall arrest system to the anchorage.

Opening - A gap or void 30 inches or more high and 18 inches or more wide in a wall or partition, through which employees can fall to a lower level.

Personal Fall Arrest System - A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline or suitable combinations of these.

Positioning Device System - A body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall and work with both hands free while leaning. A positioning device cannot be used for fall protection.

Qualified Person - A qualified person is one who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to fall protection.

Rope Grab - A deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

Safety Monitoring System - A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

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Self-retracting Lifeline/Lanyard - A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Slip - A same level fall caused by inadequate friction between the foot or footwear and the walking/working surface.

Snap Hook - A self-closing connecting device with a gatekeeper latch or similar arrangement that will remain closed until manually opened. May be single action or double action.

Toeboard - A low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

Unprotected Sides and Edges - Any side or edge (except at entrances to points of access of a walking/working surface, e.g., floor, roof, ramp or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

Walking Working Surface - Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

Warning Line System - A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of guardrail, body belt or safety net system to protect employees in the area.

Work Area - Portion of a walking/working surface where job duties are being performed.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO has overall responsibility for the D&B Fall Protection Program. The HSO will be responsible for revising the Fall Protection Program to include new OSHA updates. The HSO is also responsible for confirming that Fall Protection training is available for D&B Authorized Personnel. The HSO may conduct site inspections to verify that D&B personnel employ Fall Protection measures, as required.

Health and Safety Representative (HSR) - The HSR has primary responsibility for the implementation of the Fall Protection Program, as required at each project. The HSR should be able to identify different types of fall hazard situations associated with the job site and maintain the appropriate supply of fall arrest equipment and hardware and confirm that authorized personnel correctly use fall control methods when required.

Authorized Personnel - Authorized Personnel perform tasks which expose them to fall hazards and are therefore authorized to use personal fall arrest systems. Authorized Personnel will be able to identify types of fall hazards associated with each project, be knowledgeable in the methods used to eliminate, prevent and arrest falls and be knowledgeable in the use of personal fall arrest equipment.

FALL PROTECTION GUIDELINES

D&B Personnel - D&B Personnel are responsible for keeping aisleways, work platforms, and other working surfaces in their work areas in orderly condition, clean and dry, and kept free from holes and loose materials.

5.0 GUIDELINES

5.1 Circumstances Which Require Fall Protection

Once it has been determined that the walking/working surface on which the employees are to work has the strength and structural integrity to support employees safety, the HSO, HSR or a designee must evaluate the walking/working surface to determine whether there is a fall hazard. D&B requires either a guardrail system or personal fall arrest system in the following circumstances where the employee will be working six feet or higher above a lower level:

- Unprotected sides and edges.
- Leading edges.
- Hoist areas.
- Holes (if the hole creates a tripping hazard, a cover should be used).
- Open sides of ramps, runways and other walkways.
- Excavations.
- Wall openings.

- Situations where the employee is working above dangerous equipment and has the potential to fall into the machine.

5.2 Fall Protection Systems and Practices

To assess the fall hazards at D&B project locations and to implement preventive measures, the HSO, HSR or a designee can use the Fall Hazard Assessment Checklist, presented in Appendix A. Fall Hazard Control Analysis Guide, presented in Appendix B, can be used to outline the engineering, administrative and personal protective controls that are designed to protect D&B personnel exposed to fall hazards.

The following fall protection systems may be used, as determined by the HSO, HSR or a designee.

5.2.1 Protection from Falling Objects

When employees are exposed to falling objects, D&B requires that each employee wear a hard hat. One of the following measures could also be implemented, as determined by the HSO or HSR:

- Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels.
- Barricade the area where the falling object hazard may exist, prohibit employees from entering the area, and keep objects far enough away from the edge on the higher level so that they will not go over the edge

5.2.2 Guardrail Systems

The top edge of the guardrail must be 42 inches (+ or – 3 inches) above the walking/ working surface. When there is not a wall at least 21 inches high, there must also be a midrail, screen, mesh or intermediate vertical member (not more than 19 inches apart). At the bottom is a toe board at least 3 1/2 inches in vertical height, with no more than ¼ inch clearance above the floor level. Construction and load-testing of the guardrail system must be according to the specifications outlined in OSHA 29 CFR 1926.502(b).

5.2.3 Personal Fall Arrest Systems

Personal fall arrest system may consist of anchorage, connectors, body harnesses, deceleration device and lifelines. The system must not allow an employee to free-fall more than six feet or contact a lower level. The personal fall arrest system must be inspected prior to each use for wear, damage and other deterioration. The attachment point of the body harness should be in the center of the wearer's back near shoulder level or above the wearer's head. The components of a fall arrest system may not be used as for hoisting materials. Required strengths, tolerances, and testing requirements for personal fall arrest systems are specified in OSHA 29 CFR 1926.502(d).

5.2.3.1Rescue Plan

There must be a plan in place for prompt rescue of employees in the event of a fall. This plan must include the needed equipment and personnel to affect a rescue. This plan should be documented in the Site-Specific HASP or the H&S Checklist, as appropriate.

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Note: Body belts are not permitted to be used as fall arrest system.

5.3 Inspection Checklists

To verify that each piece of equipment used for fall protection is properly maintained and ready for use, inspections must be performed and documented. Equipment Inspection Checklist is presented in Appendix D.

5.4 Fall Protection Plan

Where it has been demonstrated that it is infeasible or creates a greater hazard to use conventional fall protection as described in section 5.2 (during leading edge work or precast concrete erection work), a Fall Protection Plan (FPP) can to be used. FPP must be prepared and implemented to meet the requirements of OSHA 29 CFR 1926.502(k), and the requirements listed below:

- The FPP must be developed specifically for the site where the work is being performed and must be updated to reflect current conditions.
- Any changes to the FPP must be approved by a qualified person.
- A copy of the FPP and approved changes must be kept at the job site.
- The implementation of the FPP must be supervised by the HSO, HSR or a designee.
- The FPP must document the reasons why conventional fall protection is infeasible or why their use would create a greater hazard.

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- The FPP must include a written discussion of other measures taken to reduce or eliminate fall hazards for those employees who are not protected by conventional fall protection systems.

- Where no other measures to reduce or eliminate fall hazards have been implemented, a Safety Monitoring System must be used (see Section 5.5).

- The FPP must identify each location where conventional fall protection methods cannot be used. These locations must then be classified as controlled access zones.

- The FPP must identify, by name, the employees who are designated to work in controlled access zones. No other employees may enter controlled access zones.

- In the event of a fall or some other related, serious incident, D&B will investigate the circumstances to determine if new practices, procedures or training need to be incorporated into the FPP.

5.5 Safety Monitoring System

When conventional fall protection systems are not feasible as described in section 5.4, D&B employees will be protected using a Safety Monitoring System. The Safety Monitoring System must comply with the following requirements:

- The HSO, HSR or a designee will monitor the safety of site personnel.

- The HSO, HSR or a designee will warn the personnel when it appears that they are unaware of a fall hazard or acting in an unsafe manner.

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- The HSO, HSR or a designee will be on the same walking/working surface and within visual sighting distance of the employee being monitored.
- The HSO, HSR or a designee will be close enough to communicate orally with the employee.
- The HSO, HSR or a designee will not have other responsibilities which could take the monitor's attention from the monitoring function.
- Areas where a Safety Monitoring System is in use is a controlled access zone.

5.6 Training Requirements

D&B employees who might be exposed to fall hazards must have adequate training which will enable them to recognize the hazards of falling and will train them in the procedures to be followed to minimize these hazards. The training must be conducted by a competent person qualified in the following areas:

- The nature of fall hazards in the work area.
- Correct procedures for erecting, maintaining, disassembling and inspecting the fall protection systems to be used.
- The use and operation of guardrail systems, personal fall arrest systems, safety nets, warning lines, safety monitoring systems, controlled access zones and other protection.
- The role of each employee in the Safety Monitoring System.

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- The limitations on the use of mechanical equipment during work on sloped walking/working surfaces.
- Correct procedures for handling and storage of equipment and materials and erection of overhead protection.
- The roles of employees in the FPP.

Employees should be retrained when:

- Inadequacies in the employee's knowledge or use of fall protection systems or equipment indicate that he/she has not retained the requisite understanding or skill.
- There are changes at the worksite which render previous training obsolete.
- Changes in the types of fall protection systems or equipment used renders previous training obsolete.

Employees must be trained prior to operating manlifts or aerial lifts. Training must be specific to the type of manlift used.

6.0 REFERENCES

- OSHA 29 CFR 1926, Subpart M.

Performed by:________________________________

Date:________________________________

APPENDIX A – FALL HAZARD ASSESSMENT CHECKLIST

Use the following checklist to identify potential fall hazard situations at the site. If a listed hazard is present at your facility, mark "yes" on the checklist and describe the location(s) where the hazard is identified. Attach additional sheets if necessary if there is not enough space on the checklist to note all locations of a particular identified fall hazard. If a listed hazard is not present at your site, mark "no" on the checklist and proceed to the next item.

NOTE: When filling out this checklist, you must consider both *routine and non-routine tasks* (maintenance or repair of equipment, troubleshooting, inspections, etc.).

Potential Fall Hazard	Yes	No	Location(s)
General			
Fall hazards from open pits, tanks, vats, ditches, etc. OSHA 29 CPR [1910.22(c)].			
Floor and Wall Openings and Holes			
1. Stairway floor openings OSHA 29 CPR [1910.23(a)(1)].			
2. Ladderway floor opening or platform OSHA 29 CPR [1910.23(a)(2)].			
3. Hatchway and chute floor openings OSHA 29 CPR [1910.23(a)(3)].			

Potential Fall Hazard	Yes	No	Location(s)
4. Skylight floor openings OSHA 29 CPR [1910.23(a)(4)].			
5. Pit and trapdoor floor openings OSHA 29 CPR [1910.23(a)(5)].			
6. Manhole floor openings OSHA 29 CPR [1910.23(a)(6)].			
7. Temporary floor openings OSHA 29 CPR [1910.23(a)(7)].			
8. Floorholes into which persons can accidentally walk OSHA 29 CPR [1910.23(a)(8)].			
9. Doors or gates which open directly into a stairway OSHA 29 CPR [1910.23(a)(10)].			
10. Wall openings with drops of more than 4 feet OSHA 29 CPR [1910.23(b)(1)].			
11. Chute wall openings with drops of more than 4 feet OSHA 29 CPR [1910.23(b)(2)].			
12. Window wall opening at stairway landings, floors, platforms, or balconies from which there is a drop of more than 4 feet and where the bottom of the opening is less than 3 feet above the platform or landing OSHA 29 CPR [1910.23(b)(3)].			
13. Temporary wall openings OSHA 29 CPR [1910.23(b)(4)].			

Potential Fall Hazard	Yes	No	Location(s)
14. Hazard of material falling through a wall hole, and the lower edge of the near side of the hole is less than 4 inches above the floor and the far side of the hole is more than 5 feet above the next lower level OSHA 29 CPR [1910.23(b)(5)].			
15. Open-sided platforms 4 feet or more above the adjacent floor or ground level OSHA 29 CPR [1910.23(c)(1)].			
16. Runways with open sides 4 feet or more above the floor or ground level OSHA 29 CPR [1910.23(c)(2)].			
17. Open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment regardless of heights OSHA 29 CPR [1910.23(c)(3)].			
18. Flights of stairs with 4 or more risers OSHA 29 CPR [1910.23(d)(1)].			

Fixed Industrial Stairs

1. Exposed (open sides) stairways and stair OSHA 29 CPR platforms [1910.24(h)].			
2. Enclosed stairways OSHA 29 CPR [1910.24(h)].			

Potential Fall Hazard	Yes	No	Location(s)
Fixed Ladders			
1. Ladders of more than 20 feet to a maximum unbroken length of 30 feet OSHA 29 CPR [1910.27(d)(1)(ii)].			
2. Ladder landings OSHA 29 CPR [1910.27(d)(1)(iii)].			
3. Landing platforms OSHA 29 CPR [1910.27(d)(2)(ii)].			
4. Ladders of more than 20 feet in unbroken length on towers, water tanks, and chimneys OSHA 29 CPR [1910.27(d)(5)].			
Scaffolding			
1. Scaffolding with open sides more than 10 feet above the ground or the floor OSHA 29 CPR [1910.28(b)(15)].			
2. Crawl boards or chicken ladders OSHA 29 CPR [1910.28(t)(2)].			
Mobile Ladder Stands			
1. Mobile ladder stands with more than 5 steps or 60 inches vertical height to the top step OSHA 29 CPR [1910.29(f)(4)].			
Powered Platforms for Building Maintenance			
1. Work performed on roofs during building maintenance OSHA 29 CPR [1910.66(e)(3)].			
2. Elevated track system 4 feet or more above a safe surface and traversed by carriage supported equipment OSHA 29 CPR [1910.66(e)(6)].			

Potential Fall Hazard	Yes	No	Location(s)
3. Working platforms of suspended units OSHA 29 CPR [1910.66(f)(5)(i)(G)].			
4. Working platforms suspended by 2 or more wire ropes where the failure of 1 rope will cause the platform to upset OSHA 29 CPR [1910.66(f)(5)(ii)(M)].			
5. Employees on working platforms OSHA 29 CPR [1910.66(j)].			

Permit-Required Confined Spaces

1. Entrance covers removed where an employee could fall into a confined space OSHA 29 CPR [1910.146(c)(5)(ii)(B)].			
2. Use of tripod and winch to lower employees into confined spaces OSHA 29 CPR [1910.146(d)(4)(ix)].			

Other

1. Any other walking/working surface with an unprotected side or edge 6 feet or more above a lower level OSHA 29 CPR [1926.501(b)(1)].			
2. Hoist areas 6 feet or more above a lower level OSHA 29 CPR [1926.501(b)(3)].			
3. Excavations 6 feet or more in depth which are not readily seen because of plant growth or other visual barriers.			

Other(s):____

____

APPENDIX B – FALL HAZARD CONTROL ANALYSIS GUIDE

Fall Hazard	Engineering Controls	Administrative Controls	Personal Protective Equipment
Working on top of vertical or horizontal tanks.	1. For new construction, the access areas on horizontal or vertical tanks (both operation and maintenance) should be identified and located for easy access during the design phase. If employees must access the top of a tank, then an appropriate guardrail should be specified in the design. 2. Existing tanks should be evaluated to determine if access points, such as vents, openings, motors, piping, etc, which are routinely accessed are protected by an adequate guardrail. If not currently protected, then personnel working in the unprotected area must use fall protection equipment. The facility should evaluate the situation to determine if a guardrail is appropriate.	1. Personnel accessing the top of tanks must be instructed on fall protection prior to access according to the guidelines established in this manual. Training should include knowing when they need PPE and when they do not. 2. Personal fall protection equipment will be inspected prior to and after use. Inspection must be documented using the Fall Protection Equipment Inspection Checklist provided as Appendix D.	1. When accessing the top of tanks and the nature of work will be outside of a protective guardrail, a fall arrest system must be used.

	3. When safety harnesses and lanyards are to be utilized, the appropriate anchor point will be predetermined and marked.		

Fall Hazard	Engineering Controls	Administrative Controls	Personal Protective Equipment
Working on an elevated pipe or conduit Rack or Chase.	1. Where routine maintenance or regular access is required, elevated work platforms should be installed with a standard guardrail with access by either a ladder or stair.	1. Personnel must be properly trained in the use of fall protection equipment prior to use according to the guidelines established in this program. 2. Personal fall protection equipment will be inspected prior to and after use. Inspection must be documented using the Fall Protection Equipment Inspection Checklist provided as Appendix D.	1. Provide a personal fall arrest. 2. Should a horizontal lifeline system not be appropriate, a designated anchor point meeting the OSHA requirements, as outlined in this program, should be available to attach a shock-absorbing lanyard. 3. Fall protection equipment must be selected from the equipment list contained in this program or equivalent to the equipment specified.

Fall Hazard	Engineering Controls	Administrative Controls	Personal Protective Equipment
Open Sided Roof or Platform.	1. Material and personnel access points to elevated platforms must be equipped with guarding. When material access points are not used, either a fixed or movable guardrail must be used. The guardrails must be capable of withstanding a 200-pound force. 2. When material access points are being utilized and a guardrail has been removed, an evaluation to determine if operators are required to be in the fall hazard zone should be conducted. If personnel can operate the material hoist from outside the zone, they are not required to wear fall protective equipment.	1. Personnel required to work in the fall hazard area must be trained prior to the work according to the training guidelines established by this program. 2. Personal fall protection equipment will be inspected prior to and after use. Inspection must be documented using the Fall Protection Equipment Inspection Checklist provided as Appendix D.	1. Personnel required to be in a fall hazard zone must wear a body harness and shock-absorbing lanyard of appropriate length but not longer than 6 feet attached to an approved and designated anchor point. 2. Fall protective equipment must be selected from the equipment list contained in this program or equivalent to the equipment specified.

Fall Hazard	Engineering Controls	Administrative Controls	Personal Protective Equipment
Using Manlifts or Mobile Personnel Lifting Equipment.	1. Purchase, lease or rent lifts that have personal cage areas conforming to OSHA requirements.	1. Any associate who operates a powered platform or manlift, must have been instructed and have demonstrated proficient operating ability before being allowed to operate in the facility. 2. Prior to operation, the powered platform/manlift must be inspected to verify that safety features of the lift are working properly, including brakes, access gates, etc. A checklist must be completed prior to usage according to the checklist provided as Appendix D. 3. Personal Protective Equipment will be inspected prior to and after use. Inspection must be documented using the Fall Protection Equipment Inspection	1. While working from a telescoping boom platform or manlift, personnel must wear a safety harness with a shock-absorbing lanyard of appropriate length but not longer than 6 feet. The lanyard must attach to an approved and designated anchor point at the same height as the D-ring on the harness. The midrail should never be used as the anchor point. 2. Fall protective equipment must be selected from the Fall Protection Equipment Inspection Checklist provided as Appendix D or equivalent to the equipment specified.

		Checklist provided as Appendix D.	

No. 5

Fall Hazard	Engineering Controls	Administrative Controls	Personal Protective Equipment
Entry or exit from a vertical confined space.	1. Reconfigure the confined space to allow access at the level of the work to be performed.	Confined Space training is mandatory for entering a confined space. Awareness training is not acceptable.	1. During entry and exit an approved tripod and combination hoist mechanism rated for fall protection must be used. 2. Fall protective equipment must be selected from the Fall Protection Equipment Inspection Checklist provided as Appendix D or equivalent to the specified equipment.

APPENDIX C – GUIDELINES FOR ANCHOR POINTS

An anchor point is a secure point of attachment for a personal fall arrest system. It must be independent from the means supporting or suspending a worker.

Anchor points:

- Must be able to support a weight of at least 5,000 pounds of force for each worker attached.
- Should be located at a height that reduces free fall to 6 feet or less. Factors to consider are deceleration distance (shock-absorbing lanyard) and elongation lanyard stretching.
- Should be located so that if a free fall occurs, and attached worker will not collide with equipment or structure or contact any lower level.

The lanyard is connected to an anchor point using a self-locking snap hook or to a tie-off strap. The tie-off point should be at or above the D-ring on the back of the worker's harness. This will limit the free fall distance to the length of the lanyard.

Anchoring plan:

Every anchor point must pass each of the following nine tests for safe usage:

1. Height
   - ✓ Does the anchor point height reduce free fall to the shortest distance possible?
   - ✓ Is the anchor point away from possible collisions with the body or the head?

- ✓ Is the anchor point unaffected by the local environment, or contamination such as paint over-spray?

2. Location

- ✓ Is swing fall reduced to a reasonably safe minimum in order to reduce the potential for collision injury and to allow for self-recovery?
- ✓ Is the anchor point continuous by design, to accomplish the task without intermittent fall hazards?
- ✓ Is the anchorage reachable, to permit connection without a hazard?

3. Shape

- ✓ Is the anchor point compatible with the attachment method of the deceleration device? Many shapes are not attachable with snap hooks, including certain eyebolt shapes.
- ✓ Will the likely method of attachment cause damage or failure to the deceleration device? Looping a lanyard around an angle iron could cut the lanyard in a fall.
- ✓ Will the likely method of attachment be to a bolt hole? Snap hooks can detach from slotted bolt holes with as little as 2 pounds of steady force.
- ✓ Can the attachment method allow sliding-down falls or permit cutting the line?
- ✓ Will the attachment method of a lanyard to a flanged edge without closure of the snap hook gate be prohibited?

4. Strength

- ✓ Has the anchor point been identified by a competent person for its intended use?
- ✓ Is the anchor point still reliable after long exposure to the elements, such as salt air?

- ✓ Will a tie-back point prevent any additional free fall if a primary anchor point fails?

5. Usage

- ✓ How many workers can be safely attached to the same common anchor point? This is an engineering question, if the answer is more than one worker.
- ✓ Are the load-bearing suspension line and the lifeline attached to separate support systems?
- ✓ Is trying knots prohibited for providing anchor point attachments? Knots aren't reliable without a strict worker training system and an approved method of tying them.
- ✓ Has wrapping a line around a typical structural member such as an I-beam been tested by the company for sufficient strength?
- ✓ Is it prohibited to attach snap hooks to each other or to a lifeline or lanyard? Doing so results in hazards such as roll-out and loss of strength.
- ✓ Will the snap hook be used for attaching to the structure or for pulling back?
- ✓ Will the method of use cause workers to disconnect themselves at heights because they can't reach their task?

6. Stability

- ✓ Has attachment to the lip of an I-beam been prohibited? A snap hook may slip off with an angled pull and cause system failure.
- ✓ Has attaching a lifeline to a projection been prohibited? The lifeline can detach by movement off the end.

7. Independence

- ✓ Are the anchor points independent? The independence of each anchor point from the main work-positioning anchor support is an important principle. Where tripods, building, or structure itself are concerned, it is important to address the kind of failure that would likely produce an injury. Anchor point design should address all predictable scenarios.

8. Protection while moving
   - ✓ If horizontal lifelines are sued to allow protected movement, have they been engineered for this purpose? A horizontal line may be intended as a hand line or perimeter cable. Termination of lines or butting them with mechanical clips can be dangerous under dynamic conditions.
   - ✓ Do the horizontal lines allow enough sag under the dynamic conditions of a fall to permit the worker to avoid colliding with an obstruction or the ground?
   - ✓ A horizontal life line must be designed by a qualified person.
9. Labeling
   - ✓ Can the anchor point be marked for future recognition and limited specific use? Anchor points for a specific activity should be identified on the Maintenance Job Procedure for that task.

Inspector:________________________________

Inspection Date:________________________________

APPENDIX D – EQUIPMENT INSPECTION CHECKLIST

Type	Manufacturer	Model No.	Serial No.
Harness			
Lanyard			
Anchor Strap			
Carabiner			

Inspection of fall protective equipment must be conducted before and after each use. This checklist is designed to document and confirm that components have been inspected as required and that no defective or damaged components have been found. Should defective or damaged parts be found, the entire piece of fall protective equipment must be removed from service and tagged "OUT OF SERVICE - DO NOT USE" until the components can be either repaired or discarded.

Part	Condition	Acceptable	Unacceptable
Personal fall arrest systems (*Harness, buckles, D-rings, straps, keepers, etc.*)	Metal connectors, snap hooks, D-rings etc., must not show signs of damage, including: broken, distorted, sharp edges, burrs, cracks, worn parts, or corrosion. *Note: Make sure buckles work freely.*		

	The harness and straps must not show signs of damage including: frayed, cut or broken fibers; tears, abrasions, mold, burns, or discoloration, pulled or cut stitches, knots, excessive soiling or paint buildup. *Note: Broken stitches or exposed fall indicator stitching may be an indication the harness has been shock-loaded during a fall and must be discarded.*		
	The harness must have an original label indicating the manufacturers intended load capacity.		
Shock-absorbing lanyards	The lanyards must not show signs of damage or stress or shock loading including: rust or staining, chemical or heat damage, or degradation. The lanyard must also have complete and legible labels including the manufacturer name and rated capacity. *Note: Broken stitches or exposed fall indicator stitching may be an indication the harness has been shock loaded in a fall and must be discarded.*		

Inspector:__________________________________

Inspection Date:__________________________________

Vehicle Mounted Platforms and Manlifts

Type	Manufacturer	Model No.	Serial No.

Inspection of vehicle mounted platforms must be completed prior to operation each day or each shift. The inspection must be documented using this form. If any condition is found to be defective or damaged, then the vehicle mounted platform or manlift may not be used until the defective or damage component has been repaired or replaced. During the time when the platform or lift is being repaired or waiting repair, the unit is to be tagged "OUT OF SERVICE - DO NOT USE". Safety harnesses and lanyards used in conjunction with unit operation must be inspected according to the Fall Protection Equipment Checklist.

Part	Condition	Acceptable	Unacceptable
Tires	Tires are in good condition and are not flat or loosely attached to unit.		
Hydraulic System	There are no visible hydraulic leaks or hydraulic fluid on ground around unit.		
Controls	The controls are labeled clearly and correct. The controls work as intended.		
Guardrails	The guardrails and toeboards around the personnel platform area are intact, secure and welds not cracked or broken.		
Platform Gate	The gate is self-closing and works properly. Latching mechanism works and securely fastens gate.		
Outriggers (if equipped)	The outriggers are free from recognized damage and move easily. The support pads are intact and not damaged.		
Brakes	The brakes have been tested and work properly.		
Horn	The horn is functional and can be heard over nearby operating equipment		

Inspector:___________________________________

Inspection Date:___________________________________

Horizontal Lifeline Systems

Location:____

Inspection of the horizontal lifeline system must be conducted before and after each use. The checklist is designed to document and confirm that components have been inspected as required and that no defective or damaged components have been found. Should defective or damaged parts be found the piece must be removed and replaced with new part. The damaged or defective piece must be made unusable and discarded. If the wire rope is damaged, the entire horizontal lifeline should be tagged "OUT OF SERVICE - DO NOT USE". The inspection of safety harnesses and lanyard must be documented using the Fall Protection Equipment Checklist.

Part	Condition	Acceptable	Unacceptable
Hardware *(Hardware includes: end anchors, links, terminals, brackets and connectors)*	Hardware items must not show signs of damage, including: broken, distorted, sharp edges, burrs, cracks, worn parts, or corrosion.		
Wire Rope	Wire rope must not be damaged, including: six (6) or more broken wires in one rope lay or three (3) or more broken wires in one strand, corrosion, permanent kinks, burn marks, bird caging or exposed core.		

CONFINED SPACE OPERATIONS GUIDELINES

Table of Contents

CONFINED SPACE OPERATIONS GUIDELINES

1.0 PURPOSE

To establish safe procedures for employees of D&B who have the potential to be exposed to the hazards of a confined space as detailed in OSHA 29 CFR 1910.146 (General Industry) and 29 CFR 1926.1200 (Construction).

2.0 SCOPE

Applies to the activities of D&B personnel exposed to the hazards of a confined space.

3.0 DEFINITIONS

CONFINED SPACE OPERATIONS GUIDELINES

Attendant - A trained individual stationed outside the confined space who monitors the Authorized Entrant.

Authorized Entrant - A trained individual whose name is listed on the entry permit and who is authorized by the employer to enter a confined space.

Confined Space - A space that:

- Is large enough and so configured that an employee's entire body can enter and perform assigned work (e.g., storage tanks, stacks, pits, basements, silos, boilers, ventilation and exhaust ducts, manholes, sewers, tunnels, underground utility vaults, etc.).

- Has limited or restricted means for entry or exit.

- Is not designed for continuous employee occupancy.

Emergency - Any occurrence or event internal or external to the permit space that could endanger entrants.

Engulfment - The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction or crushing.

CONFINED SPACE OPERATIONS GUIDELINES

Entry - The act of intentionally passing through an opening into a confined space. Entry occurs as soon as any part of the entrant's body breaks the plane of the opening into the space.

Entry Permit - A written or printed document provided by the employer that authorizes the confined space entry and identifies acceptable conditions for entry into a confined space. At a multi-employer site, each affected employers must be in agreement regarding who will issue a Permit.

Entry Supervisor - The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned for authorizing entry, overseeing entry operations and for terminating the confined space entry.

Hazardous Atmosphere - An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL).
- Airborne combustible dust at a concentration that meets or exceeds its LFL.
- Atmospheric oxygen concentration below 19.5% or above 23.5%.
- Atmospheric concentration of any substance for which a dose or a permissible exposure limit (PEL) is published in OSHA 1919 Subpart Z, Toxic and

Hazardous Substances, which could result in employee exposure in excess of its dose or PEL.

- Any other atmospheric condition that is immediately dangerous to life or health.

Hot Work Permit - The employer's written authorization to perform operations (e.g., welding, cutting, burning and heating) capable of providing a source of ignition.

Immediately Dangerous to Life or Health (IDLH) - Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit required confined space.

Isolation - The process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding, blocking, bleeding and lockout/tagout of all sources of energy.

Line Breaking - The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure or temperature capable of causing injury.

Oxygen Deficient Atmosphere - An atmosphere containing less than 19.5 % oxygen.

Oxygen Enriched Atmosphere - An atmosphere containing greater than 23.5 % oxygen.

CONFINED SPACE OPERATIONS GUIDELINES

Permit Required Confined Space (PRCS) - A confined space that has one or more of the following characteristics:

- Contains or has potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfment of an entrant.
- Has inwardly converging walls or floors that could trap or asphyxiate an entrant.
- Contains any other recognized serious safety or health hazard.

Permit System - The employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited Condition - Any condition in a permit system that is not allowable by the permit during the period when entry is authorized.

Rescue Service - The personnel designated to rescue employees from permit required spaces.

Retrieval System - The equipment used for non-entry rescue of persons from permit required spaces.

CONFINED SPACE OPERATIONS GUIDELINES

Testing - The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

4.0 RESPONSIBILITIES

Health and Safety Coordinator (HSO) - The HSO is responsible for:

- Coordinating training for personnel designated as an Authorized Entrant, Attendant or Entry Supervisor.
- Reviewing and updating this program annually to include new revisions by OSHA.
- Conducting annual field audits of this program.

On-Site Health and Safety Representative (HSR) - The HSR is responsible for:

- Confirming that the Permit requirements are implemented.
- Reporting incidents or PRCS guidelines deficiencies.
- Making on-site H&S decisions related to field operations.
- HSR may take on an Entry Supervisor's responsibilities, if assigned.

Entry Supervisor - The entry supervisor is responsible for:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Completing the Entry Permit, verify that requirements of the Permit have been met and equipment specified in the permit is in place before endorsing the permit and allowing entry to begin.

Authorized Entrant - The Authorized Entrant is responsible for:

- Knowing the hazards and understanding the consequences of exposure.
- Maintaining contact with the Attendant.
- Understanding and utilizing the provided personal protective equipment.
- Exiting the permit space if evacuation is ordered by the Attendant.
- Alert the Attendant whenever:
    - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
    - The entrant detects a prohibited condition.

CONFINED SPACE OPERATIONS GUIDELINES

- Exit from the permit space as quickly as possible whenever:
  - An order to evacuate is given by the Attendant or the entry supervisor.
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - The entrant detects a prohibited condition.
  - An evacuation alarm is activated.

Attendant - The Attendant is responsible for:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Continuously maintaining an accurate count and identity of Authorized Entrants in the permit space.
- For remaining outside the permit space until relieved by another Attendant.
- Maintaining continuous communication with all Authorized Entrants.
- Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space and ordering the Authorized Entrants to evacuate the permit space immediately under any of the following conditions:
  - If the Attendant detects a prohibited condition of the entry.

CONFINED SPACE OPERATIONS GUIDELINES

- If the Attendant detects the behavioral effects of hazard exposure in an Authorized Entrant.
- If the Attendant detects a situation outside the space that could endanger the Authorized Entrants.
- If the Attendant cannot effectively and safely perform all of his or her required duties.

- Summoning rescue or emergency services as soon as the Attendant determines that Authorized Entrants may need assistance to escape from PRCS hazards. The client may have its own rescue services. If outside rescue services are employed, they are to be notified ahead of time as to the PRCS entry so as to be prepared. They may also visit the site prior to the entry, to understand the logistics and scope of work.
- Perform non-entry rescue as specified in the rescue procedure.
- The attendant is not allowed multiple confined spaces at the same time.

5.0 GUIDELINES

D&B will use these guidelines for any entry into a PRCS for testing, maintenance, inspection or repair activities.

CONFINED SPACE OPERATIONS GUIDELINES

5.1 General

In general, the HSO or HSR should evaluate the workplace and identify the number, type and location of confined space areas within the site that personnel may need to enter to perform work. Once the confined spaces have been identified, as defined in Section 3.0, a determination must be made if the space(s) requires an Entry Permit.

If a confined space has been defined as a PRCS, the HSO, HSR or his/her designee must inform site personnel of the existence, location and danger posed by the space. This can be accomplished by posting a danger sign with appropriate language (e.g. DANGER – PERMIT REQUIRED CONFINED SPACE). *NO ENTRY INTO A PRCS WILL OCCUR WITHOUT A PERMIT.*

5.2 Reclassifying Permit-Required Confined Spaces

PRCS can be temporarily reclassified as either a Non-Permit Confined Space or Alternate Space, providing the following is met:

5.2.1 Reclassification to a Non-Permit Confined Spaces

Some identified confined spaces are classified PRCS based solely upon the space containing hazards which can effectively be eliminated through lockout/tagout procedures. For a PRCS to be temporarily reclassified as a non-permit space, there must be no potential for the space to contain other hazards. The permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated. Measures for eliminating hazards within the space should be documented and reviewed by the HSO. Upon work completion and after the control measures have been removed, the space must be reclassified as a PRCS.

5.2.2 Reclassifying PRCS to Alternate Space

If the only hazard in a PRCS is a hazardous atmosphere, then it is possible to potentially reclassify the space as an Alternate Space. In order to consider such spaces as non-permit spaces, all atmospheric hazards must be eliminated without entry into the space. Monitoring and inspection data, collected during routine entry operations, must show that the atmospheric hazards were effectively abated through the use of ventilation equipment. The HSO or HSR will verify an evaluation of designated Alternate Spaces. Although an Entry Permit is not required for entrance into an Alternate Space, the following precaution must be followed:

- Entrants must be trained in the potential hazards of the space.
- Continuous ventilation will be established and maintained throughout the entry period. The ventilation must be sufficient to maintain the space safe for entry.
- Prior to entry, the space must be tested for oxygen content, flammable gases and vapors, potential toxic air contaminants.
- Entrants and other personnel involved in the entry may review equipment calibration and air monitoring data at any time during the entry process.

CONFINED SPACE OPERATIONS GUIDELINES

- If a hazardous atmosphere is detected, entrants must evacuate the space and the space then becomes a PRCS.

5.3 Hazard Identification

The Hazard Assessment Form in Appendix A can be used to assess the hazards of each confined space prior to entry.

Other hazards may be present in the vicinity of the confined space, such as traffic, pedestrians and heavy equipment. Provisions are to be made to protect the confined space entry team as well as those outside. This can be addressed in the JHA.

5.4 Entry Permit

The Entry Permit (Appendix B) is a checklist designed to ensure that the proper precautions are implemented prior to entry.

All blocks on the permit must be completed. If an item is not applicable then "N/A" must be written in the space. NO blank spaces are to appear on the permit. The permit must be signed by the Entry Supervisor and posted at the entrance to the confined space until the entry is completed or the work shift ends. The permit is applicable for a single work shift. The entry permit will serve as a safety briefing outline before entry and will be available for review by all affected employees.

The entry permit will identify:

- The location of the confined space, a description of the entry task, date of entry and duration of permit.
- Known and potential hazards that may be encountered during the confined space entry.
- Mechanical apparatus within the confined space such as agitators and pumps, which if activated could injure the worker.
- Isolation procedures to be implemented, consisting of:
  - Blanking and/or disconnecting of lines.
  - Electrical lockout and tagout.
  - Mechanical isolation and tagout.
  - Mechanical ventilation (volumes).
- Safety and protective equipment required (specify routine and emergency requirements), consisting of:
  - Level of respiratory protection.
  - Personal protective equipment.

CONFINED SPACE OPERATIONS GUIDELINES

- Safety harness and/or lifelines.
- Extraction devices.
- Tools and equipment to be taken into the confined space by the entrant.

- Pre-entry atmospheric monitoring and acceptable levels of contaminants, consisting of:
    - Oxygen level (19.5 – 23.5 %).
    - Combustible gas/vapor level (< 10% LEL).
    - Toxic substances level less than established TLV, PEL. (for Hydrogen sulfide – 10 ppm; for chlorine – 0.5 ppm).
- Provisions for continuous atmospheric monitoring, identifying:
    - Equipment.
    - Evacuation criteria.
- Equipment/procedures to maintain acceptable atmospheric conditions identifying procedures for purging, ventilation, flushing and inerting.
- Identification of entry team (authorized and eligible), consisting of:
    - Personnel to make entry (Authorized Entrant).

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   - Personnel on stand-by (Attendant).

- Emergency procedures and first aid, identifying the following:
   - Communication procedures.
   - Equipment location.
   - Rescue team.

- Training required (specifics beyond Section 5.8 should be noted) for the following employees:
   - Authorized Entrant, Attendant and Entry Supervisor.
   - Non-entry rescue.
   - Respirator use.
   - PPE.

- The permit must be closed out following the completion of confined space activities.

- The permit may be cancelled if all conditions for entry are not met, or if worksite conditions change.

CONFINED SPACE OPERATIONS GUIDELINES

5.5 Work Practices

5.5.1 Pre-Entry

As part of the pre-entry procedure, the Entry Supervisor, HSO or HSR will review the entry permit with each Authorized Entrants and Attendants. The Entry Supervisor, HSO or HSR must confirm that the necessary steps have been taken to establish that conditions within the space are safe prior to issuing an entry permit. These steps include:

- Pre-entry briefing.
- Preparation of the Entry Permit including:
    - Initial Atmospheric Testing will be completed for oxygen deficiency or enrichment, combustible gases and toxic gases and vapors.
    - Hazard Control/Elimination will be completed as necessary to properly control/eliminate hazards.
    - Space Preparation will be completed and Site Controls will be employed to prevent unauthorized personnel from impacting the entry operation, allow necessary entry equipment to be staged effectively, maintain adequate housekeeping at the entry location

and in the space itself, and enable rescue services to locate and access the entry space as needed.

- Training will have been completed and documented for each employee involved with the entry.

- Emergency Rescue Procedures identifying the level and type of emergency services required for the entry.

- Equipment and Instrumentation required for monitoring, hazard control, safety and rescue.

5.5.2 Purging and Ventilation

All confined space enclosures containing a hazardous atmosphere will be subject to purging and continuous ventilation prior to an entry, and as needed. Continuous ventilation may not be required if the confined space meets all of the following criteria:

- No oxygen deficiency or enrichment (19.5 - 23.5 %).

- Lower Explosive Limits (LEL) measurements are less than 10%.

- Toxicity measurement is less than 10% of the established IDLH of the airborne contaminant present.

CONFINED SPACE OPERATIONS GUIDELINES

5.5.3 Isolation/Lockout and Tagging

Except for such confined spaces as manholes, sewers, and tunnels, where complete isolation is not physically possible, confined spaces will be completely isolated from other systems by such means as lockout/tagout, double block and bleed, or physical disconnection of lines into the confined space.

5.5.4 Buddy System

Tasks involving confined space entry will be performed by a team of not less than two employees with specific duties as described in Section 4.0 Responsibilities.

5.5.5 Communication

The Authorized Entrants and the Attendant must maintain continuous communication with each other during the entire confined space entry. If visual contact and/or verbal communication cannot be maintained, the following code may be used which utilizes the lifeline:

Person Outside Confined Space	Person In Confined Space
1 Pull - Come out	1 Pull - Send help
2 Pulls - Back out	2 Pulls - Keep slack out of line
3 Pulls - Advance	3 Pulls - I am going ahead
4 Pulls - Are you okay?	4 Pulls - I am okay

If the person inside the confined space does not respond to the pull code, assume that there is trouble and begin effecting emergency procedures.

In addition, a means of communication will be available to summon outside help.

5.5.6 Testing and Monitoring

When preparing for an entry into a PRCS, appropriate initial testing must be conducted to confirm that the atmosphere in the confined space is safe. Monitoring will be conducted for oxygen content, combustible gases/vapors, toxic contaminants, and any other contaminants identified. Air monitoring should be conducted continuously while personnel are within the confined space.

Entry into a confined space without proper personal protective equipment will not be permitted under the following conditions:

- Oxygen concentrations less than 19.5% or greater than 23.5%, or 148 mm Hg and 178 mm Hg, respectively, based on atmospheric pressure of 760 mm Hg at sea level.

- Flammability measurements greater than 10% of the LEL.

- Toxicity measurements indicating an IDLH atmosphere's existence in the confined space.

CONFINED SPACE OPERATIONS GUIDELINES

Initial atmospheric samples will be drawn while outside the confined space at the following locations: outside the entry point(s), immediately inside the entry point(s) and every four feet from the entrance. Initial-monitoring results will be recorded on the entry permit. In addition, D&B employees may request that additional monitoring be conducted. The request will be evaluated by the HSO.

5.5.7 IDLH Conditions

D&B personnel will not be permitted into confined spaces during IDLH conditions.

5.6 Equipment

Equipment necessary for safe entry, including testing, monitoring, communication, and personal protective equipment must be available prior to entry. Personnel using the equipment must be trained in proper use and maintenance of such equipment.

5.6.1 Safety Equipment

Additional safety equipment such as safety belts, body harnesses, or wristlets with lifelines will be provided and used for each confined space entry, as determined by the Entry Supervisor, HSO or HSR. If necessary, lifelines will be attached to a mechanical extraction device outside the confined space so the Attendant can perform non-entry rescue.

5.6.2 Illumination

Illumination must be provided, as necessary, pursuant to OSHA 29 CFR 1910.120(m).

5.6.3 Equipment Requirements

Tools and other equipment, including monitoring instruments, for use in PRCS will be inspected for compliance with the following requirements:

- Tools and equipment will be kept clean and in a good state of repair.
- Electrical equipment including portable tools, lighting, and power cords should meet approvals in accordance with OSHA 29 CFR 1910 subpart S, including provisions for ground fault circuit interruption.
- Only explosion proof temporary lighting listed by the Underwriters Laboratory should be used during PRCS entry and be equipped with required guards.
- Air activated tools must be used where flammable liquids are present and be bonded to the confined space.
- Compressed gas cylinders, except those that are part of SCBA or resuscitation equipment, will never be allowed inside a confined space. Cylinders used to supply compressed gases to a confined space will be turned off at the cylinder valve when not in use and the supply lines will be removed.

CONFINED SPACE OPERATIONS GUIDELINES

- Ladders, scaffolding and staging will be adequately designed and secured in conformance with OSHA 29 CFR 1910 subpart D.

- Equipment or instrumentation subject to use in a confined space where flammable atmospheres may occur will be listed as explosion proof or intrinsically safe by a recognized testing laboratory.

5.7 Rescue

If it becomes necessary to remove a worker from a confined space, the Attendant should act in accordance with the predetermined emergency rescue plan as follows:

- The Attendant will communicate through the predesignated communication network and request assistance. The following information should be given:
    - The location of the confined space.
    - Request for emergency oxygen supply and first-aid kit.
    - Request for self-contained air supply with full-face mask, safety harness and lifeline.
    - Call for professional medical assistance.

CONFINED SPACE OPERATIONS GUIDELINES

- The Attendant will only attempt a non-entry rescue. At no time will the Attendant place himself/herself inside the confined space to perform an in-space rescue.

- If the person within the confined space is secured to a winch, begin hauling him/her out. This procedure must be performed at a speed that will not further injure the person.

- If the lifeline is not secured to a winch, the Attendant will secure lifeline.

5.8 Employee Information and Training

Prior to assignment, employees will be trained to recognize confined spaces, the hazards of working in a confined space, and demonstrate understanding, knowledge, and skills necessary for the safe performance of their assigned duties during any confined space entry. The HSO will also confirm that employees are properly trained before an employee is assigned the duties of Entrant, Attendant or Entry Supervisor. Training will also be conducted if there are changes in duties, hazards or other circumstances. All training will be documented through sign-in sheets and certificates.

Training will include:

- Hazard recognition associated with confined space operations.

- Emergency entry and egress procedures.

- Respiratory protection.
- First aid.
- Cardiopulmonary resuscitation.
- Lockout/Tagout procedures.
- Personal Protective Equipment.
- Rescue operations.
- Permit system.
- Work practices (see Section 5.5).

5.9 Subcontractors

Subcontractors will be provided with available information on existing confined spaces, their hazards, necessary permits (if applicable) and any other workplace hazards, safety rules and emergency procedures necessary to complete the task safely.

CONFINED SPACE OPERATIONS GUIDELINES

5.10 Recordkeeping

Copies of the entry permits and personnel exposure record will be maintained by the HSO as required under OSHA 29 CFR 1910.20.

6.0 REFERENCES

- ANSI Z117.1-1989 "Safety Requirements for Confined Space."
- OSHA 29 CFR 1910.146, Permit Required Confined Spaces (general industry).
- OSHA 29 CFR 1926.1200, Permit Required Confined Spaces (construction).
- OSHA 29 CFR 1910.120(m) Hazardous Waste Operations (Illumination).
- OSHA 29 CFR 1910 Subpart S (Electrical).
- OSHA 29 CFR 1910 Subpart D (Walking-Working Surfaces).

APPENDIX A – HAZARD ASSESSMENT FORM

CONFINED SPACE ENTRY CLASSIFICATION AND HAZARD ASSESSMENT FORM

Location of Space:
____

Description of Space:
____

____

1. Can an employee enter the space and perform assigned work within the space? Yes ____ No ____

2. Are there limited or restricted means of entry and/or exit? Yes ____ No____

3. Was the space designed for continuous human occupancy? Yes ____ No____

If you answered "no" to #1 or #2 or you answered "yes" to #3, this space is not a confined space as defined by OSHA 29 CFR 1910.146 Confined Space Standard. Please sign here and complete the classification section at the end of this form.

Name	Title	Signature	Date
____________________	_________________	________________	_______________

For all spaces classified as confined spaces please complete the following hazard assessment.

4. Can the space be oxygen deficient or enriched? Yes ____ No ____

   Explain: ____
   ____

5. Can the space contain a flammable atmosphere? Yes ____ No ____

   Explain: ____
   ____

6. Can the space contain a toxic atmosphere? Yes ____ No____

   Explain: ____
   ____

7. Is there material in the space which could engulf an entrant?

7a. If yes, can the material be removed prior to entry?

   If "no" to 7a, space is a permit required confined space.
   If "yes" to 7a, explain:____

8. Are there hazards on the walking/working surfaces which could cause entrants to trip or slip or fall while in the confined space? Yes ____ No ____

8a.	If "yes" can these hazards be removed prior to entry?	Yes ____ No ____

If "no" to 8a, space is permit required confined space.
If "yes to 8a, explain:____
____

9.	Does the space have inwardly converging walls?	Yes ____ No ____
10.	Does the space contain an energy source?	Yes ____ No ____
10a.	If "yes" can the energy source be de-energized and locked out prior to entry?	Yes ____ No ____

If "no" to 10a space is a permit required confined space.
If "yes" to10a, explain:____
____

11.	Does the space contain moving machinery or equipment?	Yes ____ No ____
11a.	If "yes", can it be secured from outside the space?	Yes ____ No ____

If "no" to 11a, the space is permit required confined space.
If "yes" to 11a, explain:____
____

12.	Is there process piping connected to the space?	Yes ____ No ____
12a.	If "yes" can the piping be blanked off, disconnected or isolated using a double block valve and bleeder system?	Yes ____ No ____

If "no" to 12a, space is a permit required confined space
If "yes" to 12a, identify the material in the piping:____________________
____

I certify that the above is a true and accurate assessment of the hazards or potential hazards associated with entry into the specified confined space.

___________________	_________________	____________________	__________
Name	Title	Signature	Date

Confined Space Classification
Based on the above assessment this classifies the space as:

_____	Not a confined space	
_____	Non-permit required confined space.	Answered "No" to all questions #4 through #12
_____	Permit required confined space	Answered "Yes" to any question #7 through #12
_____	Alternate confined space	Answered "Yes" to any question #4 through #6 but "No" to all questions #7 through #12

__________________________	_________________	____________________	__________
Name	Title	Signature	Date

APPENDIX B – ENTRY PERMIT CHECKLIST

PERMIT – REQUIRED CONFINED SPACE-SAFE WORK PERMIT

<table>
<tr><td colspan="6">Section 1-Work Assignment -TO BE COMPLETED BY PERMIT INITIATOR</td></tr>
<tr><td colspan="3">PERMISSION IS GRANTED TO (NAME & ORGANIZATION)</td><td colspan="3">LOCATION (BUILDING, FLOOR, ROOM)</td></tr>
<tr><td>WORK ORDER No.</td><td colspan="2">DESCRIBE WORK/TASK (BE SPECIFIC)</td><td colspan="3">PERMIT TYPE (CHECK ALL THAT APPLY)
☐ CONFINED SPACE
☐ HOT WORK WILL BE PERFORMED</td></tr>
<tr><td colspan="3">PERMIT IS VALID FOR THIS LOCATION/TASK/DATE ONLY AND FOR THE TIME PERIOD INDICATED- NOT TO EXCEED ONE SHIFT (12 HOURS)</td><td>DATE</td><td>WORK TO BEGIN AT</td><td>PERMIT EXPIRES AT</td></tr>
</table>

<table>
<tr><td colspan="4">SECTION 2-HAZARD CONTROL CHECKLIST</td></tr>
<tr><td>HAZARD CONTROL MEASURES</td><td>YES OR N/A</td><td>HAZARD CONTROL MEASURES</td><td>YES OR N/A</td></tr>
<tr><td>NOTIFIED PERSON(S) IN AFFECTED WORK AREA</td><td></td><td>REQUIRE CONTINUOUS ATMOSPHERIC (OXYGEN/LEL/CONTAMINANT) REQUIRED- IF YES, CIRCLE TYPE AND COMPLETE SECTION 3</td><td></td></tr>
<tr><td>ALL AFFECTED PERSONNEL ADVISED OF WORK HAZARDS, PRECAUTIONS AND EMERGENCY PROCEDURES</td><td></td><td>REQUIRE VISUAL/RADIO CONTACT WITH ENTRY TEAM</td><td></td></tr>
<tr><td>IDENTIFIED PROPER MEANS OF EGRESS</td><td></td><td>REQUIRE FORCED AIR VENTILATION IN PLACE 15 MINUTES PRIOR AND DURING CONFINED SPACE ENTRY</td><td></td></tr>
<tr><td>REQUIRED PERSONAL PROTECTIVE EQUIPMENT- IF YES COMPLETE SECTION 4</td><td></td><td>REQUIRE SAFETY HARNESS/TRIPOD AND WINCH/FALL PROTECTION REQUIRED</td><td></td></tr>
<tr><td>CONDUCTED HAZARD COMMUNICATION</td><td></td><td>REQUIRE 2-WAY RADIO CONTACT WITH</td><td></td></tr>
</table>

REVIEW AND IDENTIFIED HAZARDOUS (MSDS AVAILABLE)		COMMAND CENTER REQUIRED AT ALL TIMES (CELL TELEPHONE OR OTHER)	
ALL PERSONNEL ADVISED/TRAINED IN PROPER PROCEDURES AND EQUIPMENT OPERATION FOR WORK ASSIGNMENT		IF HOT WORK WILL BE PERFORMED COMPLETE ALL THAT APPLY BELOW	
PROTECTED WORK AREA WITH APPROPRIATE BARRICADES AND CAUTION SIGNS		FIRE PROTECTION SYSTEM IN SERVICE. PROPER SIZE/TYPE FIRE EXTINGUISHERS/FIRE HOSE AVAILABLE AT WORK SITE	
ENTRY SUPERVISOR TO INSPECT WORK AREA BEFORE STARTING WORK		MOVED ALL COMBUSTIBLES 30-40 FEET AWAY OR PROTECTED WITH APPROVED MATERIALS	
IDENTIFIED AND PROPERLY SECURED ALL IONIZING/NON-IONIZING RADIATION SOURCES		SWEPT CLEAN AND WET DOWN FLOORS AND SURROUNDING AREAS	
IDENTIFIED ALL HAZARDOUS ENERGY SOURCES		PROTECTED/COVERED ALL FLOOR, WALL OPENINGS INCLUDING DRAIN AND SEWER OPENINGS, AND BELOW ROOF OPENINGS	
LOCKED AND TAGGED OUT ELECTRICAL/MECHANICAL EQUIPMENT AT DISCONNECTS		DRAINED/SECURED ALL PUMPS/PIPING AND REMOVED ALL CONTAINERS OF FLAMMABLE/COMBUSTIBLE LIQUIDS	
DISCONNECTED AND BLANKED ALL APPROPRIATE LINES AND VESSELS		INSPECT BURNING, WELDING OR HOT WORK EQUIPMENT	
RELIEVED PRESSURIZED EQUIPMENT AND PIPING TO ZERO ENERGY STATE OR VENTED TO ATMOSPHERE		WELDING EQUIPMENT PROPERLY GROUNDED TO STRUCTURAL BUILDING STEEL OR GROUND VERIFIED BY ELECTRICIAN	
LOCK AND TAGOUT ALL APPROPRIATE VALVES		REPORTED HOT WORK PERMIT TO SAFETY	
DRAINED, PURGED, AND CLEANED EQUIPMENT OF CONTAMINANTS		CHECKED ALL AREAS INCLUDING FLOORS ABOVE AND BELOW WHERE EXPOSED FOR 30 MINUTES AFTER HOT WORK IS COMPLETED	
INSPECTED PIPING & EQUIPMENT FOR ASBESTOS CONTAINING MATERIALS		SCREENS SET UP TO PROTECT OTHERS FROM WELDING FLASHES	
STOPPED HAZARDOUS WORK IN AREA		FIREWATCH/STANDBY PERSONNEL ASSIGNED FOR HOT WORK	
REQUIRE INTRINSICALLY SAFE/NON-		BAGGED SMOKE DETECTOR/SHUTDOWN FIRE	

SPARKING INSTRUMENTS		PROTECTION SYSTEM	
IMPLEMENT PRECAUTIONS FOR CHEMICAL/BIOLOGICAL DECONTAMINATION		DUCT OR CONVEYOR SYSTEMS EXPOSED TO SPARKS ARE SHUTDOWN OR COVERED	
ADDITIONAL PRECAUTIONS:			

SECTION 3- ATMOSPHERIC TESTING

FLAMMABLE VAPOR						
TIME						
%LEL						
TESTER INITIALS						
OXYGEN						
TIME						
%LEL						
TESTER INITIALS						
TOXIC VAPORS						
TIME						
%LEL						
TESTER INITIALS						

SECTION 4- PERSONAL PROTECTIVE EQUIPMENT

(Check all that may be required)

EYE PROTECTION: · SAFETY GLASSES · FACE SHIELD
· GOGGLES
HEARING PROTECTION: · PLUGS · MUFFS
RESPIRATORY PROTECTION: · AIR PURIFYING TYPE
□ SELF CONTAINED BREATHING APPARATUS (SCBA)
□ AIR LINE · OTHER (specify)
PROTECTIVE CLOTHING: · DISPOSABLE CLOTHING
· STERILE GARMENT · WELDING/BURRING VEST/SLEEVES
· BOOTS · HARD HAT · GLOVES-
· IMPERVIOUS CHEMICAL SPLASH OUT SUIT-TYPE
· SPLASH APRON · OTHER (specify)

SECTION 5- PRE-ENTRY

CONFINED SPACE ENTRY CHECKLIST- The following must exist prior to any entry:
· Lower Explosive Limit (LEL) <10% · Oxygen Content 19.5-23.5% · Toxic Vapor <TLV/PEL

List potential hazards of entry:	List materials last known to be in space:

LIST ENTRANTS/(NAMES)	TIME		TIME		TIME	
	IN	OUT	IN	OUT	IN	OUT
LIST ATTENDANTS/(NAMES)						

SECTION 6- APPROVALS (Signatures indicates inspection of work area and review of aforementioned precautions)			
I HAVE BEEN PROPERLY INSTRUCTED IN APPLICABLE PERMIT PROCEDURES, PRECAUTIONS AND UNDERSTAND MY DUTIES AND EMERGENCY RESPONSIBILITIES.			
"OK TO PROCEED"	PRINT NAME	SIGNATURE	PHONE/PAGER
Permit Initiator			
Competent Ops. Person			
Entry Supervisor			
Attendant			
Attendant			
Other (when required)			

APPENDIX C – AIR MONITORING DATA SHEET

DATE: ___________________

PROJECT #: ______________

SITE LOCATION: ____

TIME	SAMPLING LOCATION*	CO (ppm)	O2 (%)	LEL (%)	H2S (ppm)	

* at entrance, #feet down, bottom, what room, etc

ELECTRICAL SAFETY GUIDELINES

Table of Contents

1.0 PURPOSE

These guidelines have been established to protect D&B employees from injuries that could result from electrical hazards at various project sites.

2.0 SCOPE

These guidelines apply to all D&B work sites where electrical equipment and installations that provide electric power and light are used.

ELECTRICAL SAFETY GUIDELINES

3.0 DEFINITIONS

Arc Flash - An arc flash is a phenomenon where a flashover of electric current leaves its intended path and travels through the air from one conductor to another, or to ground. The results are often violent and when a human is in close proximity to the arc flash, serious injury and even death can occur.

Refer to Attachment A for further information on arc flash.

Ground-Fault Circuit Interrupters (GFCI) - Fast-acting circuit breaker which senses approximately 5 mA circuit imbalance, and automatically stops the flow of power from the circuit.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO must confirm that ground-fault protection procedures are developed and that the GFCI or Assured Equipment Grounding Conductor Program are available for the work sites.

On-Site Health and Safety Representative (HSR) - The HSR, or a designee, will be responsible for the implementation of general electrical safety and Ground-Fault Protection guidelines as specified in this guideline.

Authorized Employees - D&B Authorized Employees, if designated, are responsible to be knowledgeable in Ground-Fault Protection.

5.0 GUIDELINES FOR ELECTRICAL SAFETY

5.1 General

OSHA 29 CFR 1926.404 through 408 requires that employers must provide either GFCI or an Assured Equipment Grounding Conductor Program to employees to protect them from ground-fault hazards at work sites. These requirements are in addition to any other requirements for equipment grounding conductors.

Electrical equipment must be selected following the provisions of the National Electric Code (NEC).

Electrical equipment to be used in hazardous locations (explosive, flammable or combustible atmospheres) will be selected based on Articles 500 through 503 of the current version of the National Electric Code. These articles include both wiring components and equipment, including portable equipment operated with batteries.

5.2 Ground-Fault Circuit Interrupters

GFCI can be used successfully to reduce electrical hazards on the sites. GFCIs monitor the current-to-the load for leakage to ground. When this leakage exceeds 5 mA ± 1 mA, the GFCI interrupts the circuit.

120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure must have approved GFCI.

Receptacles on a two-wire, single-phase portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with GFCI.

5.3 Assured Equipment Grounding Conductor Program

An Assured Equipment Grounding Conductor Program on construction sites covers cord sets, receptacles which are not a part of the building or structure, and equipment connected by cord and plug which are available for use or used by employees. This program should comply with the following minimum requirements:

- A written description of the program included in the Site-Specific HASP.
- At least one competent person to implement the program.

- Daily visual inspections of extension cords and equipment connected by cord-and-plug for external defects, such as deformed or missing pins or insulation damage and for indications of possible internal damage.

- Two tests as required by OSHA:

    - Continuity tests of equipment grounding conductors, performed on receptacles, extension cords and cord-and-plug connected equipment.

    - Test receptacles and plugs to confirm that the equipment grounding conductor is connected to its proper terminal.

The required tests must be performed before the first use, after any repairs, after suspected damage and at 3-month intervals. Equipment found damaged or defective will not be used until repaired or replaced.

Performed tests should be recorded. This test record will identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test and will indicate the last date it was tested or the interval for which it was tested. This record will be kept by means of logs, color coding, or other effective means and will be maintained by a designated individual until replaced by a more current record.

5.4 Temporary Lighting

Below are the general requirements for temporary lighting:

- Light bulbs for general illumination must be protected from breakage and metal shell sockets must be grounded.

- Temporary lights must not be suspended by their cords, unless they are so designed.

- Portable lighting used in wet or conductive locations, such as tanks or boilers, must be operated at no more than 12 volts or must be protected by GFCI.

Illumination must be provided if D&B personnel are working in areas with energized electrical parts

5.5 Extension Cords and Adapters

Only three wire adapters should be used. Adapters should have a wide neutral blade, and be grounded to the tab under the cover screw on the bottom of the adapter and not with a flexible pigtail (a single piece of electrical wire that is used to connect two or more wires).

Generally, extension and flexible cords should:

- Be of the three-wire type.
- Be designed for hard or extra hard usage (e.g., types S, ST, and SO) when used with temporary lights.
- Not be fastened with staples, hung from nails, or suspended by wire.
- Not be used if worn or frayed.
- Be protected by GFCI.
- Be approved by the Underwriters Laboratories.

5.6 Working on or near exposed energized parts

There are many hazards associated with working on or near exposed energized equipment. In addition to contact with energized parts, arc flash hazards may exist, which can kill or seriously injure anyone working nearby such equipment.

The following guidelines have been established for D&B employees working on or near energized parts:

ELECTRICAL SAFETY GUIDELINES

- Only qualified employees may work on or with exposed energized lines or parts of equipment.
- Only qualified employees may work in areas containing unguarded, uninsulated energized lines or parts of equipment operating at 50 volts or more.
- Electric lines and equipment shall be considered and treated as energized unless they have been deenergized and tested in accordance with § 1926.961.
- Utilize a buddy system. No one should be working alone.
- Do not take any conductive object near exposed energized parts unless you are insulated (rubber insulating gloves/gloves and sleeves).
- Do not wear clothing that can melt onto skin or that could ignite and continue to burn when exposed to flames or heat energy. Generally, natural materials, such as cotton and wool, are best. Only wear non-conductive apparel unless covered or otherwise insulated.
- If D&B personnel will be in confined spaces (refer to SOP 25) or enclosed areas with live electrical components, protective shields, protective barriers or insulating materials shall be used, as necessary.
- Practice safe digging procedures for below grade utilities. This includes calling 811 or 1-800-DIG-SAFE to locate underground utilities.
- Utilize hand cleaning/digging when working within approximately two (2) feet of the underground utility. Also rely on geophysical survey and other resources that can delineate the location of underground utilities.
- If working on ladders, the ladders shall have non-conductive sides.
- When working near overhead utilities, perform work at least 10 feet away from energized power lines of up to 50,000 volts (50 kV). For power lines exceeding 50 kV, maintain distances of at least 15 feet. This includes personnel and equipment Refer to Table S5 on approach distances.

5.7 General Work Practices

Hazards are created when cords, cord connectors, receptacles and cord and plug-connected equipment are improperly used and maintained. Work spaces, walkways and similar locations should be clear of cords. Receptacles, cord sets, and cord- and plug-connected equipment should be protected from contact with water. Listed, labeled or certified equipment should be installed in accordance with instructions included in the labeling or certification. Cords with missing ground prongs shall be removed from service. Cords that feel hot should not be used. Cords with exposed insulation or wires should be taken out of service.

Observe the guidelines listed in Section 5.6 when working on or near energized parts.

6.0 REFERENCES

- OSHA 29 CFR 1926.403 through 408.
- OSHA 29 CFR 1926.960.

APPENDIX A – UNDERSTANDING ARC FLASH

Understanding "Arc Flash"

Simply put, an arc flash is a phenomenon where a flashover of electric current leaves its intended path and travels through the air from one conductor to another, or to ground. The results are often violent and when a human is in close proximity to the arc flash, serious injury and even death can occur.

Arc flash can be caused by many things including:

- Dust
- Dropping tools
- Accidental touching
- Condensation
- Material failure
- Corrosion
- Faulty Installation

Three factors determine the severity of an arc flash injury:

- Proximity of the worker to the hazard
- Temperature
- Time for circuit to break

Because of the violent nature of an arc flash exposure when an employee is injured, the injury is serious – even resulting in death. It's not uncommon for an injured employee to never regain their past quality of life. Extended medical care is often required, sometimes costing in excess of $1,000,000.

Typical Results from an Arc Flash

- Burns (Non FR clothing can burn onto skin)
- Fire (could spread rapidly through building)
- Flying objects (often molten metal)
- Blast pressure (upwards of 2,000 lbs. / sq.ft)
- Sound Blast (noise can reach 140 dB – loud as a gun)
- Heat (upwards of 35,000 degrees F)

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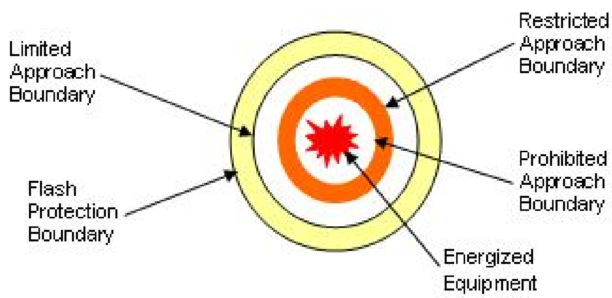
Approach / Protection Boundaries

The National Fire Protection Association (NFPA) has developed specific approach boundaries designed to protect employees while working on or near energized equipment. These boundaries are:



- Flash Protection Boundary (outer boundary)
- Limited Approach
- Restricted Approach
- Prohibited Approach (inner boundary)

Flash Protection Boundary (outer boundary): The flash boundary is the farthest established boundary from the energy source. If an arc flash occurred, this boundary is where an employee would be exposed to a curable second degree burn (1.2 calories/cm^2). The issue here is the heat generated from a flash that results in burns.

Limited Approach: An approach limit at a distance from an exposed live part where a shock hazard exists.

Restricted Approach: An approach limit at a distance from an exposed live part which there is an increased risk of shock.

Prohibited Approach (inner boundary): A distance from an exposed part which is considered the same as making contact with the live part.

This distance is not common between equipment. Some equipment will have a greater flash protection boundary while other equipment will have a lesser boundary.

Ways to Protect the Workers

There exists a number of ways to protect workers from the threat of electrical hazards. Some of the methods are for the protection of qualified employees doing work on electrical circuit and other methods are geared towards non-qualified employees who work nearby energized equipment.

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Here are a few of the protective methods:

- De-energize the circuit
- Work Practices
- Insulation
- Guarding
- Barricades
- Ground Fault Circuit Interrupters (GFCI)
- Grounding (secondary protection)

If You Must Work on Energized Circuits
If it has been determined that deenergizing a circuit is not feasible and the employee must work "hot", the employer shall develop and enforce safety-related work practices to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts.

The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

These safety related work practices could include:

- Energized Electrical Work Permit
- Personal Protective Equipment
- Insulated Tools
- Written Safety Program
- Job Briefing

Fast Fact: The most effective and fool-proof way to eliminate the risk of electrical shock or arc flash is to simply deenergize the equipment.

Understanding the Arc Flash Warning Labels
Each piece of equipment operating at 50 volts or more and not put into a deenergized state must be evaluated for arc flash and shock protection. This evaluation will determine the actual boundaries (i.e. prohibited, limited, restricted etc) and will inform the employee of what PPE must be worn.

Once the evaluation is complete an Arc Flash Hazard warning label must be affixed to the equipment and readily accessible to employees who may work on the energized equipment.

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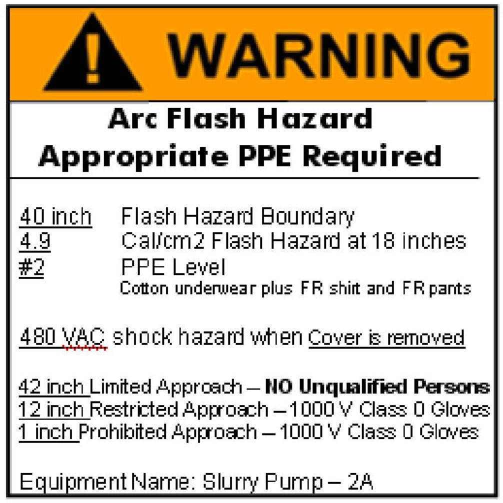
Minimum arc flash label example



Detailed (preferred) arc flash label example

The Employees Obligation

Employees must follow the requirements of the Arc Flash Hazard label by wearing the proper personal protective equipment (PPE), use of insulated tools and other safety related precautions. This includes not working on or near the circuit unless you are a "qualified" worker.

<u>Qualified person:</u> One who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.

<u>Additional requirements for qualified persons</u>. Qualified persons (i.e. those permitted to work on or near exposed energized parts) shall, at a minimum, be trained in and familiar with the following:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts, and
- The clearance distances specified in 1910.333(c) and the corresponding voltages to which the qualified person will be exposed.

LOCKOUT/TAGOUT GUIDELINES

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1.0 PURPOSE

LOCKOUT/TAGOUT GUIDELINES

Lockout/Tagout guidelines have been established to protect D&B employees from injuries that could result from the unexpected or unplanned start-up or movement of machinery or equipment during inspections, maintenance, installation, adjustment or servicing operations. These guidelines provide D&B personnel with information regarding the hazards and control measures associated with the release of such hazardous energy pursuant to OSHA 29 CFR 1910.147.

If D&B is expected to take measures to control hazardous energy for site-specific operations, then a written energy control procedure must be prepared for each site and included in the Site-Specific HASP. Such procedures will include steps for equipment shutdown, isolation, application of locks and tags, dissipation of stored energy, verification of equipment isolation, removal of locks and tags and restoration of energy to machines.

The components of the Lockout/Tagout Program include:

- Energy control procedures, if applicable.
- Employee notification.
- Contractor activities.
- Employee training.
- Periodic audits of the energy control procedures, if applicable.

2.0 SCOPE

LOCKOUT/TAGOUT GUIDELINES

These guidelines apply to D&B employees who perform activities (such as surveying, construction, installation, set-up, adjustment, inspection, maintenance and repair) where a hazardous energy release potential exists. This applies to any source of electrical, hydraulic, pneumatic, potential (stored), chemical, thermal or other energy.

3.0 DEFINITIONS

Affected Employee - An employee who performs job duties in an area in which lockout or tagout is performed. An affected employee **does not** perform servicing or maintenance on machines or equipment and **is not** responsible for implementing energy control procedures or applying locks or tags.

Authorized Employee - An employee who performs servicing or maintenance on machines or equipment and who implements energy control procedures, including the application of locks or tags.

(Note: A single employee may be both authorized and affected if he/she performs servicing or maintenance under Lockout/Tagout on a machine or equipment he/she normally operates).

Capable of Being Locked Out - An energy isolating device is considered to be capable of being locked out if it meets **one** of the following criteria:

- It is designed in such a way so that a lock can be attached.
- It is designed with any other integral part through which a lock can be affixed.

LOCKOUT/TAGOUT GUIDELINES

- It has a locking mechanism built into it.

- It can be locked without dismantling, rebuilding or replacing the energy isolating device or permanently altering its energy control capability. (For example, although many valves are not designed with an integral locking device, they can be secured with chains, blocking braces, or wedges, which can then be locked).

Energized - Machines and equipment are energized when they are connected to an energy source or they contain residual or stored energy.

Energy-Isolating Device - A mechanical device that physically prevents the transmission or release of energy, including, but not limited to: manually operated circuit breakers; disconnect switches; valves and blocks. The term does not apply to pushbuttons, selector switches or other control circuit devices.

Energy Source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other energy.

Energy Control Procedure - A written procedure which contains the information and steps an Authorized Employee needs to follow in order to safely isolate equipment to perform servicing or maintenance under Lockout/Tagout. Note, only Authorized Employees are permitted to use the energy control procedures.

Lockout - The act of padlocking and tagging an energy-isolating device in the off or safe position. In cases where more than one employee is involved, provision will be made so that each Authorized Employee can affix his/her own lock and tag.

LOCKOUT/TAGOUT GUIDELINES

"Other" Employees - D&B employees who are not Authorized or Affected Employees.

Tagout - The act of placing an energy-isolating device in the off or safe position and placing a tag on it to indicate that the equipment may not be operated until the tag is removed.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO has an overall responsibility for the Lockout/Tagout Program. The HSC will coordinate Lockout/Tagout training for authorized and affected employees, if necessary, and assess authorized employees' knowledge of the Lockout/Tagout Program.

On-Site Health and Safety Representative (HSR) - The HSR will:

- Be knowledgeable about the types and magnitude of hazardous energy sources and the hazards associated with the unexpected or unplanned start-up or movement of machinery or equipment during maintenance, installation, adjustment or servicing operation.
- Be knowledgeable in the methods to control hazardous energy, verify that each authorized and affected D&B personnel has received Lockout/Tagout training before they begin work in an area where energy control procedures are used.
- Verify that D&B personnel correctly obtain, review and apply the appropriate energy control procedures, when required, and maintain adequate supply of Lockout devices and equipment.

LOCKOUT/TAGOUT GUIDELINES

- Be responsible for developing new or modify existing energy control procedures for each job site, if required, and attached them to the Site-Specific HASP.
- Coordinate Lockout/Tagout operations, which involve outside contractors.

Authorized Employees - D&B Authorized Employees, if designated, are responsible to correctly apply energy control procedures, including the application of locks or tags. Authorized employees will:

- Be knowledgeable about the types and magnitude of hazardous energy and the hazards employed with the unexpected or unplanned start-up or movement of machinery or equipment during maintenance, installation, adjustment or servicing operations.
- Be knowledgeable in the methods used to control hazardous energy (Energy control procedures).
- Notify affected employees prior to application of Lockout/Tagout devices and after the devices are removed.
- Coordinate the Lockout/Tagout activities when a Lockout/Tagout operation continues beyond one shift.

Affected and "Other" Employees - These employees are generally responsible for operating or working near machines upon which Lockout/Tagout operations are performed. Affected employees will:

LOCKOUT/TAGOUT GUIDELINES

- Understand the purpose of energy control procedures and the importance of not attempting to start-up or use machines that have been locked or tagged.
- Recognize when energy control procedures are being implemented.

Please note that since D&B does not maintain electrical equipment at project sites (they belong either to the client or the contractor), D&B does not conduct periodic inspections of energy control procedures aside from how D&B employees are affected. This will be documented.

5.0 GUIDELINES FOR LOCKOUT/TAGOUT

5.1 General

It is anticipated that for most jobs, D&B personnel will not be responsible for developing energy control procedures. However, when working in the areas of potential hazardous energy release, employees must recognize the types and magnitudes of hazardous energy sources and the hazards associated with the unexpected or unplanned start-up or movement of machinery or equipment. They must also observe safe work practices.

Only authorized employees are permitted to implement the energy control procedures.

LOCKOUT/TAGOUT GUIDELINES

5.2 Work Practices

Following is a typical sequence to implement the Lockout/Tagout procedures.

- Prepare for Shutdown - Authorized employees must review the applicable energy control procedure. If a specific energy control procedure does not exist for a machine, the Lockout/Tagout event will not be conducted until the HSO or designee develops or obtains an appropriate equipment-specific procedure.

- Notify Affected Employees - Authorized employees must verbally notify affected employees prior to application of lockout or tagout devices.

- Shut Down Machinery or Equipment.

- Isolate Machinery or Equipment from Energy Source - Place manually operated circuit breakers, disconnect switches, valves and related equipment into the “off” or safe position. Place blocks where necessary to physically isolate the machinery or equipment from its energy source to prevent the transmission or release of energy.

- Apply Lockout and/or Tagout Devices - Each authorized employee or outside contractor involved in the work which requires the use of Lockout/Tagout must personally place his/her lock and identification tag on each identified energy isolating device. The tag must be filled out with the authorized employee’s name, the date it was placed, and the reason for the Lockout/Tagout operation. Each authorized employee must maintain possession of the key to his/her lock during the entire work operation. Where an energy-isolating device is not designed to accept a lock, a signed and dated tag may be used according to procedures specified in Section

5.4. After applying locks and tags, the energy isolating devices must be tested to make certain they cannot be moved into the "on" position.

- Release Stored Energy in air lines, water lines, etc by bleeding off excess pressure. Bleed-off valves must be locked and/or tagged out in the open position. Disconnected lines must be tagged out. Restrain potential energy using safety blocks.

- Verify that Machinery or Equipment is De-energized - Using normal operating controls, attempt to start the machinery or equipment to make sure that it has been completely de-energized.

5.3 Release from Lockout/Tagout

Upon completion of work requiring the use of Lockout/Tagout procedures, the following sequence can be used to restore machinery or equipment to service:

- Check Equipment - Following completion of the work, the authorized employees who performed the work must inspect the area around the machinery or equipment to verify that tools or other non-essential items have been removed, machine guards have been reinstalled, and the machinery or equipment components are operationally intact and safe to energize.

- Check Work Area - The authorized employees who performed the work must inspect the work area to make certain employees are safely positioned away from the machinery or equipment.

LOCKOUT/TAGOUT GUIDELINES

- Removal of Lockout/Tagout Devices - Locks and/or tags must be removed from each energy isolating device by the authorized employee or outside contractor who placed it. If the authorized employee or outside contractor is not available to remove his/her own lockout/tagout device, use the Emergency Lock or Tag Removal Procedures described in Section 5.7.

- Restore Energy to Machinery/Equipment - Place manually operated circuit breakers, disconnect switches, valves, etc. into the "on" position. Remove safety blocks.

- Notify Affected Employees - Authorized employees must verbally notify affected employees following removal of locks and tags and the re-energization of the machinery or equipment.

5.4 Use of a Tagout System Only

In cases where machinery or equipment is not capable of being locked out, it will be necessary to use a completed "Do Not Operate" tag to provide the highest level of safety available without the use of locks. The tag must be filled out with the authorized employee's name, the date it was placed, and the reason for the Tagout operation. Note that tags alone may not be used as a substitute when the use of locks is specified in the applicable energy control procedure. Only authorized employees are permitted to implement tagout. The following conditions apply to the use of tags without locks:

- Only authorized D&B employees are permitted to place a "Do Not Operate" tag.

- The tag must be placed at the same location that a lock would have been attached with a self-locking plastic or nylon tie wrap capable of withstanding at least 50 pounds of force.

- The lockout tag can only be removed by the authorized employee who installed it. If the authorized employee is not available to remove his/her own tag, use the emergency lock or tag removal procedures in section 5.7.

5.5 Energy Control Procedures

Generally, energy control procedures are developed by the client or the owner of the equipment and made available to D&B project personnel. If such procedures are not available, D&B can develop, if required, a site-specific written energy control procedure, which will contain the steps and techniques to be used by authorized employees to properly de-energize machinery and equipment prior to the initiation of work.

When the operations involve more than one authorized employee or outside contractor, provision must be made to allow each individual to place his/her lock and tag on each energy isolating device identified in the applicable energy control procedure.

5.6 Shifts or Personnel Change

When Lockout/Tagout must continue beyond one shift or when there is personnel change, the following procedures apply:

- At the end of the shift, each authorized employee who is leaving work must remove his/her "Do Not Operate" tag(s) from each energy isolating device. Each oncoming authorized employee must affix his/her own personal "Do Not Operate" tag(s) on the padlock(s) to which his/her key corresponds and maintain possession of the padlock key(s).

- Verify that machinery or equipment is de-energized using the procedures described in Section 5.2.

- Proceed with operations.

5.7 Emergency Lock or Tag Removal

In the event that the authorized employee or outside contractor who attached a lock or tag is not available to unlock or remove a lock or tag, the HSO, HSR or a designee may remove the lock or tag only using the following procedures:

- Verify that the authorized employee or outside contractor who placed the lock or tag is not at the facility.

- Attempt to contact the authorized employee or outside contractor whose lock is still in place.

- Confirm that work has been completed and the equipment machinery is safe to return to service.

- The HSO, HSR or a designee may cut the lock off using a saw or bolt cutters. Where tagout only is being used, tags may be removed by designated personnel using appropriate methods.

LOCKOUT/TAGOUT GUIDELINES

- Verify that the authorized employee or outside contractor whose lock or tag has been removed is informed before he/she returns to work.
- Review the Lockout/Tagout requirements with the authorized employee or outside contractor who left their lock or tag on the isolated equipment.

5.8 Testing and Positioning of Machines and Equipment

In some situations, it may be necessary for authorized employees to operate equipment for testing or positioning before it is ready to be used. These situations require the temporary removal of Lockout/Tagout devices only during the limited time necessary for the testing or positioning. Use the following procedures for testing and positioning of machines or equipment:

- Clear the equipment of tools and materials.
- Remove employees from the machine or equipment area and ensure that required tools are safely and properly positioned.
- Release the machine, equipment or component from Lockout/Tagout.
- Perform the testing and positioning.
- De-energize and re-apply locks and tags.

5.9 Hardware and Tags

If Logout/Tagout will be employed by D&B authorized employees, the HSO is responsible for providing the resources for an adequate supply of Lockout/Tagout devices and equipment will be maintained for each project site. Lockout/Tagout hardware is issued to each authorized employee for use with this program. The HSR or designee will maintain a master list of lockout padlocks and keys.

6.0 EMPLOYEE TRAINING

An initial training program will be provided to authorized and affected employees, as required. The HSO has overall responsibility for coordinating employee training, including as needed "refresher" training.

Each HSR must verify that authorized and affected employees have received initial lockout/tagout training prior to starting work involving the control of hazardous energy. The HSO must identify employees who require re-training when there is a change in energy control procedures, a change in equipment or processes which presents a new hazard, or when observations reveal that there are inadequacies in employees' knowledge or use of energy control procedures.

Authorized employees will receive site specific training in the recognition of hazardous energy, the sources, types and magnitudes of energy and the elements of the energy control procedures. Affected employees will receive training in the purpose and use of energy control procedures. Additional training will be provided in cases where new hazards are found/introduced, there are changes in job assignments or changes in energy control procedures.

LOCKOUT/TAGOUT GUIDELINES

All training will be documented through sign-in sheets and certificates.

7.0 CONTRACTORS/SUBCONTRACTORS

Outside contractors and subcontractors performing operations which require the use of Lockout/Tagout must use *THEIR OWN* energy control procedures

8.0 PERIODIC INSPECTIONS OF ENERGY CONTROL PROCEDURES

D&B will conduct periodic evaluations of the Lockout/Tagout Program including a review of energy control procedures, as applicable. Authorized Employee(s) (other than those utilizing the energy control procedure) will perform periodic inspections at least annually.

9.0 REFERENCES

- OSHA 29 CFR 1910.147.

ROADWORK HIGHWAY SAFETY GUIDELINES

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1.0 PURPOSE

To establish safe work practice guidelines for D&B operations to be conducted in areas of vehicular traffic (roadways, parking lots, etc.) on D&B work sites.

2.0 SCOPE

Applies to D&B employees who may be exposed to vehicular traffic hazards when performing work on a D&B work site.

3.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for implementing and confirming the safe work practices outlined in this guideline are followed.

ROADWORK HIGHWAY SAFETY GUIDELINES

D&B Employees - D&B employees performing work under a D&B contract will be familiar with the requirements of this guideline and follow the established practices.

4.0 GUIDELINES

4.1 Planning Ahead

- Apply for applicable permits or permission from state, county, township or municipal governments. Develop a traffic control plan as required by the State, County, Township or Municipal governments.

- In coordination with the local authorities, determine the time when the traffic volume is typically lowest for the proposed work area. Attempt to schedule work during this period. Avoid working during "rush hour" if at all possible.

- Evaluate the need for police traffic control. It is the HSO's or designee's responsibility to arrange for police coverage if necessary.

4.2 Work Practices

- Observe applicable requirements of Department of Transportation having jurisdiction in the project area (see Section 5.0 for references).

- Park employee vehicles as far away from other vehicular traffic as possible.

- Put parking brakes on and use emergency warning flashers.

- Utilize traffic cones, triangles, flashing lights, and/or barricades in front of and to the rear of the parked vehicle to alert oncoming traffic from both directions.

- Place warning signs on roadways to alert oncoming traffic. The signs should indicate "Caution, Work in Progress" or contain a similar message.

- If sewers or manholes that are located in a public street must be entered:

  - Notify the local authorities.
  - Provide “flag person” to direct traffic.
  - Barricade the opening.
  - Provide communication for individuals entering the sewer or manhole to keep appraised of traffic conditions.
  - Comply with Permit-Required Confined Space entry regulations, as appropriate (refer to D&B SOP No. C25).

- Observe local and DOT regulations.

4.3 Personal Protective Equipment

Individuals working in areas where vehicular traffic hazards are present must wear an ANSI 107 compliant lime-green (some clients may require orange) reflective safety vests, appropriate to the working conditions, as well as other PPE appropriate for the hazards of the work to be completed. The following table summarizes the conditions for which type of vests must be worn:

VEST CLASS	MANDATED USE
Class 1	Vehicle speeds no not exceed 25 mph
Class 2	Vehicle speeds >25 mph; <50 mph
Class 3	Vehicle speeds >50 mph
Class E	Reflective trousers or shorts MUST BE WORN WITH CLASS 2 or 3 VEST. The Combination is a Class 3 Ensemble

ROADWORK HIGHWAY SAFETY GUIDELINES

5.0 REFERENCES

- OSHA 29 CFR 1926.200.
- ANSI/ISEA 107 Standard for High Visibility Safety Apparel.
- Manual on Uniform Traffic Control Devices.

EXCAVATION/TRENCHING OPERATIONS GUIDELINES

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1.0 PURPOSE

To establish safe operating procedures for D&B employees working in or near excavation or trenching operations at D&B work sites.

2.0 SCOPE

Applies to D&B employees exposed to excavation or trenching hazards at D&B work sites.

3.0 DEFINITIONS

Adjacent Area - The horizontal surface area surrounding the excavation, which extends outward from the excavation edge up to a distance that is half the depth of the excavation.

Competent Person - A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate the hazard.

Excavation - Any manmade cavity or depression in the earth's surface, including its sides, walls or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from the excavation face or into an excavation from above, or from collapse of adjacent structures. These include shoring, shielding, sloping or equivalent.

Trench - A narrow excavation made below the earth's surface. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for revising the Trenching and Excavation program to include new OSHA updates. The HSO is also responsible for confirming that trenching and excavation training is available for applicable D&B employees. The HSO or a designee may conduct site inspections of trenching and excavations that D&B employees may be exposed to.

Site Personnel - D&B personnel must follow these procedures when working in or around an excavation or trench.

5.0 GUIDELINES

D&B personnel may be providing oversight on projects where excavation and trenching operations are being undertaken. ***D&B personnel will never be placed in the role of the designated "competent person," making decisions on the safety conditions and procedures of the excavation and trenching operations***. D&B personnel should identify the contractor/subcontractor/sub-consultant "Competent Person." D&B personnel will also understand the basic H&S requirements for excavating and trenching to protect themselves and other D&B personnel.

D&B site personnel will ensure that the contractor has contacted "Call Before You Dig", to assist in identifying the type and location of any underground utilities.

D&B site personnel will also ensure that the contractor's competent person has classified the soil type prior to trenching/excavation work, and determined the most effective means to protect personnel working inside.

5.1 Hazards Associated With Excavation/Trenching

The principle hazards associated with excavation/trenching are:

- Suffocation, crushing or other injury from falling material.
- Damage/failure of installed underground services and consequent hazards.
- Tripping, slipping or falling. Housekeeping in and around excavations will reduce slip, trip fall hazards. Guardrails will be installed if personnel need to cross the trench/excavation.
- No one is permitted underneath overhead loads or where digging may cause loads to fall onto personnel beneath.
- Possibility of explosive, flammable, toxic or oxygen-deficient atmosphere in excavation. Air monitoring will be conducted in the trench/excavation to ensure the safety of personnel. Refer to Section 6 of the HASP.
- In some cases, trenches/excavations will be made in the vicinity of traffic. D&B and contractor personnel will ensure that the trench/excavation and personnel are protected from traffic and that traffic is protected from the construction activities.

5.2 Requirements for Protective Systems

Excavation Protective Systems will be employed when:

- There is a potential for cave-in.

EXCAVATION/TRENCHING OPERATIONS GUIDELINES

- The excavation is 5 or more feet in depth, as determined by the competent person, pursuant to OSHA 29 CFR Part 1926.652.
- The excavation is less than 5 feet deep but is made in unstable soil.

Protective systems may not be required for excavations made entirely in stable rock, as determined by the competent person.

5.3 Inspections

The designated "competent person" from the contractor/subcontractor/sub-consultant will perform inspections pursuant to OSHA 29 CFR 1926.651 k(1) when any of the below employee exposure to hazards are reasonably anticipated:

- Each day before employees enter the excavation.
- After every rainstorm.
- As needed throughout the shift.
- As soil conditions change.

During the inspection the "competent person" must:

- Verify the protective system is adequate for the soil classification and the external loads placed on the adjacent area.
- Evaluate the excavation, the adjacent area and the protective system, for the following:
    - Hazardous atmosphere.
    - Potential situations that could lead to cave-in.
    - Indications of failure of a protective system.
    - Cracks in the ground parallel to the top of the excavation.

  - Accumulation of water, from rain or groundwater infiltration.
  - Any other hazardous conditions.

- Verify that ladders or other means of access/egress to excavations are provided at:
  - Maximum spacing of 100 feet on the perimeter of open excavations.
  - Maximum spacing of 25 feet for trench excavations greater than 4 feet in depth.

5.4 Entering the Excavation

D&B employee will ***NOT*** enter an excavation unless the D&B site supervisor has coordinated with the contractor/subcontractor/sub-consultant competent person to verify that the excavation has been inspected and is safe.

6.0 TRAINING

Employees who are potentially exposed to the hazards of excavation and trenches should be provided with appropriate training to identify hazards and proper control methods.

7.0 REFERENCES

- OSHA 29 CFR 1926 Subpart P – Excavations.

HEAVY EQUIPMENT/HAND & POWER TOOLS GUIDELINES

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1.0 PURPOSE

These guidelines have been established to protect D&B employees from injuries that could result from working on sites with or near heavy equipment, such as earth moving equipment, excavation equipment and drill rigs. D&B employees are not expected to be working with the equipment.

2.0 SCOPE

These guidelines are provided to D&B employees on work sites where heavy equipment will be used, to aid in hazard recognition.

3.0 RESPONSIBILITIES

Health and Safety Officer (HSO) – The HSO is responsible for developing and revising guidelines for employees working with or near heavy equipment.

HEAVY EQUIPMENT/HAND & POWER TOOLS GUIDELINES

On-Site Health and Safety Representative (HSR) – The HSR or a designee is responsible for confirming D&B employees' adherence with safe work practices when working with or near heavy equipment at the sites.

D&B Employees – D&B employees are responsible for adhering to the safety policies on site and maintaining vigilance when working around heavy equipment.

4.0 GUIDELINES FOR HEAVY EQUIPMENT SAFETY

4.1 General

The type of heavy equipment that D&B employees may encounter on the job sites will typically include material handling and earth moving equipment, such as front loaders, backhoe, bulldozers, excavators, drill rigs and similar equipment. The following are general rules that apply to heavy equipment on the sites when not in operation:

- Equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, will have appropriate lights or reflectors.
- Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks will be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them.
- Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, will be either fully lowered or blocked when being repaired or when not in use and controls in a neutral position, with the motors stopped and brakes set.
- Whenever the equipment is parked, the parking brake will be set.
- Equipment parked on inclines will have the wheels chocked and the parking brake set.

4.2 Overhead Power Lines

When working or moving heavy equipment in the vicinity of power lines or energized transmitters, the following must be observed, except where electrical distribution and transmission lines have been de-energized and visibly grounded at point of work:

- Contact the electrical utility company or licensed electrician to determine the voltage of overhead power lines.
- For lines rated 50 kV or below, the minimum clearance between the lines and any part of the equipment or load will be 10 feet, unless client-specific clearance requirements are more stringent.
- For lines rated over 50 kV, the minimum clearance between the lines and any part of the equipment or load will be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator (connecting the power line to the tower), but never less than 10 feet, unless client-specific clearance requirements are more stringent.
- For cranes in transit with no load and boom lowered, the equipment clearance will be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV, unless client-specific clearance requirements are more stringent.
- A person will be designated to observe clearance of the equipment and give timely warning for operations where it is difficult for the operator to maintain the desired clearance by visual means, unless client-specific clearance requirements are more stringent.

4.3 Operations

Following is a summary of basic safety requirements when working with or near the heavy equipment identified in Section 4.1:

HEAVY EQUIPMENT/HAND & POWER TOOLS GUIDELINES

- Heavy equipment will be equipped with seat belts.
- Operators will wear seat belts when operating equipment.
- No employer will move or cause to be moved construction equipment or vehicles upon any access roadway or grade, unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.
- Earthmoving equipment will have a service braking system capable of stopping and holding the equipment fully loaded.
- Bi-directional machines, such as rollers, front-end loaders, bulldozers, and similar equipment, will be equipped with a horn, distinguishable from the surrounding noise level, which will be operated as needed when the machine is moving in either direction.
- Earthmoving or compacting equipment which has an obstructed view to the rear will not be used in reverse gear, unless the equipment in operation has a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so.
- Scissor points on front-end loaders should be guarded during normal operation.
- Heavy equipment shall have functioning backup alarms. Those working at the site shall listen for the backup alarms and be aware of their surroundings.

5.0 HAND & POWER TOOLS

D&B personnel may employ hand and power tools during their work tasks, as well as work around contractors using them. The following are guidelines when working with or around hand and power tools:

- All cords and tools must be maintained in good condition.
- The grounding plug must not be removed from the plug.

- Do not pull plugs by the cord, or carry tools by the cord.
- Ensure guarding is in place, where appropriate for use and when not in use.
- Use the right tool for the task.
- Ensure that proper PPE is worn with tools, where appropriate. This includes, but is not limited to, gloves, respirators and safety glasses.
- Remove from service any tools that are not in proper working condition. If they cannot be repaired on site, tag them or lock them out as necessary.

6.0 REFERENCES

- OSHA 29 CFR 1926 Subpart O – Motor Vehicles, Mechanized Equipment, and Marine Operations.
- OSHA 29 CFR 1926 Subpart CC – Cranes & Derricks in Construction.

CONTAINER HANDLING GUIDELINES

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1.0 PURPOSE

To provide general guidelines on proper safety procedures when inspecting, opening and handling containers at D&B work sites.

2.0 SCOPE

These guidelines apply to D&B employees who may be required to inspect, open or handle containers found at D&B work sites.

CONTAINER HANDLING GUIDELINES

3.0 DEFINITIONS

Overpack Drums - Larger drums in which leaking or damaged drums are placed for storage or shipment.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for verifying that training is available for applicable D&B employees in proper container handling procedures. The HSO will use these guidelines in assessing procedures and revise them as necessary.

Health and Safety Representative (HSR) - The HSR has primary responsibility for confirming that employees safely handle containers, as required at each project.

D&B Employees - D&B employees working on the sites are responsible for using the correct container handling procedures, as determined by the HSO or HSR.

5.0 GUIDELINES

5.1 Introduction

Hazards associated with containers such as drums, aboveground tanks, underground tanks, compressed gas cylinders or other containers existing at work sites may include detonations, fires, explosions, vapor generation, exposure to radiation and physical injury. These hazards may be a result of moving heavy containers by hand, working around stacked drums, use of heavy equipments, and deteriorated containers. In order to work with or around containers encountered at a site, thoroughly and carefully planned techniques and procedures must be used prior to the beginning of work.

CONTAINER HANDLING GUIDELINES

5.2 Planning

Every step of the container handling operations should be carefully planned, based upon the information available at the time. Prior to starting work, available information should be obtained to assess the potential hazards and materials that may be encountered. Sources of background information include:

- Owner, EPA or other government agencies' historical files.
- Site records.
- Local authorities.
- Historical aerial photographs.

The preliminary records review may be used to determine if hazards are present and the appropriate response.

5.3 Inspection

Before work is conducted, the containers should be visually inspected to assess their contents and condition. The following should be inspected:

- Symbols, words, or other marks on the container indicating whether its contents are hazardous, e.g., radioactive, explosive, corrosive, toxic, flammable.
- Symbols, words, or other marks on the drums or containers that may indicate whether it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume individual containers.
- Signs of deterioration such as corrosion, rust and leaks.
- Signs to determine whether the container is under a pressure, such as swelling and bulging.

- Drum type.
- Configuration of the drumhead.

Conditions in the immediate vicinity of the containers may provide information about container contents and their associated hazards. Monitoring should be conducted around the containers using instruments such as gamma radiation survey instruments, organic vapor monitors and combustible gas meters.

As a precautionary measure, personnel should assume that unlabeled containers contain hazardous materials, until their contents are characterized.

5.4 Container Handling

Containers should be handled only if necessary.

Sometimes, containers may be deteriorated from prolonged exposure to weather, in which case, leaks and spills during handling becomes a concern. Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur. Where major spills may occur, a containment berm adequate to contain the entire volume of liquid in the drums or other containers should be constructed, before handling takes place. Personnel trained in spill response should isolate and contain the spill.

Drums may be moved manually or several types of equipment may be employed, such as a drum grappler attached to a hydraulic excavator, a small front end loader, forklift or a drum cart.

The following container categories require special procedures when such containers need to be handled:

<u>**CONTAINER HANDLING GUIDELINES**</u>

5.4.1 Radioactive

If a container is labeled with a radiation sign or suspected to contain radioactive material, immediately contact the HSO. Do not handle containers that are suspected or determined to be radioactive.

5.4.2 Explosive or Shock-Sensitive

If a container is suspected of containing explosive or shock-sensitive materials (as determined by visual examination), immediately contact the HSO. Do not handle containers that are suspected to contain explosive or shock-sensitive materials.

5.4.3 Bulging

Pressurized containers are extremely dangerous and caution must be exercised when working with or near them. Whenever possible, do not move containers that may be under internal pressure, as evidenced by bulging or swelling. Venting or carefully loosening the small bung may relieve container pressure. When the container heads are distended and swollen, relief of the over pressure must be done very carefully. If a pressurized container has to be moved, handle the container with a grappler unit constructed for explosive containment. Move the bulged container only as far as necessary to allow seating on firm ground.

5.4.4 Leaking, Open or Deteriorated

If a container with liquid cannot be moved without rupture, consult the HSO for the proper transfer method of its contents to another container. Leaking, open or deteriorated containers should be placed in overpack drums using appropriate equipment as soon as possible, as determined by the HSO. Overpack drums are designed to accommodate damaged or deteriorated standard drums. The most common size is the 85-gallon overpack drum designed to hold a 55-gallon standard drum.

CONTAINER HANDLING GUIDELINES

If necessary, as determined by the HSO, repairs to drums may be made using plugs or patches, or a combination of the two. Plugs can be made from wedges of wood, screws with washers, tubeless tire plugs, toggle bolts with washers and expandable plugs.

5.5 Opening Containers

Containers are usually opened and sampled in-place during site investigations. To enhance the efficiency and safety of personnel, the following guidelines should be instituted (assuming that the contents are unknown):

- Contact the HSO prior to sampling containers or drums.
- Proper respiratory protection should be used.
- Non-essential personnel should be moved to a safe distance away, upwind, if possible.
- Personnel involved with the opening process should have explosion-resistant shields between them and the container opening equipment.
- Monitor continuously during the opening with sensors as close to the container opening as safely possible.
- The following remote-controlled devices can be used for opening containers:
    - Pneumatically operated impact wrench to remove drum bungs or bands.
    - Hydraulically or pneumatically operated drum piercers.
    - Backhoes equipped with bronze spikes for penetrating container tops in large-scale operations.
- Do NOT use picks or chisels to open containers

- If the container shows signs of bulging or swelling, perform steps slowly. Relieve excess pressure prior to opening and, if possible, from a remote location. If pressure must be relieved manually, place a barrier such as an explosive resistant shield between the workers and bung to deflect gases, liquids, or solids that may be expelled as the bung is loosened.

- Do NOT open or sample individual containers within laboratory packs.

- Reseal open bungs as soon as possible with plugs.

5.6 Sampling

Container sampling can be one of the most hazardous activities to worker H&S because it often involves direct contact with unidentified wastes. Before collecting samples, develop a sampling plan:

- Research background information about the wastes.

- Determine which drums should be sampled.

- Select the appropriate sampling device(s) and container(s).

The HSO, HSR or a designee should determine the appropriate personal protection to be used during the sampling.

When sampling a drum, the following safety procedures should be followed:

- Keep sampling personnel at a safe distance while drums are being opened.

- Do NOT lean over other drums to reach the drum being sampled.

- Cover drum tops with plastic sheeting or other suitable uncontaminated materials to avoid excessive contact with the drum top.

- Never stand on drums.

CONTAINER HANDLING GUIDELINES

- Obtain samples with either glass rods or vacuum pumps.

6.0 REFERENCES

- NIOSH – Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES

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PERSONAL PROTECTIVE EQUIPMENT GUIDELINES

1.0 PURPOSE

To establish guidelines for selection and use of Personal Protective Equipment (PPE) for use at D&B work sites.

2.0 SCOPE

Applies to decisions regarding PPE selection and use by D&B personnel during D&B project field tasks.

3.0 DEFINITIONS

Degradation - The loss of or change in the fabric's chemical resistance or physical properties due to exposure to chemicals, or ambient conditions (e.g., sunlight).

Penetration - The movement of chemicals through zippers, stitched seams or imperfections (e.g., pinholes) in a protective clothing material.

Permeation - The process by which a chemical dissolves in and/or moves through a protective clothing material on a molecular level.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for confirming that training is provided to applicable D&B employees in proper use of PPE. The HSO may conduct site inspections to confirm that D&B personnel use proper PPE. The HSO will use these guidelines in conducting PPE assessments and selecting PPE for job tasks.

Health and Safety Representative (HSR) - The HSR has the responsibility for verifying that employees use appropriate PPE correctly, as required at each project. The HSR should be able to identify different types of hazards associated with the job site and maintain adequate supply of appropriate PPE.

D&B Employee - Employee is responsible for wearing the appropriate PPE, as determined by the HSO or HSR.

5.0 GUIDELINES

A certified hazard assessment will be completed for each job. Efforts will be made to reduce or eliminated exposure to on-site hazards, through employment of engineering and/or administrative controls. Use of PPE should be a last resort. When engineering and administrative controls are not feasible, not effective or cannot be used in lieu of PPE due to regulations, appropriate PPE will be used. Employees should also wear PPE when it is reasonably expected that the use of the PPE would prevent injury. Specific clients may have their own PPE requirements for working on their sites. According to OSHA Standards 29 CFR 1910 and 29 CFR 1926, the following body areas require special protection:

- Eyes and face.
- Head.
- Ears.
- Skin.
- Hands, arms, and feet.
- Respiratory system.

The use of PPE itself can create worker hazards, such as heat stress, physical and psychological stress, impaired vision and impediment in mobility and communication. For any given situation, equipment and clothing should be selected to provide protection. Over-protection as well as under-protection can be dangerous and should be avoided.

D&B will provide all necessary PPE to its employees at no cost, with the following exceptions:

- Non-specialty prescription safety eyewear that are worn off of project sites
- Non-specialty safety-toe protective footwear that are worn off of project sites
- Replacement PPE if lost or intentionally damaged by the employee

5.1 Types of PPE

The following types of PPE form the basis for the protective clothing:

- Head Protection - Regulated by OSHA 29 CFR 1910.135 and 1926.100; specified in ANSI Z89.1, Safety Requirements for Industrial Head Protection. Head protection equipment includes hard hats, hard hat liners, hoods and protective hair coverings.

- Eye and Face Protection - Regulated by OSHA 29 CFR 1910.133(a) and 1926.102; specified in ANSI Z87.1, Eye and Face Protection. Eye and face protection equipment includes face shields, safety glasses, splash hoods, goggles and sweatbands.

- Ear Protection - Regulated by OSHA 29 CFR 1910.95 and 1926.101; specified in 41 CFR Part 50-204.10. Ear protection equipment includes earplugs and earmuffs.

- Foot Protection - Regulated by OSHA 29 CFR 1910.136 and 1926.96; specified in ASTM F2413-05 Safety Toe Footwear and ASTM 2413-11 and 2412-11. Foot protection equipment includes safety boots and overboots.

- Hand (and Arm) Protection - Not specifically regulated. Hand and arm protection equipment includes inner disposable gloves, overgloves and sleeves.

- Protective Clothing - Not specifically regulated. Protective clothing equipment includes fully encapsulating suits, non-encapsulating suits, aprons,

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES

leggings, sleeve protectors, blast and fragmentation suits, radiation contamination protective suits, flame/fire retardant coveralls, flotation gear and cooling garments.

- Safety vests – Regulated by ANSI-107. Used primarily during roadwork, some clients require safety vests on their sites for all construction work.

Note: **Respiratory protection is addressed in a separate SOP: D&B Corporate No. C23**. **Safety vests are also discussed in SOP C08.**

5.1.1 Foot Protection

Foot protection will be required when there is a reasonable probability of injury without the protection, and conform to the following:

- Shoes shall be Class 75 for men, equivalent to Class 50 for women, and shall meet the specifications of American National Standard for Safety Toe Footwear, ANSI Z41.1-1967. The class, which defines the minimum requirements for compression and impact, shall be stamped by the manufacturer on the shoe interior.

- Specifically constructed shoes may be required for specific work environments. For example, reinforced soles, inner soles of flexible metal, or steel shanks are to be used for construction work and other work with the potential for protruding hazards.

- Overboots may be required for chemical protection.

5.1.2 Eye and Face Protection

Eye protection equipment includes protection against impact, penetration, molten metal splashes, chemical splashes, dusts, glare, and injurious light radiation (infrared and ultraviolet). It does not include the special protection required to prevent damage from x-rays, gamma rays, and high energy particulate radiation such as alpha, beta or neutron.

- Eye and face protective equipment must meet the standard established by the Occupational Safety and Health Act as detailed in the American National Standard for Eye and Face Protection, ANSI Z87.1.

- The protective equipment must be appropriately selected for the hazard.

- Employees requiring correction (prescription) lenses should be provided with glasses with the sideshields. The HSO should be consulted regarding the prescription safety glasses.

- Employees who do not require corrective lenses should be provided with plain safety glasses with safety shields.

Note: As adopted by the American Optometric Association concerning the use of contact lenses in industrial environments, contact lenses may be worn in some hazardous environments with appropriate covering safety eyewear. Contact lenses of themselves do not provide eye protection in the industrial sense. Ocular hazards are greater in some environments than others and workers should be concerned as to the advisability of wearing the lenses in a given environment.

5.1.3 Head Protection

Head protection (hard hats) is required where employees are subject to head injuries from falling of flying or moving objects, from splashing hazardous chemicals and other liquids, from limited electric shock and burns, and from bumps caused by working in limited space where the head may come in contact with equipment or objects or when other individuals are working above them.

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- The hardhat suspension will be changed when it shows signs of wear and will be kept in clean and sanitary condition.

- The protective equipment must be appropriately selected for the hazard.

- Head protection equipment must meet the standard established by the Occupational Safety and Health Act as detailed in the American National Standard for Safety Requirements for Industrial Head Protection, ANSI Z89.1.

- Head protection, when not assigned to an individual, will be sanitized after each use or disposable head covering will be utilized.

5.1.4 Hearing Protection

Adequate hearing protection should be used when personnel is exposed to a noise level of/or greater than 90 dBA as an 8-hour time-weighted average.

Hearing protectors should be worn according to manufacturer's specifications and as trained. Procedures should be implemented to assure proper cleaning, maintenance and use. See D&B SOP No. 18 for additional information.

5.1.5 Hand Protection

Hand protection should be used when there is a potential for skin absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns and temperature extremes.

The hand protection must be appropriately selected for the type of hazard that may be encountered. The selection process should include an evaluation of the tasks to be performed, conditions, duration of hand protection to be used and the identified hazards.

5.1.6 Safety Vests

While required on all roadway projects (refer to SOP C08 for roadway work requirements), safety vests are also required to be worn on projects not involving roadway work. D&B primarily requires lime green Class 2 safety vests. However, some clients require standard or site-specific orange Class 2 vests. Those D&B personnel requiring specific vests other than the Class 2 lime green vests shall speak with their supervisor and the HSO to ensure that they have the proper vest.

5.2 Chemical Protective Clothing

Chemical protective equipment is used to minimize or eliminate chemical contact. The selection depends on accurate assessment of the hazardous conditions, cost, availability, compatibility with other equipment and performance.

5.2.1 Chemical Protection Selection Criteria

The most important factor in selecting PPE is determining the chemicals to which D&B employees are likely to be exposed. Once the chemical(s) have been identified and the type of work to be performed has been considered, the most appropriate clothing should then be selected.

Garments are selected for use by their resistance to permeation, degradation, and penetration. No material protects against all chemicals and combinations of chemicals, or is an effective barrier to prolonged chemical exposure.

Charts are available from most manufacturers indicating the resistance of their products to degradation, permeation or penetration. When permeation tables are available, they should be used in conjunction with degradation tables.

Limited permeation data for mixtures is currently available. Chemical mixtures can be significantly more aggressive towards PPE materials than any single component alone.

Even small amounts of a rapidly permeating chemical may provide a pathway that accelerates the permeation of the chemicals.

Selection should be based upon the most hazardous chemicals, potential for skin contact and absorption, and expected concentrations. Sometimes layering of several different types of protective materials or using a material laminated of two or more materials affords the best protection.

When selecting PPE, the following criteria should be evaluated:

- Concentration of the chemical.
- Physical State - The physical state of a chemical determines the exposure route and potential for toxicity.
- Length of Exposure - The length of time a material is exposed to a chemical increases the probability of breakthrough. It should be kept in mind that during permeation testing, usually a pure (100% composition) liquid is placed in direct contact with the material producing a worst-case situation.
- Abrasion - The use of leather gloves and a heavy apron over regular protective clothing will prevent damage to the PPE and protect against exposures during manual material handling.
- Dexterity required performing necessary tasks.
- Ability to decontaminate.
- Climatic Conditions - Protective clothing add a burden of additional weight, restriction of movement, as well as limiting natural cooling, contributing to heat stress. Some material act differently when they are very hot or very cold.

5.2.2 Types of Protective Material

The following materials are generally used in protective garments:

- Cellulose or paper.
- Natural and synthetic fibers:
    - Tyvek.
    - Nomex.
- Elastome:
    - Polyethylene.
    - Saran.
    - Polyvinyl chloride.
    - Neoprene.
    - Butyl rubber.
    - Chlorapel.
    - Viton.

5.3 Use of PPE

The proper use of PPE includes the following:

- The protective equipment must be appropriately selected for the chemical hazard.

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- Protective clothing should be inspected for wear, tears, etc. before each use.
- Chemical protective clothing must be adequately decontaminated after each use.

5.3.1 Donning and Doffing

Exact procedures for removing PPE ensembles must be established, practiced and followed in order to prevent damage, reduce or eliminate migration from the work area and a transfer of contaminants to the wearer and/or others.

5.4 Training

Training in PPE use is necessary. This training:

- Allows the user to become familiar with the equipment in a non-hazardous situation.
- Instills confidence of the user in the equipment.
- Makes the user aware of the limitations and capabilities of the equipment.
- Increases the efficiency of operations performed by workers wearing PPE.

Training should be completed prior to PPE use in a hazardous environment and repeated as necessary (changing conditions, not using or not using properly). All training will be documented.

At a minimum, the training program should include:

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- The proper use and maintenance of selected PPE, including capabilities and limitations.
- The nature of the hazards and the consequences of not using the PPE.
- The human factors influencing PPE performance.
- Hands on instruction in inspecting, donning, checking, fitting and using PPE.
- Wearing PPE in a test atmosphere to evaluate its effectiveness.
- The user's responsibility for decontamination, cleaning and maintenance of PPE.
- Emergency procedures and self-rescue in the event of PPE failure.

5.5 Inspection

An effective PPE inspection program includes the following:

- Inspection and operational testing of equipment received from the factory or distributor.
- Inspection of equipment as it is issued to workers.
- Inspection after use or training and prior to maintenance.
- Periodic inspection of stored equipment.

Detailed inspection procedures, where appropriate, are usually available from the manufacturer.

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Records should be kept of inspection procedures. Individual identification numbers should be assigned to reusable equipment and records should be maintained by that number. Each inspection should record the ID number, date, inspector, and any unusual conditions or findings. Periodic review of these records should be conducted to identify potential weaknesses in the PPE program.

5.6 Storage

PPE must be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact.

- Potentially contaminated clothing should be stored in an area separate from regular clothing.
- Potentially contaminated clothing should be stored in a well-ventilated area.
- Different types and materials of clothing and gloves should be stored separately to prevent issuing the wrong material by mistake.
- Protective clothing should be folded or hung in accordance with manufacturers' recommendations.

5.7 Additional Considerations

- If hard hats are necessary, chinstraps or lanyards should be used if the tasks may cause the hard hat to fall off.
- In cold temperatures, natural material clothing should be worn under the protective clothing. Protective clothing should be removed prior to allowing a person "to get warm." Applying heat, such as a space heater, is not recommended as the heat may drive the contaminants through.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES

- In hot weather, cotton undergarments should be worn to absorb perspiration.
- Body protection should be taped to the boots to prevent contaminants from running into the boot. Gloves should be taped to prevent substances from entering the top of the glove. Aprons should be taped across the back for added protection.
- Atmospheric conditions such as precipitation, temperature, wind direction, wind velocity and pressure effect the behavior of air contaminants or the potential for volatile material becoming airborne.
- Levels of protection should be selected based on the job function.
- Defective equipment will be taken out of service and replaced.

6.0 DECONTAMINATION

All D&B personnel wearing PPE will undergo a decontamination procedure which varies according to the chemicals encountered, concentrations, level of PPE (A, B, C or D). A specific procedure is established for a projects requiring employee decontamination. This procedures details decontamination of non-permeable clothing and other reusable PPE, and disposal of used disposable PPE along with procedures for employee decontamination. No employee entering a contaminated area will be permitted to leave the area without first following the decontamination procedure and being properly decontaminated. All disposable PPE will be properly disposed of during the decontamination process. Showers and changing rooms will be available if necessary under the decontamination procedures. All non-authorized personnel will be prohibited in the decontamination/changing areas.

These procedures will be monitored by a site health and safety representative.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES

7.0 REFERENCES

- Subpart O (OSHA 29 CFR 1926.600 through 1926.606).
- ANSI-107

APPENDIX A – Construction and Hazardous Waste PPE Requirements

CONSTRUCTION

PPE required for construction services will be specific to each site. Personnel should be provided with a hard hat, steel toe safety shoes, safety glasses or other PPE, as appropriate. The Site-Specific HASP to be developed for each project should be referred to in determining the type of protection that is necessary.

HAZARDOUS WASTES

Protection Levels

Protection levels are generally based on the levels defined by EPA, such as Levels A, B, C and D, as described below. Each ensemble should be tailored to the specific situation. The type of equipment used and the overall level of protection should be reevaluated periodically. Provisions should be made to upgrade or downgrade levels of protection.

Reasons to upgrade:

- New information indicating presence of dermal hazards.
- Occurrence or likely occurrence of gas or vapor emission.
- Change in work task that will increase contact or potential contact with hazardous materials.
- Request of the individual performing the task.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally thought.
- Change in site conditions that decrease the hazard.

- Change in work task that will reduce contact with hazardous materials.

Level A Protection

The following conditions suggest a need for Level A protection:

- Confined facilities where probability of skin contact is high.

- Sites containing known hazards which are absorbed through the skin.

- Sites with insufficient information to rule out hazards which are absorbed through the skin.

- Atmospheres immediately dangerous to life and health including skin absorption route.

- Site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into site by humans).

- Sites at which sealed drums of unknown materials must be opened.

- Total atmospheric readings on the PID, FID and similar instruments indicate 500 ppm to 1,000 ppm of unidentified substances.

- Extremely hazardous substances (e.g., cyanide compounds, concentrated pesticides, DOT Poison "A" materials, suspected carcinogens, and infectious substances) are known or suspected to be present, and skin contact is probable.

Level A protection minimally consists of the following items:

- Open circuit, pressure-demand SCBA or pressure-demand supplied air respirator with egress cylinder.

- Totally encapsulated suit.

- Gloves, inner (surgical type).

- Gloves, outer (chemical protective).
- Boots, chemical protective, steel toe and shank.
- Communication system.

Level B Protection

Level B protection is selected when the highest level of respiratory protection is needed, but conditions do not warrant Level A.

The following conditions suggest a need for Level B protection:

- The type and concentration of substances has been identified and requires the highest level of respiratory protection, but exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely.
- IDLH atmospheres, but the substance or concentration does not present a severe skin hazard.
- The type and concentrations of substances that do not meet the selection criteria permitting the use of air purifying respirators.
- It is unlikely that the work being done will generate high concentrations of vapors, gases or particulates that will affect the skin or result in skin contact.

Personal Protective Equipment for Level B minimally includes:

- Open circuit, pressure-demand SCBA or pressure-demand supplied air respirator with egress cylinder.
- Chemical protective overalls and long-sleeved jacket or coveralls.
- Gloves, inner (surgical type).
- Gloves, outer (chemical protective).

- Boots, chemical protective, steel toe and shank.
- Communication system.

Level C Protection

Level C is selected when air purifying respirators offer adequate respiratory protection and skin contact is unlikely.

Personal Protective Equipment for Level C minimally includes:

- Full face piece air-purifying respirator.
- Emergency escape respirator (carried, optional).
- Chemical protective overalls and long-sleeved jacket or coveralls.
- Gloves, inner (surgical type).
- Gloves, outer (chemical protective).
- Boots, chemical protective, steel toe and shank.

Level D Protection

Level D is the basic work uniform.

Personal Protective Equipment for Level D includes:

- Coveralls.
- Safety boots/shoes.
- Safety glasses with side shields.
- Hard hat with optional face shield.

Level E Protection

Level E protection is used when radioactivity above 10 mR/hr is encountered on a hazardous waste site. Procedure is to immediately evacuate to a safe distance (2 mR/hr level). A health physicist must be consulted to determine personal protective clothing.

RESPIRATORY PROTECTION GUIDELINES

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RESPIRATORY PROTECTION GUIDELINES

1.0 PURPOSE

This guideline provides necessary information to:

- Establish a Respiratory Protection Program for employees whose project activities may require the use of a respirator.
- Define project activities which may require respiratory protection.
- Implement the Respiratory Protection Program.

2.0 SCOPE

This guideline applies to D&B employees whose project activities may require the use of a respirator.

2.1 Permissible Practice

When feasible, employee exposures to a hazardous atmosphere will be controlled by accepted engineering and/or administrative controls. When engineering and administrative controls are not feasible or are not effective, appropriate respirators will be used. D&B will provide the respirators suitable for the purpose intended. These respirators will be utilized by employees as defined by the Site-Specific HASP, Health & Safety Officer (HSO) or a designee, and provided to the employee at no cost to them.

3.0 DEFINITIONS

Air Purifying Respirator - A respirator which is designed to remove air contaminants (i.e., dust, fumes, mists, gases, vapors or aerosols) from the ambient air as the air enters the respirator.

Approved Respirator - A respirator which has been tested, found to meet established performance criteria, and listed as being approved by an authority such as MSHA (Mine Safety and Health Administration) or NIOSH (National Institute of Occupational Safety and Health).

RESPIRATORY PROTECTION GUIDELINES

Atmosphere Supplying Respirator - A respirator which supplies the wearer with air or oxygen from a source independent of the immediate ambient atmosphere. This includes supplied-air respirators and self-contained breathing apparatus (SCBA) units.

Buddy System - A system of organizing employees into work groups in such a manner that each employee of the work group is designated to observe the activities of and remain in communication with at least one other employee in the work group. In some cases, an employee, outfitted with a SCBA unit and other necessary emergency equipment is stationed outside the work area in full view of others in the group and ready to react to any potential emergencies.

End–of-Service Life Indicator (ESLI) - An indicator on a respirator cartridge that warns the respirator user of the approach of the end of adequate respiratory protection.

Filtering Facepiece (Dust mask) - A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Immediately Dangerous to Life or Health (IDLH) - An atmospheric concentration of any toxic, corrosive or asphyxiating substance that poses an immediate threat to life or would cause irreversible or adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere. D&B discourages its personnel from working in IDLH conditions.

Maximum Use Concentration (MUC) - The maximum concentration of an air contaminant in which a particular respirator can be used, based on the respirator's assigned protection factor. The MUC cannot exceed the use limitations specified on the NIOSH/MSHA approval label for the cartridge, canister, or filter.

Negative Pressure Respirator - A respirator in which the air pressure inside the facepiece is negative during inhalation in respect to the ambient air pressure outside the respirator.

Oxygen Deficient Atmosphere - An atmosphere with an oxygen content of less than 19.5% by volume (an IDLH atmosphere).

Positive Pressure Respirator - A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

RESPIRATORY PROTECTION GUIDELINES

Powered Air Purifying Respirator (PAPR) - An air purifying respirator which uses a blower to deliver air through the air purifying element to the inlet covering.

Protection Factor - The value regarded as applicable for an achievable ratio of average ambient concentration of an air contaminant in a workplace to the average concentration of the contaminant measured inside the respirator facepiece for a specific class of respirators.

Qualitative Fit Test - A pass/fail fit test to assess the adequacy of a respirator fit that relies on the individual's response to the test agent.

Quantitative Fit Test - An assessment of the adequacy of a respirator fit by numerically measuring the amount of leakage into the respirator.

Respirator - Any device worn by an individual and intended to provide the wearer with respiratory protection against inhalation of airborne contaminants or oxygen-deficient air.

Self Contained Breathing Apparatus (SCBA) - An atmosphere supplying respirator for which the source of air or oxygen is carried by the wearer.

Service Life - The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Supplied Air Respirator - A respirator which receives breathable air through an air line or hose from a portable or stationary source of compressed air.

4.0 RESPONSIBILITIES

Respiratory Program Administrator - The Respiratory Program Administrator is a designated qualified person who is responsible for administrating and overseeing the Respiratory Protection Program and conducting the required evaluations of program effectiveness (required by 29 CFR 1910.134).

Health and Safety Officer (HSO) - The HSO is responsible for confirming that the proper respiratory protection is available, that the employees have been properly trained and medically qualified for respirator use, that facilities are provided for the cleaning and storage of respirators, and that operating procedures reflect the required use of respirators.

Health and Safety Representative (HSR) - The HSR is responsible for confirming proper use and maintenance of respirators.

D&B Employees - D&B employees are responsible for using the provided respiratory protection in accordance with this program and the training received. The employee must check the facepiece seal each time the respirator is worn. The employee must inspect the respirator as instructed, protect it from damage, and report malfunctions.

5.0 RESPIRATOR SELECTION

Respirators certified by the National Institute for Occupational Safety and Health (NIOSH) must be selected and used in compliance with the conditions of its certification. Respirators must be selected on the basis of the respiratory hazard(s) at the workplace and user factors that affect respirator performance and reliability. Respirator selection criteria include:

- General use conditions, including determination of contaminants, oxygen deficiency or IDLH atmospheres.
- Physical, chemical, and toxicological properties of the contaminant(s).
- Warning properties of the contaminant(s).
- Exposure Limits (PELs, TLVs).
- Assigned Protection Factors.
- Maximum Use Concentrations.
- Eye irritation potential.
- End of service life determination.
- Location of "safe" area.
- Duration of respirator use.

RESPIRATORY PROTECTION GUIDELINES

6.0 RESPIRATOR TRAINING

Employees required to wear respirators must be trained before wearing a respirator. Training must be comprehensive and understandable. It must be performed prior to requiring the employee to use a respirator and annually thereafter.

The following, as a minimum, will be included in the training:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- How to identify the limitations and capabilities of the respirator.
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
- How to inspect, put on and remove, use, and check the seals of the respirator.
- Respirator maintenance and storage procedures.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- The general requirements of the Respiratory Protection Standard.

7.0 RESPIRATOR FITTING

Below are the requirements for the fit testing:

- Each employee required to wear a respirator will be fit tested using accepted fit test methods as described in OSHA 29 CFR 1910.134.
- Qualitative or Quantitative fit testing must be performed prior to initial use of respirators and thereafter at least annually.
- A qualified person must administer fit testing. The person performing the fit testing will provide documentation of the fit test protocol(s) used.
- Fit tests will be performed using the same make, model and size of respirator to be worn.

- A user seal test following OSHA 29 CFR 1910.134 must be performed immediately after donning and adjusting the respirator, each time a respirator is used.

8.0 RESPIRATOR MAINTENANCE AND CARE

Respirators will be properly maintained and be in working order. Respirators that are not functioning properly will be removed from use.

8.1 Inspection

Respirators must be inspected as follows:

Routine use:	Before each use and during cleaning.
Emergency use:	At least monthly and before and after each use.
Emergency-escape :	Before being carried into the workplace for use.
(SCBA):	Monthly. Air and oxygen cylinders must be maintained in a fully charged state and will be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.

The inspection must include a check of respirator function, tightness of connections, and the condition of the various parts of the respirator, including a check of the elastomeric parts for pliability.

8.2 Cartridge/Filter Changing/Replacement

Filters/cartridges used on air-purifying respirators must be replaced when one of the following occurs:

- Change is scheduled according to cartridge replacement schedule created by the HSO, or designee.
- A resistance/break-through during breathing is noted.

- Indicated on end-of-service-life indicator.
- Employees will leave the area to wash, when changing cartridges or if breakthrough or resistance is encountered.

8.3 Cleaning and Disinfecting

Respirators will be properly cleaned and disinfected after each use in accordance with OSHA 29 CFR 1910.134. The respirators will be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an employee will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee will be cleaned and disinfected before being worn by different individuals.
- Respirators maintained for emergency use will be cleaned and disinfected after each use.
- Respirators used in fit testing and training will be cleaned and disinfected after each use.

8.4 Repair

Respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired as follows:

- Repairs or adjustments are made only by individuals that have been appropriately trained for such repairs.
- Only manufacturer's NIOSH-approved parts are used.
- Repairs are only conducted according to manufacturer recommendations and specifications.

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- Reducing and admission valves, regulators, and alarms must be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

8.5 Proper Respirator Storage

Respirators must be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture and damaging chemicals. They must be stored to prevent deformation of the facepiece and exhalation valve.

Storage for emergency respirators must meet the above requirements, plus:

- Be kept accessible to the work area.
- Stored in compartments or in covers that are clearly marked as containing emergency respirators.
- Stored in accordance with the manufacturer recommendations.

9.0 MEDICAL SURVEILLANCE

Employees assigned to tasks requiring the use of respirators will be medically evaluated to determine if they are physically able to wear respirators. These determinations must be made prior to any use, including fit-testing, and must be completed by a physician. In some states a Licensed Health Care Professional (LHCP) other than a physician may conduct the evaluation. These medical evaluations will be reviewed periodically as deemed appropriate by the physician or Respiratory Program Administrator or if there are medical reasons to evaluate the employee.

The following information must be provided to the physician before a medical determination can be made:

- Type and weight of respirator that is to be used.
- Duration and frequency of respirator use.
- Expected physical work effort.

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- Additional protective clothing and equipment to be worn.
- Temperature and humidity extremes that may be encountered.
- Written copy of this Respiratory Protection Program.

A written recommendation must be obtained from the physician. The recommendation will provide information on any limitations on respirator use. Additional medical evaluations must be provided if any of the following occurs:

- An employee reports medical signs or symptoms that are related to ability to use a respirator.
- A LHCP, supervisor or the Respirator Program Administrator informs the employer that an employee needs to be reevaluated.
- Information from the Respiratory Protection Program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation.
- A change occurs in workplace conditions that may result in a substantial increase in the physiological burden placed on an employee.

10.0 RECORDKEEPING

Records of employee exposure, monitoring, medical surveillance, training, respiratory protection use, inspection and maintenance will be kept in the project file.

11.0 FIT TESTS

Records of qualitative and/or quantitative fit tests will be maintained until the employee's next fit test. The records must include the name and identification of employee, type of fit test performed, make, model, style, and size of respirator tested, date of fit test, and fit test results.

12.0 PROGRAM EVALUATION

RESPIRATORY PROTECTION GUIDELINES

The Respiratory Program Administrator will conduct periodic evaluations of the Respiratory Protection Program. The Respiratory Program Administrator should:

- Consult with users to determine program acceptance.
- Conduct inspections of respirator use.
- Review required records.

13.0 SPECIAL CONSIDERATIONS IN RESPIRATOR USE

13.1 Facial Hair

Respirators will not be worn when conditions prevent a good respirator facepiece-to-face seal. Persons with facial hair that interferes with the facepiece-to-face seal or the operation of the inhalation or exhalation valves will not be permitted to wear or be fitted with a respirator until such conditions are corrected.

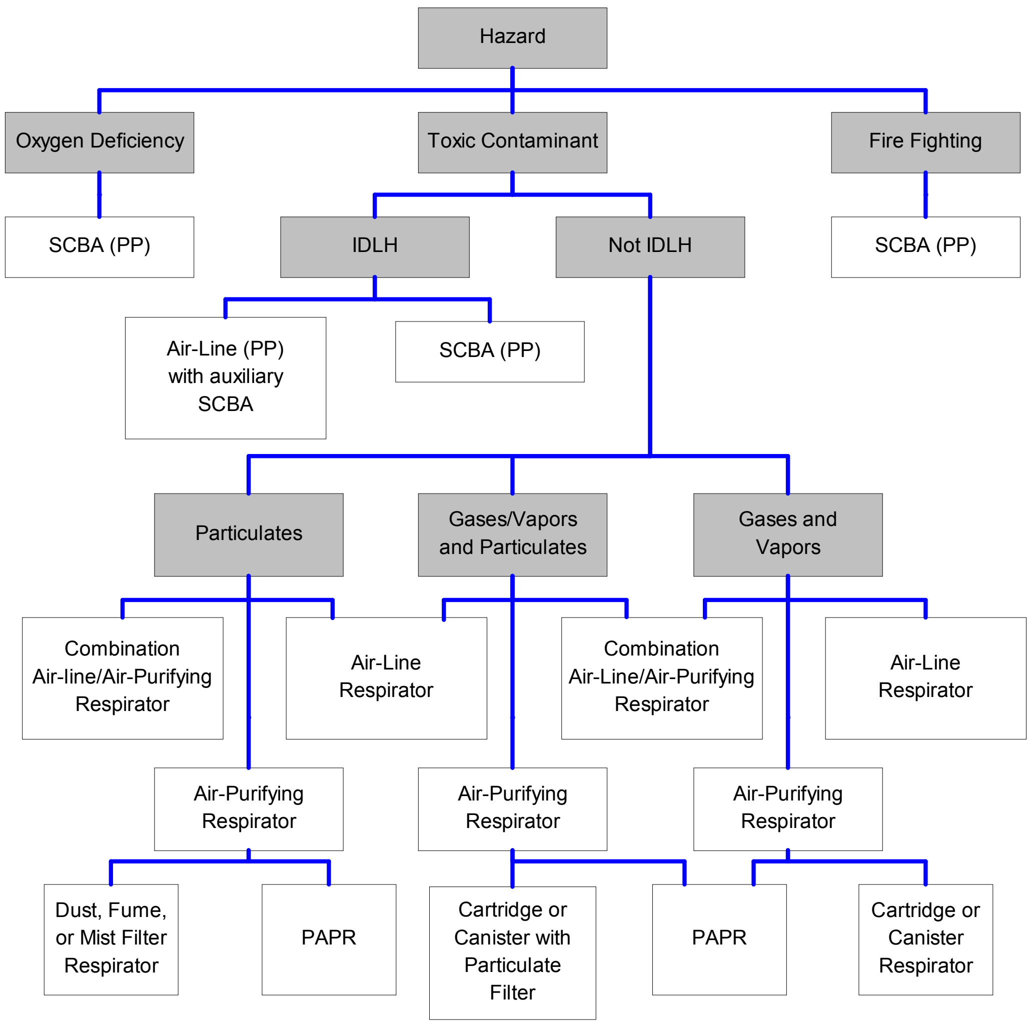
13.2 Corrective Lenses

- Employees with eyeglass temple pieces which interfere with the facepiece-to-face seal of the respirator will not be permitted to wear or be fitted with a respirator until such conditions are corrected.
- If corrective lenses are required, contact lenses or special lens holding devices which do not interfere with the facepiece-to-face seal may be utilized.

14.0 REFERENCES

- OSHA 29 CFR 1910.134.
- OSHA 29 CFR 1926.103.

APPENDIX A – Respiratory Protection Selection Diagram



APPENDIX B – Program Evaluation Checklist/Questionnaire

RESPIRATOR USE

Employee Name ________________________
Identification ___________________________
Position _______________________________

Description of Work Activities:

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1. What jobs/activities require the use of respiratory protection?

2. Is respiratory protection used every time that it is required?

3. What type of respiratory protection is used?

4. Where is the respiratory protection stored?

5. How is the respiratory protection cleaned and maintained?

6. What was the date of the last fit test?

7. When did employee last receive respiratory protection training?

8. Are other employees that are required to use respiratory protection using it properly/effectively?

List any problems/concerns/comments.

MEDICAL SURVEILLANCE GUIDELINES

Table of Contents

1.0 POLICY AND PURPOSE

D&B has developed a Medical Surveillance Program for employees who may be exposed to potentially hazardous chemicals while working on a hazardous waste site, who must wear or have the potential to wear a respirator or who may be accidentally overexposed to a chemical as a result of a spill or leak. This program has been designed to meet OSHA 29 CFR 1910.120 and to be consistent with recommended medical surveillance practices.

The Medical Surveillance Program is designed to support and monitor the effectiveness of the safe work practices, and is provided at no cost to the employee. The Program should include:

MEDICAL SURVEILLANCE GUIDELINES

- Assessment of physical and medical conditions of D&B employees before they are assigned to work on hazardous sites or are required to wear a respirator.

- Periodic medical examinations and follow-up examinations as directed by corporate physician.

- Examination upon termination of employment or reassignment to an area where the employee would not be covered by the OSHA 29 CFR 1910.120 provided they have not received a medical exam within the last six months.

2.0 SCOPE

Applies to D&B activities at sites where exposure to potentially hazardous chemicals may occur or when employees may be required to wear respiratory protection. In addition to hazardous waste sites, this SOP also applies where D&B personnel may be exposed to chemicals such as asbestos and lead.

3.0 RESPONSIBILITIES

Corporate Physician (CP) - D&B contracts a medical provider/physician to conduct complete and thorough medical examinations for each employee as required per established protocol. Based on the results of the examination, the physician must determine the individual's suitability to perform his/her job.

Health and Safety Officer (HSO) - The HSO designs, implements and reviews the policies and procedures of the Medical Surveillance Program. The HSO's responsibilities include:

- Providing CP with information regarding the type of Personal Protection Equipment employee may use potential exposures and other site/activities information that may be pertinent to health.

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- Designating employees who must participate in the Medical Surveillance Program.
- Retaining a qualified CP to conduct necessary medical examinations.
- Obtaining from the examining physician(s) a written statement indicating the employee's availability for assignment on a hazardous waste site.
- Obtaining from the examining physician(s) a written statement indicating the employee's suitability to use a respirator.
- Maintaining copies of the Physician's Statement and Disclosure Agreement for employees participating in the Medical Surveillance Program.
- Documenting that personnel medical examinations are conducted within the prescribed time frame.

4.0 GUIDELINES

4.1 Introduction

The Medical Surveillance Program has four essential components:

- Pre-exposure screening (baseline).
- Routine medical monitoring of designated employees.
- Emergency medical care and treatment if accidents or exposure to contaminants occur while on site.
- Termination examination.

MEDICAL SURVEILLANCE GUIDELINES

4.2 Baseline

Pre-exposure (baseline) screening has two major functions: (1) determining individual's fitness for duty, including the ability to work while wearing protective equipment, and (2) providing baseline for comparison with future medical data. D&B must obtain the results of baseline examination before an employee engages in any hazardous waste work, or is fit-tested for a respirator.

4.3 Periodic

Periodic medical examinations should be used in conjunction with pre-employment screening examinations. Comparison of periodic medical results with baseline data is essential to determine biologic trends that may mark early signs of adverse health effects, and thereby facilitate appropriate protective measures.

OSHA requires that covered employees be re-examined on a regular basis. These examinations must be provided annually unless the attending physician believes that a shorter or a longer interval (not greater than biennially) is appropriate.

4.4 Emergency Medical Care

The Site-Specific HASP addresses emergency medical care and treatment of personnel, including possible exposures to the site specific toxic substances and injuries due to accidents or physical problems.

The Project Manager or HSO is responsible for providing medical care to any D&B site employee requesting or requiring medical care due to an injury or illness. Once at the medical facility, the examining physician may consult with the CP to obtain the individual's medical history and proper medical treatment. D&B personnel requiring emergency medical treatment should have a written physician release, prior to returning to the site.

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4.5 Termination

Exit examinations are required for employees who are terminated, left the firm voluntarily or retire from the hazardous waste industry. This exam is not required if the employee has not been in the field since their last periodic exam or if they have taken a baseline/periodic exam within the last six months.

4.6 Special Tests

In addition to those tests required by the medical protocol, special medical tests may also be required. The decision to conduct such tests is based on potential exposure to specific toxic substances in the work environment, by the medical history or condition of the person examined. The CP will determine what special medical tests are appropriate and the manner in which these exams will be conducted.

4.7 Examination Content

Due to the variety of work and potential exposures that can occur on hazardous waste sites, it is not feasible to recommend a single examination protocol. However, according to NIOSH and OSHA, the following areas should be considered and addressed as appropriate:

Baseline examination

- Medical and occupational history review.
- Physical examination including:
  - Head, nose and throat
  - Musculoskeletal system
  - Blood pressure
  - Skin
  - Audiometric testing

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  - Vision test

- Diagnostic tests including:

  - Pulmonary and heart (EKG) functions test.
  - Blood.
  - Urine.
  - Chest X-rays.

The baseline for respirator users must comply with the medical evaluation requirements of OSHA 29 CFR 1910.134, beginning with the medical questionnaire.

Periodic examination

The annual or biannual examination is used in conjunction and compared with the baseline examination and will include:

- A medical questionnaire.
- Physical examination.
- Blood chemistry profile.
- Urinalysis.

The examination may also be supplemented by other procedures and medical tests based on specific exposures, the individual's medical history or results of physical examination.

5.0 MEDICAL EXAMINATION FORMS AND QUESTIONNAIRES

Medical evaluations will be confidential and conducted during business hours at a location convenient for the employee. The exams/results will be understandable to the employee, with the employee given the opportunity to discuss the results with the physician or other licensed health care professional.

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5.1 Forms Completed by Employee

Employees will complete a confidential medical/occupational history questionnaire prior to his/her baseline examination. Questionnaires are an important part of the health monitoring program medical records.

5.2 Forms Completed by Examining Physician/Medical Consultant

The Physician's Statement of Qualification (attached in Appendix C) is a summary, completed and signed by the licensed examining physician, of an employee's qualification to work with hazardous chemicals and/or to use a respirator. If the examining physician finds that an examinee is not qualified for hazardous waste site work, the physician will so indicate and explain on the Physician's Statement Form.

The written opinion obtained by the employer will not reveal specific findings or diagnoses unrelated to occupational exposure.

In addition to individual employee records, an annual list of D&B employees participating in the Medical Surveillance Program should be developed and maintained by HSO.

6.0 CONFIDENTIALITY

D&B must maintain medical exam records and reports for the duration of employment plus 30 years, per OSHA 29 CFR 1910.120 and 1910.1020. According to OSHA clarification/interpretation statement, the physician's office can maintain the physical custody of the records under agreement with employer. Employer must establish procedures to allow access, storage, transfer and disposal of these records, while keeping personal medical information confidential. Records that are physically maintained by an employer typically include a Physician's Statement of Qualification, Disclosure Agreements, and requests for copies of the medical records.

Medical records, under law, must be considered confidential (with the exception of the Physician's Statement). Therefore, access to the information contained in the employee

MEDICAL SURVEILLANCE GUIDELINES

medical files will be restricted to review and usage by the medical consultant, the HSO and his/her designee, examining and consulting physician(s) and physician staff. These records will be maintained in a locked filing cabinet. Upon death, retirement, resignation or other termination of service, the records will be stored in the appropriate company personnel file.

The employee may also request release of records or information. Medical release forms (Appendix B) are available for this purpose through the HR. An employee may also designate a representative (i.e., personal physician). The full name and address of the representative and the content of the records to be released must be specified in a letter to D&B. A copy of this request will be sent to the HSO.

APPENDIX A – PHYSICIAN'S STATEMENT OF QUALIFICATIONS

For Employee or Applicant of D&B

Participant Name: _________ Date of Exam: _____

Date of Birth:________ Social Security Number:________________________

Type of exam: (baseline, annual, or other):____

The individual named above has:

1. undergone a physical examination and has been found medically:
   ( ) qualified for hazardous waste site work
   ( ) not qualified for hazardous waste work

   and

2. undergone a physical examination as per OSHA (29 CFR 1910.134 and has been found medically:
   ( ) qualified to use a respirator
   ( ) not qualified to use a respirator

Physician's Signature ____
Printed Name of Physician ____
Physician's Address ____
Physician's Telephone Number ____
Physician's State License Number ____

Note: Copies of test results are maintained and available at _______________________________
____

OSHA 1910.134 (b)(10) states that persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment.

The local physician will determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually).

If it is the opinion of the examining physician that an examinee is unqualified to perform hazardous waste site work or to wear a respirator, the physician should append a further report to this statement which details reasons for this opinion.

SUMMARY PROFILE

Employee Name: ________________________ Exam Date: __________

The Examining Physician and/or Medical Consultant has reviewed the medical information regarding the aforementioned employee, and the following has been established:

A ( ) There is no medical condition which will interfere with the duties of the individual.

B ( ) Medical condition exists which will not interfere with job responsibilities. The individual has been advised of this finding.

C ( ) The examination disclosed a medical condition which may require special consideration by the company.

D ( ) Deferred pending further evaluation. Employee will need outside medical records or additional subspecialty evaluation before a final determination can be made.

E ( ) Qualified to use an approved respirator.

____
Signature of Reviewing Physician

HAZARD COMMUNCATION GUIDELINES

Table of Contents

HAZARD COMMUNCATION GUIDELINES

1.0 PURPOSE

To provide guidance for the implementation of a comprehensive Hazard Communication Program in order to effectively communicate the chemical hazards to be encountered at D&B office and project locations.

2.0 SCOPE

Applies to all D&B sites.

3.0 DEFINITIONS

Affected Employees - an employee who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.*

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* Note that Hazard Communication standards apply to any employee working with or exposed to chemicals, whether they are hazardous or not.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for the implementation of the Hazard Communication Program and compliance with the OSHA 29 CFR 1910.1200 and 29 CFR 1926.59.

On-Site Health and Safety Representative (HSR) - The HSR is responsible for maintaining and updating site-specific chemical inventory list, verifying labeling is adequate, obtaining and maintaining SDS, notifying D&B personnel of the hazards associated with specific assignments and reviewing areas with D&B personnel where a potential hazard may be encountered.

D&B Employees - Observe label warning and adhere to established safety procedures.

5.0 GUIDELINES

HAZARD COMMUNCATION GUIDELINES

5.1 Introduction

These guidelines should be used to communicate chemical hazards to be encountered at D&B work sites, provide personnel access to information on chemical hazards, and familiarize them with procedures for the safe handling of hazards in the workplace. A written plan shall be present at each worksite where chemicals are in use.

5.2 Hazard Determination

Hazard assessment of chemicals used by D&B are made by the suppliers and manufacturers of these chemicals and communicated to D&B via Safety Data Sheets (SDS).

5.3 Chemical Inventory List

A list of potentially hazardous materials will be maintained in each office, included with the site-specific HASP and other applicable project documents and will contain, at a minimum, the following:

- Product names.

- Hazardous components.

- Manufacturer's identification.

- Location used.

After the initial determination, the Hazard Communication inventory list will be updated annually. New chemicals will be added to the lists when received.

5.4 Labels

5.4.1 Incoming Products

Products arriving from chemical manufacturers and/or distributors will be inspected by receiving personnel to confirm that:

- The labels and warnings are appropriate, legible, in English and prominently displayed on each container.

- The existing labels have not been removed or defaced.

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The HSO or HSR must be notified if a container arrives without a label, the label is illegible or the label does not identify the chemical, supply the name and address of the manufacturer or list hazard warnings.

This practice is to be completed before the product is used so that its contents may be assessed and labeled appropriately or returned to the supplier.

5.4.2 Transfer Containers

When a hazardous chemical is transferred from its primary container to a new one, the transfer container must be adequately labeled. At a minimum, the identity of the chemical and appropriate hazard information must be included on the label.

5.5 Safety Data Sheets

Copies of safety data sheets (SDSs) for hazardous chemicals being used on each site will be accessible to employees working at that site. Each SDS will be in English and will contain the following information:

- Manufacturer's name, addresses and telephone number.

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- Name and signature of sheet's preparer.
- The date of preparation or revision of the SDS.
- Product identification using chemical, common and trade names (must include the same name on the label).
- Chemical Abstract Service (CAS) Number.
- Chemical formula.
- Chemical family.
- Hazardous ingredients of products as defined by OSHA according to toxicity, flammability and reactivity. If the hazardous chemical has not been tested as a whole, the chemical and common name(s) of all ingredients which have been determined to be a health hazard and which comprise 1% or greater of the composition will be listed (except the chemicals identified as carcinogens will be listed if the concentration is 0.1% or greater).

HAZARD COMMUNCATION GUIDELINES

- Physical data including vapor pressure, flash point, specific gravity and boiling point.

- Fire and explosion data including flammable limits in air, auto-ignition temperature, specific recommendations on the types of fire extinguisher(s) to be used and/or avoided and special fire fighting procedures.

- Health hazard information including the primary route(s) of exposure, established exposure limits (listed as the permissible exposure limit (PEL) or the threshold limit value [TLV]), potential adverse health effects of exposure, signs and symptoms of exposure, and medical conditions aggravated by exposure and whether the chemical is listed as a carcinogen by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC) or by OSHA.

- Precautions for safe handling and use including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for cleanup of spills and leaks.

- Control measures including engineering controls, work practices and personal protective equipment (PPE).

- Emergency and first aid procedures.

Requests for copies of SDS by any employee will be honored within 72 hours.

SDS's will be maintained for 30 years but chemicals no longer in use may be placed in an archive file.

5.6 Training

D&B employees who may be exposed to chemicals during their work tasks or foreseeable emergencies will be trained regarding the characteristics and safe handling of hazardous chemicals in the workplace at the time of initial assignment, periodically thereafter, prior to assignment of non-routine tasks and whenever a new hazard, chemical, or operation is introduced into the workplace environment.

The following information will be provided in the training course:

- Requirements of OSHA 29 CFR 1910.1200.
- Location and availability of the D&B Hazard Communication Program.

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- Details of the D&B Hazard Communication Program including:
  - An explanation of the labeling system and how to read labels.
  - An explanation of the SDS and how to obtain and use them to find the appropriate hazard information.
  - The location of hazardous chemicals to which employees may be exposed.
  - The name(s) of hazardous chemicals present in the work area including generic, chemical, common and trade names.
  - The physical and chemical properties of hazardous chemicals to which employees may be exposed.
  - Definition of terms (e.g., exposure, TLV, PEL, etc.).
  - Health effects of exposure to the hazardous chemicals.
  - Symptoms of exposure.

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous materials when released).

- Safe handling of hazardous chemicals.

- Emergency procedures to follow if exposed to hazardous chemicals.

- How to lessen or prevent exposure to hazardous chemicals through safe work practices and PPE.

5.7 Non-Routine Tasks

In the event that an employee may be required to perform tasks that are not part of normal duties, the employee will be given information about hazardous chemicals involved with such activities. This information will include:

- Specific chemical hazards.

- Protective measures the employee can take.

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- Measures that D&B has taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

5.8 Recordkeeping

The following records must be maintained:

- A record of Hazard Communication Employee Training Program and attendance.
- The chemical inventory list.
- SDS locations.
- This SOP.

5.9 Informing Contractors and Subcontractors

Each contractor and subcontractor will be provided with the following information:

HAZARD COMMUNCATION GUIDELINES

- List of hazardous chemicals they may encounter while on the job.

Each contractor and subcontractor will be informed of:

- Hazardous chemicals to which they may be exposed. SDS for each chemical on the list is available at their request.

- Measures that may be taken to lessen the possibility of exposure.

- Transfer container labeling system.

The contractor and subcontractor will sign a statement confirming that they have reviewed the above information. The Contractor Sign-off form is located in Appendix A of this SOP.

Contractors and subcontractors should provide SDS for any chemicals brought into a D&B site and should confirm that chemical containers are appropriately labeled. D&B employees will be informed of any potential hazards with which they might be exposed due to contractor or subcontractor operations.

HAZARD COMMUNCATION GUIDELINES

5.10 Informing Visitors

Visitor access will be restricted. Visitors are required to check in with the appropriate authority. Visitors should be provided with any necessary PPE and the following information:

- Hazardous chemicals to which he/she may be exposed.
- Measures the visitor may take to lessen the possibility of exposure including the proper use of the PPE.
- D&B policies and procedures to be followed to reduce the risks.
- Emergency procedures.

6.0 REFERENCES

- OSHA 29 CFR 1910.1200.
- OSHA 29 CFR 1926.59.

APPENDIX A – CONTRACTOR SIGN-OFF FORM

Project/Name:____

Date:____

I, ____, as an authorized representative of

____ have received a copy of the following information from the D&B project representative:

1. List of hazardous substances that may be encountered while on the job.

The D&B project representative has informed me of:

1. Hazardous chemicals to which I may be exposed.
2. SDSs for each chemical on the list is available on request.
3. Measures I may take to lessen the possibility of exposure.
4. First aid/emergency procedures.

I will confirm that the other representatives from our company receive this information before beginning work on the project.

If I bring any chemicals onto the D&B project site, I will verify SDSs are available on site and that the appropriate labels are affixed to containers. I will alert any D&B employees working with me of the potential hazards if there is a chance that they will come into contact with such hazards.

Name____

Title____

Signature____

CONTAINMENT AND DISPOSAL OF CONTAMINATED MATERIAL

Table of Contents

1.0 PURPOSE

The objective of these guidelines is to provide general reference information regarding the control and disposal of contaminated materials generated during site investigation activities.

2.0 SCOPE

Applies to D&B work sites where contaminated materials will be generated.

3.0 DEFINITIONS

Contaminated Materials - Contaminated materials are defined as any by-products of field operations that are known or suspected to be contaminated with hazardous substances. These by-products include materials such as decontamination solutions, disposable equipment and clothing, drilling debris, well-development fluids and spill-contaminated materials.

4.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for revising these guidelines to include new OSHA updates. The HSO is also responsible for confirming that proper training is available to D&B employees regarding proper disposal procedures and that a Site-Specific HASP incorporates these guidelines.

Health and Safety Representative (HSR) - The HSR or his/her designee (such as a Field Operations Manager) is responsible for the correct implementation of these procedures in the field.

5.0 GUIDELINES

Field investigation activities often result in the production or movement of contaminated material that must be properly managed to protect field personnel, the public and the environment. These guidelines address the proper management of this material.

5.1 General

As a general policy, site investigation methods that minimize the generation of contaminated material will be utilized. Until sample analysis is complete, it must be assumed that all produced material suspected to be contaminated would require containment. The Site-Specific HASP will include control procedures for contaminated material. It should address the type of contamination, estimated amounts that would be produced, containment equipment and procedures and storage or disposal methods.

5.2 Sources of Contaminated Material and Containment Methods

Contaminated materials usually consist of water, soil, disposable tools used in sampling and used PPE.

CONTAINMENT AND DISPOSAL OF CONTAMINATED MATERIAL

5.2.1 Decontamination Solutions

Decontamination solutions and rinses must be assumed to contain hazardous chemicals associated with the site, unless there is analytical or other data to the contrary. The solution volumes could vary from a few gallons to several hundred gallons in some cases.

The decontamination solutions are typically generated from:

- Personnel decontamination.
- Sampling equipment decontamination.
- Large equipment decontamination.

Depending upon site conditions, contamination type and site requirements, the decontamination solutions may be allowed to be drained back into the contaminated portion of the site. In some situations the decontamination solutions must be disposed of off site. The Site-Specific HASP must include whether the fluids from personnel and equipment decontamination activities should be contained and disposed of off site, contained and left on the site for future disposal, or allowed to be drained back into the soil.

Only DOT-approved drums should be used for the transportation of decontamination fluids.

5.2.2 Disposable Equipment and Clothing

Disposable equipment that could be contaminated during the site investigation typically includes protective suits, gloves, boots, broken sample containers, paper towels, and spent respirator cartridges. These items can be temporarily stored in plastic bags and transferred to 55-gallon drums (with lids) at the end of the day. These containers will be secured at the end of each workday.

5.2.3 Drilling Fluids and Well Development Fluids

Drilling, well development and well evacuation fluids are generated during or as a result of groundwater monitoring, well installation and sampling activities. Since these fluids are potentially contaminated, they are also required to be contained for eventual treatment or disposal.

The volumes of drilling, well development and well evacuation fluids depend on the well diameter and depth, groundwater characteristics, geologic formations and drilling methods utilized. There are no simple mathematical formulas available to accurately predict these volumes. It is best to rely on the experience of reputable well drillers familiar with local conditions and the selected well installation techniques.

Drilling fluid (mud) is stored in a container commonly referred to as a mud pit. This mud pit consists of a suction section from which drilling fluid is pumped to the drill pipe and back to the settling section of the mud pit. In the settling section, the well cuttings are allowed to settle. If the mud pit is lined to prevent leaks, it can also be used to contain possibly contaminated drilling fluids. Spent drilling fluids can then be pumped directly from the mud pit to 55-gallon drums for treatment and/or disposal. The sediments that accumulate in the settling section are transferred into drums or other similar containers.

If ground pits are used, they will not extend into the natural water table. They should be lined with a bentonite-cement mixture followed by a layer of flexible impermeable material such as plastic sheeting compatible with the wastes. Depending on site conditions and the size of the pit, it may be advantageous to excavate the entire pit for disposal and backfill the excavation with clean fill.

When the aboveground tank or the inground pit is used, a reserve tank or pit should be located at the site as a backup system in the event of leaks, spills, and overflows. In addition, surface drainage will be planned so that leaks, spills, and overflows can be controlled within the immediate area of the drill site.

The containment procedure for well development fluids is similar to that for drilling fluids. The volume of contaminated fluid will be determined by the method of development. Bailing a new well usually generates less fluid volume than processes using backwashing. When bailing, the removed fluids can be directly placed in drums. For backwashing, a T-section can be fitted on the well casing to direct the overflow to the drums.

5.2.4 Soil Cuttings

Contaminated soil cuttings, generated while performing field investigation activities, typically consist of cuttings from borings, test pit excavations, and discarded soils from sampling activities. These soils should be contained in drums for further treatment or disposal.

5.2.5 Spill-Contaminated Materials

A spill is always possible when a site investigation involves opening and moving containers of liquids. Contaminated sorbents and soils resulting from spills must be containerized for disposal. Small quantities of spill-contaminated materials are typically contained in drums, while larger quantities can be placed in lined pits or other impermeable structures. In some cases onsite containment may not be feasible, in which case, the immediate transport to an approved disposal site will be required.

5.3 Disposal of Contaminated Materials

Actual disposal techniques for contaminated material are the same as those for any hazardous substance: incineration, landfill, treatment, etc. All involved parties must agree on determining who is responsible for disposal before the fieldwork starts. Without a previous agreement, the contractor must provide for the disposal of wastes resulting from field activities. Therefore, the contractor is responsible for subcontracting with reputable waste transporters and for verifying compliance with RCRA requirements whenever it is necessary to containerize and remove hazardous wastes. To expedite the disposal process, the following should be completed prior to field activities:

- Identify authorized, permitted facilities for proper treatment, storage, and/or disposal of wastes.
- Obtain generator identification numbers.
- Prepare the required manifests.

Another consideration in selecting disposal methods for contaminated materials is whether the disposal can be incorporated into subsequent site cleanup activities. In this case, the contaminated material generated during the investigation activities can be stored at the site for future disposal with other contaminated site materials. If the contaminated material will be stored onsite, then containment suitable for long-term storage must be provided. On site storage must include protection from sunlight and hot

CONTAINMENT AND DISPOSAL OF CONTAMINATED MATERIAL

or cold temperatures. Site conditions, such as surface drainage, security and soil type as well as meteorological conditions must be considered to design proper storage.

RECORD KEEPING GUIDELINES

Table of Contents

1.0 PURPOSE

To establish guidelines for the retention of H&S records.

2.0 SCOPE

RECORD KEEPING GUIDELINES

Applies to all D&B work sites.

3.0 RESPONSIBILITIES

Health and Safety Officer (HSO) - The HSO is responsible for reviewing and approving generated documents and confirming that the records are complete.

Health and Safety Coordinator (HSC) – Maintains training records and fit test results

Human Resources (HR) – Maintains employee medical records, and records of illnesses and injuries.

4.0 RECORDS AND REPORTS

4.1 General

H&S related records and reports are required to document and monitor program compliance to company policy and procedures. The H&S records and reports include:

- Site-Specific Health and Safety Plan.
- Accident/Incident Reports.
- H&S training records.
- Audit reports and related corrective action documentation.
- Medical Surveillance Program and personal monitoring records.
- Instrument calibration records.

4.2 Site-Specific H&S or Project H&S Checklist

A Site-Specific HASP will be developed prior to the beginning of field activities for each project and reviewed by the HSO. The original of each completed Site-Specific HASP will be placed in the project file. A copy should accompany the field team and be readily available at the work site. Copies of the Site-Specific HASP will be made available to D&B employees when site-specific training is provided.

4.3 Incident Reports

D&B is exempt from the requirements of OSHA 29 CFR 1904.2 (Recording and Reporting Occupational Injuries and Illnesses, OSHA 300 log), except for reporting fatalities and multiple hospitalization accidents. However, a record of incidents meeting the OSHA criteria of "OSHA recordable" incidents will be maintained.

OSHA recordable occupational injuries or illnesses are any occupational injuries or illnesses that result in:

- Fatalities, regardless of the time between the injury and death, or the length of the illness.
- Lost workday cases, other than fatalities, that result in lost workdays.
- Nonfatal cases without lost workdays, which result in:
    - Transfer to another job or restricted work assignment.
    - Termination of employment.
    - Required medical treatment.
    - Loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses that are reported to the employer but are not classified as fatalities or lost workday cases.

An Incident Report should be completed within 24 hours by the Project Manager (PM) or a designee for every personal injury, accidental damage to property or near miss, which could have resulted in personal injury or illness. The original Incident Report and Investigation Findings are placed in the Project File. Please see Appendix D and E for appropriate forms.

4.4 Personnel Training Records

Personnel training records are required to document personnel qualifications and capabilities and to determine compliance to D&B training requirements. Each training session should be documented by a Training Attendance Sheet. The Instructor should prepare the report and include the date of training, location, a list of attendees, their signatures and a description of the material covered. The original report should be filed in the project file and a copy sent to the HSO.

4.5 Health and Safety Audit Reports

The H&S Audit Report must include details on each deficiency, even if the deficiency is corrected immediately during the audit, and a proposed or implemented solution. The HSO will approve and implement the solution. The Audit Report will be dated and signed by the Auditor and HSO. The original report will be placed in the Program File with copies sent to the HSO and PM.

4.6 Medical Surveillance Reports

The employer will maintain the original medical record and employee monitoring records with a copy maintained by the medical consultant. OSHA 29 CFR 1910.1020 requires retention of these records to termination of employment plus 30 years. The firm's Human Resources Department should maintain a copy of the employee's Disclosure Agreement and Physician's Statement. These records are maintained in a confidential file. Only the employee or their assigned representative may access these files.

4.7 Instrument Calibration Records

RECORD KEEPING GUIDELINES

A maintenance and calibration program is essential to verify the continued proper operation of used instrumentation. The three elements of this program are: (1) normal upkeep of equipment, (2) service and repair (when required) and (3) recordkeeping, documenting maintenance and repair activities.

Field personnel using monitoring or sampling equipment are responsible for performing the required maintenance and calibrations. Field personnel should also maintain and transfer records of calibration to the appropriate equipment custodian and report any instances of malfunctioning or improperly calibrated or used equipment to the PM and the HSO.

Records of calibration will be retained by the equipment custodian for the life of the monitoring or sampling equipment. Records of calibration should be filed in the project file at end of project. Please see Appendix F for Calibration Logs.

5.0 REFERENCES

- OSHA 29 CFR 1910.120.
- OSHA 29 CFR 1910.1020.

APPENDIX A – PHYSICIAN'S STATEMENT

For Employee or Applicant of D&B

Participant Name:______________________________ Date of Exam:_________________________

Date of Birth:_____________________ Social Security Number:____________________________

Type of exam: (baseline, annual, or other):____

The individual named above has:

1. undergone a physical examination and has been found medically
   ( ) qualified for hazardous waste site work
   ( ) not qualified for hazardous waste work
   and
2. undergone a physical examination as per OSHA 29 CFR 1910.134 and has been found medically
   ( ) qualified to use a respirator
   ( ) not qualified to use a respirator

Physician's Signature____

Printed Name of Physician____

Physician's Address____

Physician's Telephone Number____

Physician's State License Number____

Note: Copies of test results are maintained and available at

____

OSHA 1910.134 (b)(10) states that persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment.

The local physician will determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually).

If it is the opinion of the examining physician that an examinee is unqualified to perform hazardous waste site work or to wear a respirator, the physician should append a further report to this statement which details reasons for this opinion.

SUMMARY PROFILE

Employee Name: ________________________ Exam Date: __________

The Examining Physician and/or Medical Consultant has reviewed the medical information regarding the aforementioned employee, and the following has been established:

A ( ) There is no medical abnormality which will interfere with the duties of the individual.

B ( ) Medical condition exists which will not interfere with job responsibilities. The individual has been advised of this finding.

C ( ) The examination disclosed a medical abnormality which may require special consideration by the company.

D ( ) Deferred pending further evaluation. Employee will need outside medical records or additional subspecialty evaluation before a final determination can be made.

____
Signature of Reviewing Physician

APPENDIX B – INCIDENT REPORT AND INVESTIGATION

TYPE OF INCIDENT – CHECK ALL THAT APPLY

☐ INJURY/ILLNESS ☐ VEHICLE DAMAGE ☐ PROPERTY DAMAGE ☐ FIRE
☐ SPILL ☐ AIR EMISSION ☐ HIGH LOSS POTENTIAL ☐ OTHER

GENERAL INFORMATION

OFFICE/DEPARTMENT:___________________ REPORT # _______________________
DATE OF INCIDENT: ___________________________________ TIME (AM/PM) ___________
SUPERVISOR ON DUTY: __________________________AT SCENE OF INCIDENT? Y ☐ N ☐
DAY OF WEEK ___________________________
LOCATION OF INCIDENT: ____
WEATHER CONDITIONS: ____
ADEQUATE LIGHTING AT SCENE?: Y ☐ N ☐ N/A ☐

____

DESCRIBE WHAT HAPPENED

(Attach additional sheet if necessary)

____
____
____
____

AFFECTED EMPLOYEE INFORMATION

NAME: ____D&B EMPLOYEE ? Y ☐ N ☐
HOME ADDRESS:____
SOCIAL SECURITY NUMBER:___________________________________ AGE _________
HOME PHONE NUMBER: (________)___________________________
JOB CLASSIFICATION: _________________________________YEARS IN THAT JOB _______
YEARS WITH D&B: ________
NUMBER OF HOURS WORKED PRIOR TO INCIDENT (that day): ____________
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? Y ☐ N ☐

INJURY/ILLNESS INFORMATION

NATURE OF INJURY OR ILLNESS: ____
____

OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM: ______________________________
____

FIRST AID PROVIDED?: Y ☐ N ☐
IF YES, WHERE WAS IT GIVEN: (ON SITE, OTHER) _____________________________
IF YES, WHO PROVIDED FIRST AID? ____
WILL THE INJURY/ILLNESS RESULT IN:
RESTRICTED DUTY ___ LOST TIME ___ UNKNOWN
____

MEDICAL TREATMENT INFORMATION

WAS MEDICAL TREATMENT PROVIDED? Y ☐ N ☐
IF YES, WAS MEDICAL TREATMENT PROVIDED:
____ON SITE ____DR.'S OFFICE____HOSPITAL
NAME OF PERSON(S) PROVIDING TREATMENT: ______________________________
ADDRESS WHERE TREATMENT WAS PROVIDED: ______________________________

TYPE OF TREATMENT ____
____
____

VEHICLE AND PROPERTY DAMAGE INFORMATION

VEHICLE/PROPERTY DAMAGED: ____
DESCRIPTION OF DAMAGE: ____
____
____
____

SPILL AND AIR EMISSIONS INFORMATION

SUBSTANCE SPILLED OR RELEASED: _____________________________________
ESTIMATED QUANTITY/DURATION:_______________________________________
IS THIS A REPORTABLE QUANTITY?_____________________________________

RESPONSE ACTION TAKEN: ____
____
____
____

ADDITIONAL INFORMATION (e.g., witnesses)

____
____
____
____
____
____

NOTIFICATIONS:

NAME(S) OF D&B PERSONNEL NOTIFIED: __________________________________
____
____
____

PERSONS PREPARING REPORT

EMPLOYEE NAME: (PRINT) ____________________SIGN: _________________________
EMPLOYEE NAME: (PRINT) ____________________SIGN: _________________________
SUPERVISOR'S NAME: (PRINT) _______________________SIGN: ___________________

APPENDIX C – FOLLOW-UP INVESTIGATION REPORT

DATE OF INCIDENT: ______________ DATE OF INVESTIGATION REPORT: ___________________

____

INCIDENT COST: ESTIMATED: $__________________ ACTUAL: $___________

OSHA RECORDABLES: Y ☐ N ☐
RESTRICTED DAYS ______ # DAYS AWAY FROM WORK ___________

____

CAUSE ANALYSIS

IMMEDIATE CAUSES – ACTIONS AND CONDITIONS THAT CONTRIBUTED TO THIS EVENT

____
____
____

BASIC CAUSES, – SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT

____
____
____
____

ACTION PLAN

WHAT HAS AND/OR SHOULD BE DONE TO CONTROL THE CAUSES LISTED? INCLUDE MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS IF APPLICABLE.

ACTION	PERSON RESPONSIBLE	TARGET DATE

PERSONS PERFORMING INVESTIGATION

INVESTIGATOR'S NAME: (PRINT) ________________ SIGN: ___________DATE:_______

INVESTIGATOR'S NAME: (PRINT) ________________ SIGN: ___________DATE:_______

MANAGEMENT REVIEW

Project Manager: (PRINT)_________________ SIGN: ___________________DATE: ____________
COMMENTS: ____

____

HSC: (PRINT) ____________________ SIGN: ___________________DATE: _____________
COMMENTS: ____

____

NOTE: Attach additional information as necessary

EXAMPLES OF IMMEDIATE CAUSES

SUBSTANDARD ACTIONS	SUBSTANDARD CONDITIONS
1. Operating equipment without authority	1. Guards or barriers
2. Failure to warn	2. Personal protective equipment
3. Failure to secure	3. Tools, equipment, or materials
4. Operating at improper speed	4. Congestion
5. Making safety devices inoperable	5. Warning system
6. Removing safety devices	6. Fire and explosion hazards
7. Failure to use PPE properly	7. Noise exposure
8. Using defective equipment	8. Exposure to hazardous materials
9. Improper loading	9. Poor housekeeping
10. Improper lifting	10. Extreme temperature exposure
11. Improper position for task	11. Illumination
12. Improper placement	12. Ventilation
13. Servicing equipment in operation	13. Visibility
14. Under influence of alcohol/drugs	
15. Horseplay	

EXAMPLES OF BASIC CAUSES

PERSONAL FACTORS	JOB FACTORS
1. Capability	1. Supervision
2. Knowledge	2. Engineering
3. Skill	3. Purchasing
4. Stress	4. Maintenance
5. Motivation	5. Tools/equipment
	6. Work standards
	7. Wear and tear
	8. Abuse or misuse

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration	10. Health control
2. Management training	11. Program audits
3. Planned inspections	12. Engineering controls
4. Task analysis and procedures	13. Personal communications
5. Task observation	14. Group meetings
6. Emergency preparedness	15. General promotion
7. Organizational rules	16. Hiring and placement
8. Accident/Incident analysis	17. Purchasing controls
9. Personal protective equipment	

APPENDIX D – INSTRUMENTATION CALIBRATION LOG

Client:____________________ Project Location:____

Date:____________________ Project Number:____

Weather: Temperature range ___^{O}F to ___^{O}F. Relative Humidity:

Low	Moderate	High

____
____

Personnel/Trades:____
____

INSTRUMENT CALIBRATION

Time	Instrument	ID Number	Calibration Media	Initial Reading	Calibration Reading	Initials

Signature:___________________________

APPENDIX E – RESPIRATORY PROGRAM EVALUATION CHECKLIST/QUESTIONNAIRE

Employee Name _______________________
Title ______________________________

Description of Work Activities:
____

____

____

1. What jobs/activities require the use of respiratory protection?

2. Is respiratory protection used every time that it is required?

3. What type of respiratory protection is used?

4. Where is the respiratory protection stored?

5. How is the respiratory protection cleaned and maintained?

6. What was the date of the last fit test?

7. When did employee last receive respiratory protection training?

8. Are other employees that are required to use respiratory protection using it properly/effectively?

List any problems/concerns/comments:

APPENDIX B

NEW YORK STATE DEPARTMENT OF HEALTH
GENERIC COMMUNITY AIR MONITORING PLAN

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 mcg/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 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

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

December 2009

APPENDIX C

FIELD SIGN-OFF FORM

Appendix C

FIELD SIGN OFF

Each field team member shall sign this section after the site-specific training has been completed and before being permitted to work on site.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with all of its provisions.

Project: LIRR Arch Street Yard

Name (Print)	Signature	Date

THOMAS P. FOX, P.G.

Corporate Title
Vice President

Education
State Univ. of NY at Stony Brook, M.S. (Hydrogeology) - 1996

State Univ. of NY at Oneonta, B.S. (Geology and Water Resources) - 1986

Prof. Registration
Pennsylvania

Specialized Training
10-Hour OSHA Construction

NYCOER Certified Environmental Professional

Fractured Bedrock Assessment and Remediation Course, Burlington, Vermont

Geothermal Training Course, Heat Spring Energy, Elizabeth, NJ

Groundwater Hydrology and Pollution, Princeton, New Jersey

Groundwater Remediation, Orlando, Florida

Hazardous Waste Management, Summit Environmental Inc.

40-hour Health and Safety Training for Hazardous Waste Sites, USEPA

8-hour Hazardous Waste Supervisory Training

Railroad Worker Protection Training

Years Experience
27

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Professional Experience

Mr. Fox has over 27 years of experience covering a broad range of soil, surface water, bedrock and groundwater investigations and remediation projects involving hazardous waste and petroleum contaminated sites. He has also performed geologic investigations throughout New York State to determine soil and bedrock conditions including identification of bedding planes, major fractures, strike and dip and the type and condition of site bedrock. Through his work, Mr. Fox has gained extensive experience in managing complex, multidisciplinary projects. In addition to project management, Mr. Fox's responsibilities include proposal development, client and legal counsel liaison, and contract negotiations. His responsibilities also include negotiations with regulatory agencies and developing cost-effective remediation strategies for sites containing a wide array of contaminants. Mr. Fox is very experienced in development of bid specifications for subcontractor procurement, as well as the management of subcontracts.

Mr. Fox's technical responsibilities include the planning and management of site investigation and remediation assignments including remedial investigation/feasibility studies (RI/FSs) of state and federal Superfund sites and Brownfield sites. His technical skills include: bedrock and geologic investigations, evaluation of fractured bedrock settings at hazardous waste sites, determining bedrock conditions with regard to groundwater flow, developing cost-effective studies to assess the impact of a wide range of contaminants on the environment, wildlife and human health; assessing fate and transport of contaminants within complex hydrogeological settings; developing geochemical approaches to better define the nature and extent of groundwater and surface water contamination; and performing aquifer tests needed to design groundwater pump and treat systems. Mr. Fox has extensive experience in dealing directly with federal, state and local level environmental regulatory personnel on a wide range of projects. In addition, Mr. Fox has managed and performed numerous Phase I and II environmental site assessments and underground storage tank (UST) closure programs. He has completed and managed more than 160 environmental assessments and audits for commercial and industrial properties on Long Island, New York; New York City; New York State; Connecticut; Pennsylvania; and New Jersey.

Mr. Fox is Project Director of a major ongoing brownfield redevelopment and soil management program for Columbia University as part of the redevelopment of their Manhattanville Campus in upper Manhattan, New York. The Phase 2 Development project consists of the redevelopment of one city block which was previously used as light industrial and commercial properties into a mixed use college campus. The project will include the excavation and off-site disposal of 210,000 cubic yards of lightly to moderately contaminated soil. The project requires meeting the regulatory requirements of the New York City Office of Environmental Remediation (NYCOER) given the property is in the City's "E-Designated" Program as well as oversight from the New York State Department of Environmental Conservation (NYSDEC) given there exists a number of open petroleum spills association with the Site. The project included pre-characterization soil sampling, assisting Columbia with the development of contract specifications for soil management, drafting of a Remedial Action Work Plan (RAWP), selection of the excavation contractor, oversight of the soil excavation activities, implementing a comprehensive Community Air Monitoring Program (CAMP), and overall environmental management and final documentation of the brownfield remediation.

Mr. Fox served as project manager and lead technical specialist on a LIRR project involving the investigation and remediation of mercury contaminated soil at 20 electrical substations under the NYSDEC Voluntary Cleanup Program and included. The soil contamination was associated with the historical use of mercury rectifiers as part of the electrified rail system. The project included the collection of surface soil, subsurface soil and groundwater samples for chemical analysis and an exposure assessment to identify potential human health and environmental exposure pathways. Additionally, the LIRR project included the investigation and remediation of several dry wells and cesspools located a t each of the substations as part of the USEPA Underground Injection Closure (UIC) Program. The project also included the development of a Remedial Action Work Plan (RAWP) for each substation and the development of remedial design specifications and remediation oversight at 6 of 20 substations. As the project progresses, additional substations will be remediated in the future.

Working for a confidential client, Mr. Fox served as project manager and senior hydrogeologist for a groundwater investigation project located in Glenwood Landing, New York, which involved conducting a record review and several phases of field investigations to determine the likely source of groundwater contamination that was discovered on the client's property. The groundwater contamination consisting of chlorinated VOCs, primarily PCE - a common dry cleaning solvent, was not typical of the client's historical and current site operations. Furthermore, extensive on-site investigations conducted by others failed to identify any on-site source of this contamination. Regardless of these facts, the NYSDEC was requiring the client to remediate the contamination. The record search completed by D&B identified at least four potential sources of the chlorinated VOCs located within a mile and upgradient of the client's site including three dry cleaning businesses. In addition, groundwater sampling performed by D&B as part of the project identified a chlorinated VOC plume at least one-half of a mile in width that could not have originated from the client's property based on regional hydrogeology. Despite this compelling evidence, the NYSDEC would not release the client from the responsibility of remediating the contamination. As a final effort to support our position, a computerized groundwater model was developed for the site and surrounding area that was used to simulate groundwater flow and contaminant migration. The groundwater model clearly supported D&B's position that the observed contamination could not have originated from the client's site but could have come from one or more of the suspected upgradient sources. The modeling results were provided to the NYSDEC in October 2009. In 2012, the NYSDEC agreed with the final analysis and determined that the client was not responsible for remediating the groundwater contamination.

Mr. Fox served as project manager for the investigation of an inactive shotgun range located at the Brookhaven National Laboratory in Upton, New York. The objective of the investigation was to define the extent of lead impacts to site soil associated with this use and to develop a remedial strategy to clean up the lead. Utilizing the typical shot fall zone for skeet and trap shooting, Mr. Fox developed a sampling methodology designed to efficiently identify the areas of the range containing the highest concentrations of lead. The investigation was completed in a phased approach starting with the areas likely to contain the highest lead concentrations. Utilizing this approach, the firm was able to quickly and efficiently identify the limits of lead contamination requiring remediation. A remedial strategy was developed that included the treatment of soil containing the highest lead concentrations with a lead stabilization compound followed by the excavation of surficial soil. The remediation of the range is expected to be completed in the spring of 2010.

As part of the New York State Environmental Restoration Program (ERP), Mr. Fox served as project manager and lead hydrogeologist for the investigation of a former MGP site located near the Hudson River in Cold Spring, New York. Working for the Village of Cold Spring, the firm performed a subsurface investigation within and downgradient of the former MGP site. Mr. Fox worked closely with the NYSDEC project manager in the development of the investigation scope which included the collection of 8 surface soil samples, the advancement of 25 soil borings by Geoprobe, and the installation of 5 groundwater monitoring wells also by Geoprobe. Indoor and sub slab air samples were also collected in order to assess the potential for vapor intrusion occurring in a nearby building. The investigation included the assessment of bedrock conditions and the collection of sediment samples from the Hudson River to determine if the river had been impacted. Based on the investigation results, Mr. Fox developed an exposure assessment, which in turn was utilized in the development of site-specific remedial action objectives. A remedial strategy was developed for the former MGP based on the remedial action objectives and an evaluation of remedial technologies. The selected remedy included the excavation and off-site disposal of the most heavily impacted soil in and around the former MGP site along with long term monitoring of downgradient groundwater.

Mr. Fox was the project manager and lead hydrogeologist for the Glenmere Lake property NYSDEC Environmental Restoration

Program (ERP) project, located in the Town of Chester, New York. Under contract with the Orange County Department of Parks, the project involved the investigation of a 10-acre parcel located on Glenmere Lake, which also serves as the Village of Florida's drinking water supply. The investigation included the investigation of bedrock conditions and an intensive ecological assessment of the property in the spring of 2009 to determine if the property was utilized as habitat by the endangered Northern Cricket Frog. The project included the demolition of a number of dilapidated structures located on the site that contained lead based paint and asbestos containing materials. In addition, the investigation identified lead and arsenic contamination in the vicinity of the dilapidated buildings in shallow soil which also impacted nearby surface water sediments. Based on the investigation results, Mr. Fox developed a remedial alternatives analysis to determine the most appropriate and cost-effective approach to remediate the property and at the same time limiting the disruption of the lake shore line, associated wetlands and habitat for the Northern Cricket Frog.

Mr. Fox served as the project manager for a remediation project located in Astoria, New York that is being completed under the NYSDEC Voluntary Cleanup Program (VCP). The project involved a former metal plating/finishing business, which discharged chlorinated VOCs to an on-site dry well resulting in the contamination of soil and groundwater. The project included the development of a Remedial Action Work Plan (RAWP) with the site remediation being combined with the redevelopment of the property as a new hotel complex. To date, the RAWP has been submitted to the NYSDEC for review and approval. The remediation/site redevelopment will proceed upon approval of the RAWP by the NYSDEC.

Under contract with the Long Island Railroad (LIRR), Mr. Fox served as project manager and lead technical specialist for a Site Investigation/Remedial Alternatives Study conducted at an unregulated landfill located in Yaphank, New York. The project was completed under the NYSDEC Voluntary Cleanup Program and included the completion of 58 soil borings, the collection of surface and subsurface soil samples for chemical analysis and the collection of 12 groundwater samples from existing monitoring wells for chemical analysis. The project included an exposure assessment to identify potential human health and environmental exposure pathways. The project included the completion of an IRM in order to mitigate off-site exposure pathways. As part of the Remedial Alternatives Study, an evaluation of potential remedial alternatives for final site closure was completed. Based on this evaluation, it was determined that capping the site, improving site security and the implementation of land use restrictions would be the most appropriate remedial actions for the permanent closure of the site.

Functioning as the field operations manager and senior hydrogeologist on a large field investigation program of a former MGP site located in Bay Shore, New York, Mr. Fox was responsible for managing field operations which included the use of two Geoprobe field units, two hollow stem auger drilling operations and a groundwater sampling crew working concurrently in order to meet a highly aggressive project schedule. Within a three-month period, a total of 50 soil borings was completed, 40 monitoring wells were installed, 92 groundwater probes were completed and over 80 groundwater monitoring wells were sampled. This project also included an extensive indoor air sampling program of residential, commercial, school and church properties located downgradient of the site.

Mr. Fox was the project manager of an extensive soil and groundwater investigation involving a former MGP site located in Hempstead, New York. The project included the installation of 33 groundwater monitoring wells up to 165 feet deep, completion of 45 soil borings and 66 groundwater probes. The objectives of the investigation included identification of contaminant source areas, defining an off-site groundwater plume and providing sufficient data for the completion of a Baseline Human Health Risk Assessment and a Wildlife Impact Analysis.

As project manager of an Interim Remedial Measure/Investigation (IRM/Investigation) of an MGP related groundwater contaminant plume located in Brightwaters, New York, Mr. Fox was responsible for developing an investigation program designed to refine existing knowledge concerning the extent of the contaminant source area requiring treatment and to obtain additional geochemical data needed to assess existing geochemical/biochemical conditions of impacted groundwater. Based on the completed work, it was determined the area requiring remediation could be reduced by approximately 20 percent over prior estimates.

Mr. Fox served as project manager and senior hydrogeologist for the investigation and remedial design pilot study at the New York City Police Department's (NYPD's) Rodman's Neck Firing Range, located in the Bronx, New York. The Rodman's Neck range is the only NYPD outdoor shooting range, the largest police force in the world. As a result, soil at the facility is heavily impacted with lead due to the thousands of lead rounds that are fired at the 6 site ranges on a daily basis. This project included the assessment of site soil and groundwater to determine the nature and extent of lead. In addition, a pilot study was completed where lead slugs and slug fragments were sifted from approximately 1,000 cubic yards of soil from one on-site range and treated with a lead stabilization reagent. After treatment, the soil was placed back on the range. Post pilot study testing had demonstrated the treatment technology to be highly effective; and as a result, the NYPD is planning on expanding the pilot study to all six on-site ranges. As part of this project, Mr. Fox developed a low-flow sampling protocol that currently is used in the sampling of on-site monitoring wells which significantly improved the accuracy of dissolved-lead measurements in groundwater. This 5-year project includes the monitoring of over 30 groundwater monitoring wells and the collection of 144 soil samples on a biannual basis. To date, over 10,000 cubic yards of soil have been treated and stabilized as part of this project. In addition, over 400 tons of lead has been recovered for recycling. Through D&B's efforts, the NYPD was not required to pay hazardous waste generator taxes associated with the project, saving the Police Department over $80,000.

Under the NYSDEC Voluntary Cleanup Program, Con Edison undertook a Site Characterization Study (SCS) of a former MGP site located on the west side of mid-town Manhattan, New York. Mr. Fox served as project manager and senior hydrogeologist for the project. As part of the project, 26 borings and 9 test pits were completed and six monitoring wells were installed in a highly urbanized area. The project included an exposure assessment to identify potential human health and environmental exposure pathways associated with on-site contamination. The project also included a Remedial Action Work Plan (RAWP) including the evaluation and selection of remedial alternatives for the cleanup of the site. The project had to be completed on an expedited basis in order to accommodate the property owner's plans for site redevelopment.

Mr. Fox served as project manager and senior hydrogeologist for a RI/FS of titanium sheet metal manufacturer located on Long Island, New York. The project included the use of geophysical techniques, including magnetometer, terrain conductivity and ground penetrating radar (GPR) to identify potential areas of buried drums. Eight 200-foot groundwater monitoring wells were installed to collect groundwater samples.

Mr. Fox served as the project manager and senior hydrogeologist for a groundwater pump and treat remedial design project at an inactive hazardous waste site located in Rockland County, New York. The system consisted of an ultraviolet (UV) oxidation system to treat VOC contaminated groundwater and three groundwater extraction wells. Also serving as the project hydrogeologist, Mr. Fox was responsible for designing and managing the installation of a groundwater monitoring network, and the design and installation of two, 100-foot groundwater extraction wells screened within a fractured sandstone aquifer. He also conducted two, 3-day, constant rate aquifer pump tests.

Serving as project manager, Mr. Fox was responsible for a remedial design project of a commercial dry cleaning operation located in Lindenhurst, New York. The site was contaminated with dry cleaning solvents such as trichloroethene (TCE) and tetrachloroethene (PCE) through storage tank spills and discharges to on-site sanitary systems. The Project entailed the design of a groundwater recovery system including one off-site and one on-site groundwater extraction well, each pumping at 100 gallons per minute (gpm).

Working as project hydrogeologist on a RI/FS of a pesticide contaminated site located in western Nassau County, New York, Mr. Fox was responsible for assessing the fate and transport of a number of pesticides, including: lindane, heptachlor, chlordane and DDT. Based on the literature search and estimated retardation coefficients, and on the organic carbon content of site soils, Mr. Fox developed a fate and transport conceptual model that assisted in selecting an appropriate remedial action, which included: hot spot removal of the most contaminated soil; placement of a impermeable barrier over the remaining portion of the impacted area; and long-term environmental monitoring.

Mr. Fox has completed a number of tidal studies within coastal and estuarine settings to assess the influence of tidal fluctuations on groundwater levels and groundwater flow directions within contaminated sites. Locations where Mr. Fox has completed tidal studies include Staten Island, Rockaway Park, Oyster Bay and Sag Harbor, New York. Mr. Fox is experienced in the use of pressure transducers used to automatically collect water level data from monitoring wells and surface water gauging stations during tidal studies lasting between 48 hours and 7 days. He also is familiar with the operation of on-site weather stations which are used to record barometric pressure and precipitation during tidal studies. As part of the referenced tidal studies, Mr. Fox was responsible for the review and interpretation of water level and weather data, defining the tidal influences on groundwater, and how such tidal influences may impact contaminant fate and transport as well as the selection of remedial strategies.

Serving as a lead technical specialist, Mr. Fox supported and participated in insurance claim negotiations working for a confidential utility/energy provider. The objective of this project was to update prior cost models based on new environmental data and to provide a technical basis for insurance claims. The project included development of graphics supporting likely remediation scenarios for the properties owned by the client, as well as meetings between client legal counsel, insurance carrier counsel and insurance carrier technical experts.

ROBBIN A. PETRELLA

Corporate Title
Associate / Quality Assurance Officer

Education
SUNY at Buffalo, B.S. (Chemical Engineering) - 1986

Certifications
U.S. Environmental Protection Agency – Lead Based Paint Risk Assessor

U.S. Environmental Protection Agency – Organic Data Validator

U.S. Environmental Protection Agency – Inorganic Data Validator

CETCO Liquid Boot Company – Certified Inspector (Vapor Gas Barrier)

Years Experience
30

Office Location
Woodbury, NY

Contact
rpetrella@db-eng.com

Professional Experience

Since joining the firm over 26 years ago, Ms. Petrella has served as the Quality Assurance/Quality Control Officer for the firms Multi Media Compliance and Environmental Remediation Division as well as being responsible for a variety of multimedia environmental projects for municipal and industrial clients involving Phase I and Phase II Site assessments, Tier 2 environmental reviews, environmental regulatory compliance auditing and training, environmental monitoring, hazardous waste management and spill control and prevention. She has provided technical support to assist clients in reaching their goal of regulatory compliance and has developed guidance documents, standard operating procedures and training programs to enable them to maintain compliance. Ms. Petrella is certified by the U.S. Environmental Protection Agency as a lead-based paint risk assessor and has conducted hazardous materials assessments for clients prior to renovation or demolition of buildings and also as part of site inspections of buildings conducted for potential lease agreements.

Ms. Petrella is the project manager for numerous ORU projects including Phase I and Phase II ESA's for substations, Hazardous Materials Assessments, updates to the ORU Environmental Compliance Handbook, technical support for permit applications associated with flood protection berm upgrades in Rockland county, as well as a hazardous waste site evaluation for properties located in the ORU service territories in New York and New Jersey.

Ms. Petrella is currently D&B's Assistant Project Manager for the NY Rising Storm Recovery program under subcontract with the Dormitory Authority of the State of New York (DASNY). As part of this project, Ms. Petrella has acted as the point person for the Buyout and Acquisition program which entailed the completion of over 600 Phase I ESA's for properties single family and rental properties damaged during Superstorm Sandy, Hurricane Irene and Tropical Storm Lee. The Phase I ESA's were completed in accordance with ASTM E 1527-13. In addition the firm is responsible for conducting Tier 2 environmental reviews of properties damaged during Superstorm Sandy, Hurricane Irene and Tropical Storm Lee. As Assistant Project Manager, Ms. Petrella is responsible for coordinating day-to-day activities for the completion of the Phase I ESA's, Tier II checklists, including scheduling of staff for the preparation of the Tier 2 environmental checklists; coordinating with staff conducting quality assurance/quality control (QA/QC) reviews of the completed checklists. Ms. Petrella is also responsible for coordinating with the "issues team" and coordinating the resolution of issue sites to ensure there timely resolution. Resolution includes additional evaluation of sites with "issues" such as located in coastal barrier resource areas, historic properties and properties with environmental issues associated with remediation sites and spills. Once determinations were completed, checklists were revised and applications were processed. Ms. Petrella is also responsible for daily internal reporting as to the current status of the weekly Tier II checklists as well as any prior issue sites.

Ms. Petrella has been responsible for oversight of Hazardous Materials Assessments conducted by subcontractors, including MBE and WBE firms. The Hazardous Materials Assessments involved collection of lead-based paint samples and asbestos for several healthcare facilities, as well as small commercial properties.

Ms. Petrella has acted as the Project Manager for the firm's contract with the New York City School Construction Authority (NYCSCA). In that role, in support of the NYCSCA, her responsibilities included conducting and reviewing Phase I Site Assessments, Phase II Site Investigations, Indoor Air Quality Surveys, Site Assessments and Sub-slab Vapor Extraction System inspections at both SCA-owned or leased properties.

The Phase I ESA's were conducted in accordance with the most current version of the American Society for Testing and Materials (ASTM) guidance document E 152. As part of the Phase I ESA's, Ms. Petrella has conducted required site visits, interviews with site owner/manager, and a record review, including historical records such as Sanborn (fire insurance) maps, aerial photographs, historic topographic maps and environmental databases. Based on this research Ms. Petrella prepared and reviewed Phase I reports, detailing any recognized environmental conditions (RECs) associated with the site. If necessary, Phase II ESA work plans or Indoor Air Sampling Plans were prepared and implemented.

Ms. Petrella has performed multimedia compliance audits for several hospitals in both New York and New Jersey, as well as educational institutions. She also has prepared audit reports and EPA disclosure reports based on the compliance audits.

Ms. Petrella currently serves as Project Manager for eight Independent Environmental Monitor (IEM) projects in Manhattan. As IEM, D&B is responsible for monitoring noise and air emissions in order to ensure that Construction Mitigation Measures (CMMs) are being implemented. Ms. Petrella is responsible for reviewing all monitoring data and preparation of monthly compliance reports for submission to the New York City agencies overseeing the projects.

Ms. Petrella's duties include preparation of RCRA Training materials as well as providing training to D&B clients, primarily healthcare facilities and municipalities.

Ms. Petrella served as Project Manager for two projects undertaken by D&B for the City of Yonkers (COY) – Hazardous Waste Management Program and Long Term Monitoring Groundwater Monitoring/Remedial Activities at the COY Service Center. As part of the Hazardous Waste Management Program, Ms. Petrella was responsible for performing audits of all the COY facilities, preparation of waste generation summaries and RCRA training. Ms. Petrella was also responsible for oversight of the quarterly groundwater monitoring associated with an open spill at the COY Service Center, which includes collection of groundwater samples from the monitoring network of 25 monitoring wells, as well as evaluating appropriate remedial alternatives.

Ms. Petrella served as team leader for a Phase I Environmental Assessment of the 365-acre former Kings Park Psychiatric Center. The former KPPC operated for nearly 100 years and is situated in a campus-like setting with 48 vacant buildings (including a steam and electrical generating plant), open fields, wooded areas and a series of steam tunnels, roadways and walkways. Ms. Petrella was responsible for the coordination and direction of two inspection teams. Inspections were conducted of each building as well as all of the grounds. Ms. Petrella was also responsible for conducting interviews of former employees of KPPC, review of historical records and environmental databases and preparation of the Phase I ESA.

Ms. Petrella has also assisted in writing and editing numerous proposals, work plans, specifications and investigation reports. In addition, Ms. Petrella has worked on addressing comments from clients and regulatory agencies.

As the Quality Assurance/Quality Control Officer she has been responsible for preparing Quality Assurance/Quality Control Plans and Waste Analysis Plans for a number of large private sector clients. These include Chemical Waste Disposal Corporation, the International Business Machines Corporation, Northrop Grumman Corporation and the Long Island Rail Road. She also has prepared overall QA/QC programs for Northrop Grumman's on-site laboratories.

Ms. Petrella has prepared QA/QC Plans and data validation/usability reports for remedial investigation and feasibility studies conducted at numerous New York State Registry Sites, including those in the Towns of Cheektowaga, Schodack, and North Tonawanda, as well as the Villages of Croton-on-Hudson and Brentwood, New York. These tasks involved evaluation of the laboratory data to determine compliance with NYSDEC Analytical Services Protocols (ASP), as well as to determine the usability of the data particularly if it was not consistent with ASP requirements.

Ms. Petrella has assisted in the preparation and performance of air sampling programs for remedial investigation/feasibility studies (RI/FS) conducted at landfill/Superfund sites in Wallkill, New York and East Northport, New York. She has also performed water supply sampling for an RI/FS in Rensselaer County, New York, and a surface and subsurface water and soil sampling program as part of an RI/FS in Elmira, New York.

Ms. Petrella also has conducted indoor and outdoor air sampling programs as part of MGP site field investigations. She has conducted interviews with homeowners as part of the air sampling program. She also is responsible for data validation of all the data from the air sampling programs.

Ms. Petrella has acted as the QA/QC officer, and prepared and performed field audits for Superfund site investigations in Tonawanda, New York; Owego, New York; Brookhaven, New York; and Hornell, New York, and for a major railroad facility in New York City. She also has assisted in the preparation of laboratory contracts for analytical services for hazardous waste studies in Schodack, New York; Jamaica, New York; and the New York State Superfund Standby contract.

Ms. Petrella is responsible for the data validation of all data packages from ongoing hydrogeologic investigation and landfill closure investigations in Brookhaven and Hauppauge, New York. She also is responsible for validation of all data collected during field investigations for a large aerospace corporation, a major utility on Long Island, and manufactured gas plants across Long Island and the five boroughs.

LINDSAY PEPPE, P.G.

Corporate Title
Geologist

Education
State University at Albany, B.S. (Earth Science) – 2007

Professional Licenses
New York State Professional Geologist

Certifications
OSHA 40-Hour HAZWOPER

OSHA 10-Hour Construction Safety and Health

OSHA 8-Hour Confined Space Training

USEPA Certified Lead Inspector

NYSDOL Certified Asbestos Inspector

LIRR Roadway Worker Protection and Contractor Safety Training

Years Experience
8

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Professional Experience

Ms. Peppe has over 8 years of professional experience covering a wide range of subsurface and remediation projects for the firm including petroleum spill sites and hazardous waste disposal sites. Ms. Peppe has in-depth experience with various field operations and has been responsible for the collection of air, soil, groundwater and surface water samples and has provided engineering oversight for subcontractors to ensure compliance with work plans and contract specifications.

Throughout Ms. Peppe's professional experience, she has gained a broad knowledge regarding building construction, environmental regulations, environmental remediation, as well as the organization, production and management of certified documents. Ms. Peppe has assisted in the preparation and review of environmental reports, including Phase I and Phase II Environmental Site Assessments, Remedial Action Work Plans, Investigation Reports, Spill Closure Reports, Final Engineering Reports and Site Management Plans and has been responsible for the development of graphics, drawings, models and data tables associated with various projects.

Ms. Peppe is currently involved in the Metropolitan Transportation Authority's (MTA's) Underground Storage Tank and Environmental Remediation program, involving the investigation and remediation of petroleum-contaminated soil and groundwater at 19 bus depots located throughout the five boroughs of New York City. The majority of the soil and groundwater contamination observed at the bus depots is associated with the historical storage of diesel, waste oil and other petroleum products as part of the operation and maintenance of the New York City Transit Authority (NYCT) and the Metropolitan Transportation Authority Bus Company (MTABC) bus fleets. Ms. Peppe's primary responsibilities for the program include the preparation of monthly status reports, spill closure reports, remedial action plans and investigation reports, including the oversight of project team members assisting with the preparation of these documents. Ms. Peppe also coordinates with various subcontractors to ensure that all field work is conducted in accordance with the established work plans and project budgets, and assists with project scoping and budgeting.

Ms. Peppe is currently serving as project manager for a quarterly groundwater sampling program at the Long Island Rail Road (LIRR) Long Island City Passenger Yard. The yard has been used historically for storage, maintenance and fueling of diesel locomotives, which has resulted in petroleum impacts to soil and groundwater beneath the yard. Ms. Peppe is responsible for managing and coordinating all groundwater sampling and free-phase product monitoring activities at the yard. Ms. Peppe is also responsible for the preparation of quarterly groundwater reports discussing groundwater quality and the extent of free-phase product at the yard.

Ms. Peppe is currently serving as project manager for the Con Edison Elmsford Substation located in Westchester, New York. The goal of the project is to identify the presence and extent of contamination associated with a dielectric fluid (DEF) release and to develop a remedial plan that would address the identified contamination. Ms. Peppe has been responsible for managing all aspects of the project, which has included coordination with subcontractors to undergo the completion of a site investigation, as well as the development of a Site Investigation/Remedial Alternatives Report summarizing the completed investigation activities and selected remedy. Ms. Peppe is currently managing the remediation of the substation, which includes hot spot soil excavation in areas of identified DEF contamination.

LINDSAY PEPPE, P.G.

Ms. Peppe provided technical support for the Dormitory Authority of the State of New York (DASNY) to advance the "New York Rising" Program by conducting Tier 2 Environmental Reviews as required under the National Environmental Policy Act (NEPA) and New York State Environmental Quality Review Act (SEQRA). The Tier 2 reviews were conducted on properties where homeowners had applied for disaster relief funding to repair damage sustained during Hurricane Sandy. The first step of the review process included conducting database searches and creating 15 or more custom maps for each property in ArcGIS Explorer Desktop to document the property's proximity to environmental, aesthetic or historic resources and to identify potential nearby sources of environmental contamination. The second step was completion of an evaluation of the information and completing a site-specific checklist for each property.

Ms. Peppe is involved with the organization, maintenance and electronic input of analytical, geologic and hydrologic data associated with several projects utilizing EQuIS, an environmental data management software. Ms. Peppe is responsible for the review and importation of electronic data deliverables (EDDs) into the EQuIS database and subsequently submitting the completed EDDs to the New York State Department of Environmental Conservation (NYSDEC) for importation into the NYSDEC master EQuIS database. In addition, Ms. Peppe has experience utilizing GIS\Key, a data management and reporting tool. Utilizing EQuIS and GIS\Key, Ms. Peppe is responsible for the preparation of analytical data tables, sample location maps, boring logs and various diagrams and figures included in client reports.

Serving as a Field Geologist, Ms. Peppe was responsible for conducting a wide range of field activities associated with an extensive Phase I and Phase II Environmental Site Assessment (ESA) of the 365-acre former Kings Park Psychiatric Center (KPPC) located in Kings Park, Suffolk County, New York. The former KPPC operated for nearly 100 years as a psychiatric center and includes 48 vacant buildings (including a steam and electric generating plant) in a campus-like setting with open fields, wooded areas and series of roadways and walkways. Ms. Peppe has had a wide range of duties with the project including a review of environmental agency databases associated with the site, a visual inspection of the site to document recognized environmental concerns (RECs) and the completion of Phase II ESA field investigation activities. Specifically, Ms. Peppe assisted in the installation of 75 soil and groundwater probes utilizing Geoprobe, Direct-Push sampling technology, the completion of 27 test pits utilizing a backhoe and the installation of 11 groundwater monitoring wells utilizing the Hollow Stem Auger (HSA) drilling method. Over 260 soil samples and 30 groundwater samples were collected for analysis, both inside and outside buildings. As part of the sampling program, Ms. Peppe was involved with the collection of samples from inside abandoned buildings where she was required to wear Level C personal protective equipment (PPE). As part of the collection of exterior samples, Ms. Peppe utilized a Trimble GeoXH global positioning system (GPS) device in order to obtain GPS coordinates for all collected soil and groundwater samples in order to provide an accurate model for a sample location map depicting sample locations and on-site structures. Subsequent to the completion of field investigation activities, Ms. Peppe assisted in the preparation of the Phase I and Phase II Environmental Site Assessment Reports.

Ms. Peppe has assisted in the preparation of Investigation reports, Underground Injection Control Closure Reports and Remedial Action Work Plans as part of a Delineation Phase II Site Assessment program involving electrical substations of the Long Island Rail Road. The program is designed to identify and remediate areas of surface and subsurface contamination located at targeted electrical substations. In addition, Ms. Peppe has prepared contaminant concentration data tables and remedial figures associated with several of the targeted substations.

Ms. Peppe has been involved in a regulatory determination project for 82 LIRR electrical substations and eight LIRR Petroleum Bulk Storage (PBS) registered facilities. As part of this project, Ms. Peppe had to determine which of these facilities would be required to prepare a Spill Prevention Control and Countermeasures (SPCC) Plan. If facilities were determined to prepare a SPCC Plan, Ms. Peppe had to identify which of these facilities qualified as self-certified "Tier 1" facilities, "Tier II" facilities, or facilities that are required to have their SPCC Plan stamped by a Professional Engineer. In order to make this determination, each of the facilities was inspected and pertinent information was collected regarding the total aboveground and belowground oil storage of each facility, the distance to the nearest water body, the distance to the nearest drainage structures, the topography of the facility and surrounding areas and any additional relevant information to help determine the "discharge potential" of each facility.

LINDSAY PEPPE, P.G.

Ms. Peppe has been involved in a drainage inventory project for the LIRR involving nine Petroleum Bulk Storage (PBS) registered facilities. The purpose of the drainage inventory is to inspect each of the PBS facilities to identify and confirm the locations of drainage structures and petroleum storage areas within the facility and yard areas, and all associated fluid collection points. Drainage structures identified include floor drains, roof drains, storm drains, trench drains, oil/water separators, sewer manholes, sanitary sewers, storm sewers, storm sewer catch basins, dry wells and other underground injection control structures. The ultimate discharge point associated with each structure (i.e., storm sewer, sanitary sewer, combined sanitary sewer system, surface water or groundwater, surface or subsurface soil) will be determined through the use of facility drawings provided by the LIRR, sewer maps, dye testing and geophysical surveys. In addition, a GPS unit was utilized to identify the location of all inventoried structures. Ms. Peppe's responsibilities during the project have included the review of site drawings, recording GPS coordinates for inventoried drainage structures, flush and dye testing selected drainage structures, and subsequently determining the ultimate discharge points of drainage structures. Ms. Peppe was responsible for assisting in the preparation of final reports for each facility to document the locations of drainage structures and petroleum storage areas within the facility buildings and yard areas and all associated fluid collection points.

Ms. Peppe functioned as a field air monitoring technician at two major construction sites including the construction of a groundwater treatment plant at a former MGP site located in Bay Shore, NY, and the construction of a new dormitory building at the City College of New York. Ms. Peppe was responsible for daily air monitoring as part of a site-specific Community Air Monitoring Program (CAMP) throughout these construction projects. In addition, Ms. Peppe was responsible for the preparation of weekly air monitoring and construction activity reports.

PAUL J. BARUSICH

Corporate Title
Geologist II

Education
Susquehanna University, Selinsgrove, PA, B.A. (Geological and Environmental Science) – 2002

Stony Brook University, M.S. (Hydrogeology) -2013

Certifications
40-Hour Health and Safety Training Hazardous Waste Sites in Accordance 29 CFFR 1910.120(e)

10-Hour OSHA Construction Safety and Health Course

8-Hour HAZWOPER Annual Refresher

3-Hour LIRR Roadway Protection Training in Accordance with 29 CFR Part 214 Sub Part C.

Cetco Liquid Boot Inspection Certificate

Years Experience
10+

Office Location
Woodbury, NY

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Professional Experience

Mr. Barusich has 10 years of professional experience covering a wide range of soil, surface water, groundwater and soil vapor investigations and remediation projects. Mr. Barusich also has experience in hydrogeologic analysis with an emphasis on hazardous and solid waste site investigations including NYSDEC Part 360 hydrogeological investigations, NYSDEC Remedial Investigations (RIs), Phase I and Phase II site assessments, geotechnical investigations and Resource Conservation and Recovery Act (RCRA) investigations. He has extensive experience in conducting site characterization projects throughout Long Island, New York City, Westchester, Connecticut and New Jersey. Mr. Barusich is also experienced in the analysis of chemical and geological data associated with completed field investigations, as well as the creation of drawings and data tables utilizing programs such as GIS\Key, AutoCAD and ArcGIS.

Mr. Barusich served as the field geologist for Perfetto Contracting Company, Inc. during the reconstruction of storm and sanitary sewers in Staten Island, New York. He was in charge of a community air monitoring program (CAMP) which included the real-time air monitoring of volatile organic compounds (VOCs) and particulates utilizing a photoionization detector (PID) and dust meter (MEI pdr-1000), respectively, within the work zone. In addition, Mr. Barusich was responsible for screening the soil utilizing the PID during all excavation activities, preparing daily field activity reports, as well as downloading and formatting all required CAMP data.

Mr. Barusich provided technical support for the Dormitory Authority of the State of New York (DASNY) to advance the “New York Rising” Program by conducting Tier 2 Environmental Reviews as required under the National Environmental Policy Act (NEPA) and New York State Environmental Quality Review Act (SEQRA). The Tier 2 reviews were conducted on properties where homeowners had applied for disaster relief funding to repair damage sustained during Hurricane Sandy. The first step of the review process included conducting database searches and creating 15 or more custom maps for each property in ArcGIS Explorer Desktop to document the property’s proximity to environmental, aesthetic or historic resources and to identify potential nearby sources of environmental contamination. The second step was completion of an evaluation of the information and completing a site-specific checklist for each property.

Mr. Barusich served as the field geologist and assisted in the operations management of the East Garden City National Grid investigation. He performed a wide range of duties including the oversight of excavating contractors and the collection of surface and subsurface soil, as well as the installation and sampling of numerous groundwater monitoring wells. Mr. Barusich recorded descriptions of all recovered soil samples in accordance with the Unified Soil Classification System (USCS) and conducted perimeter and upwind/downwind air monitoring during intrusive field activities in accordance with the New York State Department of Health approved CAMP. In addition, Mr. Barusich was responsible for the daily maintenance and calibration of field instrumentation including a 4-gas meter, a mercury vapor analyzer, MiniRAE PIDs, MIE PDRs and DR-4000 aerosol monitors.

As part of the New York State Department of Environmental Conservation (NYSDEC) Environmental Restoration Program (ERP), Mr. Barusich served as the field geologist for the subsurface investigation within and downgradient of a former MGP site located near the Hudson River in Cold Spring, NY. The investigation scope included the low-flow sampling of 5 groundwater monitoring wells utilizing a bladder pump system. Indoor, outdoor and sub slab air samples were also collected by Mr. Barusich utilizing summa canisters in order to assess the potential for vapor intrusion occurring in a nearby building. As the building is an active facility, Mr. Barusich worked closely with site personnel to avoid interfering with site operations and to safely complete the investigation.

At Cuba landfill, a NYSDEC inactive hazardous waste site, Mr. Barusich provided oversight for a series of test trenches and test pits excavated to evaluate the characteristics of the waste being considered for reconsolidation and to develop an estimate of the quantity of waste to be consolidated from these areas. Mr. Barusich recorded descriptions of the soil and waste in accordance with the Unified Soil Classification System (USCS), and also conducted air monitoring for fugitive dust, organic vapors, and explosive vapors utilizing a MiniRAE PID and a MiniRAE four-gas meter. Mr. Barusich documented all field activities in daily written reports and through photographs.

Working under a NYSDEC contract, Mr. Barusich served as field manager for a methane vapor extraction system installed at a retail shopping center in Farmingdale, NY that was constructed on top of a landfill. The system consisted of a synthetic membrane and four industrial blowers connected to underground piping, which prevented the infiltration of methane gas inside the retail stores. Mr. Barusich was responsible for monitoring the efficiency of the blower units, and performing air quality monitoring of the 30 gas monitoring wells which surrounded the site utilizing a Landtec Portable Gas Analyzer.

Mr. Barusich served as Field Geologist for the Post-Closure Groundwater Monitoring Program at the Blydenburgh Road Landfill, Islip, New York. Field activities included groundwater sampling from a monitoring well network, sampling extraction wells and collection of site-wide groundwater water level measurements. Mr. Barusich assisted in preparation of quarterly and annual reports discussing groundwater quality and groundwater flow directions.

Mr. Barusich serves as the field geologist for the ongoing groundwater monitoring and overall performance monitoring of the remediation completed at the Town of Brookhaven Landfill, a former Class 2 Hazardous Waste Site. Routine semi-annual monitoring involves the collection of approximately 60 groundwater monitoring well, leachate and surface water samples. To date, the delineation of the leachate plume has involved re-establishing the existing downgradient monitoring well network of over 100 wells, rehabilitation and sampling of over 20 wells and completion of 22 vertical profile groundwater probes.

Mr. Barusich served as field activities manager of an air sparging system at Pilgrim Psychiatric Center located in Central Islip New York. The system consisted of 7 wells connected to an air sparging unit which helped remediate a former petroleum spill. A Landtec Portable Gas Analyzer was utilized to monitoring the system's air quality. Mr. Barusich also performed monthly sampling of 10 groundwater wells using a Grundfos submersible pump.

Mr. Barusich has had over six years of professional experience focused on environmental investigation and remediation, as well as watershed mapping, and environmental fieldwork. He has extensive experience with subsurface groundwater, soil and soil vapor sampling across New York, Connecticut and New Jersey. Mr. Barusich is also experienced in the summation and interpretation of chemical and geological data associated with completed field investigations.

Mr. Barusich served as the field geologist for a Phase II Environmental Site Assessment (ESA) for the Hellenic Service Station in Astoria, Queens, New York. He performed a wide range of duties including the oversight of subcontractors, collection and screening of soil samples by hand auger during vacuum extraction using a truck mounted guzzler unit. In addition, he collected soil samples by macrocore during Geoprobe, Direct Push sampling. He recorded descriptions of all soil samples in accordance with the USCS, and collected 4 subsurface soil vapor samples utilizing summa canisters. Four groundwater monitoring wells were installed as part of this project using hollow stem auger (HSA) drilling methods under the supervision of Mr. Barusich. After development, the wells were sampled using low-flow bladder pumps. Based on the surveyed elevations of each well and depth to water measurements, onsite groundwater flow direction was established.

Mr. Barusich served as the field geologist associated with a groundwater investigation of Nassau Oil Terminal in Princeton, NJ. Fifteen monitoring wells were redeveloped in order to remove sediment and reestablish the hydraulic communication between the well and the fractured bedrock aquifer. Because 12 of the 15 wells are bedrock wells which presented limited groundwater recharge, a low-flow bladder pump system was utilized to sample the wells. The sampling was completed under an aggressive project schedule, while managing to adhere to the rigorous New Jersey Department of Environmental Protection low-flow purging and sampling (LFPS) protocol which required utilizing Teflon lined tubing, stainless steel tubing check valves and couplings, measuring groundwater drawdown while purging and precisely calculating the stabilization of water quality indicator parameters prior to sampling.

Mr. Barusich has served as the field manager/geologist on numerous projects for the New York City School Construction Authority (NYCSCA) throughout Long Island City, the Bronx, Brooklyn, and Manhattan. The work assignments included contractor oversight, subsurface soil screening and sampling, low-flow groundwater sampling, subsurface soil vapor sampling with associated field

instrumentation, monitoring well installation and development, removal of underground storage tanks (USTs), delineation of NAPL in subsurface soil and groundwater and oversight of oxygen release compound (ORC) into weathered bedrock and overburdened soil and fill materials.

Mr. Barusich has been involved with the Long Island Rail Road (LIRR) projects since 2006 at numerous LIRR properties, including at least six electric substations, and the Long Island City Passenger Yard. Through this experience, Mr. Barusich has gained a thorough understanding of LIRR procedures and protocols associated with the investigation and remediation of LIRR properties. Mr. Barusich has experience with working safely in active LIRR right-of-ways and yards, and has maintained his Roadway Worker Protection Training since 2006. He has served as a field geologist associated with the Phase II Environmental site assessments

(ESAs) and remediation of 17 LIRR substations with historic mercury contamination. The work is being conducted as part of a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC). The overall goal of the program is to define and remediate areas of mercury and PCB contamination at targeted electric substations which provide power for rail services system-wide. The 17 substations investigations were completed in succession under an aggressive project schedule, involving the collection of numerous surface soil, subsurface soil and groundwater samples at each site. Mr. Barusich was responsible for the collection of soil samples utilizing Geoprobe direct-push sampling technology. He also conducted air monitoring utilizing the Jerome Mercury Vapor Analyzer and characterized the recovered soil samples in accordance with the Unified Soil Classification System (USCS), and provided coordination and oversight to construction contractors during remediation and backfilling activities associated with the substations.

Mr. Barusich served as the field geologist for the Remedial Investigation of the LIRR Long Island City Freight Yard site. The overall goal of the project was to define the extent of residual petroleum-related contamination from past site usage as a gasoline distribution and service station, as well as to provide recommendations pursuant to the closure of a NYSDEC spill associated with the site. Mr. Barusich was responsible for coordinating with subcontractors and implementing the subsurface investigation, including soil borings by the Geoprobe direct push method, characterizing the recovered soil samples in accordance with the Unified Soil Classification System (USCS) and the collection of groundwater samples from newly installed monitoring wells.

Mr. Barusich has also participated in the Supplemental Investigation and remediation of the LIRR / MTA train yard in Long Island City. He provided oversight to drilling contractors using Geoprobe Direct-Push equipment to install a series of temporary groundwater wells. After the wells were installed, Mr. Barusich conducted low-flow purging, and stabilization of field parameters utilizing a flow-through cell and turbidity meter prior to sampling from these temporary wells, and numerous other existing wells.

Serving as the field operations manager, Mr. Barusich was responsible for the implementation of a Phase II environmental site assessment for a proposed ConEdison substation in Manhattan, New York, in which local soil and groundwater were assessed through the completion of 10 soil borings and two geotechnical borings. Very shallow bedrock depths required changes to the work plan as the site work progressed, and as the site was an active multi-level parking lot, Mr. Barusich had to work closely with site personnel to avoid interfering with site operations, and to safely complete the investigation. Together with knowledge of the area's specific geology and hydrology this assessment provided the client a recommendation with regards to site remediation. As the site's health and safety officer, he conducted air monitoring utilizing Drager tubes, a MiniRae 2000 photoionization meter, and a Thermo DataRam dust/particulate meter.

At Brookhaven National Labs, Mr. Barusich helped test the membrane integrity of a tank farm. The overlying gravel was shoveled off the tank farm membrane, then an open-ended 55- gallon drum was placed on the membrane, and sealed against it using bentonite, and the drum was then filled with water. Over the next 24 hours, a series of leakdown tests were preformed involving the water level inside the drum with such variables as the surface area of the membrane exposed to water, the contribution of the weather conditions, and the thickness of the clay layer beneath the membrane.

Mr. Barusich was an integral part of the Rodman's Neck NYPD outdoor firing range lead remediation project involving the removal of lead bullets from the range soil and then adding a soil stabilizing agent. After treatment, a series of confirmatory post-excavation endpoint samples were then collected from each range to ensure the remaining soil met the project cleanup goals. After meeting these goals, the soil was placed back on the ranges. Three high volume air sampling stations, each consisting of a MIE DR-4000 dust monitor, were strategically placed at the perimeter of each range during the soil excavation and stabilization process. Personnel involved in these activities wore low volume personal air sampling pumps to document worker non-exposure to respirable dust particles that may contain lead. In addition, real-time monitoring for dust and fugitive emissions was conducted with a MIE PDR-1000 dust monitor with the data logging enabled. Filters from both high volume and low volume pumps were sent to a laboratory at the end of each day and analyzed for lead. Mr. Barusich was responsible for the setup and implementation of this air sampling equipment and the daily collection of the filters and shipment of filters to the laboratory.

As part of the ongoing operations and maintenance (O&M) program at the Rodman's Neck site, Mr. Barusich has been responsible for the collection of soil and groundwater samples during the biannual and annual sampling program. Each sample program is completed under an aggressive project schedule and involves the collection of up to 144 soil samples using the Geoprobe, direct push sample technology. In addition, up to 33 groundwater monitoring well samples are collected during each sampling program utilizing a low-flow sampling protocol which significantly improves the accuracy of dissolved-lead measurements in groundwater.

Mr. Barusich was responsible for the field work at several Con Edison substations involving the removal of a series of petroleum impacted french drains located at a number of electric substations. The field activities included: observation and documentation of field activities performed by a outside contractor hired by Con Edison, continuous air monitoring for potential vapors from within the work area/breathing zone using a Mini Rae 2000 Photo Ionization Detector (PID), and a Lower Explosive Limit (LEL) and Oxygen meter; as well as the collection of soil and aqueous samples for chemical analysis.

Mr. Barusich also provided oversight of an air sparging bioremediation pilot study at Con Edison's Hudson Avenue Generating Station (HGS) where a series of air sparging and soil vapor extraction wells were installed. Due to a dense network of underground utilities, an extensive utility clearance process via non-conducting handtools and a vacuum truck was utilized. As the HGS is an active facility, Mr. Barusich worked closely with site management to avoid interfering with site operations and to safely complete this investigation. Mr. Barusich preformed a wide range of duties including the oversight of subcontractors, and the collection of soil samples via hand auger during vacuum extraction. Mr. Barusich recorded descriptions of all recovered soil samples in accordance with the USCS, he also conducted upwind and downwind air monitoring and was responsible for maintaining and calibrating the field instrumentation including MiniRAE PID's, and a MiniRAE four-gas meter. He also conducted low-flow groundwater sampling at twelve of the pilot-study wells utilizing a bladder-pump and compressed air equipment. In addition, he is also active in monitoring and maintaining remedial systems at the site including an automated subsurface light nonaqueous phase liquid (LNAPL) recovery system, as well as a dewatering system currently being installed in the HGS elevated Tank Farm.

He has utilized field instrumentation, including PetroFlag for prescreening, and lab analysis results for contaminant delineation at petroleum contaminated sites. He also was responsible for the daily maintenance and calibration of field instrumentation at these sites including Photovac photo ionization detectors, multi-gas meters, and Grundfos submersible groundwater sampling pumps.

As a GIS specialist, Mr. Barusich produced maps and data sets utilizing GIS ArcView and ArcGIS, and GPS. He assisted with land use maps and watershed mapping, as well as being an integral part of the Federal Emergency Management Agency's Digital Flood Map project. He also updated maps for the emergency dispatch center, and conducted fieldwork and quality control to enhance the accuracy of data.

Mr. Barusich assisted in installing and developing 15 groundwater monitoring wells at the Montandon Marsh in Lewisburg Pennsylvania. The wells were sampled using low-flow sampling methods, including a Horiba water quality meter and flow-through cell. Mr. Barusich was also responsible for surveying the wells, utilizing standard surveying technology as well as global positioning system (GPS) equipment, and the summation of the chemical data gathered from the sampling activities.

PAUL J. BARUSICH

At Centralia, Pennsylvania, Mr. Barusich was involved in a study of the evolution of microorganisms in response to the increased soil temperature and altered soil chemistry in the area affected by underground mine fires. After setting up a site-wide grid, he assisted in soil moisture tracking utilizing Time Domain Reflectomerty (TDR).

BRIAN WERNER

Corporate Title

Environmental Scientist, Health and Safety Coordinator

Education

New England College, B.A. Environmental Studies - 2004

Certifications

OSHA 40-hour HAZWOPER

OSHA 10-hour Construction Training

8-hour HAZWOPER Annual Refresher

Asbestos Awareness Training

EPA Certified New York Inspector for Lead-Based Paint

STI Aboveground Tank System Inspector– SP001

LIRR Roadway Worker Protection and Contractor Safety Training

Hazard Communication Awareness

IAQ/IH Sampling

Years Experience

11+

Office Location

Woodbury, NY

Contact

bwerner@db-eng.com

Professional Experience

Mr. Werner's professional experience includes a variety of multimedia compliance projects for commercial, municipal and industrial clients involving Article 12 compliance for toxic and hazardous materials storage, environmental investigation, remediation oversight, soil management, spill prevention planning, petroleum and chemical bulk storage, underground storage tank removals, and regulatory compliance audits. Other assignments have included, but are not limited to the following: tracking soil excavation, trucking and waste disposal, scheduling, contractor management, and preparation of proposals, work plans, health and safety plans, report preparation, and interfacing with clients, regulatory agencies and contractors.

Mr. Werner specific experience is summarized below:

Mr. Werner has assisted a State College and industrial clients located throughout Suffolk County to achieve compliance with Article 12 regulations for toxic and hazardous materials storage. The projects involved on-site assessments of petroleum tanks, chemical tanks and drum storage areas regulated under Article 12. Mr. Werner has prepared letter reports documenting the tank and drum storage areas assessment findings and recommendations for corrective action. Reviewed and provided comments on Permit to Construct application construction documents, engineering plans, as-built drawings, completed Toxic Liquid Storage Registration Forms and tank signage templates relating to Article 12 compliance.

Mr. Werner served as a Field Manager providing oversight for a Brownfield's site located in Long Island, New York. Remediation was conducted at the site to remove petroleum contamination encountered throughout the site and adjoining properties. Approximately 8,500 cubic yards of nonhazardous, contaminated soil was excavated, removed and transported off-site for disposal. Mr. Werner provided daily oversight associated with the remediation operations conducted by the contractor. In addition, he provided Daily Field Activity Reports (DFARs) documenting field activities, photographic logs documenting remediation activities and sampling locations. In addition as part of this project Mr. Werner was responsible for ensuring the contractor meet the requirements specified in the contract documents. Mr. Werner provided periodic communication with New York State Department of Environmental Conservation (NYSDEC) personnel on the progress and daily issues requiring resolution.

Mr. Werner served as a Field Operations Manager providing oversight for remediation work activities at the former Jamaica Water Supply well and tank stations throughout Queens, New York. Remediation was conducted at each of these sites to remove and encapsulate mercury and other associated heavy metals. Mr. Werner provided daily oversight associated with the remediation operations conducted by the contractor. In addition, he provided DFARs documenting field activities, photographic logs documenting remediation activities and sampling locations. Site plans were provided documenting pipe removal locations, sample locations and analytical results. The project dealt with several areas associated with the NYCDEP well and tank stations including the interior of the well/tank station buildings, blow-off sump replacement/backfill, and soil removal from the perimeter of the water storage tanks. Approximately 2,000 cubic yards of contaminated soil was excavated, removed and transported off-site for disposal Mr. Werner provided oversight documentation for the entire project, as well as daily communication with NYCDEP personnel on the progress and daily issues requiring resolution. Mr. Werner provided the NYCDEP with copies of the DFARs, photographic logs, tabulated analytical results and site plans with sample locations, analytical results and locations of pipe removal.

BRIAN WERNER

Mr. Werner provided oversight activities associated with the excavation and removal of underground storage tanks (USTs) located in Brooklyn and Staten Island, New York. These projects were undertaken to properly close, excavate and remove the USTs and take “end point” samples to determine if the tank had impacted subsurface soil. Mr. Werner was responsible for preparing DFARs and photographic logs documenting the daily field activities.

Mr. Werner provided oversight for the removal of PCB-contaminated soil from the perimeter of a New York City School. The project included the excavation of contaminated soil and the collection of end point samples to “clear” excavated areas. In addition, continuous air monitoring was conducted during excavation related activities. DFARs were prepared documenting work activities, along with a report with findings and tabulated results.

Mr. Werner provided oversight and sampling support associated with the closure of permitted storage rooms located at a manufacturing facility located in Dutchess County, New York, and TSDF located in Suffolk County, New York. The project included the decontamination of a number of permitted hazardous waste storage rooms. Once the room had been decontaminated, Mr. Werner collected water and wipe samples to be analyzed to ensure the area had been properly decontaminated, and generated a closure report documenting the site, work activities, photographic logs, tabulated sample results and findings.

Mr. Werner provided oversight and sampling support associated with the decontamination of RCRA Solid Waste Management Units (SWMUs) located at a manufacturing facility located in Dutchess County, New York. The project included the decontamination of numerous SWMUs located at the site. Once the SWMU had been decontaminated, Mr. Werner collected rinsate water samples to be analyzed to ensure the SWMU had been properly decontaminated and prepared a closure report documenting the site, work activities, photographic logs, tabulated sample results and findings.

Mr. Werner conducted field sampling in support of a former dry cleaning ground water remediation site located in the Long Island area. The project required periodic site sampling for vapor and groundwater sampling, as well as documenting readings from an influent and effluent flow meters at each of the sites. In addition, Mr. Werner was responsible for coordination with the subcontractor to oversee routine maintenance on the system as needed.

Mr. Werner screened excavated soil associated as part of a “contained-in” demonstration in support of a manufacturing facility located in Dutchess County, New York. The project included the continuous screening of soil for elevated readings for volatile organic compounds (VOCs), odors and/or staining, as well as conducting head space sampling once a certain quantity of soil had been excavated from the area. Mr. Werner was also responsible for drafting DFARs documenting work activities.

Mr. Werner provided oversight and sampling support associated with mold remediation for a college located in Westchester County and a 7-story building located in Manhattan, New York. The projects involved field oversight for areas requiring remediation, field observation, air clearance sampling, documentation of sample locations and data review.

Mr. Werner conducted indoor air quality and sub-slab surveys for City agencies, commercial and industrial facilities. The project involved initial site inspection to confirm site conditions and inventories of chemicals stored on site; condition of air samples using certified summa canisters; prepared letter reports documenting findings; and tabulated sample results compared to the appropriate standards.

Mr. Werner conducted initial, annual and five-year inspections of chemical bulk storage (CBS) tanks for a major metropolitan area municipality, manufacturing facilities and city agencies. The projects involved conducting a review of drawings and specifications to ensure compliance with NYSDEC CBS regulations prior to a CBS being placed into service, as well as a visual site inspection of regulated CBS tanks, generating checklists of items identified during the site inspection. Mr. Werner was responsible for the preparation of engineering reports documenting violations, maintenance requirements and other recommendations associated with the CBS tank systems. In addition, as part of 5-year inspections, Mr. Werner provided oversight for tank cleaning activities. Mr. Werner was responsible for coordination between the client and contractor, oversee emptying and cleaning of CBS regulated tank, as well as ensure proper management of waste while on-site.

Mr. Werner prepared Spill Prevention Reports (SPRs) for municipalities, manufacturing facilities and City agencies. Responsibilities included ensuring the plan met the requirements mandated by the NYSDEC under the CBS regulations.

Mr. Werner assisted with the preparation of Phase I Environmental Site Assessments (ESAs) for a variety of sites and facilities located in the New York area. Typically, assignments include activities such as site inspections to identify potential issues observed at each of the sites, generating FOIL letters sent to federal, state and local agencies requesting information for each of the sites, and obtaining information from EDR databases to generate Phase I ESA reports for each of the sites.

Mr. Werner conducted drainage inventory assessments at active Long Island Rail Road (LIRR) rail yards which consisted of a detailed review of existing site drawings, conducting interviews with key personnel and performing dye testing activities.

Mr. Werner was responsible for creating and revising Spill Prevention, Control and Countermeasure Plans (SPCC) for bus companies, manufacturing facilities and city municipalities. Responsibilities included ensuring the plan met the requirements mandated by the USEPA under the SPCC regulations.

Mr. Werner drafted hazardous waste generation summary tables for a municipality from findings noted during site inspections. Responsibilities included formulating tables that addressed hazardous and non-hazardous waste generated at each facility. The tables included the following: waste stream, point of generation, accumulation/storage/ disposal method, estimated monthly quantity of waste generated, waste determination, comments and recommendations.

Assisted in the update of Vessel Security Plans and Facility Security Plans for Clean Water of New York. The project involved adding two barges to Clean Water's former plans and reviewing the plans to ensure that the regulatory requirements were met.

Provided oversight for operations at a Household Hazardous Waste Collection Day Program for a local municipality. As part of the assignment, Mr. Werner was responsible for drafting a letter report and photographic log documenting all work activities.

Mr. Werner was responsible for the collection of soil and groundwater samples in support of numerous Phase II and remedial investigation projects. Projects involved the collection of soil samples from borings advanced utilizing the hollow-stem auger and Geoprobe units.

Mr. Werner conducted sampling activities in support of a State Pollutant Discharge Elimination System (SPDES) study for the Brookhaven National Laboratory (BNL). The project included the collection of grab and composite samples from sanitary manholes, cooling tower blow downs, faucets, outfalls and other locations. In addition, the project required coordination between facility personnel to collect site specific samples.

Mr. Werner conducted a SPDES audit for a major metropolitan area municipality. The project involved a document review of all pertinent reports, data and plans associated with the facility, interviews with key personnel and site inspection. Mr. Werner prepared findings report which included checklists documented during the document review and site inspections.

Mr. Werner conducted site inspections in support of a USEPA – Region 2 Facility Audit Agreement to address federal, state and local environmental compliance issues. Also, Mr. Werner was responsible for the preparation of a disclosure report documenting the results of the environmental compliance audit.

Mr. Werner generated Standard Operating Procedures (SOPs) for municipalities and bus companies. Responsibilities included ensuring that SOPs documented the proper procedure for work practices as they pertain to each of site, as well ensuring that the procedures are being conducted in accordance with federal, state and local regulations.

Mr. Werner conducted lead-based paint surveys/inspections at municipality facilities for the presence of lead-based paint. The surveys included a visual site inspection of areas, collection of paint chip sampling and use of an XRF meter to confirm if any tested positive for lead-based paint.

BRIAN WERNER

Mr. Werner's professional experience includes technical support in the area of "lab packing," manifesting and segregating various chemical products, hazardous waste and hazardous materials in accordance with U.S. Department of Transportation (USDOT) and U.S. Environmental Protection Agency (USEPA) regulations. In his former role as lead field chemist for a major metropolitan treatment, storage and disposal facility (TSDF), Mr. Werner has extensive experience in the "in-field" treatment of high hazardous waste and materials. In addition, he provided technical support with respect to characterizing unknown chemicals, and has been involved with the development and delivery of a variety of hazardous waste training programs. As lead field chemist, he was responsible for being in daily communication with employees and clients primarily aimed at resolving issues regarding the proper characterization of waste materials in preparation for off-site transportation and disposal.

As part of an "outsourcing program" presented by the TSDF at higher education institutions like SUNY Stony Brook and Vassar College, Mr. Werner was the lead field chemist responsible for achieving and maintaining the regulatory compliance of their Main Accumulation Areas (MAA) and Satellite Accumulation Areas (SAA). As part of the "outsourcing program," Mr. Werner was responsible for the development and implementation of various compliance reports designed to keep management and clients informed as to the status of the tasks in which he was involved. Mr. Werner led and worked on numerous assignments involving the decontamination of areas where lead, mercury and various petroleum spills had occurred.