FORMER
DRIGGS PLYWOOD CORP. SITE

11 JACKSON STREET
BROOKLYN NEW YORK
Block 2741 Lot 47

REMEDIAL ACTION WORK PLAN

JUNE 2013
Revised November 2013

Prepared for:
JACKSON ESTATES II, LLC
520 Roebling Street, Suite 316
Brooklyn, NY 11211

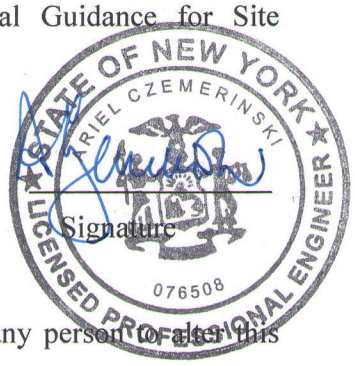
Prepared By:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

AMC Engineering
99 Jericho Turnpike, Suite 300J
Jericho, NY 11753
Phone: (516) 417-8588

CERTIFICATIONS

I Ariel Czemerinski certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



076508	11/14/2013	
NYS Professional Engineer #	Date	Signature

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

TABLE OF CONTENTS
Remedial ACTION WORK PLAN
Former Driggs Plywood Corp. Site

TABLE OF CONTENTS
Remedial ACTION WORK PLAN
Former Driggs Plywood Corp. Site

TABLE OF CONTENTS
Remedial ACTION WORK PLAN
Former Driggs Plywood Corp. Site

TABLE OF CONTENTS
Remedial ACTION WORK PLAN
Former Driggs Plywood Corp. Site

TABLE OF CONTENTS
Remedial ACTION WORK PLAN
Former Driggs Plywood Corp. Site

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

LIST OF ACRONYMS

Acronym	Definition
AMC	AMC Engineering
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CQMP	Construction Quality Management Plan
DUSR	Data Usability Statement Report
EBC	Environmental Business Consultants
FER	Final Engineering Report
HDPE	High Density Polyethylene
IRM	Interim Remedial Measure
NYC	New York City
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PS	Public School
PVC	Polyvinyl Chloride
RAO	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RSCOs	Recommended Site Cleanup Objectives
SCG	Standards, Criteria, and Guidelines
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SSDS	Sub-slab Depressurization System
SWPPP	Stormwater Pollution Prevention Plan
SVOCs	Semi-Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

This Remedial Action Work Plan has been prepared by Environmental Business Consultants (EBC) and AMC Engineering (AMC) for a commercial property located 11 Jackson Street in the Williamsburg section of Brooklyn (**Figure 1**). The Site known as the Former Driggs Plywood Corp. Site (the Site) has been formally presented for entry into to the New York State Department of Environmental Conservation (NYSDEC) Brownfields Cleanup Program (BCP) through an application submitted on June 17, 2013. The applicant has applied to this program as a Volunteer.

The Site address is 11 Jackson Street, Brooklyn, New York 11211. It is located on the north side of Jackson Street between Union Avenue and Meeker Avenue in Brooklyn, New York. The site is designated as Block 2741 Lot 47 on the Brooklyn Tax Map. The Site consists of a single tax parcel with 72 feet of street frontage on Jackson Street and is 130 feet deep for a total of 9,360 square feet (0.20 acres) (see **Figure 2**). The lot is currently developed with a vacant one-story brick building occupying the entire lot.

The property has an elevation of approximately 15 feet above the National Geodetic Vertical Datum (NGVD) feet. The depth to groundwater beneath the site, as determined from field measurements, is approximately 8 feet below grade. Based on regional groundwater contour maps, groundwater flow is expected to be toward the west.

Historic records shows the subject site as being developed developed prior to 1887 as three separate thin lots, each developed with a 3-story residential building in the front of the lots, and smaller 2-story dwellings in the rear of the lots. Each of the three lots was labeled with the street numbers 11 Jackson Street, 13 Jackson Street and 15 Jackson Street. The lots remained unchanged until around 1951 when two of the lots were cleared, leaving only the 3-story residential building on 11 Jackson Street. The 3-story building remained until the property was redeveloped in 1951 with the same building currently located at the Site. All Sanborn maps until the most recent map (2007) label the Site building as being used for lumber storage. City Directory listings from 1965 and 1973 identify the Driggs Plywood Corporation at the 11

Jackson Street address. Arnmart Whole Beer Distributers were posted in directory listings from 1997 and 2000, and "Car Fashion Seat Covers" was listed in 2005. It is not known if the beer distributor or car seat cover shop occupied half of the building or the entire building. The building is currently vacant but was most recently occupied by a charter bus maintenance / repair garage (western half of lot) and a metal fabrication shop (eastern half).

Chlorinated solvent contamination was observed in soil, soil gas and groundwater during the Remedial Investigation.

Summary of the Remedial Investigation

The remedial investigation was performed from March 16-20, 2012 and May 8, 2013 in accordance with the Remedial Action Work Plan approved by the NYCOER as part of the E-designation review process. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- Soil sampling and analysis for volatile and semi-volatile organic compounds (VOCs, SVOCs) in soil samples from soil boring locations;
- The installation of groundwater monitoring wells;
- The collection and analysis of groundwater samples for volatile and semi-volatile organic compounds;
- Sampling for non-petroleum contaminants such as pesticides, PCBs and metals in soil and groundwater including the analysis of soil and groundwater samples
- The collection of analysis of subslab soil gas samples for VOCs.

The field work portion of the RI was conducted by Environmental Business Consultants (EBC) from March 16-20, 2012 and May 8, 2013, in accordance with the protocols and methods as established in the approved Remedial Investigation Work Plan).

The results of sampling performed during this RI, The results of the RI identified elevated levels of both tetrachloroethene (PCE) and trichloroethene (TCE) in soil gas above mitigation levels established within the State DOH soil vapor guidance matrix. TCE concentrations in soil gas ranged from 10.4 μg/m^3 to a high of 12,300 μg/m^3. PCE concentrations ranged from 10.4 μg/m^3 to 8,270 μg/m^3. TCE concentrations in 5 of the 6 samples obtained and PCE concentrations in 4 of the 6 samples were above the NYSDOH threshold requiring action (monitoring or mitigation).

PCE and TCE were detected within four of the seven shallow (0-2 ft) soil samples retained at the Site and one of the five deeper (4-6 ft) soil samples, however, neither PCE nor TCE were detected within any of the soil samples at a concentration above Unrestricted Use SCOs.

Groundwater was encountered at a depth of approximately 8 feet below grade. No VOCs were detected within the three groundwater samples above NYSDEC groundwater standards. However, a low concentration of PCE was detected within one of the groundwater samples at a concentration slightly below the GQS.

SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and ideno(1,2,3-cd)pyrene, were reported above restricted soil cleanup objectives (SCOs) in shallow soil (0-2ft) at all five of the boring locations.

One or more metals including barium, copper, lead and mercury were reported above restricted residential SCOs in shallow soil in all five boring locations. Zinc was reported above unrestricted SCOs at all boring locations. Although elevated SVOCs and metals are commonly associated with historic fill, in this case some of the metals may be related historic site use and SVOC concentrations in one of the borings (>600,000 ug/kg) was considerably above that typically encountered in historic fill.

Qualitative Human Health Exposure Assessment

The qualitative exposure assessment identified potential completed routes of exposure to construction workers and remediation workers through inhalation, ingestion and dermal contact

during excavation activities. The Health and Safety Plan prepared for the site identifies such exposures and provides instructions for on-site workers to minimize potential exposure. Occupants in the proposed on-site residential buildings may be exposed to VOCs through the vapor intrusion pathway if VOCs in source area soil and groundwater are not remediated, or if preventive measures such as vapor barriers or sub-slab ventilation are not employed.

Potential environmental impacts through the groundwater to surface water discharge were not expected based on the low levels of site related contamination in groundwater and the distance to the nearest surface water receptor.

Summary of the Remedy

The remedy recommended for the Site is the Track 2 alternative which consists of the testing and removal of all CVOC contaminated soil from "hotspot" areas of the site. In addition all fill material with parameters above restricted residential SCOs will be removed from the Site and properly disposed of at an off-site facility. The remedy will include the following items:

1. Removal of CVOC impacted soil from the property.
2. Excavation of soil/fill exceeding Track 2 - restricted residential SCOs as listed in **Table 1** to a depth of 15 feet;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of restricted residential SCOs;
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. Installation of a sub-slab depressurization system and vapor barrier beneath occupied areas of the building to be constructed on the Site.

8. A composite cover system consisting of the concrete building slab will be constructed across the entire Site.
9. Implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls.
10. An Environmental Easement will be filed against the Site to ensure implementation of the SMP.

All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

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

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

On June 17, 2013. Jackson Estates II LLC submitted an application to the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate a 0.20-acre property located at 11 Jackson Street in Kings County, New York as a Volunteer in the New York State Brownfield Cleanup Program (BCP). A residential use is proposed for the property. When completed, the Site will be redeveloped with a new multi-family residential apartment building. Refer to the BCP application for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between March 16 through 20, 2012 and May 8, 2013. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 SITE LOCATION AND DESCRIPTION

The Site address is 11 Jackson Street, Brooklyn, New York 11211. It is located on the north side of Jackson Street between Union Avenue and Meeker Avenue in Brooklyn, New York. The site is designated as Block 2741 Lot 47 on the Brooklyn Tax Map. The Site consists of a single tax parcel with 72 feet of street frontage on Jackson Street and is 130 feet deep for a total of 9,360 square feet (0.20 acres). The lot is currently developed with a vacant one-story brick building occupying the entire lot.

A boundary map is provided as **Figure 2** and will be attached to the Brownfield Cleanup Agreement as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.20-acre property is fully described in **Attachment A – Metes and Bounds.**

1.2 CONTEMPLATED REDEVELOPMENT PLAN

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

The site is to be redeveloped through the new construction of a single 8-story multi-family apartment building. The building will include 44 residential apartments split between studio, 1 and 2 bedroom apartments. The project does not include a basement level. First floor use will include garage space for cars and bicycles, on-site laundry rooms, a lobby and a first floor daycare center.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The surrounding land use includes underutilized commercial / vacant properties to the west, multi-family residential buildings to the north, mixed-use residential / retail buildings to the east and the Brooklyn Queens Expressway to the South (see **Figure 3**).

The area surrounding the property is highly urbanized and predominantly consists of multi-family residential buildings with mixed-use buildings (residential w/ first floor retail) along main corridors such as Meeker Street located just south of the Site and Union Avenue just west of the Site. The area is marked by late 19th and early 20th century rowhouses with commercial and industrial properties interspersed throughout the residential sections. The area to the north of the Site was historically characterized by heavy industry and manufacturing. Following a steady decline of manufacturing in the area from the late 1960's through the 1980's, many of the industrial properties were vacated leaving the buildings to be vandalized and become derelict. Conditions continued to decline throughout the 1980's and 1990's.

The property is zoned M1-2 / R6 residential. The proposed project is compatible with the surrounding land use, and will be in compliance with the current zoning.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The field work portion of the RI was conducted by EBC during two mobilizations to the site: the initial RI mobilization March 16, 2012 through March 20, 2012 and a supplemental mobilization on May 8, 2013. The field investigation consisted of the environmental sampling, field observations and measurements to determine:

- Local geologic/hydrogeologic conditions
- Definition of source areas
- Potential migration of contaminants from the site to surrounding areas
- Overall characterization of site-related contamination in all media

The field effort included the collection and analysis of soil, groundwater and soil vapor samples. Drilling services were provided by Eastern Environmental Services (Eastern) of Manorville, NY. Laboratory services were provided by Phoenix Environmental Laboratories of Manchester, CT. A sample matrix showing the number, type and analysis of samples collected during the Remedial Investigation is provided as **Table 2**.

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

2.1.1 Borings

Seven soil borings (B1-B7) were advanced to evaluate the extent and degree of impact in the identified and suspect source areas and to obtain general soil quality information across the site. Drilling services were provided by Eastern Environmental Services of Manorville, NY.

At soil boring locations B1-B5 soil samples were collected continuously in 4 or 5-foot intervals using a Geoprobe™ model 6620DT, probe drilling machine. The Geoprobe™ system uses a direct push hydraulic percussion system to drive and retrieve core samplers. Depending on the model probe rig used, soil samples were retrieved using a 1.5-inch diameter, 5-foot long macro-core sampler with disposable acetate liners.

Borings B6 and B7 were completed on the northern portion of the property, north of previously completed borings B1 and B2. Each of the two borings were performed utilizing a 2-foot long AMS Dual-Purpose Soil Recovery Probe with disposable plastic liners and a slap hammer. At each sampling location, the soil recovery probe was driven to a depth of approximately 2 feet below grade and a sample was retained representing the interval 0-2 feet below grade.

Each soil sample recovered from the soil borings was characterized by an experienced geologist qualified environmental professional (QEP) and field screened for the presence of VOCs using a photo-ionization detector (PID). The geologist's field observations and PID readings were recorded for each boring in a soil boring log. The location of soil borings are shown on **Figure 4**.

2.1.2 Monitoring Wells

In accordance with the RI Work Plan, a total of 3 groundwater monitoring wells (MW1-MW3) were installed to establish general groundwater quality at the site, define the extent of VOC contamination in groundwater and to determine the magnitude and direction of a potential contaminant plume migrating from the site.

Monitoring wells were installed to a total depth of 15 ft, approximately 7 feet below the water table. At each well a No. 00 morie filter sand was placed in the borehole to within 2 feet above the top of the screen. A 1-foot hydrated bentonite seal was then placed on top of the filter sand and the remainder of the borehole was backfilled to grade. Monitoring well locations are shown in **Figure 5**.

2.1.3 Samples Collected

A summary of the sampling performed during the RI is provided in **Table 2**.

2.1.3.1 Soil Samples

For soil borings B1 and B5, soil samples were collected continuously from grade to a final depth of 10 ftbelow existing grade using a 5-foot steel macro-core sampler with acetate liners and Geoprobe direct-push equipment. Soil recovered from the borings was field screened for the presence of VOCs with a photo-ionization detector (PID) and visually inspected for evidence of

contamination. No PID readings above background concentrations were obtained from any soil samples recovered from soil borings B9 and B10. Soil samples were retained from 12-14 feet below grade at each location and submitted for laboratory analysis of volatile organic compounds (VOCs) by EPA Method 8260, semi-volatile organic compounds (SVOCs-BN) by EPA Method 8270, TAL Metals, pesticides and PCBs by EPA Methods 8081/8082.

For soil borings B1-B7, soil samples were collected continuously from grade to a final depth of 10 feet below existing grade using a 5-foot steel macro-core sampler with acetate liners and Geoprobe direct-push equipment. Soil recovered from the borings was field screened for the presence of VOCs with a PID and visually inspected for evidence of contamination. No PID readings above background concentrations from any of the borings.

Soil samples from soil borings B6 and B7 were retained from 0-2 feet below grade were submitted for laboratory analysis of volatile organic compounds (VOCs) by EPA Method 8260.

2.1.3.2 Groundwater Samples

Groundwater samples were obtained from the three temporary water table wells during the March 2012 mobilization.

A peristaltic pump and polyethylene tubing were used to purge and collect samples from the temporary well locations. Sample tubing was replaced between each sample location. Samples were collected directly into pre-cleaned laboratory supplied glassware, stored in a cooler with ice and submitted to Phoenix Environmental Laboratories of Manchester, CT, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

All groundwater samples from the temporary monitoring wells were analyzed for VOCs / SVOCs by EPA method 8260 / 8270, target analyte list (TAL) metals (total and dissolved) and pesticides/PCBs by Method 8081/8082. Groundwater samples from the shallow and deep monitoring were analyzed for VOCs / SVOCs.

2.1.3.3 Soil Gas Samples

To assess the presence of VOCs in soil vapor beneath the site, six soil vapor samples (SG1-SG6) were collected at the site during the supplemental mobilization on February 28, 2013. Soil vapor sampling locations are shown on **Figure 6**. All soil vapor samples were collected over a 2 hr sampling period.

Soil vapor samples were collected in accordance with the procedures as described in the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 10/06)*.

2.1.4 Chemical Analytical Work Performed

Each soil and groundwater sample was placed in pre-cleaned laboratory supplied glassware, and placed in a cooler packed with ice for transport to the laboratory. Sample analysis was provided by C Phoenix Environmental Laboratories of Manchester, CT, a New York State ELAP certified environmental laboratory (ELAP Certification No. 11301).

Soil samples were analyzed for one or more of the following depending on location and depth: VOCs / SVOCs by EPA method 8260 / 8270, target analyte list (TAL) metals and pesticides/PCBs by Method 8081/8082. All groundwater samples from the temporary monitoring wells were analyzed for VOCs / SVOCs by EPA method 8260 / 8270, target analyte list (TAL) metals (total, dissolved) and pesticides/PCBs by Method 8081/8082.

Soil gas samples analyzed for VOCs by EPA method TO-15.

2.1.5 Documentation

Maps showing the locations of the soil borings, monitoring wells and soil gas sample collection points are provided in **Figures 4**, **5** and **6**. The results of soil, groundwater and soil gas samples collected during the RI are summarized in **Tables 3** through **12**. Below is a summary of RI findings.

The results of sampling performed during this RI, identified CVOCs in shallow soil and soil gas which are likely related to a surface spill of chlorinated solvents used as degreasers in both metal

fabrication and in automotive brake cleaning and parts cleaning solutions, which migrated through cracks or other voids in the concrete floor. The timing and scenario of the release are unknown.

In any case the spill was limited, and did not significantly impact groundwater. CVOC contaminants were also found below unrestricted SCO concentrations in soils, however, it is likely that higher concentrations are present and will be encountered during implementation of remedial actions. Off-gassing is occurring from the residually contaminated soils which are resulting in elevated concentrations of TCE and PCE in soil gas.

No other source areas were identified or indicated during this RI. Elevated levels of SVOCs, metals and pesticides reported in shallow soil throughout the site are characteristic of the historic fill materials present at the site and throughout the area. However, SVOC concentrations reported in one of the locations (B2) was reported at concentrations considerably higher then that associated with fill material and may be related to petroleum.

2.2 SIGNIFICANT THREAT

The NYSDEC and NYSDOH are currently reviewing the RI Report and will determine if the site does or does not pose a significant threat to human health and the environment. Notice of that determination will be provided during the 45 day public comment period and the Proposed Decision Document.

2.3 SITE HISTORY

2.3.1 Past Uses and Ownership

Previous owners and operators of the property are shown in the tables below. Information regarding ownership of the property was obtained from online property records maintained by the NYC Department of Finance Office of the City Register under its Automated City Register Information System (ACRIS) and from hard copy records at the agencies regional office. Information regarding past operators was obtained from Sanborn Fire Insurance maps, from telephone directory listings and from an internet search of the property address.

The property is under contract for purchase by the requestor in an agreement dated February 6th 2013. The building is currently vacant but the western half of the building was most recently used by a charter bus company (AM USA Express) as a maintenance garage and the eastern half was most recently by a metal fabrication business (Wei Je Industries). The Site was developed for commercial use sometime between about 1951 and 1965 and was used by a lumber company "Driggs Plywood Corporation". The Sanborn Maps up to 2007 label the subject site building as lumber storage, but the city directory listings list other companies as site occupants, including "Arnmart Whole Beer Distributers" from 1997-2000, and "Car Fashion Seat Covers" in 2005. Since the building was separated into 2 units and was most recently occupied by two separate tenants, it is possible that the multiple tenants occupied the building in the past.

Previous Owners

Dates	Name	Comments	Contact Info
prior to 8/11/75	Irving Altman	Deed	1965 South Ocean Drive, Hallendale, Florida
From 8/11/75 to 12/28/81	Frank Matarese	Deed	431 Metropolitan Avenue, Brooklyn, NY
From 12/28/81 to 12/12/97	Joseph M. Materese & Michael J. Materese	Deed	2121 Atlantic Boulevard, Atlantic Beach, NY
From 12/12/97 to 11/18/02	Rose Realty Associates	Deed	503 Union Avenue, Brooklyn, NY
From 11/18/02 to 5/4/07	18 Properties Acquisition LLC	Deed	C/O Sukenik, Segal & Graff, P.C., 417 Fifth Avenue, 3rd Floor, New York, NY
From 5/4/07 to Present	DYR Holdings	Both RPTT and RETT	39 Heyward Street, Brooklyn, NY

Previous Operators

Dates	Name	Comments	Contact Info
Sometime prior to 1965 to sometime before 2007	Driggs Plywood Corp.	Sanborn Map	Unknown
1997 - 2000	Arnmart Beer Distributers	City Directory	Unknown
2005	Car Fashion Seat Covers	City Directory	Unknown
From 2007 to 2013	Wei Je Industries	Inspection, Interview	Unknown
From 2010 to 2013	AM USA Express	Inspection, Interview	Unknown

The following resources were employed in obtaining historical information with respect to ownership:

- NYC ACRIS Database
- Interviews with Current Owners

The following resources were employed in obtaining historical information with respect to operators:

- Interviews with Current / Previous Operators / Owners
- City Directory Listings
- Certificate of Occupancy Records as Maintained by the Department of Buildings
- Internet Address Search

2.3.2 Phase I Reports

November 2011 – Phase I Environmental Site Assessment Report (EBC)

A Phase I Environmental Site Assessment (ESA) report was prepared by Environmental Business Consultants (EBC) in January 2012.

EBC was able to establish a history for the property dating back to 1887. According to a review of NYC records, City Directory Listings and historic Sanborn maps, as well as personal interviews, the Site was developed prior to 1887 as three separate thin lots, each developed with a 3-story residential building in the front of the lots, and smaller 2-story dwellings in the rear of the lots. Each of the three lots was labeled with the street numbers 11 Jackson Street, 13 Jackson Street and 15 Jackson Street. The lots remained unchanged until around 1951 when two of the lots were cleared, leaving only the 3-story residential building on 11 Jackson Street. The 3-story building remained until the property was redeveloped in 1951 with the same building currently located at the Site. All Sanborn maps until the most recent map (2007) label the Site building as being used for lumber storage. City Directory listings from 1965 and 1973 identify the Driggs Plywood Corporation at the 11 Jackson Street address. Arnmart Whole Beer Distributers were posted in directory listings from 1997 and 2000, and "Car Fashion Seat Covers" was listed in 2005. It is not known if the beer distributor or car seat cover shop occupied half of the building or the entire building.

At the time of the Phase I inspection half of the building was occupied by a charter bus maintenance / repair garage and half was occupied by a metal fabrication shop.

Based upon reconnaissance of the Site and surrounding properties, interviews and review of historical records and regulatory agency databases, EBC noted the following recognized environmental conditions for the Site.

- The use of the Site as an auto / charter bus repair facility.
- The use of the Site as a metal fabrication shop.

The Phase I noted that the property was assigned an "E" designation for "hazardous materials" as part of the Greenpoint-Williamsburg rezoning action adopted in 2005. The lots were assigned E-138 under the City Environmental Quality Review (CEQR) number 04DCP003K. An E-Designation for Hazmat is a NYC zoning map designation that indicates the presence of an environmental requirement pertaining to potential Hazardous Materials Contamination on a particular tax lot. E-Designations are established on the Zoning Map by the Department of City Planning (DCP) and City Council as a part of a zoning change/action.

The Hazmat E required a detailed environmental review and release by the NYC Office of Environmental Remediation. Such reviews require a full subsurface investigation, remedial and health and safety planning, implementation of a remedial program and documentation that the remedial program was completed during redevelopment of the property. EBC recommended performing a Phase II Subsurface Investigation Report in order to satisfy The E-designation Environmental Review Program administered by the Office of Environmental Remediation.

2.3.3 Sanborn Maps

Sanborn Fire Insurance Maps - Sanborn Fire Insurance Maps - Sanborn fire insurance maps for the subject site and surrounding area were reviewed for the years 1887, 1905, 1916, 1942, 1951, 1965, 1978, 1979, 1980, 1981, 1982, 1983, 1986, 1987, 1988, 1989, 1991, 1993, 1995, 1996, 2001, 2002, 2003, 2004, 2005, 2006 and 2007. Copies of Sanborn maps are included as **Attachment B**.

1887

Subject Site:

- Block 2741, Lot 47 (11-15 Jackson Street) – The lot is drawn as three 25ft by 100ft lots. Each lot is developed with a 3-story building on the front of the property located along Jackson Street and a 2-story dwelling in the rear yard. The 3-story buildings on 13-14 Jackson Street are dwellings, while the building on 11 Jackson Street is a store.

Adjacent properties:

North

- Block 2741, Lot 10 (26 Withers Street) – Developed with a 2-story building located along Withers Street. The first floor is utilized as a store.
- Block 2741, Lot 11 (28 Withers Street) – Developed with a 1-story dwelling located along Withers Street. Two small 1-story buildings are adjoined to the main dwelling and extend into the rear yard.
- Block 2741, Lot 12 (30 Withers Street) – Developed with a 2-story dwelling located along Withers Street. A 2-story building is adjoining the main dwelling in the rear yard.

West

- Block 2741, Lot 1 (520 Union Avenue) – Developed with a 3-story store located along Union Avenue.
- Block 2741, Lot 2 (520 Union Avenue) – Developed with a 3-story store located along Union Avenue.
- Block 2741, Lot 3 (526 Union Avenue) – The lot is drawn as 4 25ft by 25ft undeveloped and vacant lots.

South

- Block 2746
    - 12 Jackson Street – Developed with a 2-story dwelling located along Jackson Street, a 1-story stable located in the rear yard, and 2-story dwelling along the south property line.
    - 14 Jackson Street – Developed with a 3-story dwelling located along Jackson Street and a 2-story building in the rear of the lot.

- 16 Jackson Street – Developed with a 1-story dwelling located in the rear of the lot.

East

- Block 2741, Lot 13 (32 Withers Street) – The lot is drawn as 3 separate lots. The property northeast of the subject site is developed with a 2-story store located along Withers Street and a 1-story building extending into the rear yard. The property east of the subject site is undeveloped and vacant.

1905

Subject Site:

- Block 2741, Lot 47 (11-15 Jackson Street) – The lot is drawn as one 75ft by 100ft lot. In the rear yard of the lot a narrow 1-story building was constructed on the east and west property line of the subject site.

Adjacent properties:

North

- Block 2741, Lot 10 (26 Withers Street) – Developed with a 2-story building located along Withers Street. The first floor is utilized as a store.
- Block 2741, Lot 11 (28 Withers Street) – Redeveloped with a larger 1-story store in the front of the lot located along Withers Street and a 1-story shed located along the south property line.
- Block 2741, Lot 12 (30 Withers Street) – A new 1-story building is drawn along the south property line of the lot.

West

- Block 2741, Lot 3 (526 Union Avenue) – The lot is drawn as a one 100ft by 100ft undeveloped lot labeled "Barrel Storage Yard".

East

- Block 2741, Lot 13 (32 Withers Street and 17-19 Jackson Street)
    - 32 Withers Street – A 1-story building was constructed in the rear of the property labeled "Hall".

- 17 Jackson Street – Developed with a 3-story store located along Jackson Street and two 1-story buildings in the center of the lot.
- 19 Jackson Street – Developed with a 4-story store and a 1-story building labeled "Hall" that occupies the entire property.

1916

Subject Site:

- Block 2741, Lot 47 (11-15 Jackson Street) – Two small sheds were developed on the property. One is located along the west property line and the other is drawn in the center of the lot.

Adjacent properties:

North

- Block 2741, Lot 12 (30 Withers Street) – Redeveloped with a 4-story "L" shaped store and a 2-story store located along Withers Street.

West

- Block 2741, Lot 3 (526 Union Avenue) – Developed with a large 1–story shed bordering the property and labeled as "Junk Yard".

South

- Block 2746
    - 16 Jackson Street – Redeveloped with a 2-story church.

No other significant changes were noted for the subject site or adjacent properties on the 1916 Sanborn map when compared to the 1905 Sanborn map.

1942

Subject Site:

No significant changes were noted for the subject site on the 1942 Sanborn map when compared to the 1916 Sanborn map.

Adjacent properties:

West

- Block 2741, Lot 1 (520 Union Avenue and 9 Jackson Street) – A small building is drawn in the rear of the lot with the address 9 Jackson Street labeled as "Truck Chain Rep".

South

- Block 2746 has been cut back by the development of Meeker Avenue.

East

- Block 2741, Lot 13 (32 Withers Street and formerly 17-19 Jackson Street)
    - Formerly 17-19 Jackson Street – Drawn undeveloped and vacant. Property was cut back by newly developed Meeker Avenue.

No other significant changes were noted for the adjacent properties on the 1942 Sanborn map when compared to the 1916 Sanborn map.

1951

Subject Site:

- Block 2741, Lot 47 (11-15 Jackson Street) – Only the 3-story dwelling located at 13 Jackson Street and the two sheds in the rear yard remain on the subject site.

Adjacent properties:

North

- Block 2741, Lot 11 (28 Withers Street) – The 1-story building with a basement is labeled as "Nickel Plating".

West

- Block 2741, Lot 1 (520 Union Avenue and 9 Jackson Street) – The "Truck Chain Rep" is labeled as "Auto Repair".

South

- The elevated Brooklyn Queens Expressway was constructed.

No other significant changes were noted for the adjacent properties on the 1951 Sanborn map when compared to the 1942 Sanborn map.

1965

Subject Site:

- Block 2741, Lot 47 (11-15 Jackson Street) – Redeveloped with a 2-story building labeled "Lumber Storage". The building occupies the entire lot.

Adjacent Property

West

- Block 2741, Lot 3 (526 Union Avenue) – Redeveloped with a 1-story building labeled "Iron" in the south portion of the lot along Union Avenue and a small 1-story office building located in the center of the lot along Union Avenue.

1978-2007

No significant changes were noted for the subject site and adjacent properties on the 1978 through 2007 Sanborn maps when compared to the 1965 Sanborn map for the subject site.

2.4 GEOLOGICAL CONDITIONS

The geologic setting of Long Island is well documented and consists of crystalline bedrock overlain by layers of unconsolidated deposits. According to geologic maps of the area created by the United States Geologic Survey (USGS), the bedrock in this area of Brooklyn / Queens is an igneous intrusive classified as the Ravenswood grano-diorite of middle Ordovician to middle Cambrian age. Unconsolidated sediments overlie the bedrock and consist of Pleistocene aged sand, gravel and silty clays, deposited by glacial-fluvial activity. Non-native fill materials consisting of dredge spoils, rubble and / or other materials have historically been used to raise and improve the drainage of low lying areas.

Subsurface soils at the Site consists of a mixture of a silty non-native fill, to a depth of approximately 6 feet below grade followed by sandy-silt to a depth of approximately 10 feet below grade. Groundwater is present under water table conditions at a depth of approximately 8 feet below the surface and is expected to flow northwest-toward the East River.

According to the USGS topographic map for the area (Brooklyn Quadrangle), the elevation of the property 15 feet above the National Geodetic Vertical Datum (NGVD). The area topography gradually slopes to the northwest.

Groundwater at the Site is present under water table conditions at a depth of approximately 8 feet below grade. Based on regional and local water table elevation maps, groundwater flow is expected to flow northwest toward the East River (**Figure 7**).

2.5 CONTAMINATION CONDITIONS

2.5.1 Conceptual Model of Site Contamination

CVOC contamination at the Site consists mainly of TCE in shallow soil, though PCE and other chlorinated compounds are also present. The extent of contamination is expected to be limited to shallow soil in the central area of the building directly below the building slab to a maximum depth of 5 feet.

Sanborn fire insurance maps identify the past use of the Site by the Driggs Plywood Corp. It is not known if plywood manufacturing took place on the property or if it was simply used for storage. It is also possible that some type of fleet vehicle maintenance took place while Driggs Plywood operated at the Site or by other operators who occupied the Site after Driggs. At the time of the Phase I inspection half of the building was occupied by a charter bus maintenance / repair garage and half was occupied by a metal fabrication shop.

The historical use of the site as a metal fabrication business and bus repair garage combined with the site-wide PCE / TCE detections in soil and soil gas is evidence that CVOC contamination at the site is related to an on-site release and historic use. TCE is known to have been commonly and extensively used to clean and degrease metals and would be expected to be used in a metal fabrication business which specialized in manufacturing metal store-front components in various metals (aluminum, brass, nickel, chrome, etc.). An on-site painting booth was also noted in the metal fabrication shop which would require degreasing of metal parts prior to painting.

The second most-common use of PCE behind dry-cleaning is in automotive brake cleaners and it has also been used extensively in automotive parts washing solutions. A parts washing station was noted in the bas garage during the phase I inspection.

The most likely release scenario would include surface spills from the use of PCE brake cleaners and parts washing solutions, the storage of automotive fluids and waste liquids within the bus garage and the use of TCE in degreasing metals in the metal fabrication shop. Housekeeping in both businesses were noted to be grossly deficient with open containers and spills evident during the inspection. Operations regarding the plywood business are unknown. It is possible that the release of chlorinated solvents were also related to these operations.

The nature and extent of the soil contamination is indicative of a limited surface spill which migrated through cracks or other voids in the concrete floor. The timing and scenario of the release are unknown.

In any case the spill was limited, and did not migrate much beyond a depth of 5 feet below grade as indicated by the low CVOC concentrations in groundwater. Off-gassing is occurring from the residually contaminated soils which are resulting in elevated concentrations of TCE and PCE in soil gas.

No other source areas were identified or indicated during this RI. Elevated levels of SVOCs, metals and pesticides reported in shallow soil throughout the site are characteristic of the historic fill materials present at the site and throughout the area. However, SVOC concentrations reported in one of the locations (B2) was reported at concentrations considerably higher then that associated with fill material and may be related to petroleum.

2.5.2 Description of Areas of Concern

The primary area of concern is expected to be an isolated area of CVOC contaminated soil within the central area of the building. PCE and TCE were detected within four of the seven shallow (0-2 ft) soil samples retained at the Site and one of the five deeper (4-6 ft) soil samples,

however, neither PCE nor TCE were detected within any of the soil samples at a concentration above Unrestricted Use SCOs.

Although this area has not been defined it is limited to shallow soils to a depth of approximately 6 ftbg based on the low levels of CVOCs in groundwater and the likely release scenario (surface spills).

High levels of SVOCs were also reported at boring B2 in the northeast quadrant of the Site. The SVOC concentrations at this location were an order of magnitude higher than that related to historic fills and may be associated with petroleum.

No other source areas were identified or indicated during this RI. Elevated levels of SVOCs and metals reported in shallow soil throughout the site are generally characteristic of the historic fill materials present at the Site and throughout the area.

Contaminated media documented at the site includes soil, groundwater and soil gas which was found to be contaminated with VOCs during the RI.

2.5.3 Soil/Fill Contamination

SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and ideno(1,2,3-cd)pyrene, were reported above restricted soil cleanup objectives (SCOs) in shallow soil (0-2ft) at all five of the boring locations.

One or more metals including barium, copper, lead and mercury were reported above restricted residential SCOs in shallow soil in all five boring locations. Zinc was reported above unrestricted SCOs at all boring locations. Although elevated SVOCs and metals are commonly associated with historic fill, in this case some of the metals may be related historic site use and SVOC concentrations in one of the borings (>600,000 ug/kg) was considerably above that typically encountered in historic fill. Native soil beneath the fill contains several metals (mercury, lead, copper) above unrestricted SCOs making a Track 1 cleanup unlikely to be achieved.

2.5.3.1 Summary of Soil/Fill Data

Soil sample results from the RI are summarized in **Tables 3-6**. Further information on soil sample collection, handling and analysis can be found in the RI Report (EBC 7/12).

2.5.3.2 Comparison of Soil/Fill with SCGs

Table 13 shows soil sample results above Track 1 Unrestricted SCOs for all overburden soil at the Site. Sample results above Track 1 Unrestricted SCOs for all overburden soil are posted on **Figure 8**.

2.5.4 On-Site and Off-Site Groundwater Contamination

Groundwater samples obtained from all three temporary monitoring wells indicate that there were no petroleum VOC impacts to groundwater. Low levels of CVOCs were detected in one of the wells and is likely related to on-site contamination. Several metals were also reported above standards including, iron, manganese, magnesium and sodium. The concentrations and parameters reported are consistent with general background conditions documented in the area.

2.5.4.1 Summary of Groundwater Data

The results of groundwater samples collected during the RI are summarized in **Tables 7-11**. Further information on groundwater sample collection, handling and analysis can be found in the RI Report (EBC 6/13).

2.5.4.2 Comparison of Groundwater with SCGs

Sample results above GA groundwater standards in monitor wells prior to the remedy are shown in **Table 14**. A spider map which shows groundwater sampling locations and summarizes results above GA groundwater standards prior to the remedy are shown in **Figure 9**.

2.5.5 On-Site and Off-Site Soil Vapor Contamination

Total petroleum related volatile organic compounds were generally moderate and consistent with background levels, ranging from 24 $\mu g/m^3$ in SG-5 located near the northeast corner of the building to 1,430 $\mu g/m^3$ in SG-2 located in the east central area of the building.

High concentrations of the chlorinated VOCs trichloroethylene (TCE) and tetrachloroethylene (PCE) were also detected within five of the six the sub-slab soil gas sampled collected at the Site. PCE ranged from 10.4 I SG2 to 8,270 µg/m^3 in SG1 and TCE ranged from 10.4 in SG2 to 12,300 µg/m^3 in SG1. TCE concentrations in 5 of the 6 samples obtained and PCE concentrations in 4 of the 6 samples were above the NYSDOH threshold requiring action (monitoring or mitigation).

Figure 10 shows posted soil gas results from the RI.

2.5.5.1 Summary of Soil Vapor Data

A table of soil vapor data collected prior to the remedy is shown in **Table 12**. Further information on soil gas sample collection, handling and analysis can be found in the RI Report (EBC 6/13).

2.6 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.6.1 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment under the BCP is to identify potential receptors to the contaminants of concern (COC) that are present at, or migrating from, the site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur. An exposure pathway has five elements; a contaminant source, release and transport mechanisms, point of exposure, route of exposure and a receptor population.

The potential exposure pathways identified below, represent both current and future exposure scenarios.

Contaminant Source

The source of CVOCs detected in soil at the site is indicative of a limited surface spill which migrated through cracks or other voids in the concrete floor. The extent of contamination is

expected to be limited to the central area of the building from directly below the building slab to a maximum depth of 5 feet.

Contaminant Release and Transport Mechanism

CVOCs present in on-site shallow soils are volatilizing to air contributing to elevated levels of contamination in soil gas, as seen in analytical results from sub-slab soil gas samples SG1, SG2, SG3, SG4 and SG6. There does not appear to be a correlation between the CVOC contamination in soil and that in groundwater as TCE was detected in only one of the three groundwater samples obtained, at a concentration below GQS and no PCE was detected in any of the three groundwater samples obtained onsite.

Point of Exposure, Route of Exposure and Potentially Exposed Populations

Potential On-Site Exposures: Remediation workers and construction workers engaged in the excavation of impacted and non-impacted soil at the site may be exposed to CVOCs through several routes. Workers excavating impacted soil may be exposed to CVOCs through inhalation, ingestion and dermal contact. Workers excavating non-impacted soil may be exposed to CVOCs in soil vapor through inhalation. A site specific Health and Safety Plan has been developed to identify and minimize the potential hazards to on-site workers.

Under a future scenario, residents within the proposed buildings may be exposed to vapor intrusion if remediation of the source area is not completed, and also if preventive measures are not incorporated into the new building design to protect against contaminated soil vapor intrusion. This potential route of exposure will be reduced in response to the degree and success of source area remediation.

Potential Off-Site Exposures: The entire area is serviced by the New York City Water System which distributes water from the Croton Reservoir system. Since there are no public or private potable supply wells in the area, exposure from contact with tap water is not a concern. Off-site exposure is therefore limited to vapor intrusion from CVOCs in soil gas migrating from the site. Potential off-site exposure related to CVOC vapor intrusion is a concern. The potentially

exposed population in this case would include residents and commercial workers in adjacent buildings. This exposure pathway will be eliminated following the removal of CVOC impacted soil.

2.6.2 Fish & Wildlife Remedial Impact Analysis

CVOCs in soil have the potential to migrate to the groundwater table and pass beneath the site, the groundwater to surface water discharge pathway was evaluated. The nearest surface water is the East River approximately 4,200 feet west (downgradient). Based upon the low concentrations of CVOC contaminants currently in soil and groundwater at the Site and the distance and position of the site relative to The East River, there are no expected impacts to surface water environments from contaminants potentially migrating beneath the Site.

2.7 REMEDIAL ACTION OBJECTIVES

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

2.7.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.

2.7.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.7.3 Soil Vapor

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

3.0 ALTERNATIVES ANALYSIS

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. This analysis was prepared in accordance with 6 NYCRR Part 375-1.8(f) and Part 375-3.8(f) and Section 4.3(c) of NYSDEC DER-10. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

- Alternative 1 - Track 1, remediation of all soils above bedrock to unrestricted use criteria. Due to elevated levels of some metals in the native soils at the Site in the 4 to 6 foot interval it is expected that a Track 1 alternative will require excavation to a minimum depth of 10 feet across the site. This alternative does not allow the use of long-term institutional /engineering controls to address impacted media or prevent exposures which may be required beneath the proposed building.

- Alternative 2 - Track 2, remediation of all soils to restricted residential criteria to a depth of 15 feet if soils below 15 feet do not represent a source of contamination. This alternative would require excavation to approximately 4 feet below grade. This alternative does not allow the use of long-term institutional /engineering controls to meet soil cleanup objectives. Long-term institutional /engineering controls are allowed to address or prevent exposures from other impacted media however such as soil gas.

3.1 REMEDIAL ALTERNATIVE 1

The following sections provide an evaluation of Alternative 1 based on the nine evaluation criteria as previously discussed.

3.1.1 Overall Protection of Human Health and the Environment

Alternative 1 will be protective of human health and the environment by eliminating the CVOC concentrations present in all subsurface affected soils at the site and by eliminating constituents in soil related to historic fill. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all historic fill soils and hot spot areas with parameters in excess of unrestricted criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility.

Potential post-remediation exposures to on-site residents from soil vapors are not expected to require the long term (>5 yrs) operation of SSDS systems, though groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

3.1.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Track 1 unrestricted cleanup levels. SCGs for groundwater may not be achieved as impacted groundwater is related to background water quality in the vicinity of the Site. Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.1.3 Long-Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials. Under this Alternative, risk from soil impacts is eliminated though risk from groundwater will remain unless the off-site source is identified and remedied. Alternative 1 will continue to meet RAOs for soil in the future, providing a permanent long-term solution for the Site.

3.1.4 Reduction in Toxicity, Mobility or Volume Through Treatment

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting unrestricted objectives. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor.

3.1.5 Short-Term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 1 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan has also been prepared to minimize disturbance to the local roads and community.

3.1.6 Implementability

The techniques, materials and equipment to implement Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites. Note that excavation to this depth will require both shoring and dewatering.

3.1.7 Cost

Costs associated with Alternative 1 are estimated at approximately $1,251,458. This cost estimate includes the following elements and assumptions:

- Excavate to a minimum depth of 10 feet across the Site. Over-excavate as necessary to remediate hot-spot areas and meet unrestricted SCOs for all remaining soil;
- Shoring to allow excavation to lot line to a depth of 10 feet or greater;
- Dewatering to allow excavation below the water table;
- Disposal of approximately 60 cy of soil from the CVOC impact area as hazardous;
- Disposal of approximately 1,327 cy of historic fill soil as non-hazardous;
- Disposal of approximately 2,079 cy of native soil (metals above unrestricted SCOs) for beneficial reuse;
- Backfilling with approximately 2,426 cy of certified clean fill to return the site to construction grade;
- Installation and temporary operation (<5 yrs) of a Sub Slab Depressurization System (SSDS) beneath new construction;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.1.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current M1-2 / R6 residential zoning. Following remediation, the Site will meet unrestricted use objectives which will exceed the objectives for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.1.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community has comments on the presented remedial alternatives and selected remedy. If no comments are received regarding Alternative 1, it will be considered to be acceptable to the community.

3.2 REMEDIAL ALTERNATIVE 2

The following sections provide an evaluation of Alternative 2 based on the nine evaluation criteria as previously discussed.

3.2.1 Overall Protection of Human Health and the Environment

Alternative 2 will be protective of human health and the environment by eliminating the CVOC concentrations present in subsurface soils at the Site and by eliminating constituents related to historic fill above restricted residential criteria to a depth of 15 feet. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all soils with parameters in excess of restricted residential criteria to a depth of 15 feet, disposing of excavated materials off-site and backfilling as needed with certified clean fill, virgin mined materials or recycled concrete materials from a NYSDEC permitted recycling facility.

Potential post-remediation exposures to on-site residents from soil vapors would be addressed through the use of a vapor barrier and a SSDS beneath the portions of the building which are not required to be equipped with mechanical ventilation (parking garage). Groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.2.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 2 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to restricted residential cleanup levels for the top 15 feet. SCGs for groundwater may not be achieved as impacted groundwater has been shown to be background water quality in the vicinity of the Site. Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.2.3 Long-term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants above restricted residential objectives to a depth of 15 feet. Under this Alternative risk from soil impacts is eliminated for on-site residents. Alternative 2 will continue to meet RAOs for soil in the future, providing a permanent long-term solution for the Site.

3.2.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting restricted residential objectives in the upper 15 feet. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor.

3.2.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of

odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.2.6 Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites. Excavation to 4 feet will not require shoring or dewatering.

3.2.7 Cost

Costs associated with Alternative 2 are estimated at approximately $692,017. This cost estimate includes the following elements and assumptions:

- Excavate as per the foundation plans for the new buildings. Over-excavate as necessary to remediate hot-spot areas and remove all historic fill above restricted residential SCOs to a depth of 15 feet at the Site;
- Disposal of approximately 60 cy of soil from the CVOC impact area as hazardous;
- Disposal of approximately 1,327 cy of historic fill soil as non-hazardous;
- Backfilling with approximately 350 cy of certified clean fill to return the site to construction grade;
- Installation and temporary operation (<5 yrs) of a Sub Slab Depressurization System (SSDS) beneath new construction;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.2.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current M1-2/R6 residential zoning Following remediation the Site will meet restricted residential use objectives which is appropriate for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.2.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP will be subject to a 45-day public comment period to determine if the community has any comments on the presented remedial alternatives and selected remedy. If no comments are received, it will be considered to be acceptable to the community.

4.0 DESCRIPTION OF REMEDIAL ACTION PLAN

4.1 EVALUATION OF REMEDIAL ALTERNATIVES

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing remedial action objectives (RAOs) for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (SCGs);
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

4.2 STANDARDS, CRITERIA AND GUIDANCE (SCG)

A criterion for remedy selection is evaluation for conformance with SCGs that are applicable, relevant and appropriate. Principal SCGs that are applicable, relevant and appropriate for evaluating the alternatives for remediation of this BCP site include the following:

- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 10 NYCRR Part 67 – Lead
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)

- 6 NYCRR Part 375 - 6 NYCRR Part 375 Environmental Remediation Programs Subparts 375-1, 375-3 and 375-6 (December 2006)
- 6 NYCRR Part 376 - Land Disposal Restrictions
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
- 6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS ("SPDES Regulations")
- 6 NYCRR Part 375-6 Soil Cleanup Objectives
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - May 2010;
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364.
- TAGM 4059 - Making Changes To Selected Remedies (May 1998)
- STARS #1 - Petroleum-Contaminated Soil Guidance Policy
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- DER-10, Technical Guidance for Site Investigation and Remediation, May 2010
- DER-23 / Citizen Participation Handbook for Remedial Programs, January 2010
- OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)

Additional regulations and guidance are applicable, relevant, and appropriate to the remedial alternatives and will be complied in connection with implementation of the remedial program; however, the list above is intended to represent the principal SCGs which should be considered in evaluating the remedial alternatives for the BCP site.

Conformance with the appropriate standards for remediation of contaminated soil is an important criterion in evaluating the remedial alternatives for the BCP site. Presently, in New York State 6 NYCRR Part 375 establishes the primary SCGs associated with remediation of contaminated soil at sites which are in the BCP. If proposing remediation pursuant to a Track other than Track 1 (Unrestricted Use), 6 NYCRR Part 375 requires evaluation of at least one remedial alternative pursuant to Track I (Unrestricted Use) and one other alternative developed by the applicant for the proposed use of the BCP site. The remedial alternatives presented in Section 3.0 of this work plan have been prepared in conformance with this requirement.

4.3 SELECTION OF THE PREFERRED REMEDY

The remedy recommended for the site is a Track 2 alternative (Alternative 2) which consists of the removal of all CVOC contaminated soil present at the site through excavation. In addition all fill material to a depth of 15 feet with parameters above restricted residential SCOs will be removed from the Site and properly disposed of at an off-site facility.

Overall Protection of Public Health and the Environment

The recommended remedial action achieves protection of the public health and the environment by eliminating the identified release area with elevated concentrations of CVOCs in soil which will eliminate or significantly reduce or eliminate the potential for vapor intrusion in the new building and prevent the potential for contamination of groundwater and off-site migration of impacted groundwater originating on the property. The recommended action further achieves protection of the public health and the environment by eliminating constituents in surficial soils related to historic fill. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of the all soils with parameters in excess of unrestricted criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill/topsoil. Although affected groundwater would not directly affect human health, groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors

will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

The remedy will meet all of the RAOs established for soil and groundwater at the site.

Compliance with Standards, Criteria and Guidance

The recommended remedial action meets the objectives of the RAOs by removing the potential for human and environmental exposures to chemical constituents above SCGs in soil and groundwater. The proposed action will effectively remove the source area and all historic fill soils resulting in compliance with SCGs for soils.

Long-term Effectiveness and Permanence

The remedial action achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials above restricted residential SCOs to a depth of 15 feet. Groundwater is not significantly affected by Site -related contaminants. Current groundwater quality at the site is representative of general background water quality throughout the area. Under this remedy, risk from soil impacts is eliminated and risk from site-related groundwater impacts significantly reduced. The selected remedy will continue to meet RAOs for soil and groundwater in the future, providing a permanent long-term solution for the Site.

Reduction of Toxicity, Mobility and Volume

The recommended action will reduce the toxicity, mobility and volume of the chemical constituents by removing the source area of contamination and meeting unrestricted objectives for on-site soil. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor.

Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites. No issues related to the design, availability or implementation of the selected remedy are anticipated.

Cost

Costs associated with the selected remedy are estimated at approximately $692,017. This cost estimate includes the following elements and assumptions:

- Excavate as per the foundation plans for the new buildings. Over-excavate as necessary to remediate hot-spot areas and remove all historic fill above restricted residential SCOs to a depth of 15 feet at the Site;
- Disposal of approximately 60 cy of soil from the CVOC impact area as hazardous;
- Disposal of approximately 1,327 cy of historic fill soil as non-hazardous;

- Backfilling with approximately 350 cy of certified clean fill to return the site to construction grade;
- Installation and temporary operation (<5 yrs) of a Sub Slab Depressurization System (SSDS) beneath new construction;
- HASP and CAMP monitoring for the duration of the remedial activities.

Community Acceptance

Public participation plays a large role in the BCP process. A fact sheet has been prepared and sent out to all interested parties as identified in the site contact list. A draft version of this document was placed in a local repository (NYSDEC Region 2 office and the Leonard Street Branch of the Brooklyn Public Library,) and made available for public review and comment for a period of 45 days. No questions regarding the Site were raised regarding the proposed remedial action. The RAWP is subject to a 45-day public comment period to determine if the community has comments on the selected remedy.

Compatibility with Land Use

The proposed remedy will not prevent or otherwise interfere with the intended and planned future use of the site. The proposed redevelopment of the Site is compatible with its current M1-2/R6 residential zoning. Following remediation, the Site will meet restricted residential use objectives which will meet the objectives for its planned multi-tenant residential use. A groundwater use restriction may be required to prevent future exposure to affected groundwater.

4.3.1 Preferred Remedy Land Use Factor Evaluation

As required by Article 27, Title 14 of the Environmental Conservation Law 27-1415, the following land use factor evaluation examines whether the preferred alternative is acceptable based on the 14 criteria presented in the following subsections.

Zoning

The proposed redevelopment project, which includes the construction of a new residential apartment building is in compliance with the M1-2/R6 residential zoning. Therefore the project

will be constructed as-of-right regardless of the remedy implemented. The preferred remedy will comply with current zoning.

Applicable Comprehensive Community Master Plans or Land Use Plans

The proposed redevelopment project and selected remedy are consistent with comprehensive master and land use plans, specifically the Greenpoint-Williamsburg rezoning action. This area-wide comprehensive re-zoning, completed by the New York City Department of City Planning and adopted by the City Council in May 2005, re-zoned the property from M1-2 commercial to M1-2/R6 residential use. The preferred remedy will comply with applicable land use plans.

Surrounding Property Uses

The area surrounding the property is highly urbanized and predominantly consists of multi-family residential buildings with mixed-use buildings (residential w/first floor retail) along main corridors such as Meeker Street located just south of the Site and Union Avenue just west of the Site. The area is marked by late 19th and early 20th century rowhouses with commercial and industrial properties interspersed throughout the residential sections. The area to the north of the Site was historically characterized by heavy industry and manufacturing. Following a steady decline of manufacturing in the area from the late 1960's through the 1980's, many of the industrial properties were vacated leaving the buildings to be vandalized and become derelict. Conditions continued to decline throughout the 1980's and 1990's.

The community and area have seen a resurgence in recent years following the rezoning of former industrial properties to residential use during the Greenpoint-Willamsburg Rezoning Action. The proposed project is compatible with the surrounding land use and will be in compliance with the current zoning.

Citizen Participation

Citizen participation for implementation of the preferred alternative will be performed in accordance with DER 23 and NYCRR Part 375-1.10 and Part 375-3.10. A Citizen Participation Plan has been prepared and is available for public review at the identified document repositories (NYSDEC Region 2 Office, Leonard Street Branch of the Brooklyn Public Library).

Environmental Justice Concerns

The Site is not located within a potential environmental justice area. The NYSDEC defines a potential environmental justice area as a "minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies".

Environmental justice means the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Since the site is not located within a potential environmental justice area and since the goal of the remedy will achieve a residential level of cleanup and will remove contaminated materials from the community, the remedy poses no environmental justice concerns.

Land use designations

The proposed remedy is consistent with land-use designations.

Population growth patterns

Population growth patterns support the proposed use for the Site. The preferred remedy will not negatively affect on population growth patterns.

Accessibility to existing infrastructure

The Site is accessible to existing infrastructure. The close proximity of the Site to Meeker Avenue the Brooklyn-Queens Expressway and the Long Island Expressway will assist soil transportation and contractor access to the Site. The Site is also accessible to mass transit and is within walking distance to bus and subway stops on Union Avenue. The preferred remedy will not alter accessibility to existing infrastructure.

Proximity to cultural resources

The proposed remedy will not negatively impact cultural resources

Proximity to natural resources

The proposed remedy will improve the local environment and will not negatively impact affect natural resources.

Off-Site groundwater impacts

The proposed remedy will improve off-site groundwater impacts by removing a potential source of groundwater contamination at the site.

Proximity to floodplains

The site is located within a moderate risk flood zone and a portion of the site is either within a high risk flood zone (subject to 1%, 100-year annual flood) or is extremely close to it.

Geography and geology of the Site

The selected remedy will excavate soil from the Site to a depth of 4 feet. The selected alternative and development of the site have considered the geography and geology of the Site.

Current Institutional Controls

The Site was assigned an E-designation for hazardous materials as part of the rezoning action completed by the City. The compliance with the E-designation for hazardous materials will require the approval of the NYC Office of Environmental Remediation (NYCOER) of this RAWP. NYCOER must approve this RAWP in the form of a Notice to Proceed (NTP) letter before building permits will be released by the NYC Department of Buildings (DOB). Documentation in the form of a Final Engineering Report (FER) for site remediation must be approved by NYCOER in the form of a Notice of Satisfaction (NOS) before the NYCDOB will issue permanent Certificates of Occupancy for the new buildings.

4.4 SUMMARY OF SELECTED REMEDIAL ACTIONS

The remedy recommended for the Site consists of the removal of all CVOC contaminated soil from a suspected "hotspot" area in the central area of the site. In addition all fill material to a depth of 15 feet with parameters above restricted residential SCOs will be removed from the Site and properly disposed of at an off-site facility. The remedy will include the following items:

1. Removal of CVOC impacted soil from the central area of the property.
2. Excavation of soil/fill exceeding Track 2 restricted residential SCOs as listed in **Table 1,** to a depth of 15 feet;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 2 - Restricted Residential SCOs;
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in **Table 1**, (2) all Federal, State and local rules and regulations for handling and transport of material.
7. Installation of a sub-slab depressurization system and vapor barrier beneath occupied areas of the building to be constructed on the Site.
8. Installation of a composite cover system consisting of the concrete building slab across the entire Site.
9. Implementation of a Site Management Plan (SMP) for long term maintenance of the Engineering Controls.
10. An Environmental Easement will be filed against the Site to ensure implementation of the SMP.

All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

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

5.0 REMEDIAL ACTION PROGRAM

The objective of this section of the Remedial Action Work Plan, is to present a scope of work which will be approved by NYSDEC and when completely implemented will ready the BCP site for development under the Contemplated Use, which is unrestricted use, consistent with the requirements of the Brownfield Cleanup Program. Additionally, following completion of the remedial activities, it is an objective of this remedy that Clean Zones will be prepared beneath buildings, courtyards, and utility corridors so that construction can be implemented without the need for OSHA Hazardous Waste Operations and Emergency Response ("HAZWOPER") training for construction workers.

5.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the Remedial Work Plan include a Site-specific Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), a Citizen Participation Plan, a Soil Management Plan (SoMP) analytical quality assurance/quality control (QA/QC), fluid management procedures, and contractors' site operations and quality control procedures. Highlights of these documents and procedures are provided in the following sections.

5.1.1 Health & Safety Plan (HASP)

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Project Remedial Engineer will insure that it meets the minimum requirements as detailed in the site HASP prepared by EBC and must be made submitted to and approved by the NYSDEC.

Activities performed under the HASP will comply with applicable parts of OSHA Regulations, primarily 29 CFR Parts 1910 and 1926. Modifications to the HASP may be made with the approval of the Project Remedial Engineer (RE), Site Safety Manager (SSM) and/or Project Manager (PM).

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

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

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Coordinator will be Ms. Chawinie Miller. A resume will be provided to NYSDEC prior to the start of remedial construction. Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. A copy of the Site Specific Health and Safety Plan is provided in **Attachment C.**

5.1.2 Quality Assurance Project Plan (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or a cold-pak(s) to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for both soil and groundwater samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable

equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by poring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will be upgradeable to ASP category B deliverables for use in the preparation of a data usability report (DUSR). The QAPP for the Site is provided in **Attachment D**.

5.1.3 Construction Quality Assurance Plan (CQAP)

All construction work related to the remedy (i.e. soil excavation) will be monitored by EBC field personnel under the direct supervision of the Remedial Engineer. Monitoring during soil excavation will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been specifically developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health.

All intrusive and soil disturbance activities will be monitored by a qualified environmental professional (QEP) under the direct supervision of the Remedial Engineer who will record observations in the site field book and complete a photographic log of the daily activities. The QEP will provide daily updates to the Project Manager and Remedial Engineer who will both make periodic visits to the site as needed to assure construction quality.

5.1.4 Soil/Materials Management Plan (SoMP)

An SMP was prepared for excavation, handling, storage, transport and disposal of all soils/materials that are disturbed/excavated at the Site. The SMP includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SMP developed for this site is presented in **Section 4.5** of this RAWP.

5.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

Erosion and sediment controls will be performed in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Typical measures that will be utilized at various stages of the project to limit the potential for erosion and migration of soil include the use of hay bales, temporary stabilized construction entrances/exits, placement of silt fencing and/or hay bales around soil stockpiles, and dust control measures.

5.1.6 Community Air Monitoring Plan (CAMP)

The CAMP provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air.

The primary concerns for this site are vapors, nuisance odors and dust particulates. A CAMP was previously prepared for implementation of the RAWP and is provided in **Attachment E**.

5.1.7 Contractors Site Operations Plan (SOP)

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they are in compliance with this RAWP. The Remedial Engineer is responsible to ensure that all later

document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

5.1.8 Citizen Participation Plan (CPP)

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

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing. The approved Citizen Participation Plan for this project is provided in **Attachment F**.

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

Brooklyn Public Library
Leonard Street Branch
81 Devoe Street
Brooklyn, NY 11211
(718) 486-3365

Hours:

Mon 10:00 AM - 6:00 PM
Tue 1:00 PM - 8:00 PM
Wed 10:00 AM - 6:00 PM
Thu 10:00 AM - 6:00 PM
Fri 10:00 AM - 6:00 PM
Sat 10:00 AM - 5:00 PM
Sun closed

5.2 GENERAL REMEDIAL ACTION INFORMATION

5.2.1 Project Organization

The Project Manager for the Remedial Activity will be Ms. Kristen DiScenza. Overall responsibility for the BCP project will be Mr. Charles B. Sosik, P.G., P.HG. The Remedial Engineer for this project is Mr. Ariel Czemerinski, P.E.. Resumes of key personnel involved in the Remedial Action are included in **Attachment G**.

5.2.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. Ariel Czemerinski, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the Final Remediation Report. The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

5.2.3 Remedial Action Schedule

Building demolition is expected to be completed within three weeks of acceptance into the BCP. The remedial action will begin with mobilization of equipment and material to the Site which will begin approximately 2 weeks following RAWP approval and within 10 days of the distribution of the Construction Fact Sheet. Mobilization will be followed by removal of the CVOC impacted soil and confirmation sampling. This work is expected to take 1 week. Excavation and disposal of historic fill materials will be begin following the CVOC removal and

is expected to continue for 3 weeks as part of the construction excavation and foundation installation.

5.2.4 Work Hours

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

5.2.5 Site Security

A construction fence will be erected along the front of the property as required by the NYC Department of Buildings. The fence will be maintained as required and secured at the end of each work day.

5.2.6 Traffic Control

Due to the size of the property, trucks will back into the site through gates to be installed in a construction fence along Jackson Street. The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles, and provide flag services as needed to maintain safe travel exiting and entering the Site from Jackson Street. Traffic related to on-going remedial activity will require the staging of 10-wheel dump trucks along Jackson Street and Meeker Avenue on a daily basis during soil excavation activity. The soil disposal transport route will be as follows: ENTERING SITE - from the Brooklyn Queens Expressway take the Metropolitan Avenue exit (32B) and head north along Union Avenue 1 block to Withers Street. Turn right, heading east on Withers Street 1 block to Meeker Avenue. Turn right heading west on Meeker Avenue one block to Jackson Street. Bear right into Jackson Street and the Site entrance on the right. EXITING SITE – cross Jackson Street and turn right onto Meeker Avenue heading west 1 block Union Avenue. Turn left heading south on Union Avenue to Meeker Avenue East. Turn right onto Meeker Avenue heading east and bear left onto the Brooklyn Queens Expressway on-ramp. A map showing the truck routes is included as **Figure 11**.

5.2.7 Worker Training and Monitoring

An environmental remediation contractor with appropriate hazardous material handling experience and training is required to perform the excavation of CVOC impacted soil. After the contaminated soil is removed and the remediation contractor has demobilized from the Site, an excavation contractor will remove historic fill and uncontaminated soil. The excavation contractor's on-site personnel will have a minimum of 24 hour Hazardous Waste Operations and Emergency Response Operations training.

All field personnel involved in remedial activities will participate in training, if required, under 29 CFR 1910.120, including 24 and 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment.

All on-site personnel engaged in remedial or sampling activities must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.

- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

5.2.8 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in **Table 15**. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Remediation Report.

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

5.2.9 NYSDEC BCP Signage

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

5.2.10 Pre-Construction Meeting with NYSDEC

A pre-construction meeting with the Project Manager, Remedial Engineer, Construction Manager, Owner's Representative and the NYSDEC will take place prior to the start of major construction activities.

5.2.11 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in **Table 16**. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

5.2.12 Remedial Action Costs

The total estimated cost of the Remedial Action is $ 692,017. An itemized and detailed summary of estimated costs for all remedial activity is attached as **Attachment I**. This will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

5.3 SITE PREPARATION

5.3.1 Mobilization

Mobilization will include the delivery of construction equipment and materials to the site. All construction personnel will receive site orientation and training in accordance with the site specific HASP, CAMP and established policies and procedures to be followed during the implementation of the RAWP. The remediation contractor, construction manager and all associated subcontractors will each receive a copy of the RAWP and the site specific HASP and will be briefed on their contents.

5.3.2 Erosion and Sedimentation Controls

Soil erosion and sediment control measures for management of storm water will be installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control. Haybales and/or silt fence will be placed by the remedial contractor at locations surrounding excavation areas and within the perimeter fencing as needed, to control stormwater runoff and surface water

from exiting the excavation. These control measures will be installed prior to initiating the soil excavation.

5.3.3 Stabilized Construction Entrance(s)

Stabilized construction entrances will be installed at all points of vehicle ingress and egress to the Site. The stabilized entrances will be constructed of a 4 to 6-inch bed of crushed stone or crushed concrete which will be sloped back toward the interior of the Site. The stabilized entrances will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

5.3.4 Utility Marker and Easements Layout

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

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

5.3.5 Sheeting and Shoring

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

appropriate, or necessary health and safety measures during performance of work under the approved Plan.

5.3.6 Equipment and Material Staging

All equipment and work materials will be staged on-Site in areas as designated by the General Contractor, and / or Construction Site Superintendant.

5.3.7 Decontamination Area

A temporary truck decontamination pad will be constructed to decontaminate trucks and other vehicles/equipment leaving the Site. The pad will be constructed by placing a stone aggregate such as crushed rock or concrete. The pad will be bermed at the sides and sloped back to the interior of the Site. The truck pad will be sized to accommodate the largest construction vehicle used and located in line with the stabilized construction entrance.

5.3.8 Site Fencing

An 8-foot high temporary construction fence will be installed along the front of the Site with entrance gates located on Jackson Street. This fence will be properly secured at the end of the day and supplemented, as needed, by installing orange safety fencing around open excavations to ensure on-site worker safety.

5.3.9 Demobilization

Demobilization will consist of the restoration of material staging areas and the disposal of materials and/or general refuse in accordance with acceptable rules and regulations. Materials used in remedial activities will be removed and disposed properly. All equipment will be decontaminated prior to leaving the Site.

5.4 REPORTING

All daily and monthly Reports will be included in the Final Engineering Report.

5.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day in which remedial activity takes place. Daily reports will include:

- An update of progress made during the reporting day;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP finding, including excursions;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

5.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within two weeks following the end of the month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,

- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

5.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be submitted to NYSDEC on CD or other acceptable electronic media and will be sent to NYSDEC's Project Manager (2 copies) and to NYSDOH's Project Manager (1 copy). CD's will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval.

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

5.4.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions including noise, odor, truck traffic etc., will be recorded in the Site field book and reported to the NYSDEC in the daily status report.

5.4.5 Deviations from the Remedial Action Work Plan

Minor deviations from the RAWP will be identified in the daily update report and will be noted in the Final Engineering Report. When deviations are reported a brief discussion will be provided which will state the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC / NYSDOH for review.

6.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Excavation work includes the removal of CVOC impacted soil within the central area of the Site, historic fill materials which are present through out the site to a depth of 5 feet below grade and possibly a small amount of native soils which will be removed to accommodate the elevator shaft or structural components of the new building. Soil excavation will be performed using conventional equipment such as track-mounted excavators, backhoes and loaders.

All excavation work will be performed in accordance with the Site-specific HASP and CAMP. Removal of the CVOC impacted soil will be performed by a qualified remedial contractor and fully trained personnel (40HR OSHA HAZWOPER). If an underground storage tank (UST) is discovered during excavation the NYSDEC Project Manager will be immediately notified and the UST removed and closed in accordance with DER-10, NYSDEC PBS regulations and NYC Fire Department regulations. It is anticipated that the excavation of historic fill materials and native soils will be performed by the excavation contractor for the construction project.

The selected remedial action includes the excavation of soil within the identified CVOC area and the excavation of historic fill materials to a depth of approximately 4 feet throughout the Site or as needed to achieve restricted residential SCOs to a depth of 15 feet.

Dewatering is not anticipated for the excavation of contaminated areas or for foundation construction.

6.1 CONTINGENCY - UST REMOVAL METHODS

USTs, if encountered during excavation activities at the Site, will be removed in accordance with the procedures described under the NYSDEC Memorandum for the Permanent Abandonment of Petroleum Storage Tanks and Section 5.5 of Draft DER-10 as follows:

- Remove all product to its lowest draw-off point
- Drain and flush piping into the tank
- Vacuum out the tank bottom consisting of water product and sludge

- Dig down to the top of the tank and expose the upper half of the tank
- Remove the fill tube and disconnect the fill, gauge, product and vent lines and pumps. Cap and plug open ends of lines
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank
- Clean tank or remove to a storage yard for cleaning
- If the tank is to be moved it must be transported by licensed waste transported. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport
- After cleaning the tank must be made acceptable for disposal at a scrap yard cleaning the tank interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.)
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.)
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

6.2 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for this Site are listed in **Table 1**. **Table 13** summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. A spider map that shows all soil samples that exceed the SCOs proposed for this Remedial Action are shown in **Figure 8**.

6.3 REMEDIAL PERFORMANCE EVALUATION (POST EXCAVATION END-POINT SAMPLING)

Post excavation soil samples will be collected from the CVOC area excavations and from the remainder of the site to verify that remedial goals have been achieved. The CVOC area samples will be collected immediately following the removal of all impacted soil and will be analyzed for VOCs. Construction excavation samples will be taken following the excavation of all fill materials and additional soil as needed to achieve final grade. Site-wide samples will be analyzed for those parameters that exceeded restricted residential SCOs in fill materials during the RI (SVOCs and metals). Since CVOCs have been documented on the Site, endpoint samples will also be analyzed for VOCs. Approximately endpoint sampling locations are depicted in **Figure 12**.

6.3.1 End-Point Sampling Frequency

Endpoint sampling frequency will be in accordance with DER-10 section 5.4 which recommends the collection of one bottom sample per 900 sf of bottom area and one sidewall sample per 30 liner feet. Sidewall samples will not be collected where sheeting or shoring is present. Approximate endpoint sampling locations are depicted in **Figure 12**.

6.3.2 Methodology

Collected samples be placed in glass jars supplied by the analytical laboratory and stored in a cooler with ice to maintain a temperature of 4 degrees C. Samples will either be picked up at the Site by a laboratory dispatched courier at the end of the day or transported back to the EBC office where they will be picked up the following day by the laboratory courier. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory

All Verification samples will be analyzed for VOCs and SVOCs according to EPA method 8260 / 8270BN and TAL metals.

6.3.3 Reporting of Results

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data

usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format.

6.3.4 QA/QC

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for both soil samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory.

6.3.5 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in

Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the final Engineering Report.

6.3.6 Reporting of End-Point Data in FER

All endpoint data collected as part of this remedial action will be summarized and presented in the Final Engineering Report. The summary tables will include comparison of results to restricted residential SCOs to verify attainment of Track 2. Laboratory reports and the DUSR will be included as an appendix in the FER.

6.4 ESTIMATED MATERIAL REMOVAL QUANTITIES

The selected remedial action includes the excavation of soil within the CVOC hot spot area to a depth of approximately 4 feet or as needed to achieve restricted residential SCOs. The area of CVOC impacted soil is estimated to be less than 400 square feet. This will generate approximately 60 cy (90 tons) of contaminated soil classified as hazardous for disposal.

Historic fill materials were documented throughout the site varying in thickness from 2 to 4 feet. It is expected that approximately 1,327 cubic yards (1,991 tons) of historic fill classified as non-hazardous will be excavated from the site for off-site disposal.

6.5 SOIL/MATERIALS MANAGEMENT PLAN

6.5.1 Excavation of CVOC Contaminated Soils

CVOC impacted soil has been documented within the central area of the property below applicable SCOs. However it is likely that CVOCs are present above SCOs in this area to a slight degree. The vertical extent is expected to be limited to less than 4 feet. The impacted soil in this area will be removed prior to the excavation for the building foundation.

Excavated soil will be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. Soils excavated from

PCE hot-spot areas, will be classified as hazardous unless the NYSDEC issues a contained-in letter allowing the material to be classified as non-hazardous.

The final determination on classification will be based on the results of waste characterization analysis and the NYSDEC.

Soil excavation will be performed in accordance with the procedures described under Section 5.5 of DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined by the Remedial Engineer or his designee, and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.). Expansion of the excavation beyond the planned hotspot area is anticipated and can easily be accommodated.

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the HASP;

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated;

- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile or dispose of separate from the impacted soil;

- If USTs are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued removal of overburden to access the top of the structure or continued trenching around the perimeter to minimize its disturbance;

- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc), an attempt will be made to remove it to the extent not limited by the site boundaries. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separate dedicated plastic sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present;

- Excavated soils which are temporarily stockpiled on-site will be covered with 6-mil polyethylene sheeting while disposal options are determined. Sheeting will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property;

- Once the Remedial Engineer is satisfied with the removal effort, verification or confirmatory samples will be collected from the excavation as described in **Section 6.3** of this document.

The excavation of PCE contaminated areas will be performed by a qualified remedial contractor and fully trained personnel (40HR OSHA HAZWOPER).

6.5.2 Excavation of Historic Fill Materials

Historic fill has been identified throughout most of the site. The depth varies from 2 feet to approximately 4 ft below grade. The fill material contains several SVOCs and metals above restricted residential objectives. Historic fill will be segregated from non-contaminated native soils and disposed of off-site at a permitted disposal facility. Excavated historic fill materials will

be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. It is anticipated that historic fill materials will be classified as a non-hazardous material. It is anticipated that the excavation of historic fill materials will be performed by the excavation contractor for the construction project.

6.5.3 Excavation of Native Soils

Native soils are present directly below the fill materials and will possibly require some limited excavation for the elevator shaft and sum pit and for foundation components during construction of the new building. It is expected that native soils will not be contaminated. However, if evidence of contamination is discovered beneath the existing building's foundation following demolition, or during the excavation, the contamination will be removed to the extent possible and segregated from clean native soils for proper disposal. Clean native soils will be stockpiled on-site and characterized for reuse on-site in areas over excavated to remove historic fill. Any excess soil will be disposed of off-site as a beneficial re-use material upon approval by the NYSDEC Region 2's Division of Materials Management. Clean native soils utilized on-site will be subject to a testing program to verify that they meet restricted residential SCOs prior to use.

It is anticipated that the excavation of native soil materials will be performed by the excavation contractor for the construction project.

6.5.4 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a

surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

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

6.5.5 Stockpile Methods

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Hay bales will be used as needed near catch basins, surface waters and other discharge points. Water will be available on-site at suitable supply and pressure for use in dust control.

6.5.6 Materials Excavation and Load Out

The Remedial Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

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

Where effective, the equipment will be “dry” decontaminated using a broom and/or brushes. If significant amounts of soil or other contaminants remain after the dry decontamination, the equipment will also be pressure washed before leaving the Site. The QEP will be responsible for ensuring that all outbound trucks are dry-brushed or washed on the truck wash/equipment pad

before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking. The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site derived materials.

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

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

Each hotspot and structure to be remediated will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited. All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be located and shown on maps to be reported in the Final Engineering Report.

6.5.7 Materials Transport Off-Site

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

ENTERING SITE - from the Brooklyn Queens Expressway take the Metropolitan Avenue exit (32B) and head north along Union Avenue 1 block to Withers Street. Turn right, heading east on Withers Street 1 block to Meeker Avenue. Turn right heading west on Meeker Avenue one block to Jackson Street. Bear right into Jackson Street and the Site entrance on the right. EXITING SITE – cross Jackson Street and turn right onto Meeker Avenue heading west 1 block Union Avenue. Turn left heading south on Union Avenue to Meeker Avenue East. Turn right onto Meeker Avenue heading east and bear left onto the Brooklyn Queens Expressway on-ramp. A map showing the truck routes is included as **Figure 11**.

These are the most appropriate routes to and from the Site and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development. Material transported by trucks exiting the Site will be secured with tight-fitting covers. If loads contain wet material capable of producing free liquid, truck liners will be used. All trucks will be inspected, dry-brushed and / or, as needed, before leaving the site.

6.5.8 Materials Disposal Off-Site

Multiple disposal facility designations will be employed for the materials removed from the Site. Once final arrangements have been made the disposal location(s) will be reported to the NYSDEC Project Manager.

The total quantity of material expected to be disposed off-Site is 1,466 cubic yards including 80 cubic yards of CVOC impacted soil and 1,386 cubic yards of historic fill.

All petroleum contaminated and historic fill material excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval. It is anticipated that petroleum contaminated soils and historic fill will be disposed of as a non-hazardous material. Final classification of excavated materials will be dependant upon the results of waste characterization sampling. Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management (DMM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation

Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

Clean native soil removed from the site for development purposes (i.e. foundation, footings, etc.) will be handled as unregulated or beneficial use disposal. This soil will undergo a testing program to confirm that it meets Track 1 unrestricted SCOs prior to unregulated disposal or reuse on-site. Confirmation testing of clean soils will be in Accordance with NYSDEC CP-51 Guidance as follows:

Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	Each composite sample for analysis is created from 3-5 discrete samples from representative locations in the fill.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

Uncontaminated native soil confirmed by the above testing program and removed from the site, will be disposed of as unregulated C&D material or sent to a beneficial re-use facility. The final destination of soils whether classified as contaminated or uncontaminated must be approved by the NYSDEC.

Concrete demolition material generated on the Site from building slabs, parking areas and other structures will be segregated, sized and shipped to a concrete recycling facility upon approval by the NYSDEC's Division of Materials Management for Region 2. Concrete crushing or processing on-Site is prohibited. Asphalt removed from the parking areas will be sent to a separate recycling facility.

Additionally, it is common to encounter scrap metals and large boulders (greater than one foot in diameter) during excavation which may not be accepted by either the licensed disposal facility or the C&D facility. These materials will be segregated and subsequently recycled at local facilities. Uncontaminated metal objects will be taken to a local scrap metal facility.

Bricks and other C&D material are also not accepted by most soil disposal facilities if present at greater then 5% by volume. This material, if encountered, will be sent to a C&D landfill or other C&D processing facility if approved by the DEC. C&D material of this type is most often encountered on sites in which former basement structures have been filled in with material from demolishing a former building. There was no evidence of former basement areas identified during previous investigations performed at the Site.

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Engineering Report. Documentation for materials disposed of at recycling facilities (such as metal, concrete, asphalt) and as non-regulated C&D will include transport tickets for each load stating the origin of the material, the destination of the material and the quantity transported.

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

6.5.9 Materials Reuse On-Site

Approximately 200 cy of uncontaminated native soil excavated from the elevator pit and foundation structure of the new building may be reused on site to backfill behind the foundation walls. Re-use of on-Site clean native soil will only be allowed if the material is found to meet restricted residential criteria through the verification testing program detailed in Section 5.4.5 above. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Chemical criteria for on-Site reuse of material has been approved by NYSDEC. This criteria is the Track 2 Restricted Residential SCOs as presented in **Table 1**. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos. Concrete crushing or processing on-Site is prohibited. Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

6.5.10 Fluids Management

As the depth to groundwater at the site is approximately 8 feet below the planned excavation depth, dewatering operations will not be employed during construction. However, if dewatering from the accumulation of precipitation or surface runoff becomes necessary, dewatering fluids will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site. Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

6.5.11 Backfill from Off-Site Sources

Off-site fill material may be needed to stabilize the entrance - exit areas of the Site, for temporary driveways for loading trucks and as an underlayment to structural components of the new buildings including slabs and footings. Recycled Concrete Aggregate (RCA) derived from recognizable and uncontaminated concrete and supplied by facilities permitted by, and in full compliance with Part 360-16 and DSNY regulations, is an acceptable form of backfill material. The Remedial Engineer is responsible for ensuring that the facility is compliant with the registration and permitting requirements of 6 NYCRR Part 360 and DSNY regulations at the time the RCA is acquired. RCA imported from compliant facilities does not require additional testing unless required by NYS DEC and DSNY under its terms of operations for the facility. Documentation of part 360-16 and DSNY compliance must be provided to the Remedial Engineer before the RCA is transported to the Site.

Fill material may also consist of virgin mined sand, gravel or stone products. Materials from a virgin mined source may be imported to the Site without testing provided that that the material meets the specifications of the geotechnical engineer, Remedial Engineer, and Redevelopment Construction Documents and that the source of the material is approved by the Remediation Engineer and the NYSDEC Project Manager.

The source approval process will require a review of the following information:

- The origin of the material;
- The address of the facility which mines/processes the material;
- A letter from the facility stating that the material to be delivered to the site is a virgin mined material and that it has not been co-mingled with other materials during processing or stockpiling.

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site. Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

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

Under no circumstances will fill materials be imported to the site without prior approval from the NYSDEC Project Manager. If sufficient documentation is not obtained, fill materials will be tested at a frequency consistent with that as specified in Table 4 of NYSDEC CP-51 Soil Cleanup Guidance Policy. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

6.5.12 Stormwater Pollution Prevention

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering. Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

6.5.13 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be limited to STARS parameters where tanks are identified. Analyses will not be otherwise limited without NYSDEC approval.

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

6.5.14 Community Air Monitoring Plan

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at construction sites.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are odors associated with groundwater purging and sampling.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report. The complete CAMP developed for this site is included in **Attachment F** or this Work Plan.

6.5.15 Odor, Dust and Nuisance Control Plan

The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

6.5.15.1 Odor Control Plan

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

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

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

6.5.15.2 Dust Control Plan

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

- Dust suppression will be achieved though spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

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

6.5.15.3 Nuisance Control Plan

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

7.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since contaminated soil is expected to exist beneath the Site after the remedy is complete, an Institutional Control (IC) is required to protect human health and the environment. The IC is described hereafter. Long-term management of the IC will be executed under a deed restriction recorded with the NYC Department of Finance, Office of the City Register.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have the following EC systems:

The FER will report residual contamination on the Site in tabular and map form.

8.0 ENGINEERING CONTROLS

8.1 SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

An SSDS and vapor barrier were designed for the portions of the building slab which are to be used for mechanical and utility rooms, lobby, day care center and laundry room.

An SSDS will not be required beneath the remainder of the building since this areas will be used as a parking garage which must be ventilated to remove vehicle fumes in accordance with the NYC Mechanical Code.

The SSDS beneath the occupied portion of the building slab will consist of a single venting zone. This zone will provide coverage of approximately 2,500 sf of slab area. This is consistent with USEPA sub-slab depressurization design specifications which recommend a separate vent loop for every 4,000 sf of slab area.

The horizontal vent line is constructed of a continuous loop of perforated 4-inch HDPE pipe. The horizontal pipe will extend to an adjacent utility chase-way where it will be piped individually to the roof via a 6-inch schedule 40 pvc line. Fill material around the horizontal vent piping is virgin-mined, ½ inch to ¾ inch gravel.

A high density polyethylene vapor barrier liner (HPDE) will be installed over the SSDS prior to pouring the building's concrete slab. The vapor barrier will consist of a 20 mil HDPE geomembrane liner manufactured by GSE Lining Technologies of North America, or equivalent. The vapor barrier will extend throughout the portion of the slab to be used for mechanical / utility rooms and resident use in new building to be constructed at the site. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

An EBC field inspector under the direct supervision of a professional engineer will inspect and photograph the vapor barrier at several critical stages before during and after the installation is complete, to assure compliance with design specifications. Detailed specifications of the SSD system are provided **Attachment J**.

8.1.1 Criteria for Termination

The active SSDS in each building will not be discontinued without written approval by the NYSDEC and NYSDOH. A proposal to discontinue the active SSDS may be submitted by the property owner based on confirmatory data that justifies such a request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

9.0 INSTITUTIONAL CONTROLS

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

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

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

9.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. If an Environmental Easement is needed following completion of the remedy an Environmental Easement approved by NYSDEC will be filed and recorded with the City of New York. The Environmental Easement (if needed) will be submitted as part of the Final Remediation Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the City of New York before the Certificate of Completion can be issued by NYSDEC. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the Site Management Plan (SMP), which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls which will be needed to support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- A soil vapor mitigation system consisting of a sub slab depressurization system under the occupied area of the buildings must be inspected, certified, operated and maintained as required by the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater, soil vapor, and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- On-Site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;

- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these ICs for the Site is mandated by the Environmental Easement and will be implemented under the SMP. The Controlled Property (Site) may also have a series of ICs in the form of Site restrictions and requirements. The Site restrictions that may apply to the Controlled Property are:

- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;

- The Controlled Property may be used for restricted residential use provided that the EC/ICs included in this SMP are employed.

- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

9.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property

owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated [month, year], and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The Site Management Plan in the Final Engineering Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately

down-gradient of all volatile organic carbon remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

10.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) and Certificate Of Completion (COC) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Final Engineering Report will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete Site Management Plan (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

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

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that

shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

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

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

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

10.1 CERTIFICATIONS

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

I _____certify that I am currently a NYS registered professional engineer and that this Final Engineering Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

NYS Professional Engineer # _____ Date _____ Signature

11.0 SCHEDULE

Remedial activity will begin following the demolition of the existing 1-story building on the property. Building demolition and sign off is expected to be initiated and completed within 2 weeks following acceptance into the BCP and NYSDEC approval of this RAWP. Hot spot areas will then be removed and the property excavated to final construction grade. Installation of the building foundation will be performed in conjunction with construction excavation.

The remedial action will begin with mobilization of equipment and material to the Site which will begin approximately 2 weeks following RAWP approval and within 10 days of the distribution of the Construction Fact Sheet. Mobilization will be followed by removal of the CVOC hot spot area and confirmation sampling. This work is expected to take 1 week. Excavation and disposal of historic fill materials will begin following the hotspot removal and is expected to continue for 2 weeks as part of the construction excavation and foundation installation. The schedule of tasks completed under this RAWP is as follows:

Conduct pre-construction meeting with NYSDEC	Within 2 weeks of RAWP approval
Mobilize equipment to the site and construct truck pad and other designated areas	Within 2 weeks following Building demolition
Mobilize Remediation Contractor and equipment to the Site	Within 1 week following Site prep and truck pad construction
Begin removal of northwest hot spot and excavate CVOC impacted soils	Immediately following mobilization
Complete removal of impacted soils northwest hotspot area, collect endpoint samples and backfill excavation. Demobilize Remediation Contractor	Within 2 days of mobilization
Mobilize excavation contractor Begin excavation of historic fill	Within 2 weeks of completing hotspot remediation
Complete excavation and disposal of historic fill soils and install foundation.	4 months weeks following mobilization
Perform endpoint verification of entire site	Performed in sequence as final depth of each excavated area is complete.

TABLES

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
METALS							
Arsenic	7440-38 -2	16[f]	16[f]	16[f]	16[f]	13[f]	16[f]
Barium	7440-39 -3	350[f]	400	400	10,000 [d]	433	820
Beryllium	7440-41 -7	14	72	590	2,700	10	47
Cadmium	7440-43 -9	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	18540-29-9	22	110	400	800	1[e]	19
Chromium, trivalent[h]	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50 -8	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]		27	27	27	10,000 [d]	NS	40
Lead	7439-92 -1	400	400	1,000	3,900	63[f]	450
Manganese	7439-96 -5	2,000[f]	2,000[f]	10,000 [d]	10,000 [d]	1600[f]	2,000[f]
Total Mercury		0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	7440-02 -0	140	310	310	10,000 [d]	30	130
Selenium	7782-49 -2	36	180	1,500	6,800	3.9[f]	4[f]
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3
Zinc	7440-66 -6	2200	10,000 [d]	10,000 [d]	10,000 [d]	109[f]	2,480
PESTICIDES / PCBs							
2,4,5-TP Acid (Silvex)	93-72-1	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 [e]	17
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 [e]	136
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 [e]	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9
delta-BHC	319-86-8	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	132-64-9	14	59	350	1,000[c]	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	33213-65-9	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	1031-07 -8	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2
SEMI-VOLATILES							
Acenaphthene	83-32-9	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	208-96-8	100[a]	100[a]	500[b]	1,000[c]	NS	107
Anthracene	120-12-7	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	56-55-3	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	50-32-8	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b) fluoranthene	205-99-2	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i) perylene	191-24-2	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h) anthracene	53-70-3	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	206-44-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	86-73-7	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd) pyrene	193-39-5	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	108-39-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	91-20-3	100[a]	100[a]	500[b]	1,000[c]	NS	12
o-Cresol	95-48-7	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	106-44-5	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	85-01-8	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	108-95-2	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	129-00-0	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
VOLATILES							
1,1,1-Trichloroethane	71-55-6	100[a]	100[a]	500[b]	1,000[c]	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100[a]	100[a]	500[b]	1,000[c]	NS	0.33
1,2-Dichlorobenzene	95-50-1	100[a]	100[a]	500[b]	1,000[c]	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02[f]
cis-1,2-Dichloroethene	156-59-2	59	100[a]	500[b]	1,000[c]	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100[a]	100[a]	500[b]	1,000[c]	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1[e]	0.1[e]
Acetone	67-64-1	100[a]	100[b]	500[b]	1,000[c]	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100[a]	100[a]	500[b]	1,000[c]	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100[a]	100[a]	500[b]	1,000[c]	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100[a]	100[a]	500[b]	1,000[c]	100[a]	0.12
Methyl tert-butyl ether	1634-04 -4	62	100[a]	500[b]	1,000[c]	NS	0.93
Methylene chloride	75-09-2	51	100[a]	500[b]	1,000[c]	12	0.05
n-Propylbenzene	103-65-1	100[a]	100[a]	500[b]	1,000[c]	NS	3.9
sec-Butylbenzene	135-98-8	100[a]	100[a]	500[b]	1,000[c]	NS	11
tert-Butylbenzene	98-06-6	100[a]	100[a]	500[b]	1,000[c]	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100[a]	100[a]	500[b]	1,000[c]	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20 -7	100[a]	100[a]	500[b]	1,000[c]	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

TABLE 2
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Number of Samples	Rationale for Sampling	Laboratory Analysis
Subsurface soil (0 to 10 feet bgs)	5 borings throughout the site, two in the northern area, two in the southern area and one in the central area.	10	To evaluate soil quality of urban fill materials and native soil across the Site.	VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals.
Subsurface soil (0 to 2 feet bgs)	2 borings along the northern property boundary, one boring in the northwestern area and one boring in the northeastern area.	2	To supplement previous sampling and delineate CVOC affected soil gas in the northern portion of the Site.	VOCs EPA Method 8260B
Total (Soils)		12		
Groundwater (water table)	From 3 temporary monitoring wells across the Site.	3	To evaluate groundwater quality across the Site.	VOCs EPA Method 8260B, SVOCs EPA Method 8270, pesticide / PCBs EPA Method 8081/8082, TAL metals dissolved and total.
Total (Groundwater)		3		
Soil Gas (sub-slab)	6 sub-slab soil gas implants installed across the Site.	6	Evaluate soil gas at across the Site.	VOCs EPA Method TO15
Total (Soil Gas)		6		
Duplicates	One soil and one groundwater duplicate sample	2	To meet requirements of QA / QC program	1 groundwater and 1 soil duplicate for VOCs EPA Method 8260B, for SVOCs EPA Method 8270 BN, pesticide / PCBs EPA Method 8081/8082, TAL metals.
Trip Blanks	One laboratory prepared trip blank to accompany samples each time they are delivered to the laboratory.	1	To meet requirements of QA / QC program	VOCs EPA Method 8260B
Total (QA / QC Samples)		3		

TABLE 3
11 Jackson Street, Brooklyn, New York
Soil Analytical Results
Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1		B2		B3		B4		B5			B6	B7
			(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(0-2') Dup. µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(0-2') µg/Kg
1,1,1,2-Tetrachlorothane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	2,400	4,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone (Methyl Butyl Ketone)			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-isopropyltoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	250	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromoethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m&p-Xylenes	260		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Ethyl Ketone (2-Butanone)	120	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl t-butyl ether (MTBE)	930	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	50	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene			ND	ND	**940**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	12,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	11,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,300	19,000	**12**	ND	ND	ND	ND	ND	**6.6**	ND	ND	ND	ND	**54**	**8.3**
Tetrahydrofuran (THF)			ND	ND	**5.9**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	700	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	190	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trabs-1,4-dichloro-2-butene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	470	21,000	ND	ND	**75**	**6.7**	ND	ND	ND	ND	**6.3**	ND	ND	**8.2**	**53**
Trichlorofluoromethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorotrifluoroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total BTEX Concentration			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total VOCs Concentration			**12**	**0**	**1020.9**	**6.7**	**0**	**0**	**6.6**	**0**	**6.3**	**0**	**0**	**62.2**	**61.3**

Notes:

** - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives
ND - Not-detected
Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value
Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 4
11 Jackson Street, Brooklyn, New York
Soil Analytical Results
Semi-Volatile Organic Compounds

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1		B2		B3		B4		B5		
			(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(0-2') Dup. µg/Kg	(4-6') µg/Kg
1,2,4,5-Tetrachlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene			ND	ND	9300	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylphenol (o-cresol)	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Nitroaniline			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Nitrophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3&4-Methylphenol (m&p-cresol)	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3-Nitroaniline			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloroaniline			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorophenyl phenyl ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Nitroaniline			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	20,000	100,000	440	ND	9500	ND	ND	ND	ND	ND	880	ND	ND
Acenaphthylene	100,000	100,000	ND	ND	1800	ND	ND	ND	ND	ND	360	ND	ND
Acetophenone			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aniline			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	100,000	100,000	1,100	ND	19000	ND	490	ND	480	ND	2,100	560	ND
Azobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	1,000	1,000	2,800	ND	43000	750	1,400	ND	1,600	360	5,700	2,100	ND
Benzidine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	1,000	1,000	2,500	ND	38000	690	1,300	ND	1,500	300	5,300	2,200	ND
Benzo(b)fluoranthene	1,000	1,000	3,100	ND	50000	830	1,500	ND	1,900	370	6,200	2,500	ND
Benzo(g,h,i)perylene	100,000	100,000	1,700	ND	24000	610	910	ND	1,200	ND	4,600	1,700	ND
Benzo(k)fluoranthene	800	3,900	1,000	ND	19000	320	440	ND	580	ND	2,100	930	ND
Benzoic Acid			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butyl benzyl phthalate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-chloroethoxy)methane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-chloroethyl)ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole			910	ND	12000	ND	ND	ND	ND	ND	1100	ND	ND
Chrysene	1,000	3,900	2,700	ND	36000	760	1,400	ND	1,600	330	5,500	2,100	ND
Dibenzo(a,h)anthracene	330	330	500	ND	11000	ND	ND	ND	280	ND	1,100	400	ND
Dibenzofuran			320	ND	9800	ND	ND	ND	ND	ND	440	ND	ND
Diethyl phthalate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethyl phthalate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate			ND	ND	ND	ND	ND	ND	1200	ND	2,500	1,100	ND
Di-n-octylphthalate			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	100,000	100,000	6,100	ND	99000	2,200	3,400	320	4,300	790	10,000	5,500	ND
Fluorene	30,000	100,000	440	ND	9600	ND	ND	ND	ND	ND	730	ND	ND
Hexachlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	500	500	1,500	ND	20000	430	690	ND	910	ND	3,600	1,300	ND
Isophorone			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	12,000	100,000	ND	ND	17000	ND	ND	ND	400	ND	420	ND	ND
Nitrobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodimethylamine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachloronitrobenzene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	800	6,700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	100,000	100,000	5,600	ND	100000	1,200	2400	280	2,600	520	8,900	3,100	ND
Phenol	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	100,000	100,000	5,400	ND	86000	2,100	3,500	290	4,000	750	10,000	5,200	ND
Pyridine			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

* - NYSDEC Technical and Administative Guidance Memorandum 4046, 1994

** - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

ND - Not-detected

NA - Guidance value not available

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 5
11 Jackson Street, Brooklyn, New York
Soil Analytical Results
Pesticides / PCBs

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1		B2		B3		B4		B5		
			(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(4-6') µg/Kg	(0-2') µg/Kg	(0-2') Dup. µg/Kg	(4-6') µg/Kg
PCB-1016	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1221	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1232	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1242	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1248	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1254	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1260	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1262	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1268	1,000	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4-DDD	3.3	13,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4-DDE	3.3	8,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4-DDT	3.3	7,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
a-BHC	20	480	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Alachlor			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin	5	97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
b-BHC	36	360	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlordane	94	4,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
d-BHC	40	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	5	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	2,400	24,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	2,400	24,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	2,400	24,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	14	11,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin aldehyde			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Endrin ketone			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	42	2,100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toxaphene			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

* - NYSDEC Technical and Administative Guidance Memorandum 4046, 1994

** - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

ND - Not-detected

NA - Guidance value not available

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 6
11 Jackson Street, Brooklyn, New York
Soil Analytical Results
Metals

COMPOUND	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives	NYDEC Part 375.6 Restricted Residential Soil Cleanup Objectives*	B1		B2		B3		B4		B5		
			(0-2') mg/Kg	(4-6') mg/Kg	(0-2') mg/Kg	(4-6') mg/Kg	(0-2') mg/Kg	(4-6') mg/Kg	(0-2') mg/Kg	(4-6') mg/Kg	(0-2') mg/Kg	(0-2') Dup. mg/Kg	(4-6') mg/Kg
Silver	2	180	<0.5	<0.36	<0.5	<0.35	< 0.38	< 0.39	< 0.41	< 0.38	< 0.70	<0.60	< 0.42
Aluminum			9,200	8,910	5,940	8,090	7,740	8,870	7,950	8,900	6,310	6,690	11,800
Arsenic	13	16	6.88	3.49	13.2	8.58	8.5	4.46	10	2.99	13	11.7	1.91
Barium	350	400	357	74.2	689	243	276	88.7	450	205	920	575	48.7
Beryllium	7.2	72	0.41	0.4	0.32	0.39	0.42	0.42	0.39	0.59	0.4	0.42	0.48
Calcium			16,600	4,710	20,300	14,600	10,400	2,980	13,300	22,400	19,600	23,000	1,580
Cadmium	2.5 c	4.3	<0.33	<0.36	0.61	0.92	< 0.38	< 0.39	< 0.41	< 0.38	1.05	0.63	< 0.42
Cobalt			5.92	5.91	6.43	6.5	5.69	5.09	5.74	6.71	6.54	5.88	7.74
Chromium	30 c	180 - trivalent	21.9	19.7	20.2	28.8	21.3	16.8	20.5	18.3	95.6	26.2	21
Copper	50	270	65.8	30.7	156	78.4	165	33	94.1	36	487	392	18.7
Iron			26,400	24,000	28,000	31,800	24,200	17,900	27,200	34,100	30,500	28,200	28,800
Mercury	0.18 c	0.81	1.35	0.56	1.59	2.6	1.8	0.53	1.41	0.47	1.61	1.5	0.12
Potassium			1,080	1,100	1,010	1,230	1,240	854	1,110	914	1,060	1,100	1,030
Magnesium			2,650	2,000	2,840	1,930	1,910	1,520	2,370	1,960	2,490	2,520	2,080
Manganese	1600 c	2,000	2,920	408	319	398	770	294	386	478	380	332	446
Sodium			271	167	295	279	379	133	587	237	724	674	59.8
Nickel	30	310	17.2	11.8	18.7	14.6	14.9	10.5	14	16.9	22.9	28.6	12.1
Lead	63 c	400	752	151	1,590	961	666	216	1230	928	1,140	968	58
Antimony			<3.3	<3.6	<10	<3.5	< 3.8	< 3.9	< 4.1	< 3.8	< 25	<20	< 4.2
Selenium	3.9c	180	<1.3	<1.4	<1.5	<1.4	< 1.5	< 1.6	< 1.6	< 1.5	< 1.5	<1.5	< 1.7
Thallium			<3.0	<3.2	<3.4	<3.1	< 3.4	< 3.5	< 3.7	< 3.4	< 3.3	<3.3	< 3.8
Vanadium			29.9	25.9	21.2	27.2	28.5	23.2	23.7	27.6	27.1	25.6	35.7
Zinc	109 c	10,000	535	101	620	1,400	514	119	536	210	1,010	572	42.2

Notes:

* - NYSDEC Technical and Administative Guidance Memorandum 4046, 1994

** - 6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives

ND - Not-detected

NA - Guidance value not available

Bold/highlighted- Indicated exceedance of the NYSDEC UUSCO Guidance Value

Bold/highlighted- Indicated exceedance of the NYSDEC RRSCO Guidance Value

TABLE 7
11 Jackson Street, Brooklyn, New York
Groundwater Analytical Results
Volatile Organic Compounds

Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 µg/L	GW2 µg/L	GW2 Duplicate µg/L	GW3 µg/L
1,1,1,2-Tetrachlorothane	5	ND	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND	ND
1,1-Dichloroethene		ND	ND	ND	ND
1,1-Dichloropropene		ND	ND	ND	ND
1,2,3-Trichlorobenzene		ND	ND	ND	ND
1,2,3-Trichloropropane		ND	ND	ND	ND
1,2,4-Trichlorobenzene		ND	ND	ND	ND
1,2,4-Trimethylbenzene	5	ND	ND	ND	of
1,2-Dibromo-3-chloropropane		ND	ND	ND	ND
1,2-Dichlorobenzene		ND	ND	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND
1,2-Dichloropropane	0.94	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5	ND	ND	ND	ND
1,3-Dichlorobenzene		ND	ND	ND	ND
1,3-Dichloropropane		ND	ND	ND	ND
1,4-Dichlorobenzene		ND	ND	ND	ND
2,2-Dichloropropane		ND	ND	ND	ND
2-Chlorotoluene		ND	ND	ND	ND
2-Hexanone (Methyl Butyl Ketone)		ND	ND	ND	ND
2-Isopropyltoluene		ND	ND	ND	ND
4-Chlorotoluene		ND	ND	ND	ND
4-Methyl-2-Pentanone		ND	ND	ND	ND
Acetone		ND	ND	ND	ND
Acrylonitrile		ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND
Bromobenzene		ND	ND	ND	ND
Bromochloromethane	5	ND	ND	ND	ND
Bromodichloromethane		ND	ND	ND	ND
Bromoform		ND	ND	ND	ND
Bromomethane	5	ND	ND	ND	ND
Carbon Disulfide		ND	ND	ND	ND
Carbon tetrachloride	5	ND	ND	ND	ND
Chlorobenzene		ND	ND	ND	ND
Chloroethane		ND	ND	ND	ND
Chloroform	7	ND	ND	ND	ND
Chloromethane		ND	ND	ND	ND
cis-1,2-Dichloroethene	5	ND	ND	ND	ND
cis-1,3-Dichloropropene		ND	ND	ND	ND
Dibromochloromethane		ND	ND	ND	ND
Dibromoethane		ND	ND	ND	ND
Dibromomethane		ND	ND	ND	ND
Dichlorodifluoromethane		ND	ND	ND	ND
Ethylbenzene	5	ND	ND	ND	ND
Hexachlorobutadiene		ND	ND	ND	ND
Isopropylbenzene	5	ND	ND	ND	ND
m&p-Xylenes	5	ND	ND	ND	ND
Methyl Ethyl Ketone (2-Butanone)		ND	ND	ND	ND
Methyl t-butyl ether (MTBE)		ND	**4.5**	**3.2**	ND
Methylene chloride		ND	ND	ND	ND
Naphthalene		ND	ND	ND	ND
n-Butylbenzene	5	ND	ND	ND	ND
n-Propylbenzene	5	ND	ND	ND	ND
o-Xylene	5	ND	ND	ND	ND
p-Isopropyltoluene		ND	ND	ND	ND
sec-Butylbenzene		ND	ND	ND	ND
Styrene		ND	ND	ND	ND
tert-Butylbenzene		ND	ND	ND	ND
Tetrachloroethene	5	ND	**2**	ND	ND
Tetrahydrofuran (THF)		ND	ND	ND	ND
Toluene	5	ND	ND	ND	ND
Total Xylenes		ND	ND	ND	ND
trans-1,2-Dichloroethene		ND	ND	ND	ND
trans-1,3-Dichloropropene		ND	ND	ND	ND
trabs-1,4-dichloro-2-butene		ND	ND	ND	ND
Trichloroethene	5	ND	ND	ND	ND
Trichlorofluoromethane		ND	ND	ND	ND
Trichlorotrifluoroethane		ND	ND	ND	ND
Vinyl Chloride		ND	ND	ND	ND

Notes:
ND - Not detected
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 8
11 Jackson Street, Brooklyn, New York
Groundwater Analytical Results
Semi-Volatile Organic Compounds

Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 µg/L	GW2 µg/L	GW2 Duplicate µg/L	GW3 µg/L
1,2-Dichlorobenzene	3	ND	ND	ND	ND
1,3-Dichlorobenzene	3	ND	ND	ND	ND
1,4-Dichlorobenzene		ND	ND	ND	ND
2,4-Dinitrotoluene	5	ND	ND	ND	ND
2,6-Dinitrotoluene	5	ND	ND	ND	ND
2-Chloronaphthalene	10	ND	ND	ND	ND
2-Methylnaphthalene		ND	ND	ND	ND
2-Nitroaniline	5	ND	ND	ND	ND
3,3'-Dichlorobenzidine	5	ND	ND	ND	ND
3-Nitroaniline	5	ND	ND	ND	ND
4-Bromophenyl phenyl ether		ND	ND	ND	ND
4-Chloroaniline	5	ND	ND	ND	ND
4-Chlorophenyl phenyl ether		ND	ND	ND	ND
4-Nitroaniline	5	ND	ND	ND	ND
Acenaphthene	20	ND	ND	ND	ND
Acenaphthylene		ND	ND	ND	ND
Anthracene	50	ND	ND	ND	ND
Azobenzene		ND	ND	ND	ND
Benzo(a)anthracene	0.002	ND	ND	ND	ND
Benzidine	5	ND	ND	ND	ND
Benzo(a)pyrene		ND	ND	ND	ND
Benzo(b)fluoranthene	0.002	ND	ND	ND	ND
Benzo(g,h,i)perylene		ND	ND	ND	ND
Benzo(k)fluoranthene	0.002	ND	ND	ND	ND
Benzoic Acid		ND	ND	ND	ND
Benzyl Alcohol		ND	ND	ND	ND
Butyl benzyl phthalate	50	ND	ND	ND	ND
Bis(2-chloroethoxy)methane	5	ND	ND	ND	ND
Bis(2-chloroethyl)ether	1	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether		ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	5	**5.9**	ND	**7.9**	ND
Chrysene	0.002	ND	ND	ND	ND
Dibenzo(a,h)anthracene		ND	ND	ND	ND
Dibenzofuran		ND	ND	ND	ND
Diethylphthalate	50	ND	ND	ND	ND
Dimethylphthalate	50	ND	ND	ND	ND
Di-n-butylphthalate	50	ND	ND	ND	ND
Di-n-octylphthalate	50	ND	ND	ND	ND
Fluoranthene	50	ND	ND	ND	ND
Fluorene	50	ND	ND	ND	ND
Hexachlorobenzene	0.04	ND	ND	ND	ND
Hexachlorobutadiene	0.5	ND	ND	ND	ND
Hexachlorocyclopentadiene	5	ND	ND	ND	ND
Hexachloroethane	5	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.002	ND	ND	ND	ND
Isophorone	50	ND	ND	ND	ND
Naphthalene	10	ND	ND	ND	ND
Nitrobenzene	0.4	ND	ND	ND	ND
N-Nitrosodimethylamine		ND	ND	ND	ND
N-Nitrosodi-n-propylamine		ND	ND	ND	ND
N-Nitrosodiphenylamine	50	ND	ND	ND	ND
Phenanthrene	50	**0.08**	**0.15**	ND	**0.09**
Pyrene	50	ND	ND	ND	ND

Notes:

ND - Not detected

Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 9
11 Jackson Street, Brooklyn, New York
Groundwater Analytical Results
Pesticides/PCBs

Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 µg/L	GW2 µg/L	GW2 Duplicate µg/L	GW3 µg/L
PCB-1016	**0.09**	ND	ND	ND	ND
PCB-1221	**0.09**	ND	ND	ND	ND
PCB-1232	**0.09**	ND	ND	ND	ND
PCB-1242	**0.09**	ND	ND	ND	ND
PCB-1248	**0.09**	ND	ND	ND	ND
PCB-1254	**0.09**	ND	ND	ND	ND
PCB-1260	**0.09**	ND	ND	ND	ND
PCB-1262	**0.09**	ND	ND	ND	ND
PCB-1268	**0.09**	ND	ND	ND	ND
4,4-DDD	**0.3**	ND	ND	ND	ND
4,4-DDE	**0.2**	ND	ND	ND	ND
4,4-DDT	**0.11**	ND	ND	ND	ND
a-BHC	**0.94**	ND	ND	ND	ND
Alachlor		ND	ND	ND	ND
Aldrin		ND	ND	ND	ND
b-BHC	**0.04**	ND	ND	ND	ND
Chlordane	**0.05**	ND	ND	ND	ND
d-BHC	**0.04**	ND	ND	ND	ND
Dieldrin	**0.004**	ND	ND	ND	ND
Endosulfan I		ND	ND	ND	ND
Endosulfan II		ND	ND	ND	ND
Endosulfan Sulfate		ND	ND	ND	ND
Endrin		ND	ND	ND	ND
Endrin aldehyde	**5**	ND	ND	ND	ND
Endrin ketone		ND	ND	ND	ND
gamma-BHC	**0.05**	ND	ND	ND	ND
Heptachlor	**0.04**	ND	ND	ND	ND
Heptachlor epoxide	**0.03**	ND	ND	ND	ND
Methoxychlor	**35**	ND	ND	ND	ND
Toxaphene		ND	ND	ND	ND

Notes:

ND - Non-detect

Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

Table 10
11 Jackson Street, Brooklyn, New York
Groundwater Analytical Results
TAL Metals

Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 µg/L	GW2 µg/L	GW2 Duplicate µg/L	GW3 µg/L
Silver	50	<1	<1	<1	<1
Aluminum	NS	122,000	136,000	40,100	135,000
Arsenic	25	24	27	12	26
Barium	1000	1,210	1,080	435	1,330
Beryllium	3	9	8	2	9
Calcium	NS	159,000	150,000	132,000	161,000
Cadmium	5	3	3	1	4
Cobalt	NS	190	132	61	209
Chromium	50	376	490	230	423
Copper	200	514	287	110	585
Iron	500	378,000	312,000	114,000	421,000
Mercury	0.7	<0.2	<0.2	<0.2	0.2
Potassium	NS	34,000	36,300	10,000	35,400
Magnesium	35000	124,000	84,000	74,900	129,000
Manganese	300	8,450	18,800	2,580	9,410
Sodium	2000	68,700	77,200	73,000	67,800
Nickel	100	332	303	165	371
Lead	25	178	146	40	202
Antimony	3	8	12	<5	11
Selenium	10	<10	<10	<10	<10
Thallium	0.5	<2	<2	<2	<2
Vanadium	NS	420	346	142	468
Zinc	2000	800	542	220	894

Notes:
ND - ND
NS - No Standard
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

Table 11
11 Jackson Street, Brooklyn, New York
Groundwater Analytical Results
TAL Filtered Metals

Compound	NYSDEC Groundwater Quality Standards µg/L	GW1 µg/L	GW2 µg/L	GW2 Duplicate µg/L	GW3 µg/L
Silver	50	<1	<1	<1	<1
Aluminum	NS	80	940	150	630
Arsenic	25	<4	<4	<4	<4
Barium	1000	90	151	90	93
Beryllium	3	<1	<1	<1	<1
Calcium	NS	146,000	144,000	107,000	147,000
Cadmium	5	<1	<1	<1	<1
Cobalt	NS	9	8	5	7
Chromium	50	<1	3	<1	1
Copper	200	<5	<5	<5	<5
Iron	500	96	1,040	183	804
Mercury	0.7	<0.2	<0.2	<0.2	<0.2
Potassium	NS	4,300	21,800	3,500	4,200
Magnesium	35000	72,900	52,000	57,000	74,000
Manganese	300	1,090	6,400	658	733
Sodium	2000	69,200	77,200	71,900	68,900
Nickel	100	11	18	10	9
Lead	25	<2	4	<2	<2
Antimony	3	<5	<5	<5	<5
Selenium	10	<11	<11	<11	<11
Thallium	0.5	<2	<2	<2	<2
Vanadium	NS	2	4	3	4
Zinc	2000	4	5	4	6

Notes:
ND - ND
NS - No Standard
Bold/highlighted- Indicated exceedance of the NYSDEC Groundwater Standard

TABLE 12
11 Jackson Street, Brooklyn, New York
Soil Gas - Volatile Organic Compounds

COMPOUNDS	NYSDOH Maximum Sub-Slab Value (µg/m³) [a]	NYSDOH Soil Outdoor Background Levels (µg/m³) [b]	SG-1 (µg/m³)	SG-2 (µg/m³)	SG-3 (µg/m³)	SG-4 (µg/m³)	SG-5 (µg/m³)	SG-6 (µg/m³)
1,1,1,2-Tetrachloroethane			**9.6**	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	100	<2.0 - 2.8	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane		<1.5	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane		<1.0	**3.76**	ND	ND	ND	ND	ND
1,1-Dichloroethane		<1.0	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene		<1.0	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene		NA	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene		<1.0	**6.73**	**14.4**	**6.34**	**15.2**	ND	**86**
1,2-Dibromoethane		<1.5	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene		<2.0	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane		<1.0	ND	ND	ND	ND	ND	**1.38**
1,2-Dichlorotetrafluoroethane			ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene		<1.0	**2.31**	**5.26**	**2.06**	**6.29**	ND	**36**
1,3-Butadiene		NA	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene		<2.0	ND	ND	ND	ND	ND	**1.5**
1,4-Dichlorobenzene		NA	ND	ND	ND	ND	ND	ND
1,4-Dioxane			ND	ND	ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND	ND	ND
4-Ethyltoluene		NA	**3.24**	**7.37**	**2.55**	**7.86**	ND	**49.6**
4-Isopropyltoluene			ND	ND	ND	ND	ND	**4.39**
4-Methyl-2-pentanone			**1.23**	**4.99**	ND	**1.15**	ND	ND
Acetone		NA	**96.6**	**593**	**40.4**	**149**	**15.3**	**413**
Acrylonitrile			ND	ND	ND	ND	ND	ND
Benzene		<1.6 - 4.7	**10.8**	**76**	**4.21**	**2.08**	ND	**18.4**
Benzyl Chloride		NA	ND	**1.97**	ND	ND	ND	ND
Bromodichloromethane		<5.0	ND	ND	ND	**3.28**	ND	ND
Bromoform		<1.0	ND	ND	ND	ND	ND	ND
Bromomethane		<1.0	ND	ND	ND	ND	ND	ND
Carbon Disulfide		NA	**3.08**	**5.76**	**1.12**	**1.06**	ND	**118**
Carbon Tetrachloride	5	<3.1	**0.88**	**0.629**	**0.251**	**0.377**	**0.44**	**0.88**
Chlorobenzene		<2.0	ND	ND	ND	ND	ND	ND
Chloroethane		NA	ND	ND	ND	ND	ND	ND
Chloroform		<2.4	**25.1**	ND	**2.98**	**4.59**	ND	**28**
Chloromethane		<1.0 - 1.4	ND	**1.44**	ND	ND	ND	**3.38**
cis-1,2-Dichloroethene		<1.0	**1.74**	ND	ND	ND	ND	**15.4**
cis-1,3-Dichloropropene		NA	ND	ND	ND	ND	ND	ND
Cyclohexane		NA	**3.78**	**86.3**	**2.27**	**7.05**	ND	**19.2**
Dibromochloromethane		<5.0	ND	ND	ND	ND	ND	ND
Dichlorodifluromethane		NA	**2.72**	**2.92**	**2.72**	**2.72**	**2.72**	**2.82**
Ethanol			**103**	**248**	**82.8**	**163**	**13.3**	**350**
Ethyl Acetate		NA	ND	ND	ND	**2.81**	ND	**3.56**
Ethylbenzene		<4.3	**9.94**	**39.1**	**6.12**	**5.73**	ND	**14.9**
Heptane		NA	**5.41**	**112**	**3.77**	**37.3**	ND	**54.5**
Hexachlorobutadiene		NA	ND	ND	ND	ND	ND	ND
Hexane		<1.5	**7.64**	**260**	**6.8**	**3.49**	**8.98**	**18.9**
Isopropylalcohol		NA	ND	ND	ND	**62.6**	ND	**58.2**
Isopropylbenzene			**1.57**	**2.85**	**1.23**	**1.18**	ND	**6.19**
Xylene (m&p)		<4.3	**32.9**	**100**	**20.4**	**19**	ND	**57.3**
Methyl Ethyl Ketone			**8.25**	**65.4**	**3.57**	**4.6**	ND	**33.9**
MTBE		NA	ND	ND	ND	ND	ND	ND
Methylene Chloride		<3.4	**1.04**	**5.28**	ND	**52.1**	**26.9**	**2.46**
n-Butylbenzene			ND	ND	ND	ND	ND	**3.29**
Xylene (o)		<4.3	**9.42**	**29.3**	**6.12**	**6.38**	ND	**20.7**
Propylene		NA	ND	**18.9**	ND	**1.93**	ND	**74.6**
sec-Butylbenzene			ND	ND	ND	ND	ND	ND
Styrene		<1.0	**1.19**	**1.15**	ND	ND	ND	ND
Tetrachloroethene	100		**8,270**	**10.4**	**383**	**393**	ND	**245**
Tetrahydrofuran		NA	**18.3**	**111**	**14.1**	ND	ND	**5.45**
Toluene		1.0 - 6.1	**33.7**	**248**	**19.7**	**15.8**	**2.03**	**22.6**
trans-1,2-Dichloroethene		NA	**2.38**	ND	ND	ND	ND	**13.7**
trans-1,3-Dichloropropene		NA	ND	ND	ND	ND	ND	ND
Trichloroethene	5	<1.7	**12,300**	**10.4**	**961**	**313**	ND	**7,090**
Trichlorofluoromethane		NA	**6.01**	**1.4**	**1.8**	**5.11**	**1.24**	**3.99**
Trichlorotrifluoroethane			ND	ND	ND	ND	ND	ND
Vinyl Chloride		<1.0	ND	ND	ND	**0.639**	ND	**0.894**
*Total PVOCs**			259	1,430	182	363	24	938
*Total BTEX***			97	492	57	49	2	134
*Total VOCs****			20,886	1,470	1,535	1,139	56	8,465

Notes:
NA No guidance value or standard available
(a) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006. New York State Department of Health.
(b) NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, February 2005, Summary of Background Levels for Selected Compounds (NYSDOH Database, Outdoor values)
* Petroleum Volatile Organic Compounds
** Benzene, toluene, ethylbenzene, xylene
** * Volatile Organic Compounds (excluding acetone)
Value detected above NYSDOH Air Guidance Value of 5 µg/m3, which according to Soil Vapor/Indoor Air Matrix 1 would require at a minimum, monitoring.
Value detected above NYSDOH Air Guidance Value of 100 µg/m3, which according to Soil Vapor/Indoor Air Matrix 2 would require at a minimum, monitoring.

TABLE 13
FORMER DRIGGS PLYWOOD CORP
Brooklyn, NY
Parameters Detected Above Track 1 Soil Cleanup Objectives

COMPOUND	Range in Exceedances	Frequency of Detection	B1		B2		B3		B4		B5			B6	B7
			(0-2')	(4-6')	(0-2')	(4-6')	(0-2')	(4-6')	(0-2')	(4-6')	(0-2')	(0-2') Dup.	(4-6')	(0-2')	(0-2')
Sample Results in µg/kg															
Benzo(a)anthracene	1,400-43,000	5	**2,800**		**43,000**		**1,400**		**1,600**		**5,700**				
Benzo(a)pyrene	1,300-38,000	5	**2,500**		**38,000**		**1,300**		**1,500**		**5,300**				
Benzo(b)fluoranthene	1,500-50,000	5	**3,100**		**50,000**		**1,500**		**1,900**		**6,200**				
Benzo(k)fluoranthene	1,000-19,000	3	**1,000**		**19,000**						**2,100**				
Chrysene	1,400-36,000	5	**2,700**		**36,000**		**1,400**		**1,600**		**5,500**				
Dibenzo(a,h)anthracene	500-11,000	3	**500**		**11,000**						**1,100**				
Indeno(1,2,3-cd)pyrene	690-20,000	5	**1,500**		**20,000**		**690**		**910**		**3,600**				
Napthalene	17,000	1			**17,000**										
Sample Results in mg/kg															
Arsenic	13.2	1			**13.2**										
Barium	357-920	5	**357**		**689**				**450**		**920**	**575**			
Chromium	95.6	1									**95.6**				
Copper	65.8-487	7	**65.8**		**156**	**78.4**	**165**		**94.1**		**487**	**392**			
Mercury	0.47-2.6	10	**1.35**	**0.56**	**1.59**	**2.6**	**1.8**	**0.53**	**1.41**	**0.47**	**1.61**	**1.5**			
Manganese	2,920	1	**2,920**												
Lead	151-1,590	10	**752**	**151**	**1,590**	**961**	**666**	**216**	**1,230**	**928**	**1,140**	**968**			
Zinc	119-1,400	9	**535**		**620**	**1,400**	**514**	**119**	**536**	**210**	**1,010**	**572**			

TABLE 14
FORMER DRIGGS PLYWOOD CORP.
Brooklyn, NY
Parameters Detected Above Ambient Water Quality Standards

SVOCs

COMPOUND	Range in Detections	GW1	GW2	GW2 Duplicate	GW3
Sample Results in (µg/L)					
Bis(2-ethylhexyl)phthalate	**5.9-7.9**	**5.9**		**7.9**	

Metals (dissolved)

COMPOUND	Range in Detections	GW1	GW2	GW2 Duplicate	GW3
Sample Results in (µg/L)					
Iron	**804-1,040**		**1,040**		**804**
Magnesium	**52,000-74,000**	**72,900**	**52,000**	**57,000**	**74,000**
Manganese	**658-6,400**	**1,090**	**6,400**	**658**	**733**
Sodium	**68,900-77,200**	**69,200**	**77,200**	**71,900**	**68,900**

Metals (total)

COMPOUND	Range in Detections	GW1	GW2	GW2 Duplicate	GW3
Sample Results in (µg/L)					
Arsenic	**26-27**		**27**		**26**
Barium	**1,080-1,330**	**1,210**	**1,080**		**1,330**
Beryllium	**8-9**	**9**	**8**		**9**
Chromium	**376-490**	**376**	**490**		**423**
Copper	**287-585**	**514**	**287**		**585**
Iron	**114,000-421,000**	**378,000**	**312,000**	**114,000**	**421,000**
Magnesium	**74,900-129,000**	**124,000**	**84,000**	**74,900**	**129,000**
Manganese	**2,580-18,800**	**8,450**	**18,800**	**2,580**	**9,410**
Sodium	**67,800-77,200**	**68,700**	**77,200**	**73,000**	**67,800**
Nickel	**165-371**	**332**	**303**	**165**	**371**
Lead	**40-202**	**178**	**146**	**40**	**202**
Antimony	**12-Aug**	**8**	**12**		**11**

TABLE 15

Project Permit Listing

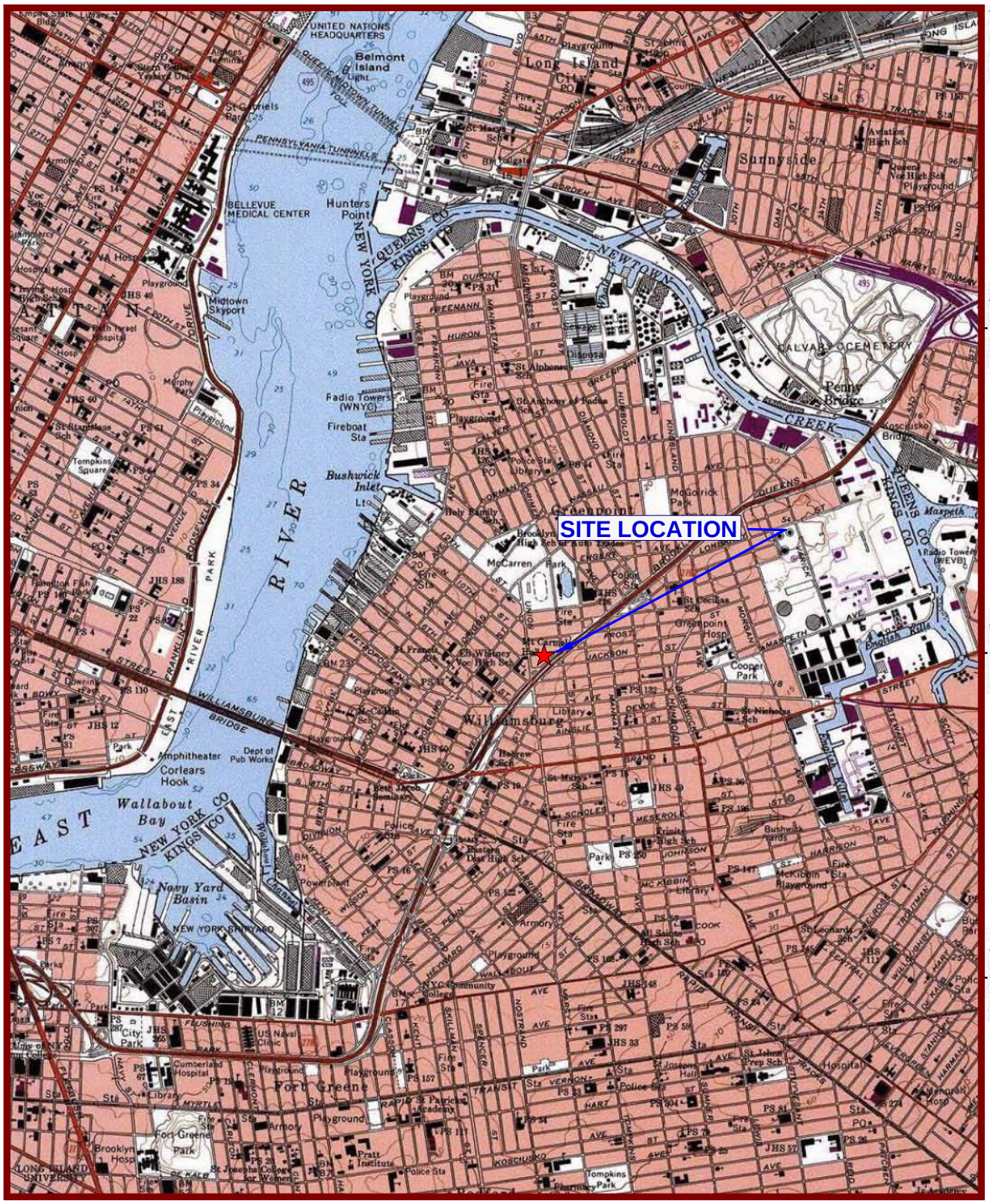
To Be Updated as Project Progresses

Permit	*Permit Number*	*Originating Agency*	*Pursuant to*	*Issued*	*Expires*	*Contact Phone*
No Permits Issued as of June 2013						

Table 16
Emergency Contact List

General Emergencies	911
NYC Police	911
NYC Fire Department	911
Woodhull Medical Center	(718) 963-8000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(518) 402-9768
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
EBC Project Manager	1-631-504-6000
EBC BCP Program Manager	1-631-504-6000
EBC Site Safety Officer	1-631-504-6000
Remedial Engineer	1-516-987-1662
Construction Manager	1-718-218-8330

FIGURES



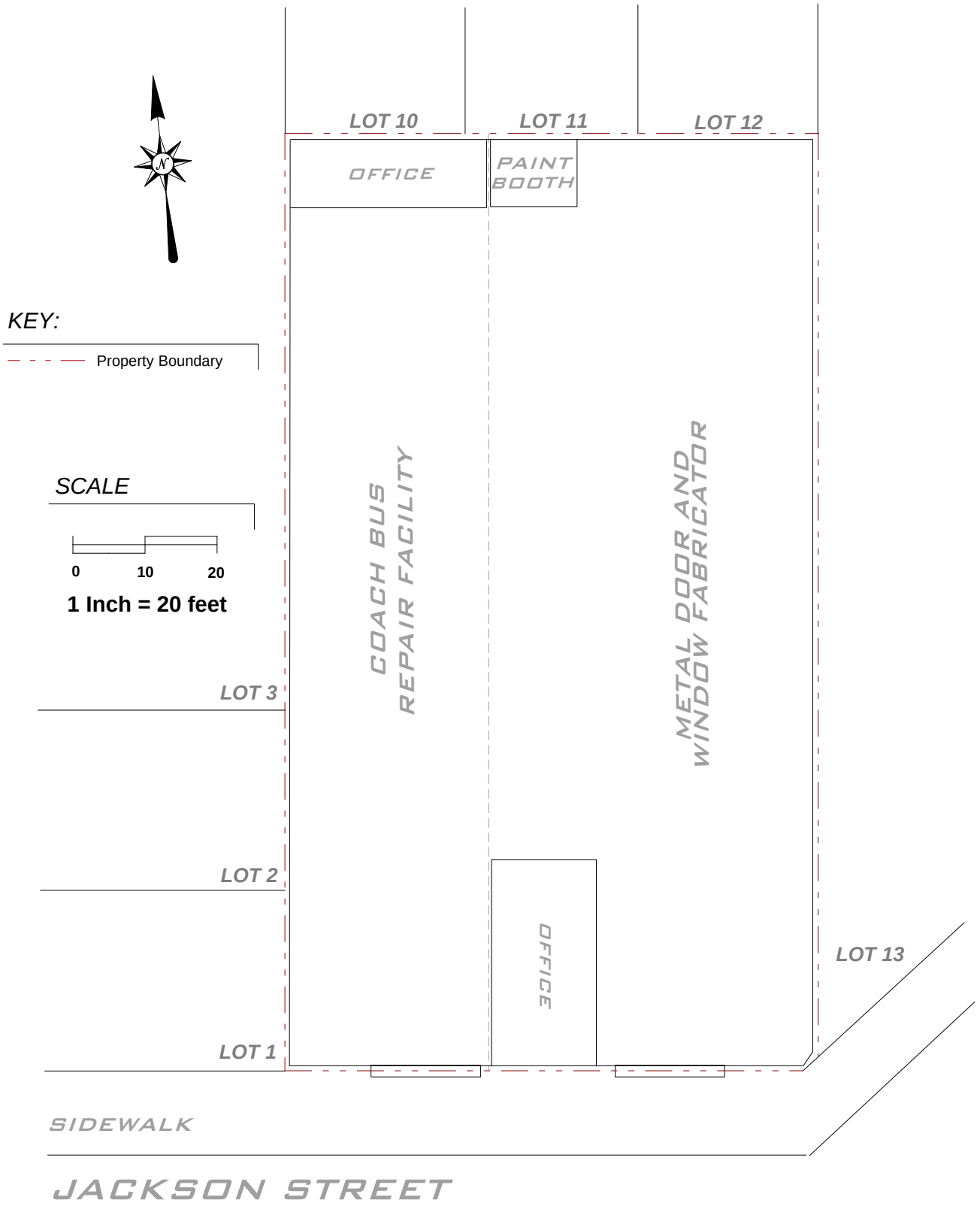
USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP

11 JACKSON STREET, BROOKLYN, NY

FIGURE 1 SITE LOCATION MAP



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

SITE PLAN

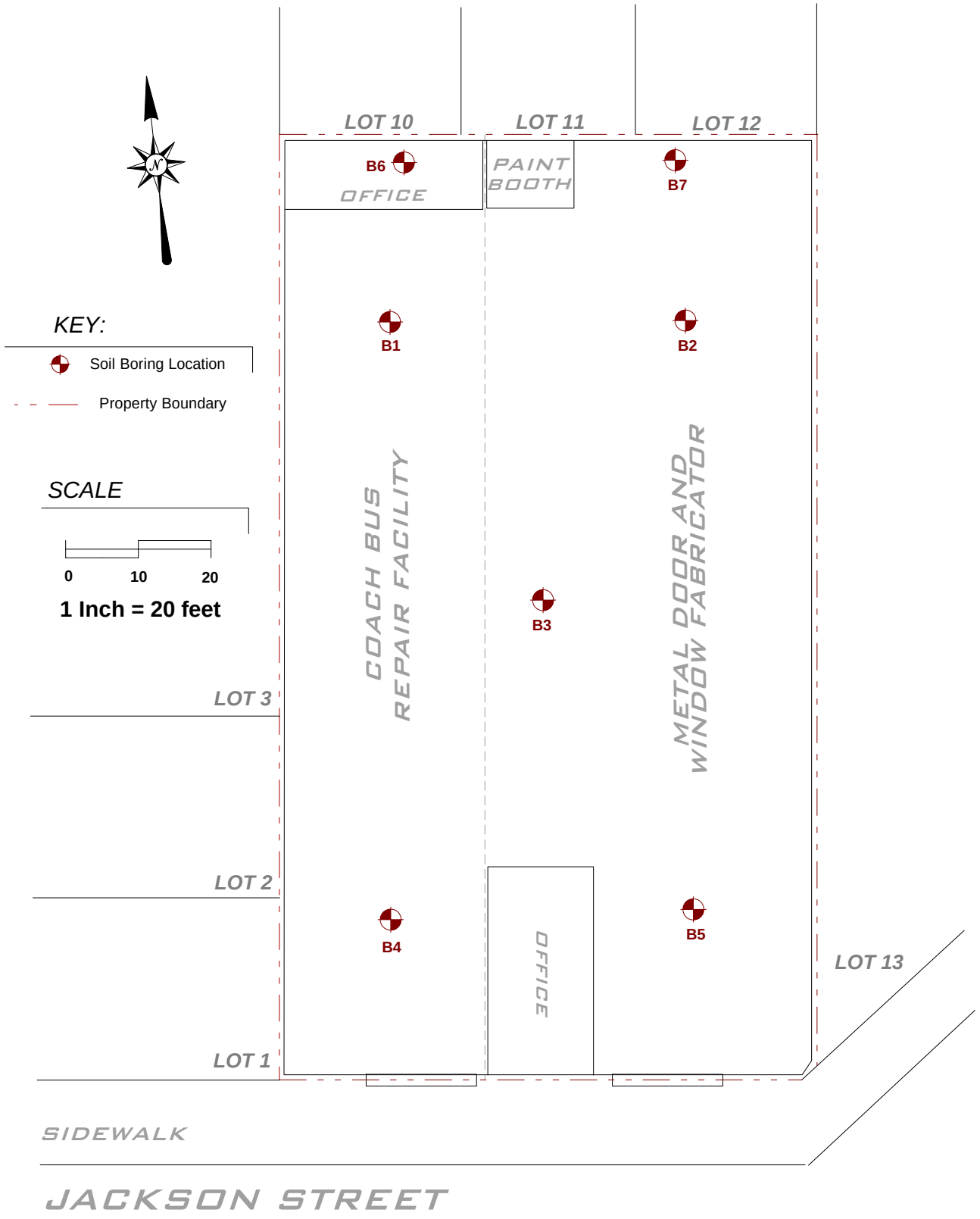
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 2

EBC
Environmental Business Consultants
1808 Middle Country Road. Ridge. NY 11961
Phone: 631.504.6000
Fax: 631.924.2780

431 Kent Avenue
Brooklyn, NY 11211

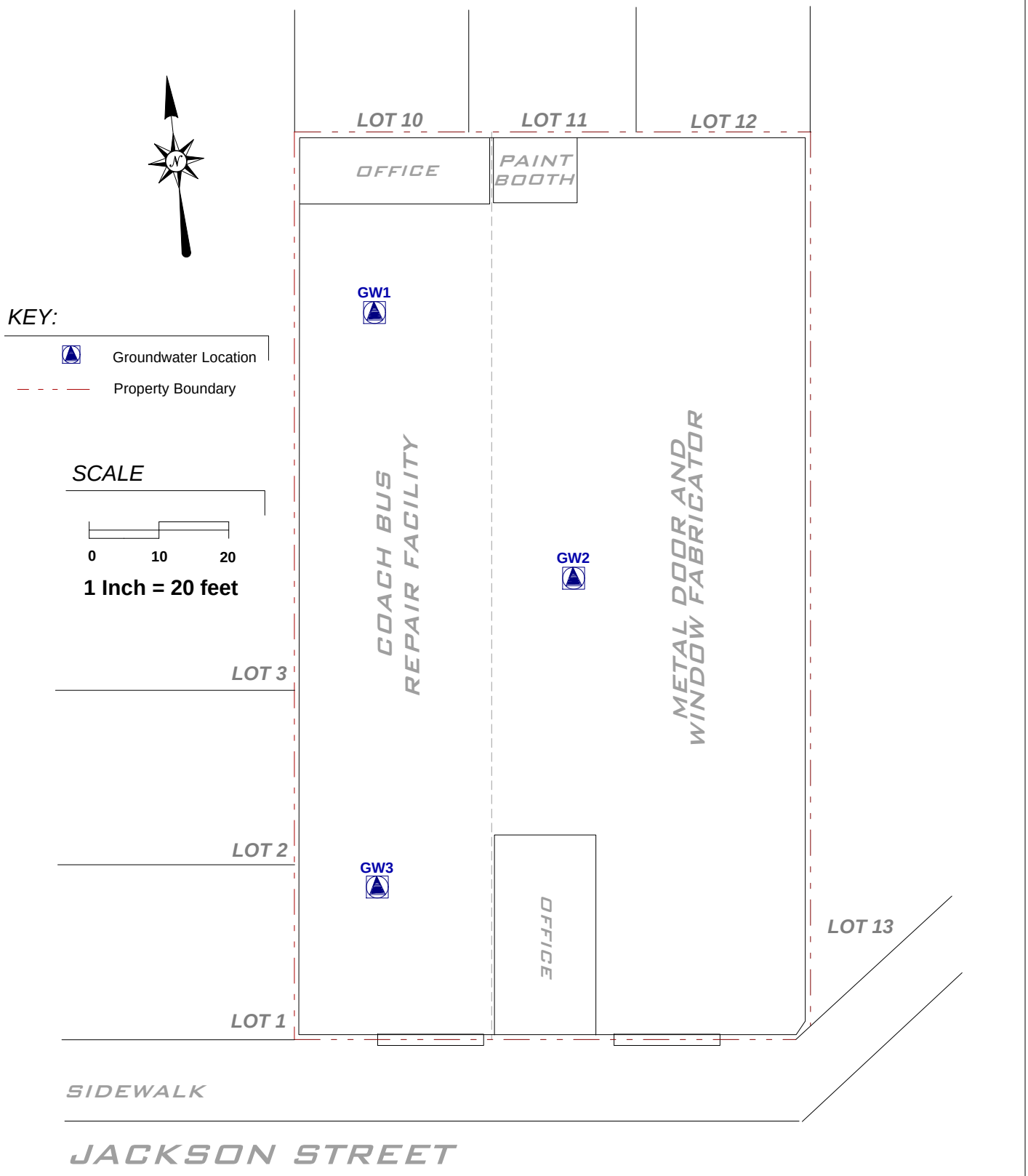
FIGURE 3 Project Site and Adjacent Properties



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

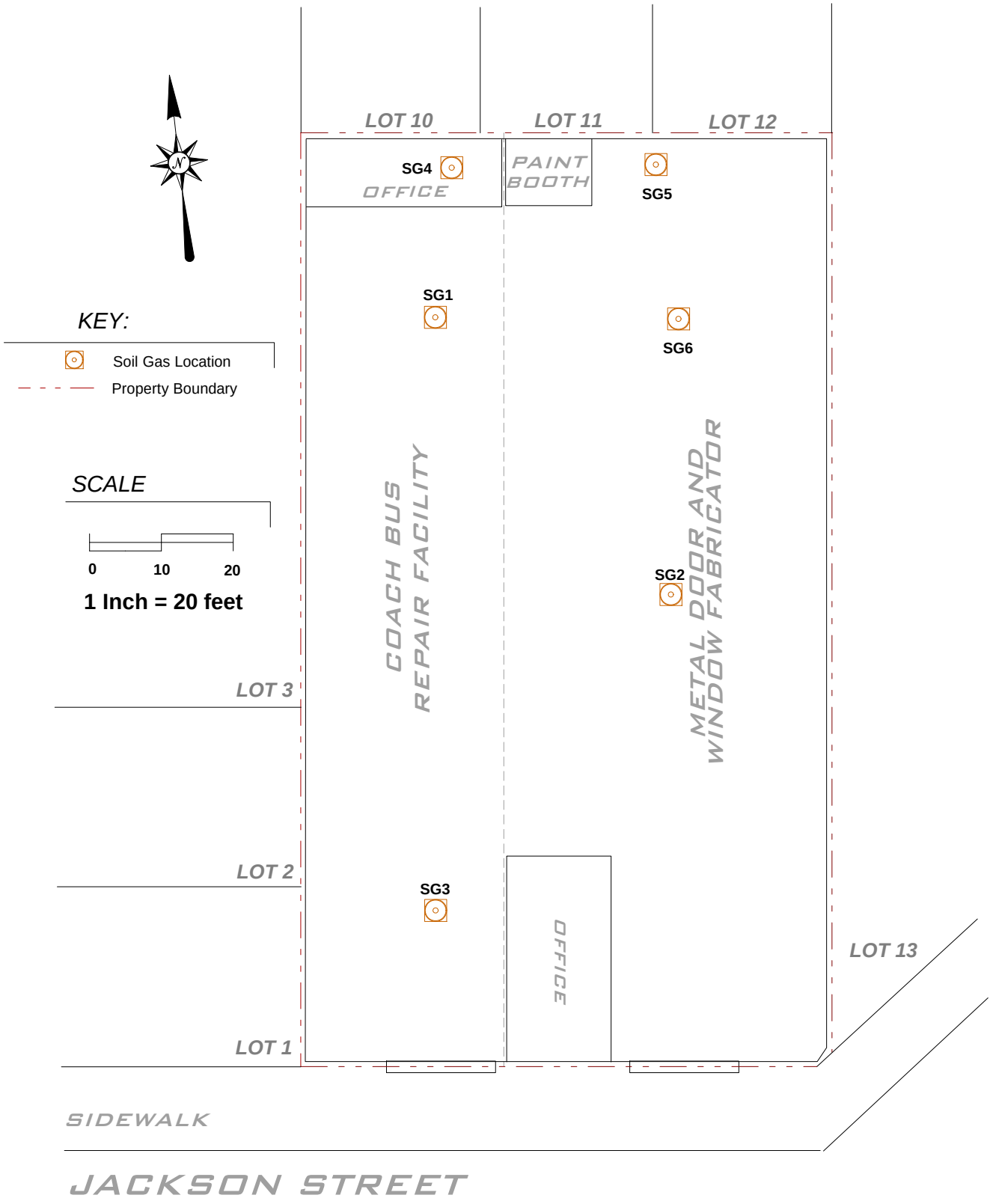
FIGURE 4 SOIL SAMPLING LOCATIONS



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

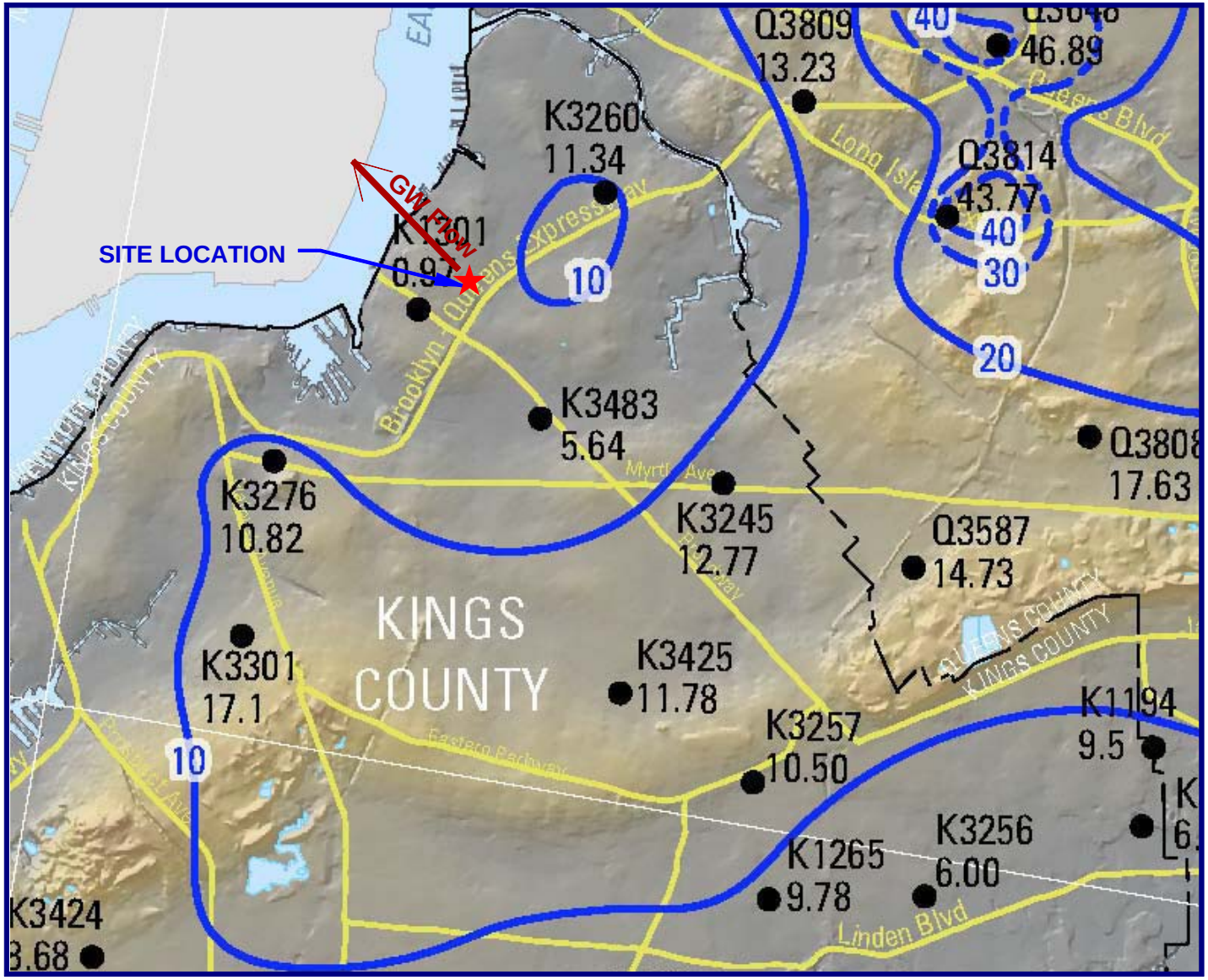
FIGURE 5 GROUNDWATER SAMPLING LOCATIONS



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

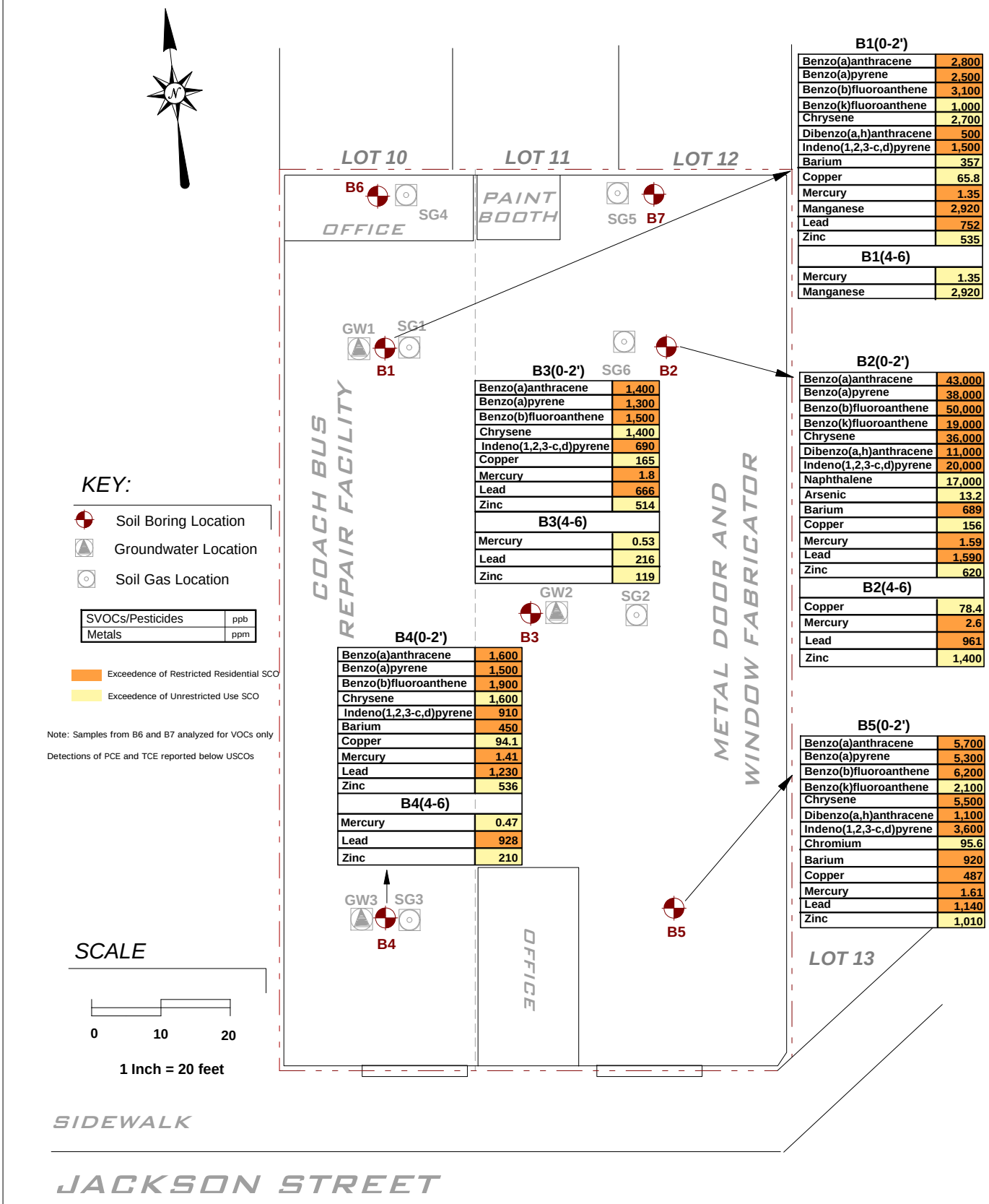
FIGURE 6 SOIL GAS SAMPLING LOCATIONS



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD. RIDGE. NY 11961
Phone 631.504.6000
Fax 631.924.2780

FORMER DRIGGS PLYWOOD CORP.
11-15 JACKSON STREET, BROOKLYN, NY

FIGURE 7 REGIONAL GROUNDWATER MAP



B1(0-2')

Benzo(a)anthracene	2,800
Benzo(a)pyrene	2,500
Benzo(b)fluoroanthene	3,100
Benzo(k)fluoroanthene	1,000
Chrysene	2,700
Dibenzo(a,h)anthracene	500
Indeno(1,2,3-c,d)pyrene	1,500
Barium	357
Copper	65.8
Mercury	1.35
Manganese	2,920
Lead	752
Zinc	535

B1(4-6)

Mercury	1.35
Manganese	2,920

B3(0-2')

Benzo(a)anthracene	1,400
Benzo(a)pyrene	1,300
Benzo(b)fluoroanthene	1,500
Chrysene	1,400
Indeno(1,2,3-c,d)pyrene	690
Copper	165
Mercury	1.8
Lead	666
Zinc	514

B3(4-6)

Mercury	0.53
Lead	216
Zinc	119

B2(0-2')

Benzo(a)anthracene	43,000
Benzo(a)pyrene	38,000
Benzo(b)fluoroanthene	50,000
Benzo(k)fluoroanthene	19,000
Chrysene	36,000
Dibenzo(a,h)anthracene	11,000
Indeno(1,2,3-c,d)pyrene	20,000
Naphthalene	17,000
Arsenic	13.2
Barium	689
Copper	156
Mercury	1.59
Lead	1,590
Zinc	620

B2(4-6)

Copper	78.4
Mercury	2.6
Lead	961
Zinc	1,400

B4(0-2')

Benzo(a)anthracene	1,600
Benzo(a)pyrene	1,500
Benzo(b)fluoroanthene	1,900
Chrysene	1,600
Indeno(1,2,3-c,d)pyrene	910
Barium	450
Copper	94.1
Mercury	1.41
Lead	1,230
Zinc	536

B4(4-6)

Mercury	0.47
Lead	928
Zinc	210

B5(0-2')

Benzo(a)anthracene	5,700
Benzo(a)pyrene	5,300
Benzo(b)fluoroanthene	6,200
Benzo(k)fluoroanthene	2,100
Chrysene	5,500
Dibenzo(a,h)anthracene	1,100
Indeno(1,2,3-c,d)pyrene	3,600
Chromium	95.6
Barium	920
Copper	487
Mercury	1.61
Lead	1,140
Zinc	1,010

KEY:

- Soil Boring Location
- Groundwater Location
- Soil Gas Location

SVOCs/Pesticides	ppb
Metals	ppm

Exceedence of Restricted Residential SCO

Exceedence of Unrestricted Use SCO

Note: Samples from B6 and B7 analyzed for VOCs only

Detections of PCE and TCE reported below USCOs

SCALE

0 10 20

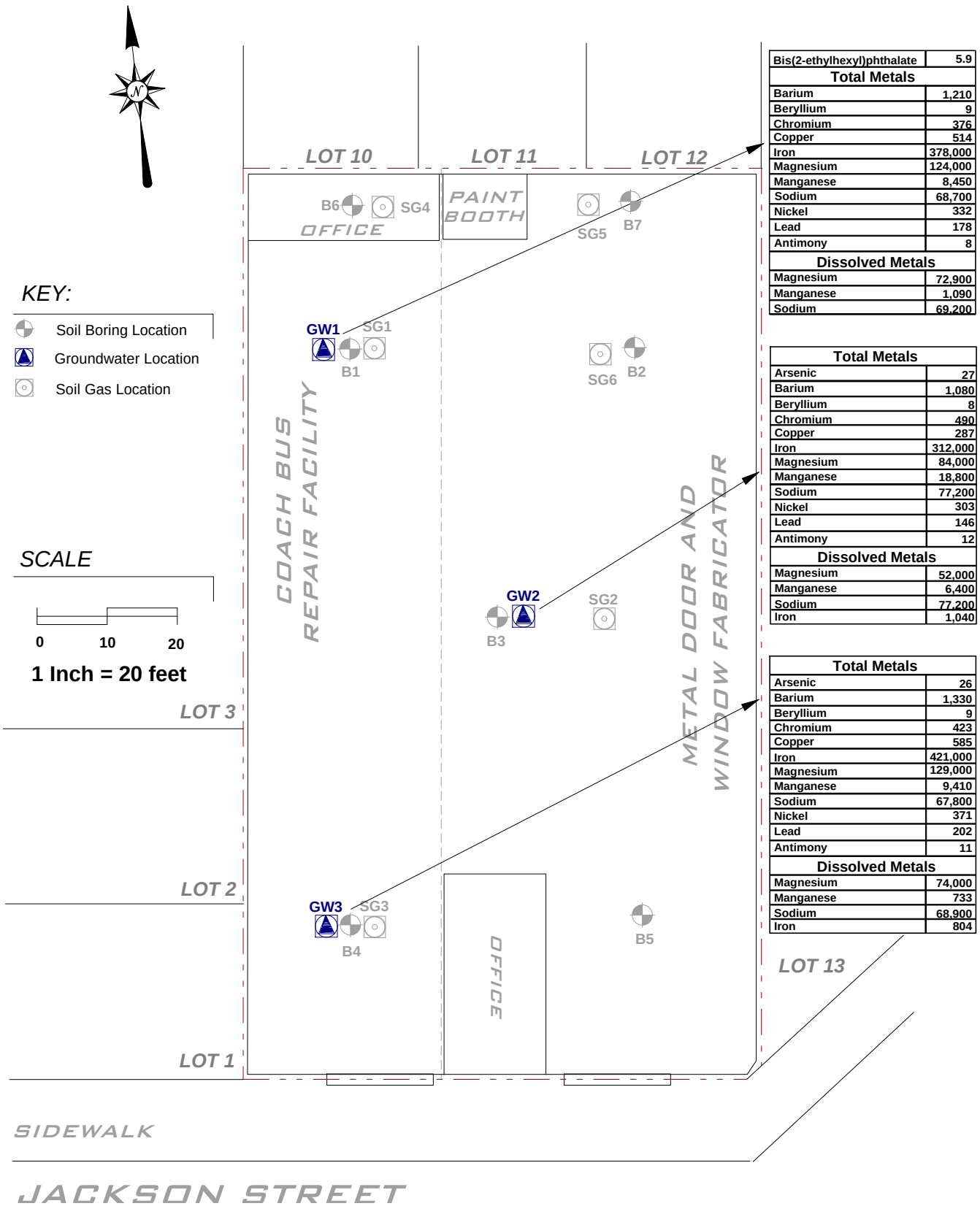
1 Inch = 20 feet

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

POSTED SOIL RESUTLS ABOVE UNRESTRICTED/RESTRICTED RESIDENTIAL SCOS

11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 8



Bis(2-ethylhexyl)phthalate	5.9
Total Metals	
Barium	1,210
Beryllium	9
Chromium	376
Copper	514
Iron	378,000
Magnesium	124,000
Manganese	8,450
Sodium	68,700
Nickel	332
Lead	178
Antimony	8
Dissolved Metals	
Magnesium	72,900
Manganese	1,090
Sodium	69,200

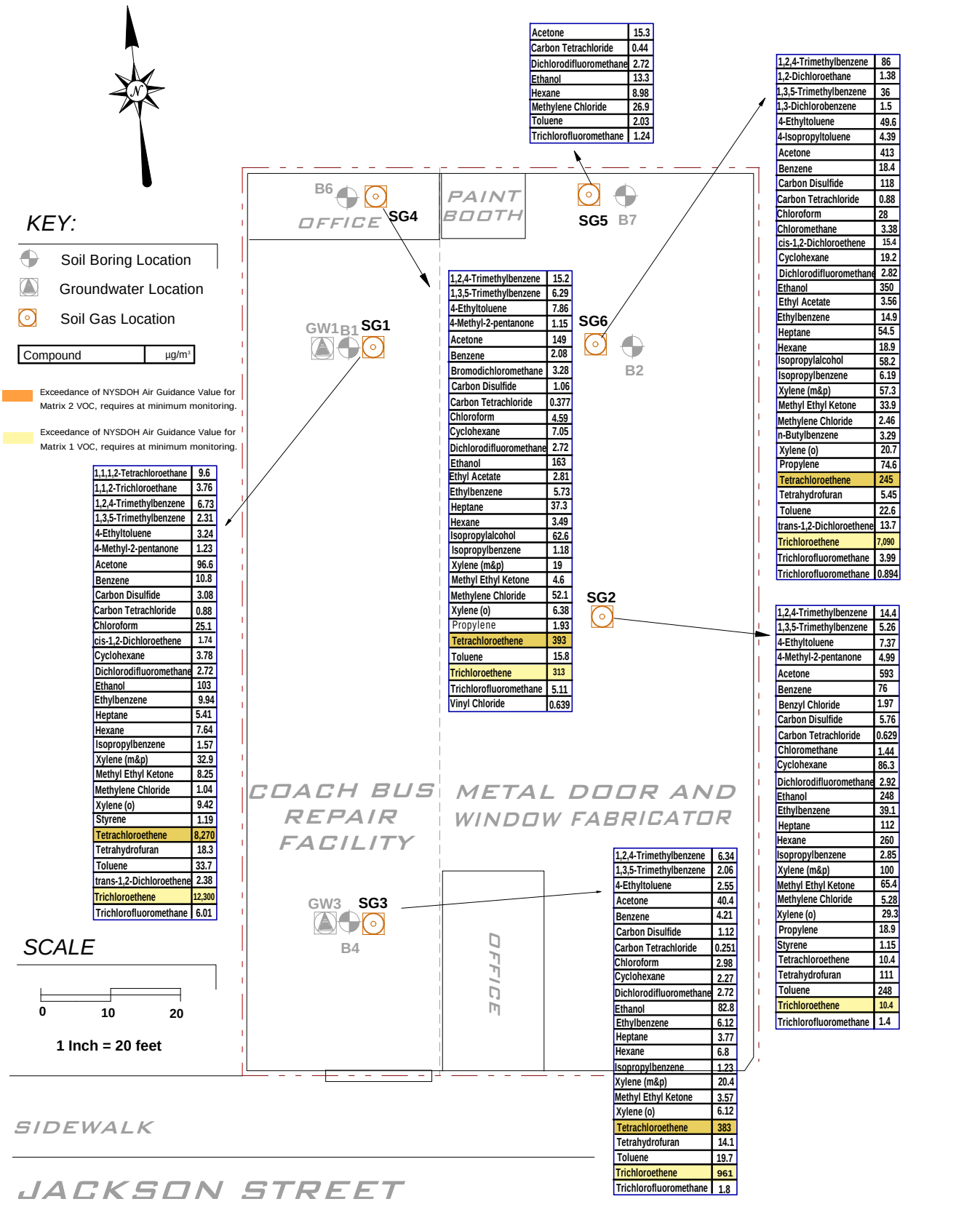
Total Metals	
Arsenic	27
Barium	1,080
Beryllium	8
Chromium	490
Copper	287
Iron	312,000
Magnesium	84,000
Manganese	18,800
Sodium	77,200
Nickel	303
Lead	146
Antimony	12
Dissolved Metals	
Magnesium	52,000
Manganese	6,400
Sodium	77,200
Iron	1,040

Total Metals	
Arsenic	26
Barium	1,330
Beryllium	9
Chromium	423
Copper	585
Iron	421,000
Magnesium	129,000
Manganese	9,410
Sodium	67,800
Nickel	371
Lead	202
Antimony	11
Dissolved Metals	
Magnesium	74,000
Manganese	733
Sodium	68,900
Iron	804

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

POSTED GROUNDWATER RESUTLS ABOVE AWQS
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 9



Acetone	15.3
Carbon Tetrachloride	0.44
Dichlorodifluoromethane	2.72
Ethanol	13.3
Hexane	8.98
Methylene Chloride	26.9
Toluene	2.03
Trichlorofluoromethane	1.24

1,2,4-Trimethylbenzene	86
1,2-Dichloroethane	1.38
1,3,5-Trimethylbenzene	36
1,3-Dichlorobenzene	1.5
4-Ethyltoluene	49.6
4-Isopropyltoluene	4.39
Acetone	413
Benzene	18.4
Carbon Disulfide	118
Carbon Tetrachloride	0.88
Chloroform	28
Chloromethane	3.38
cis-1,2-Dichloroethene	15.4
Cyclohexane	19.2
Dichlorodifluoromethane	2.82
Ethanol	350
Ethyl Acetate	3.56
Ethylbenzene	14.9
Heptane	54.5
Hexane	18.9
Isopropylalcohol	58.2
Isopropylbenzene	6.19
Xylene (m&p)	57.3
Methyl Ethyl Ketone	33.9
Methylene Chloride	2.46
n-Butylbenzene	3.29
Xylene (o)	20.7
Propylene	74.6
Tetrachloroethene	245
Tetrahydrofuran	5.45
Toluene	22.6
trans-1,2-Dichloroethene	13.7
Trichloroethene	7,090
Trichlorofluoromethane	3.99
Trichlorofluoromethane	0.894

1,2,4-Trimethylbenzene	15.2
1,3,5-Trimethylbenzene	6.29
4-Ethyltoluene	7.86
4-Methyl-2-pentanone	1.15
Acetone	149
Benzene	2.08
Bromodichloromethane	3.28
Carbon Disulfide	1.06
Carbon Tetrachloride	0.377
Chloroform	4.59
Cyclohexane	7.05
Dichlorodifluoromethane	2.72
Ethanol	163
Ethyl Acetate	2.81
Ethylbenzene	5.73
Heptane	37.3
Hexane	3.49
Isopropylalcohol	62.6
Isopropylbenzene	1.18
Xylene (m&p)	19
Methyl Ethyl Ketone	4.6
Methylene Chloride	52.1
Xylene (o)	6.38
Propylene	1.93
Tetrachloroethene	393
Toluene	15.8
Trichloroethene	313
Trichlorofluoromethane	5.11
Vinyl Chloride	0.639

1,1,1,2-Tetrachloroethane	9.6
1,1,2-Trichloroethane	3.76
1,2,4-Trimethylbenzene	6.73
1,3,5-Trimethylbenzene	2.31
4-Ethyltoluene	3.24
4-Methyl-2-pentanone	1.23
Acetone	96.6
Benzene	10.8
Carbon Disulfide	3.08
Carbon Tetrachloride	0.88
Chloroform	25.1
cis-1,2-Dichloroethene	1.74
Cyclohexane	3.78
Dichlorodifluoromethane	2.72
Ethanol	103
Ethylbenzene	9.94
Heptane	5.41
Hexane	7.64
Isopropylbenzene	1.57
Xylene (m&p)	32.9
Methyl Ethyl Ketone	8.25
Methylene Chloride	1.04
Xylene (o)	9.42
Styrene	1.19
Tetrachloroethene	8,270
Tetrahydrofuran	18.3
Toluene	33.7
trans-1,2-Dichloroethene	2.38
Trichloroethene	12,300
Trichlorofluoromethane	6.01

1,2,4-Trimethylbenzene	14.4
1,3,5-Trimethylbenzene	5.26
4-Ethyltoluene	7.37
4-Methyl-2-pentanone	4.99
Acetone	593
Benzene	76
Benzyl Chloride	1.97
Carbon Disulfide	5.76
Carbon Tetrachloride	0.629
Chloromethane	1.44
Cyclohexane	86.3
Dichlorodifluoromethane	2.92
Ethanol	248
Ethylbenzene	39.1
Heptane	112
Hexane	260
Isopropylbenzene	2.85
Xylene (m&p)	100
Methyl Ethyl Ketone	65.4
Methylene Chloride	5.28
Xylene (o)	29.3
Propylene	18.9
Styrene	1.15
Tetrachloroethene	10.4
Tetrahydrofuran	111
Toluene	248
Trichloroethene	10.4
Trichlorofluoromethane	1.4

1,2,4-Trimethylbenzene	6.34
1,3,5-Trimethylbenzene	2.06
4-Ethyltoluene	2.55
Acetone	40.4
Benzene	4.21
Carbon Disulfide	1.12
Carbon Tetrachloride	0.251
Chloroform	2.98
Cyclohexane	2.27
Dichlorodifluoromethane	2.72
Ethanol	82.8
Ethylbenzene	6.12
Heptane	3.77
Hexane	6.8
Isopropylbenzene	1.23
Xylene (m&p)	20.4
Methyl Ethyl Ketone	3.57
Xylene (o)	6.12
Tetrachloroethene	383
Tetrahydrofuran	14.1
Toluene	19.7
Trichloroethene	961
Trichlorofluoromethane	1.8

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

POSTED SOIL VAPOR RESULTS

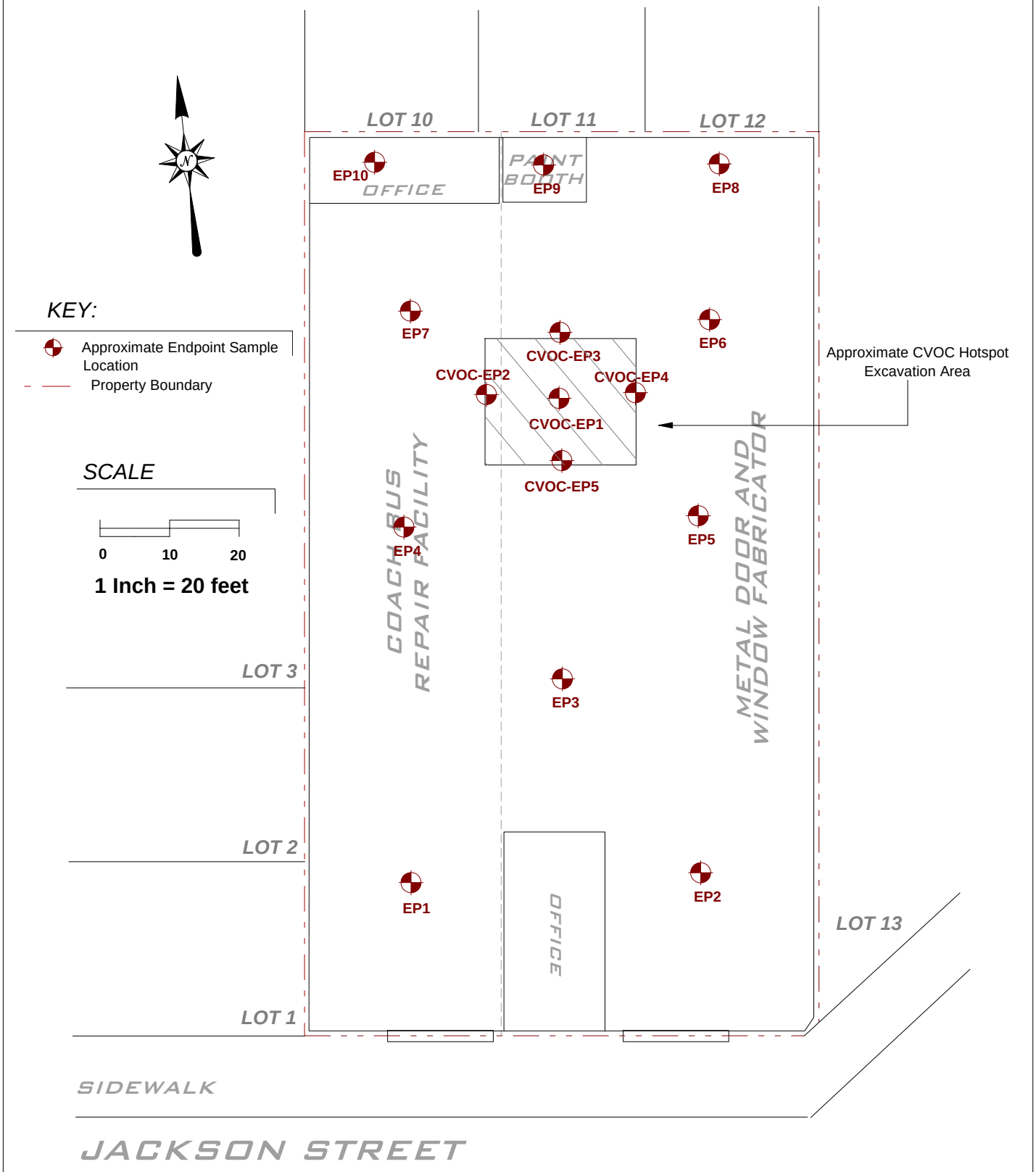
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 10

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.
11-15 JACKSON STREET, BROOKLYN, NY

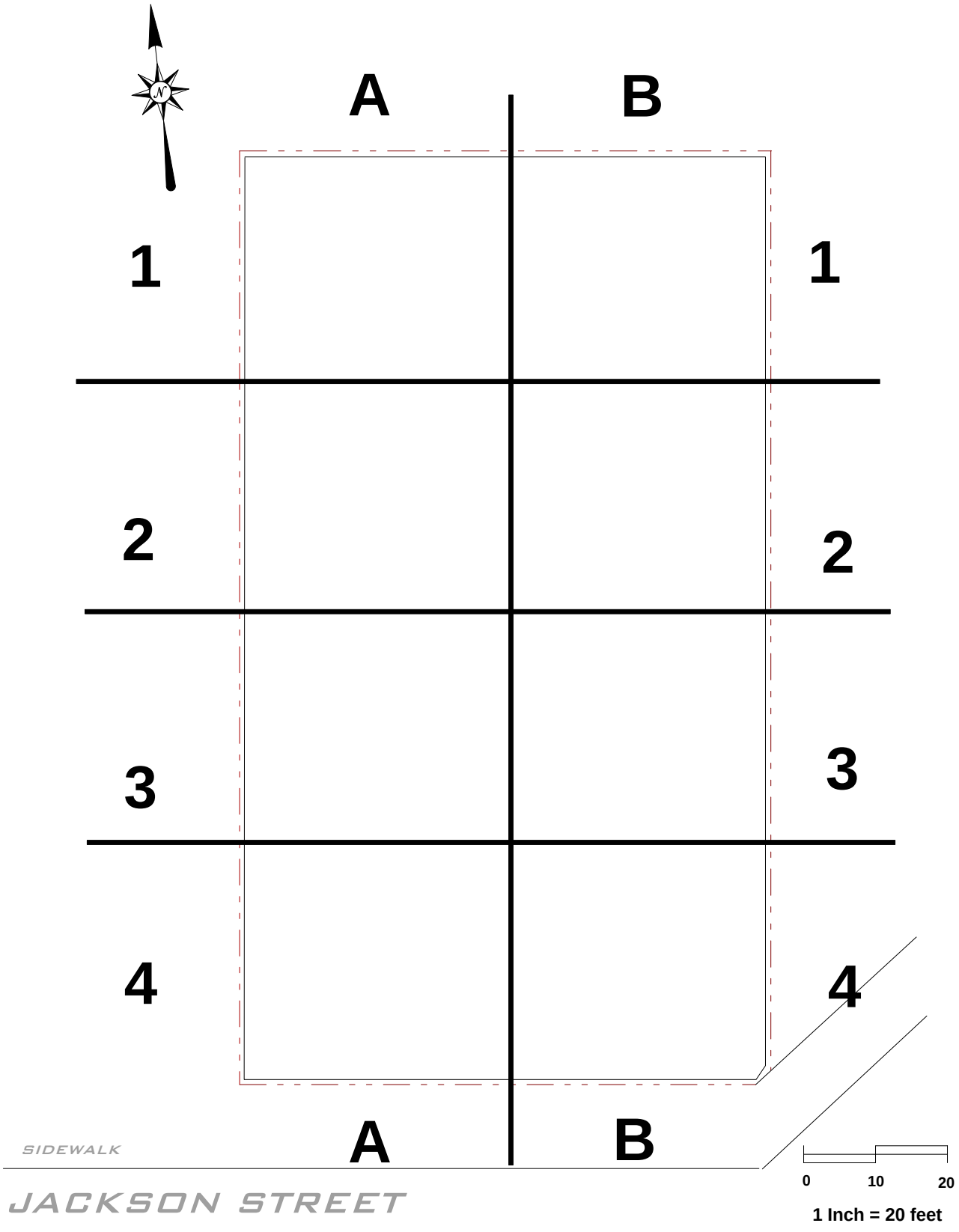
FIGURE 11 TRUCK ROUTE



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 12 ENDPOINT SAMPLING LOCATIONS



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.

11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

FIGURE 13 GRID MAP

ATTACHMENT A
Metes and Bounds Description of Property

LEGAL DESCRIPTION

All that certain Lot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the northerly side of Jackson Street, distant 100 feet easterly from the corner formed by the intersection of the easterly side of Union Avenue with the northerly side of Jackson Street;

RUNNING THENCE northerly parallel with the easterly side of Union Avenue, 130 feet;

THENCE easterly again parallel with Jackson Street, 75 feet;

THENCE southerly again parallel with Union Avenue 128.27 feet (128 feet ¾ inches Tax Map) to the northwesterly side of Meeker Avenue a/k/a Brooklyn-Queens Connecting Highway;

THENCE southwesterly along Meeker Avenue a/k/a Brooklyn-Queens Connecting Highway 3.05 feet (3 feet 5 inches Tax Map) to the corner formed by the intersection of the northerly side of Jackson Street with the northwesterly side of Meeker Avenue a/k/a Brooklyn-Queens Connecting Highway;

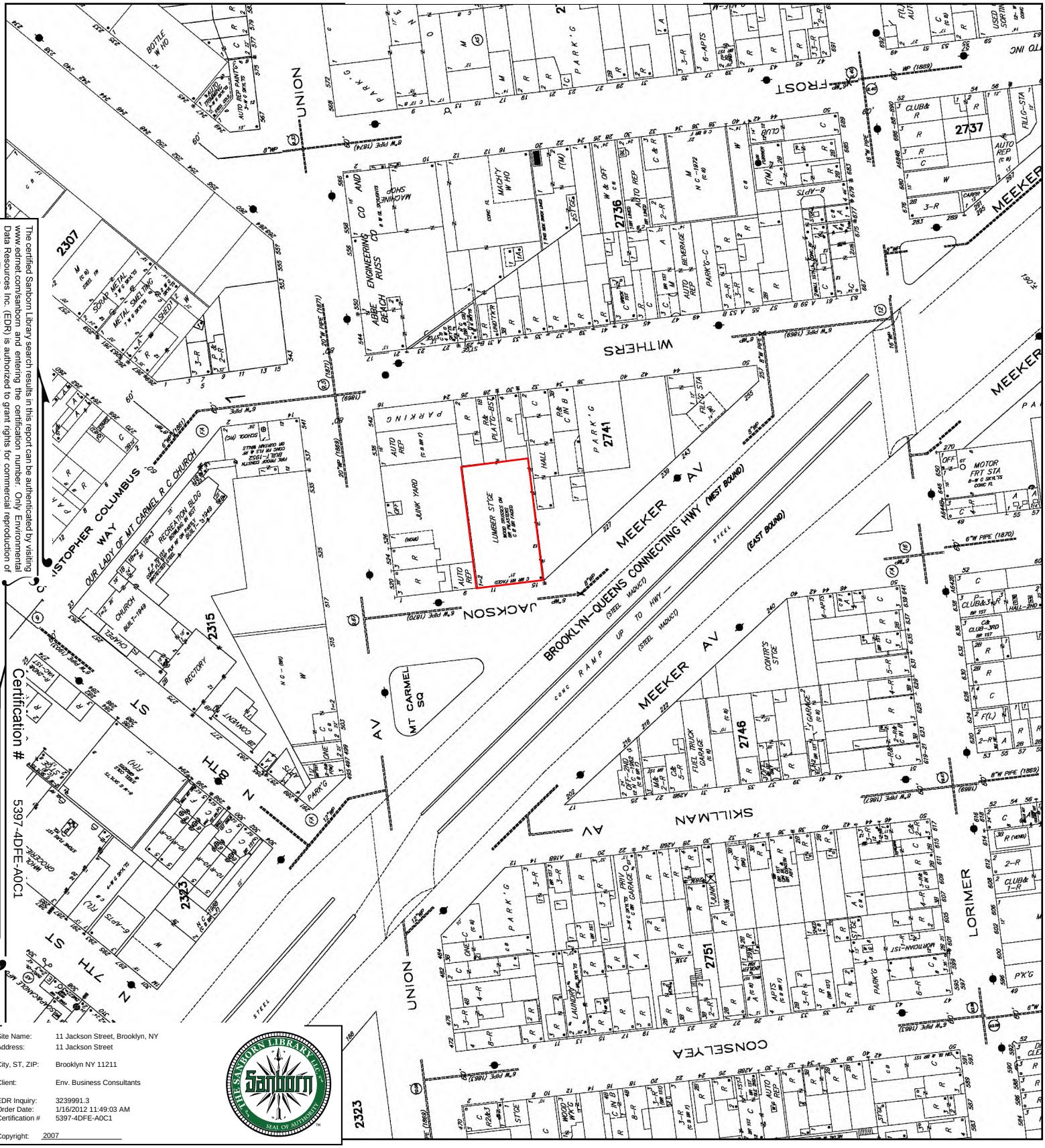
THENCE westerly along the northerly side of Jackson Street, 72.49 feet (72 feet 2 1/8 inches Tax Map) to the point or place of BEGINNING.

NOTE: Being District , Section , Block 2741, **Lot(s)** 47, **Tax Map of the** Borough **of** Brooklyn, **County of** Kings.

NOTE: Lot and Block shown for informational purposes only.

ATTACHMENT B
Sanborn Maps

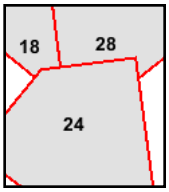
2007 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2007

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

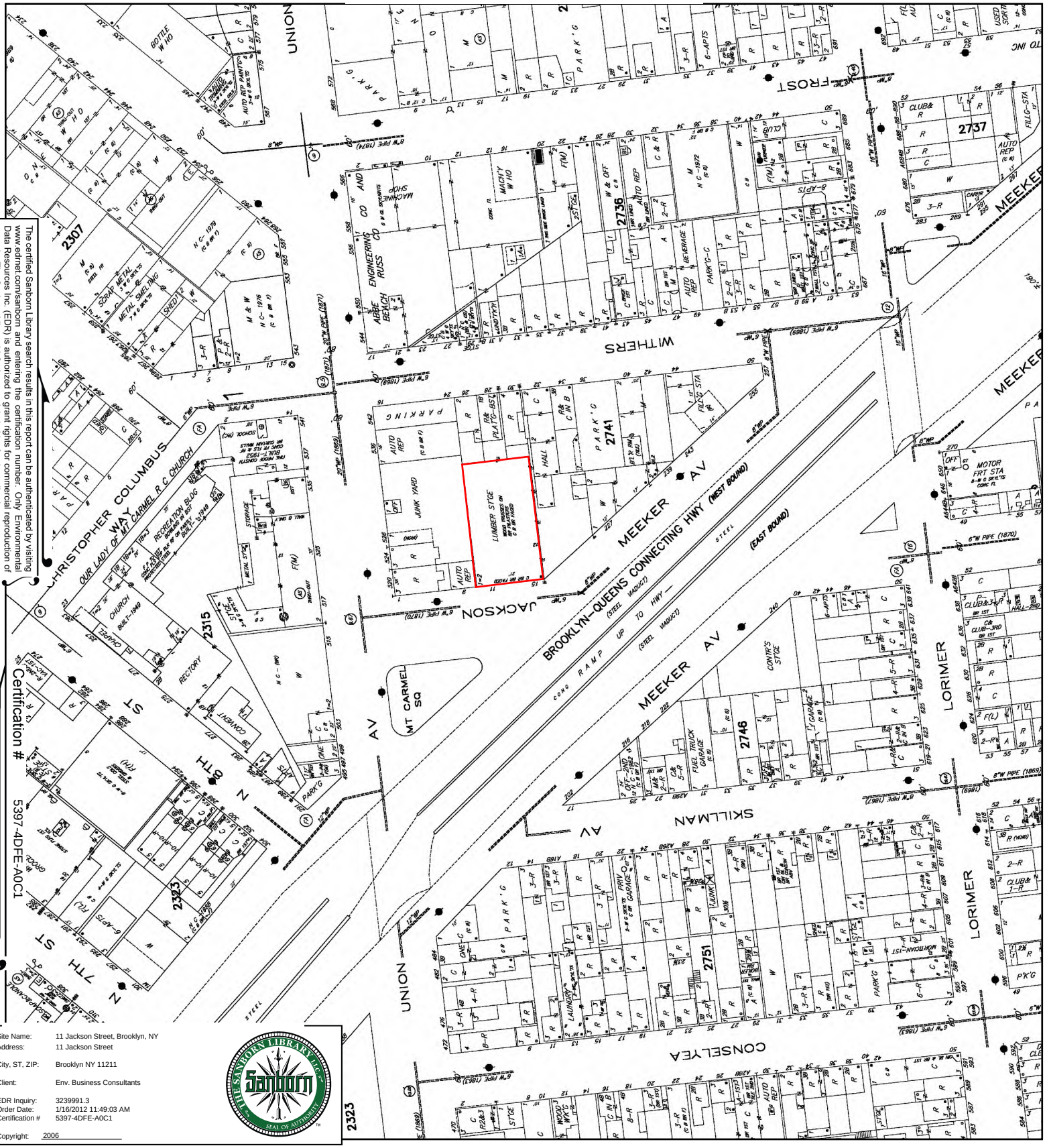


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

2006 Certified Sanborn Map

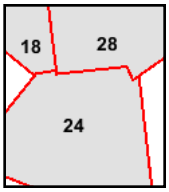


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2006

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

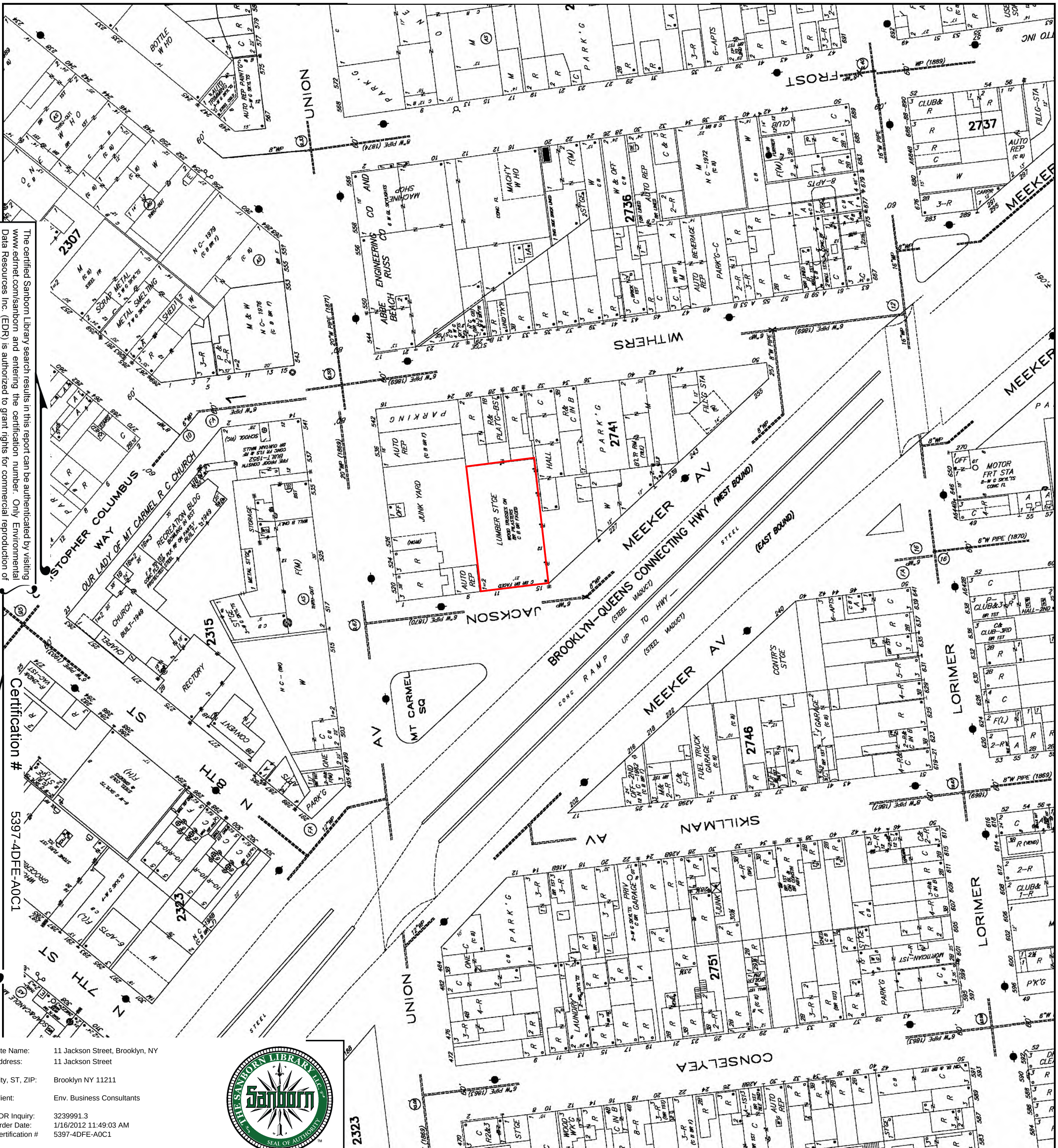


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

2005 Certified Sanborn Map



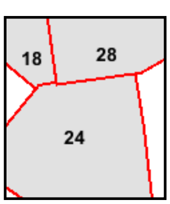
The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2005

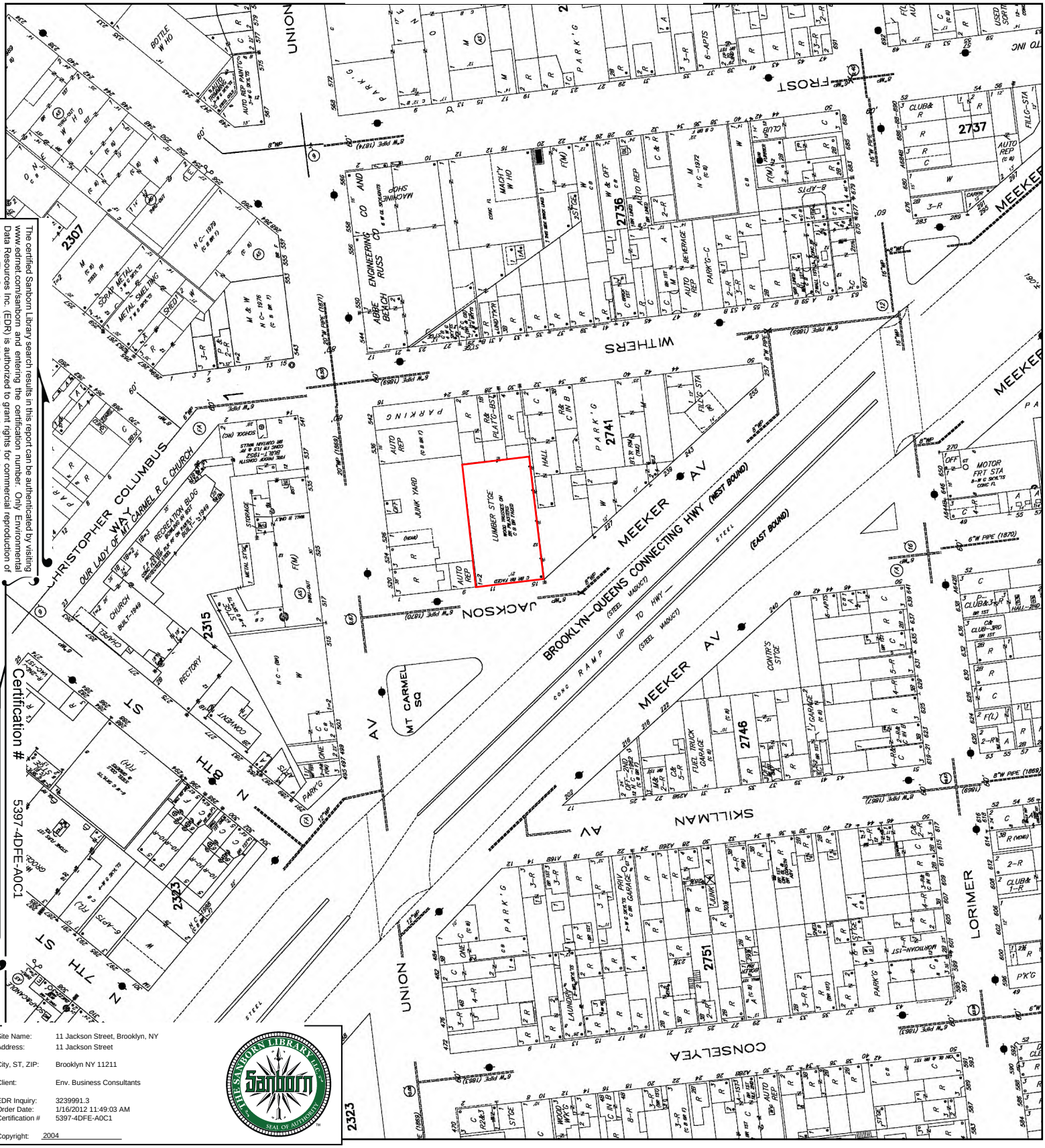
This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

0 Feet 150 300 600



Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

2004 Certified Sanborn Map

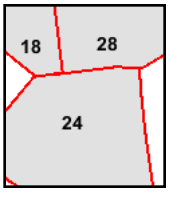


The certified Sanborn Library search results in this report can be authenticated by visiting www.ednet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2004

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

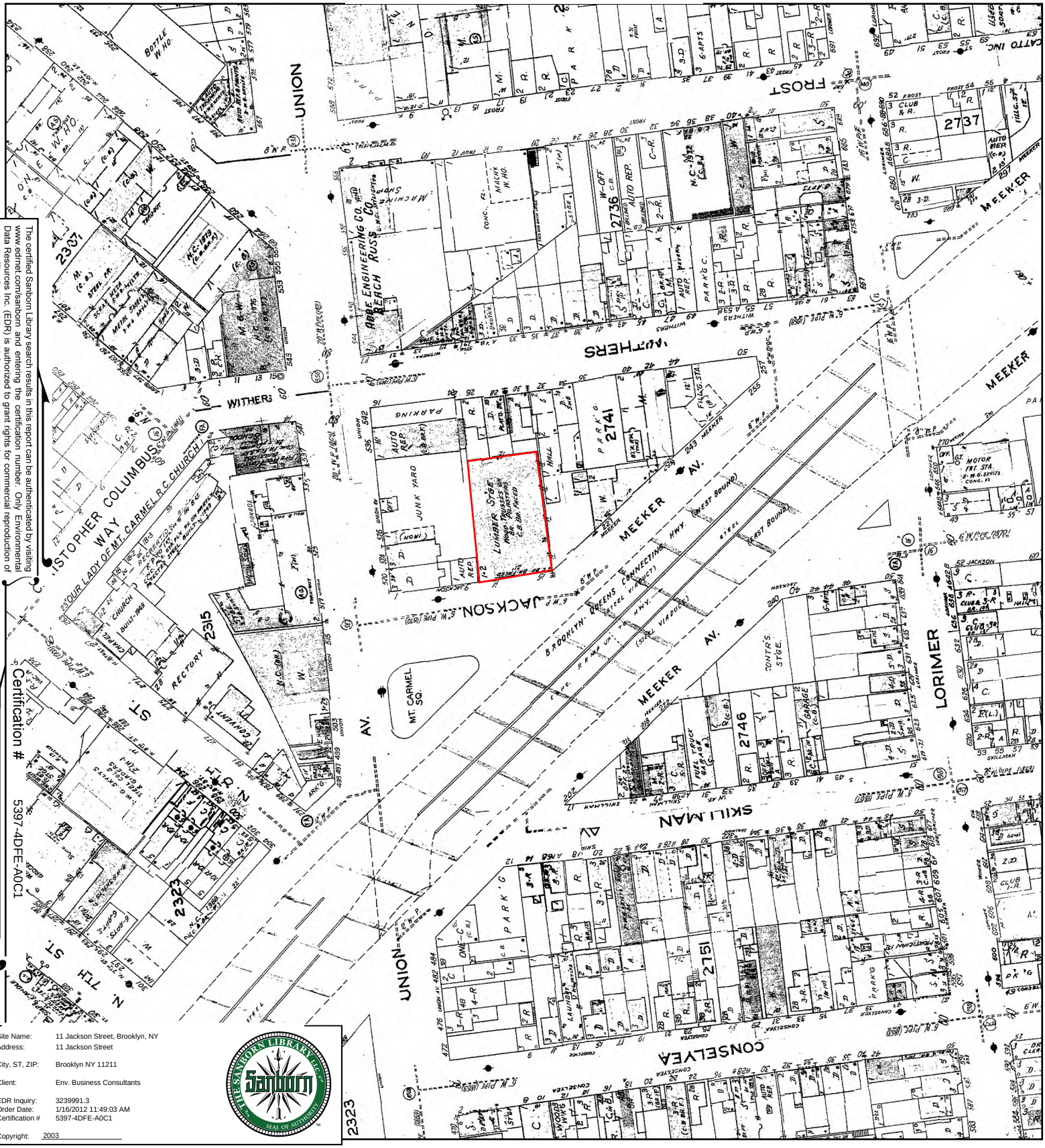


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

2003 Certified Sanborn Map

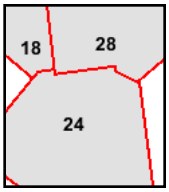


The certified Sanborn Library search results in this report can be authenticated by visiting www.ednet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2003

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

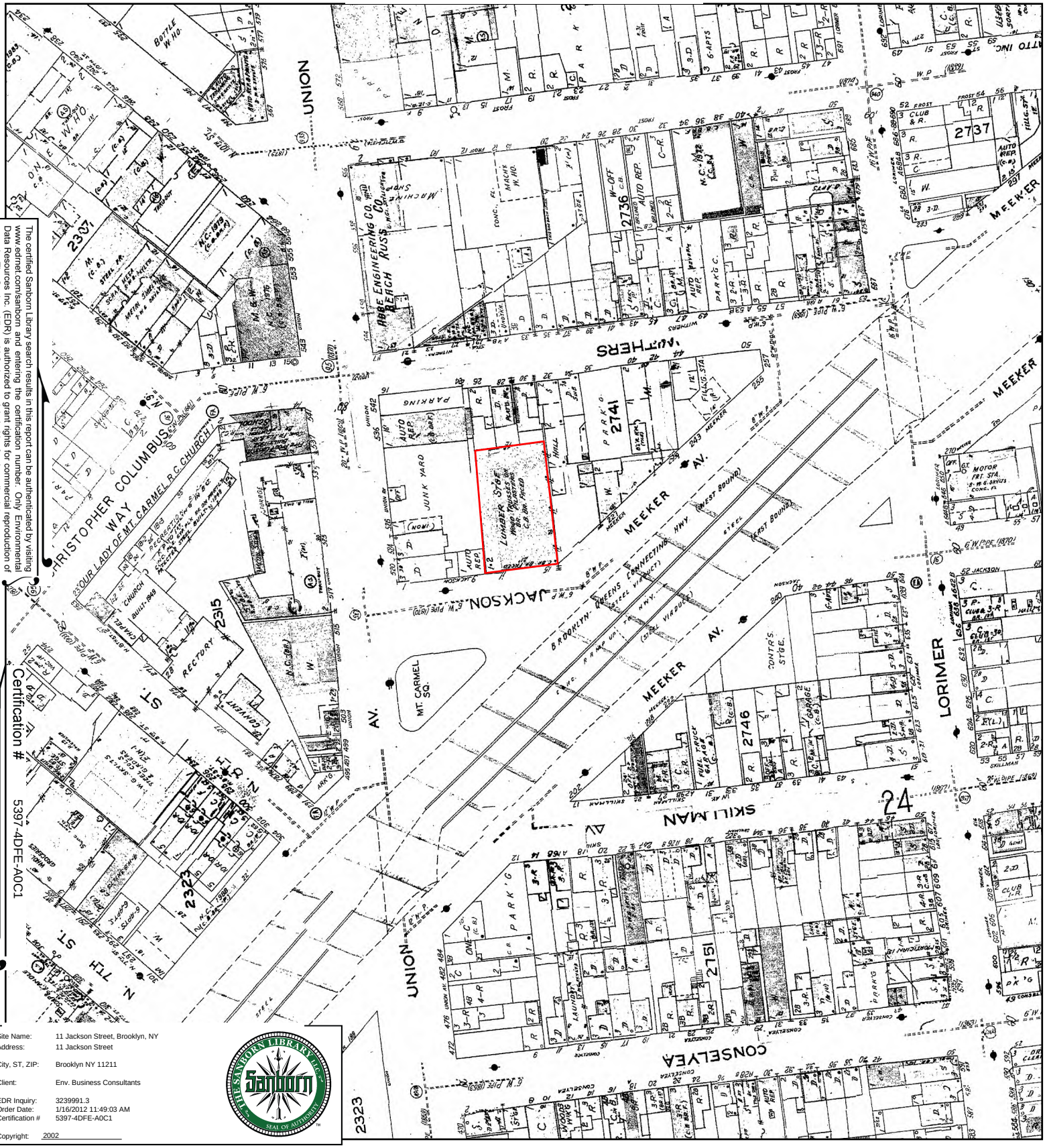


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

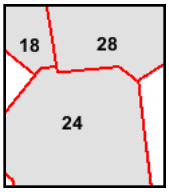
2002 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2002

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

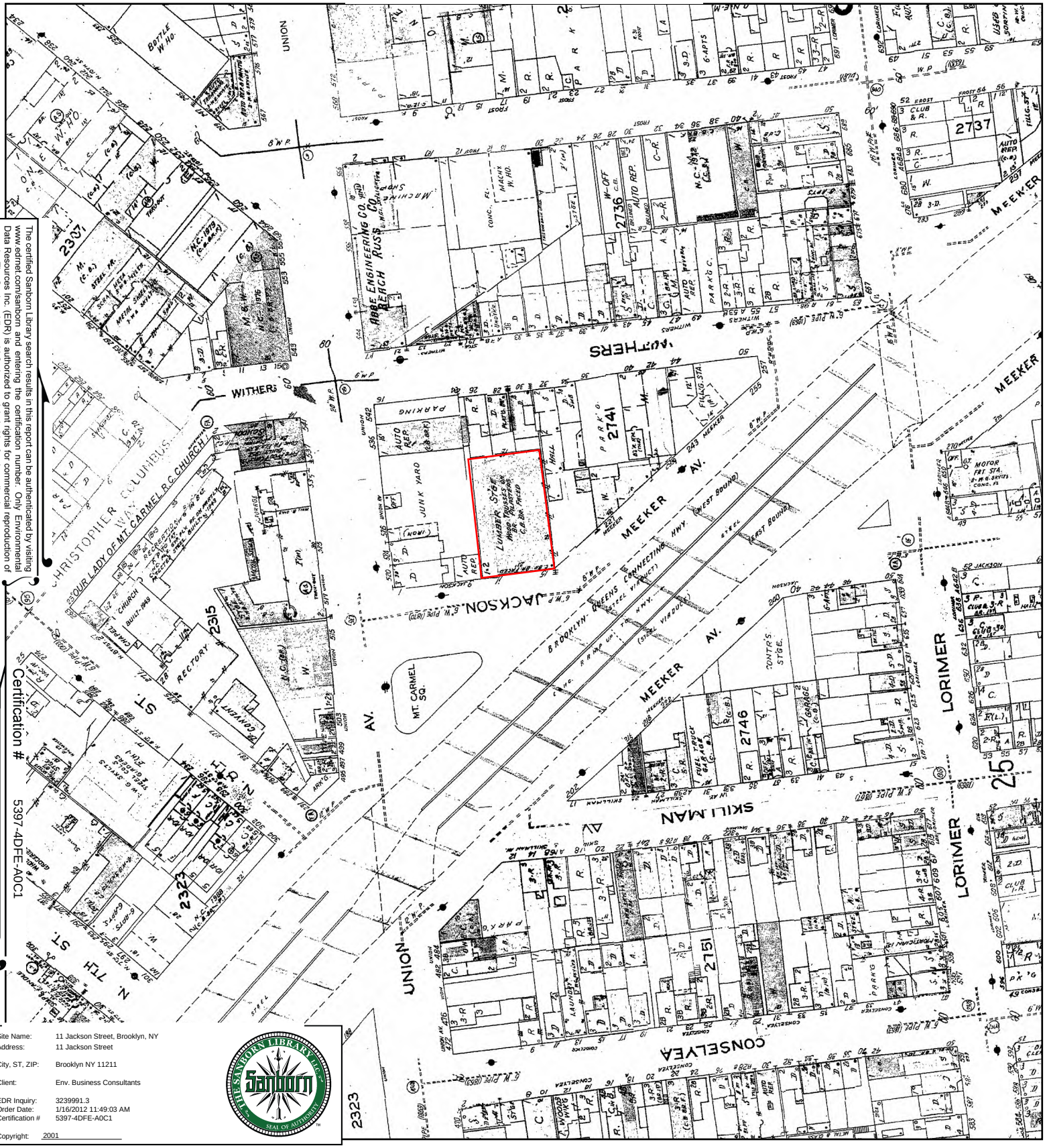


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

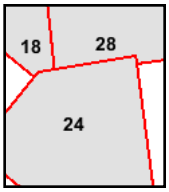
2001 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	2001

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

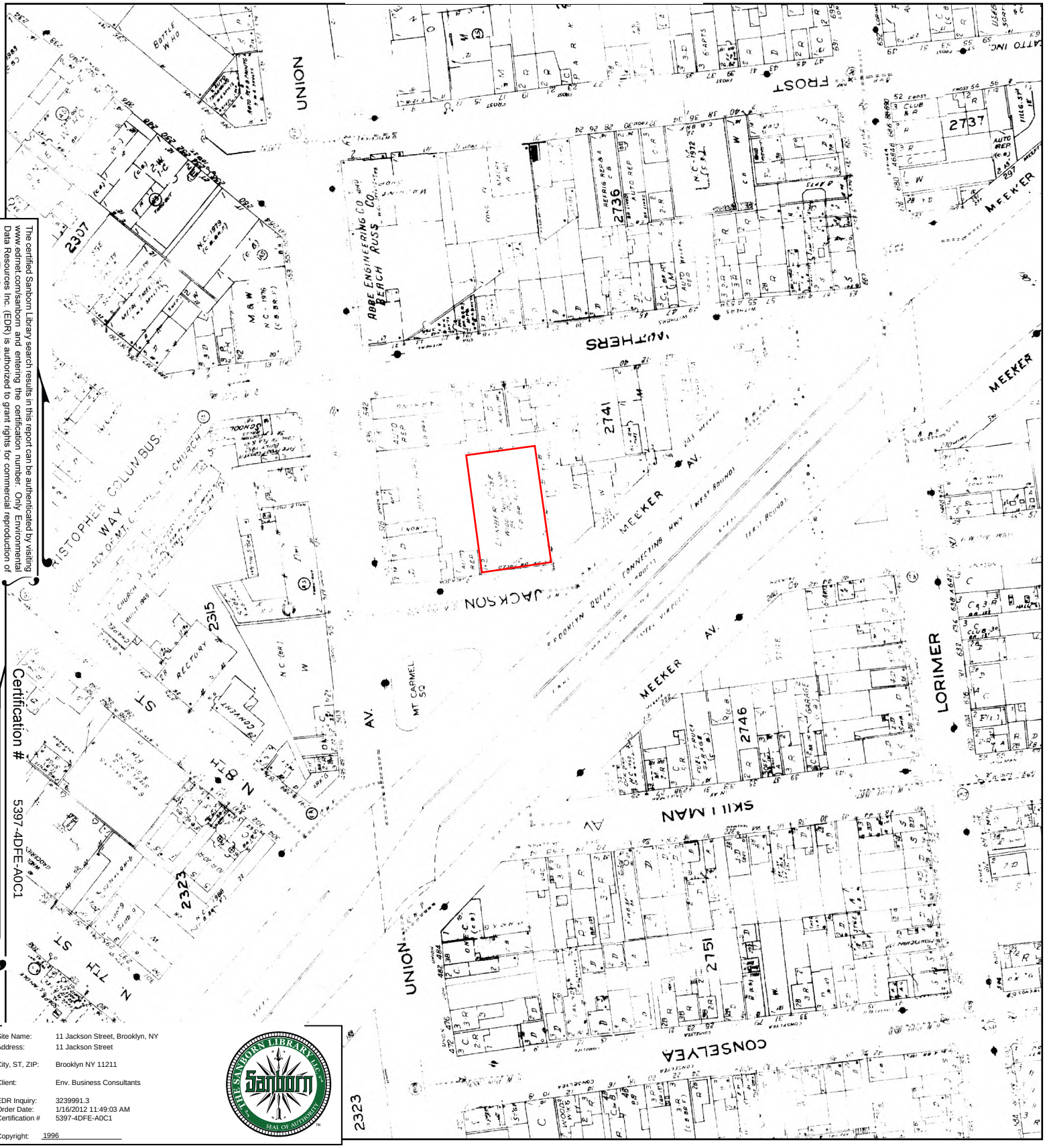


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

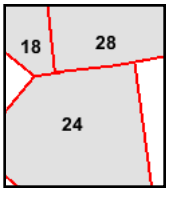
1996 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1996

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

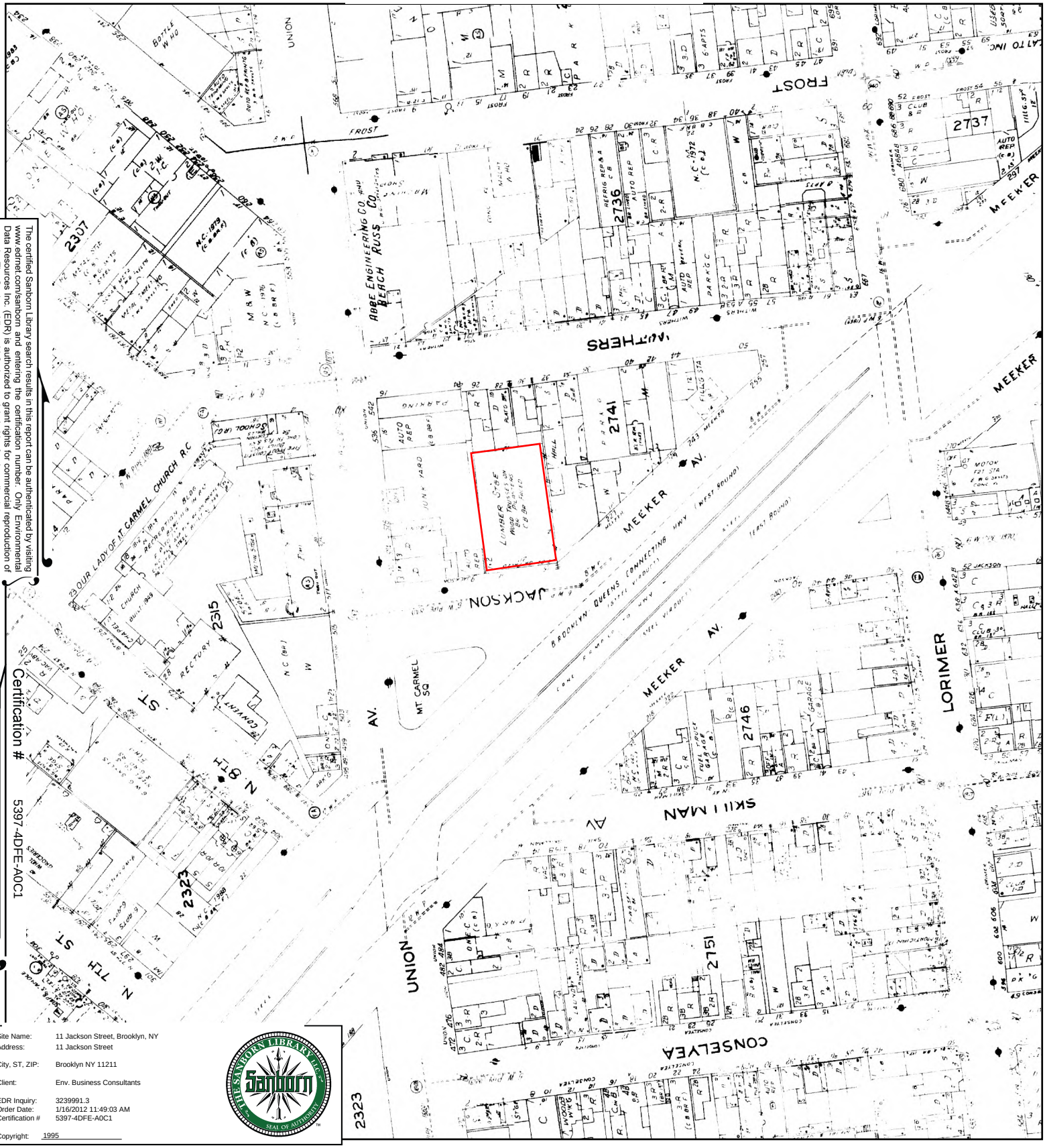


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1995 Certified Sanborn Map

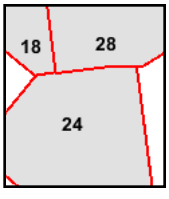


The certified Sanborn Library search results in this report can be authenticated by visiting www.ednet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1995

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

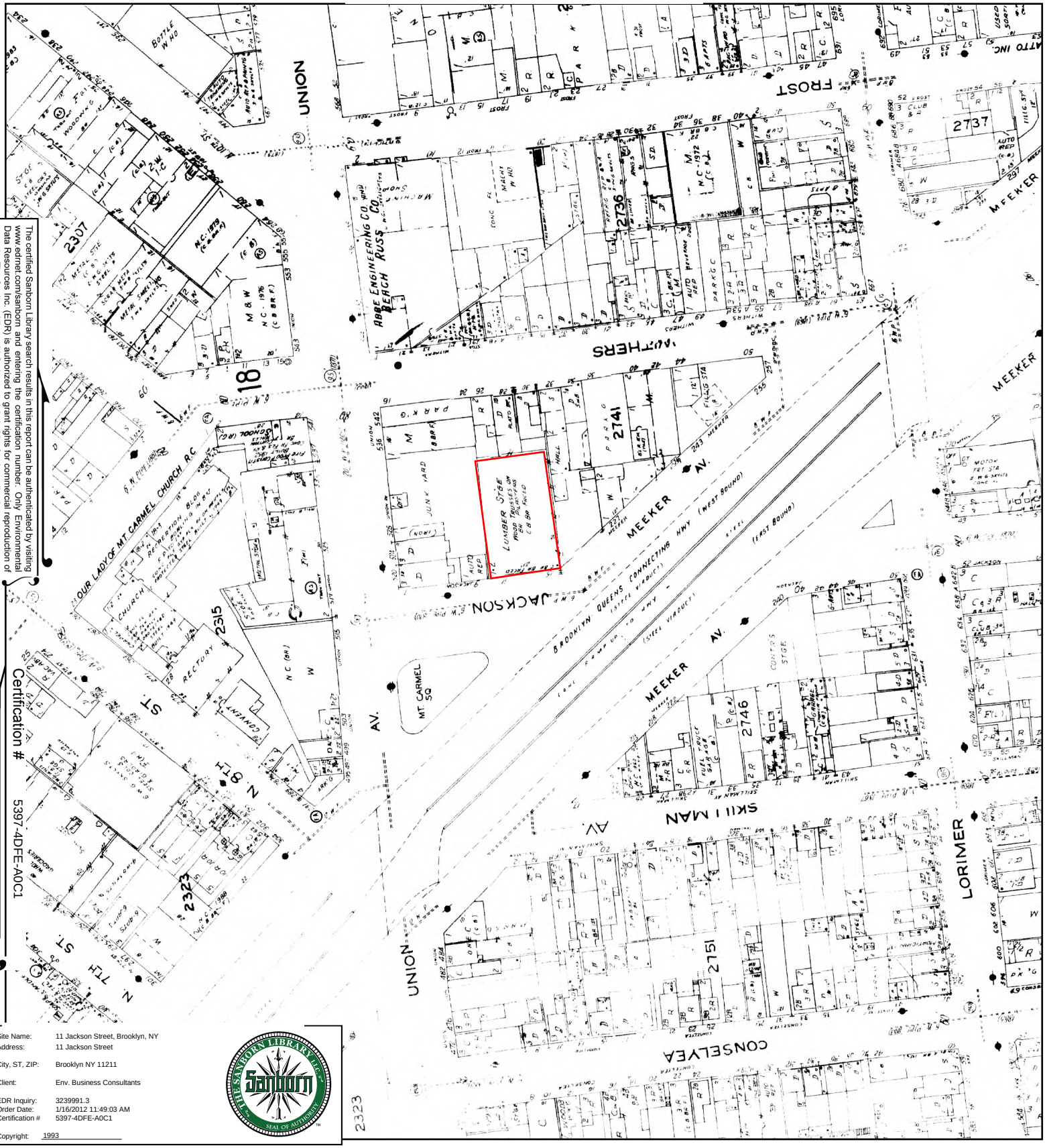


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1993 Certified Sanborn Map

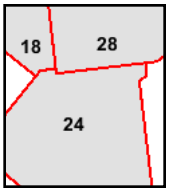


The certified Sanborn Library search results in this report can be authenticated by visiting www.ednet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1993

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

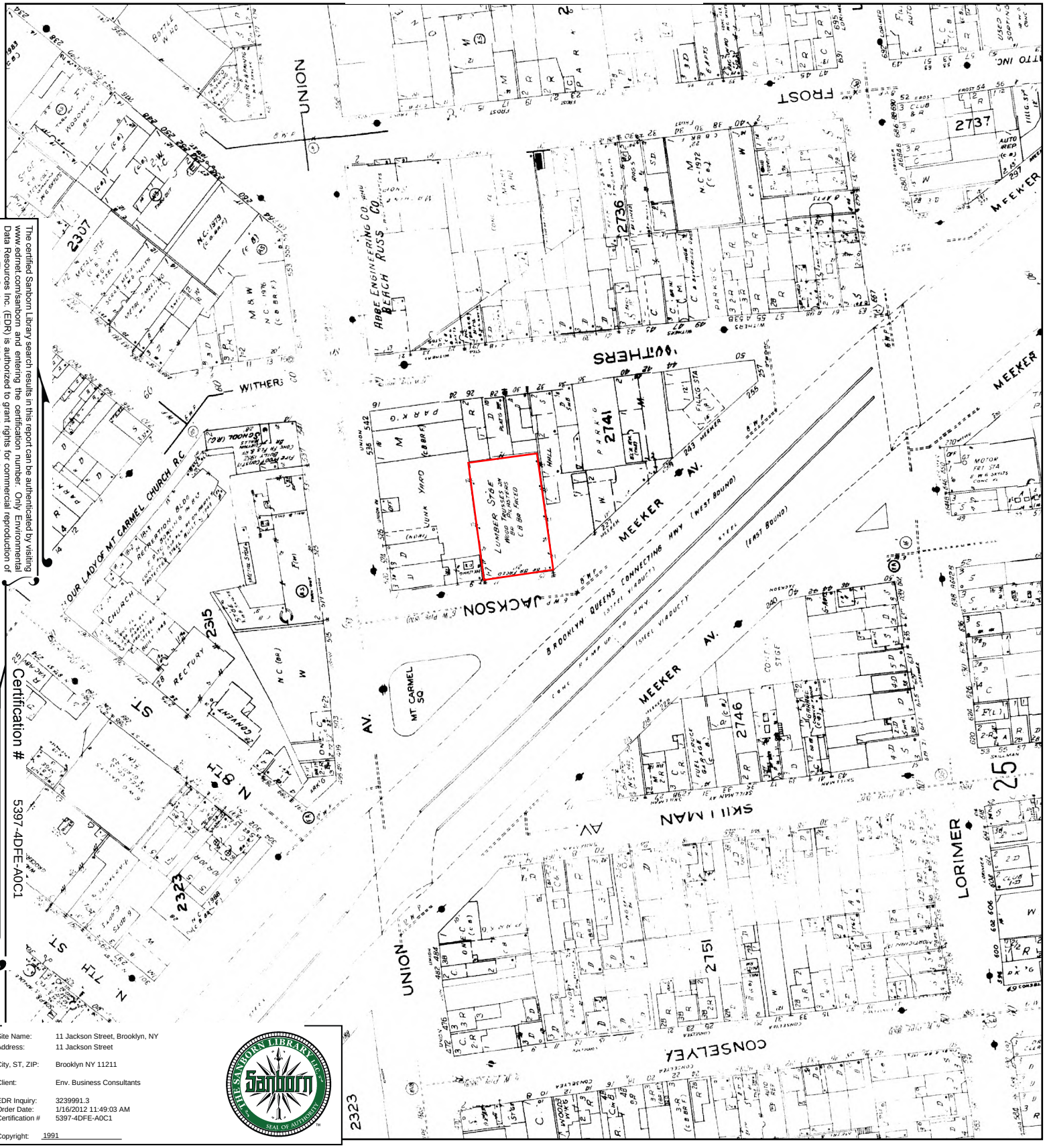


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1991 Certified Sanborn Map

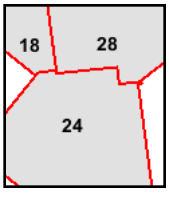


The certified Sanborn Library search results in this report can be authenticated by visiting www.ednet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1991

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

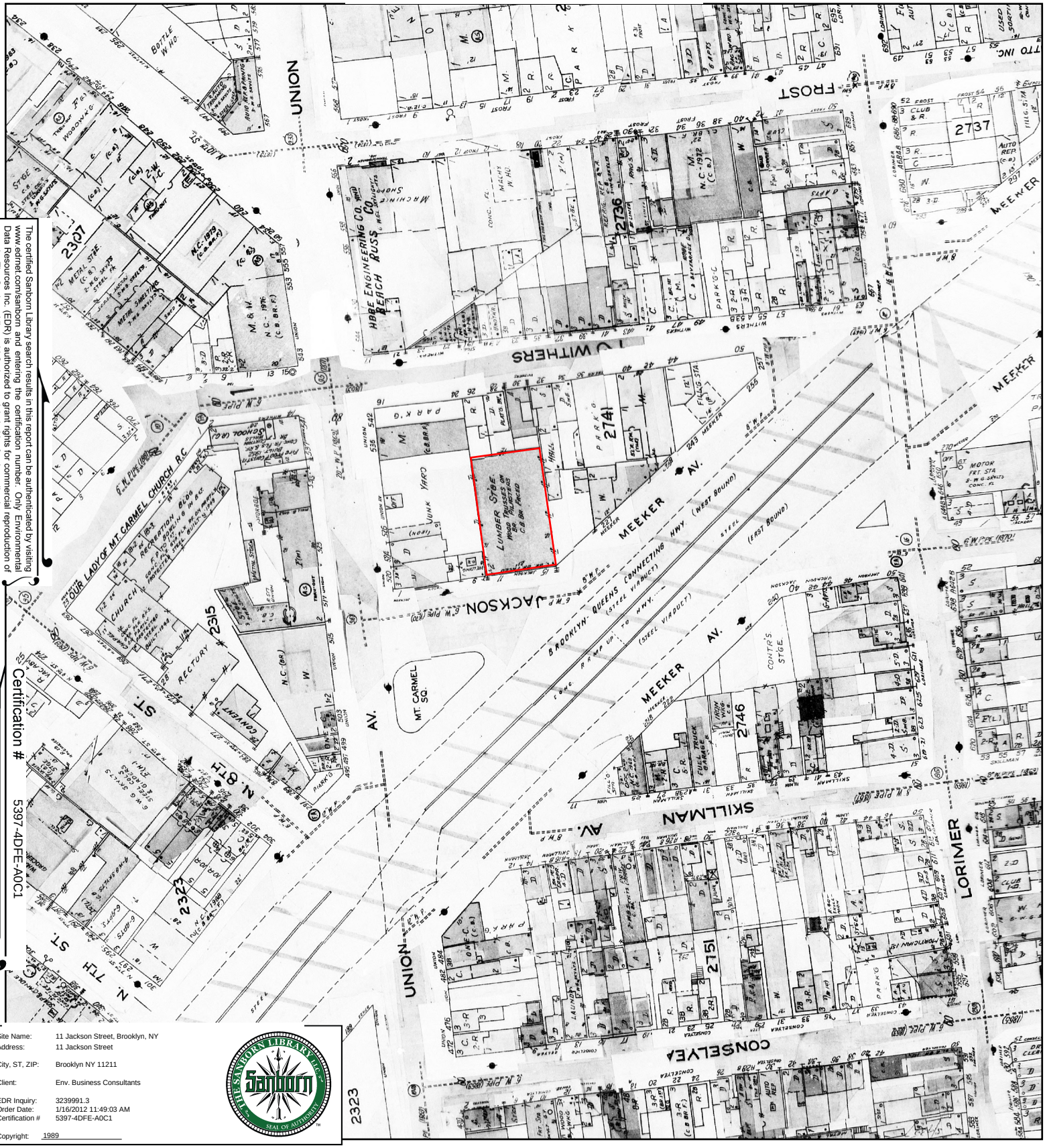


Volume 4, Sheet 28
Volume 4, Sheet 18
Volume 4, Sheet 24

0 Feet 150 300 600

N

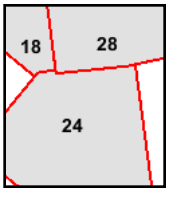
1989 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1989

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

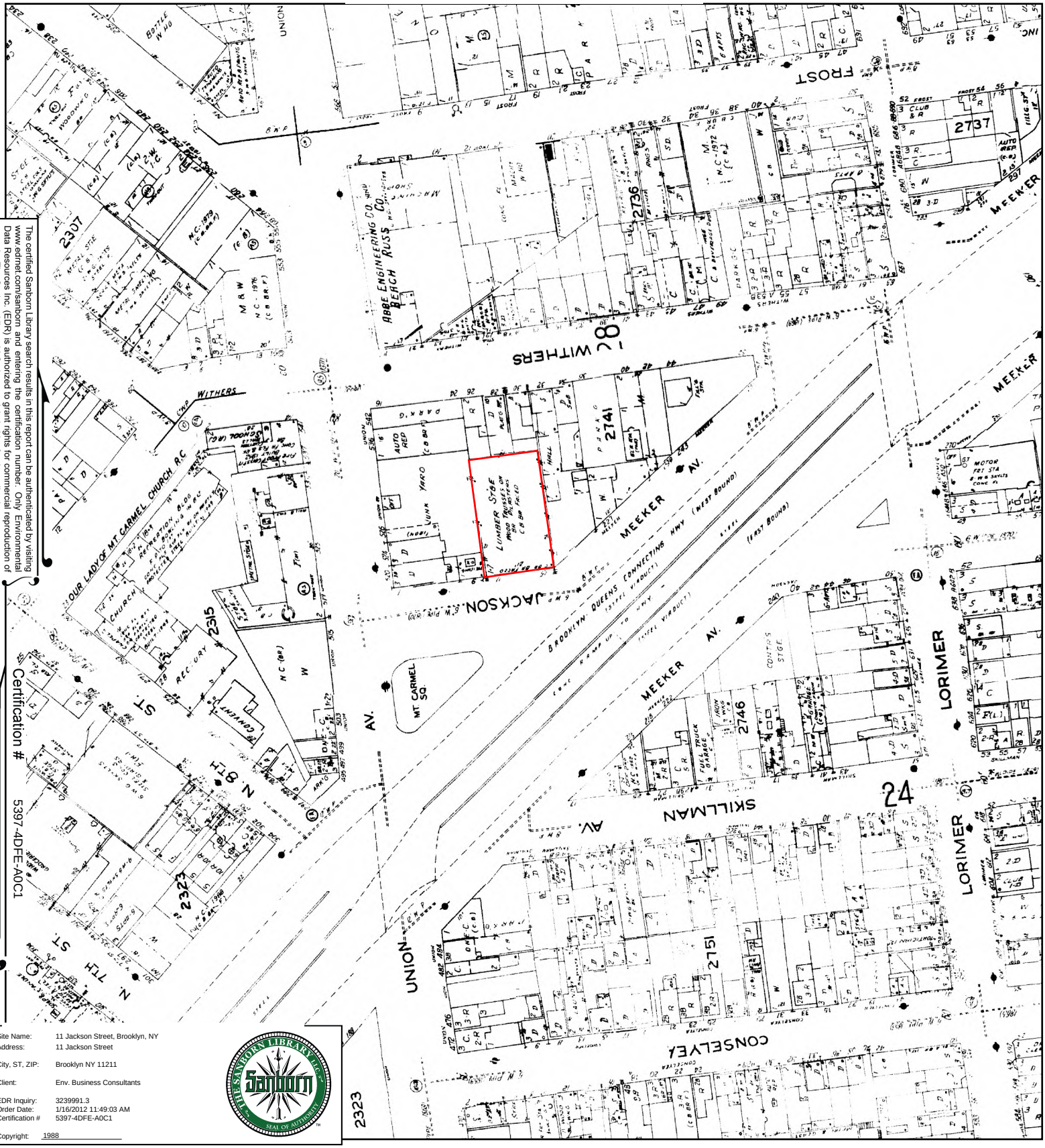


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1988 Certified Sanborn Map

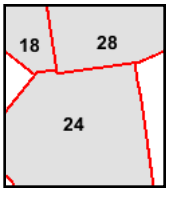


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1988

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

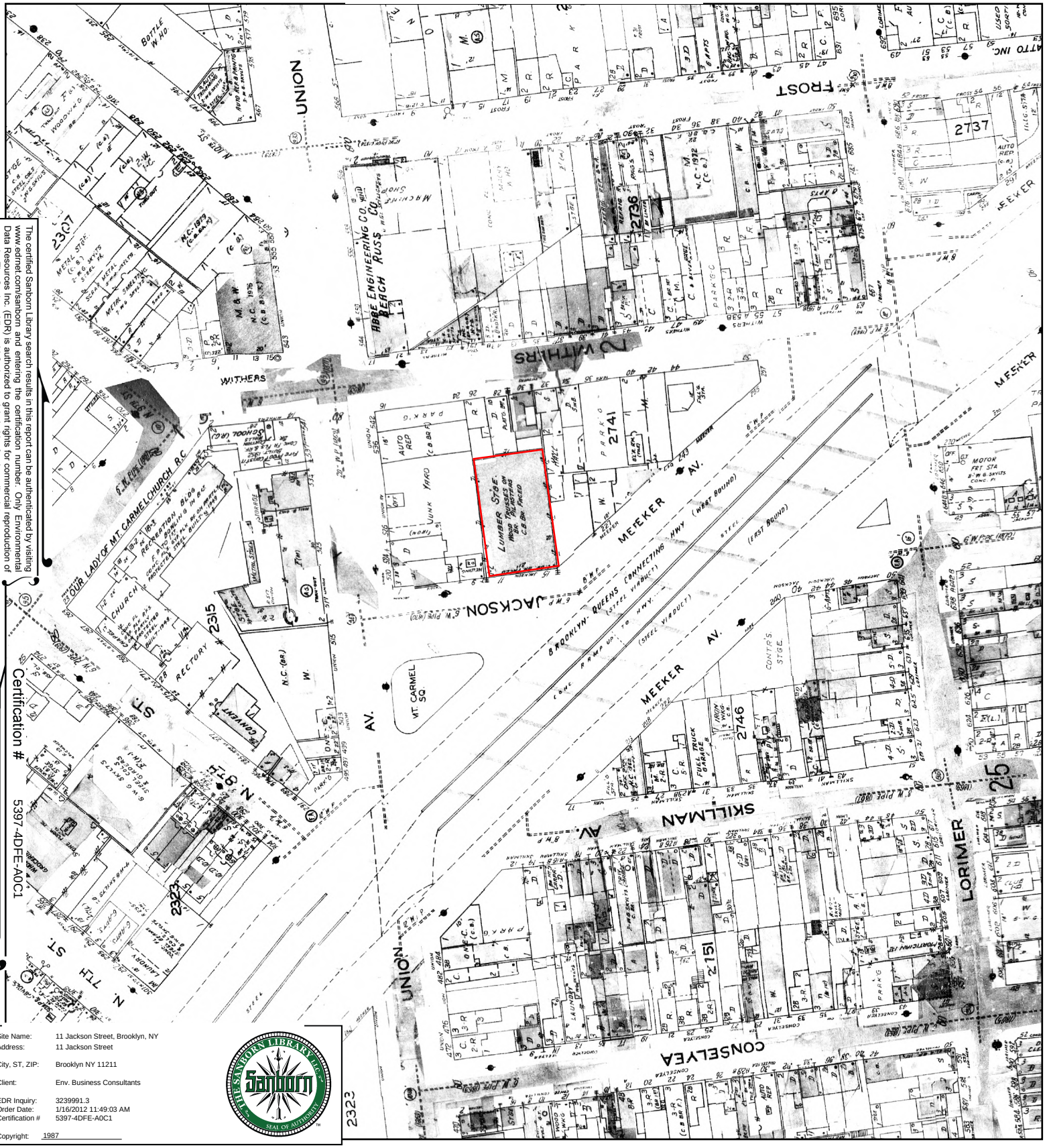


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

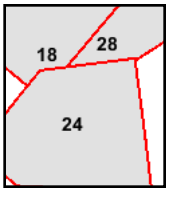
1987 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1987

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

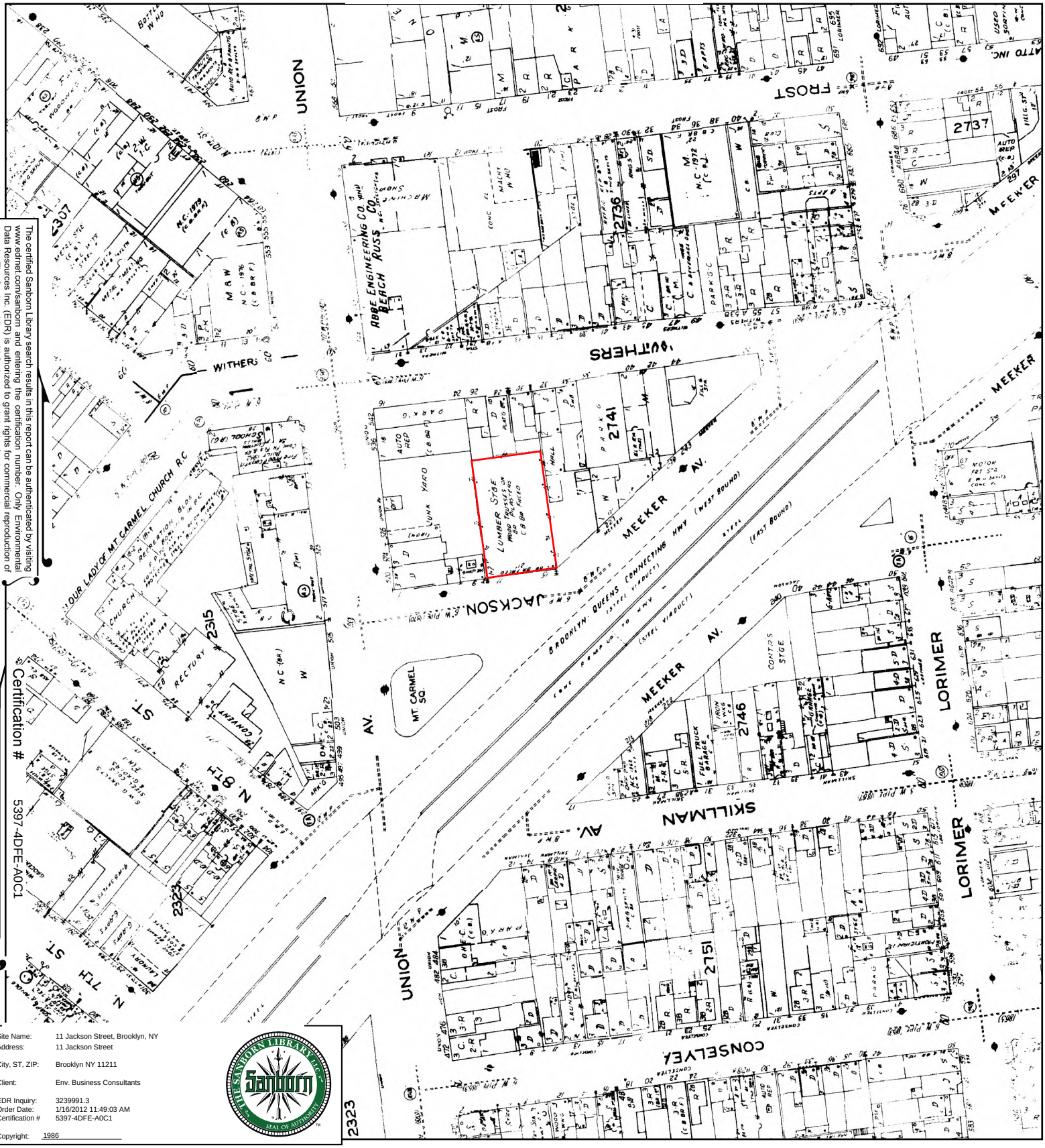


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1986 Certified Sanborn Map

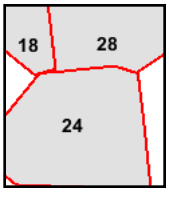


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1986

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

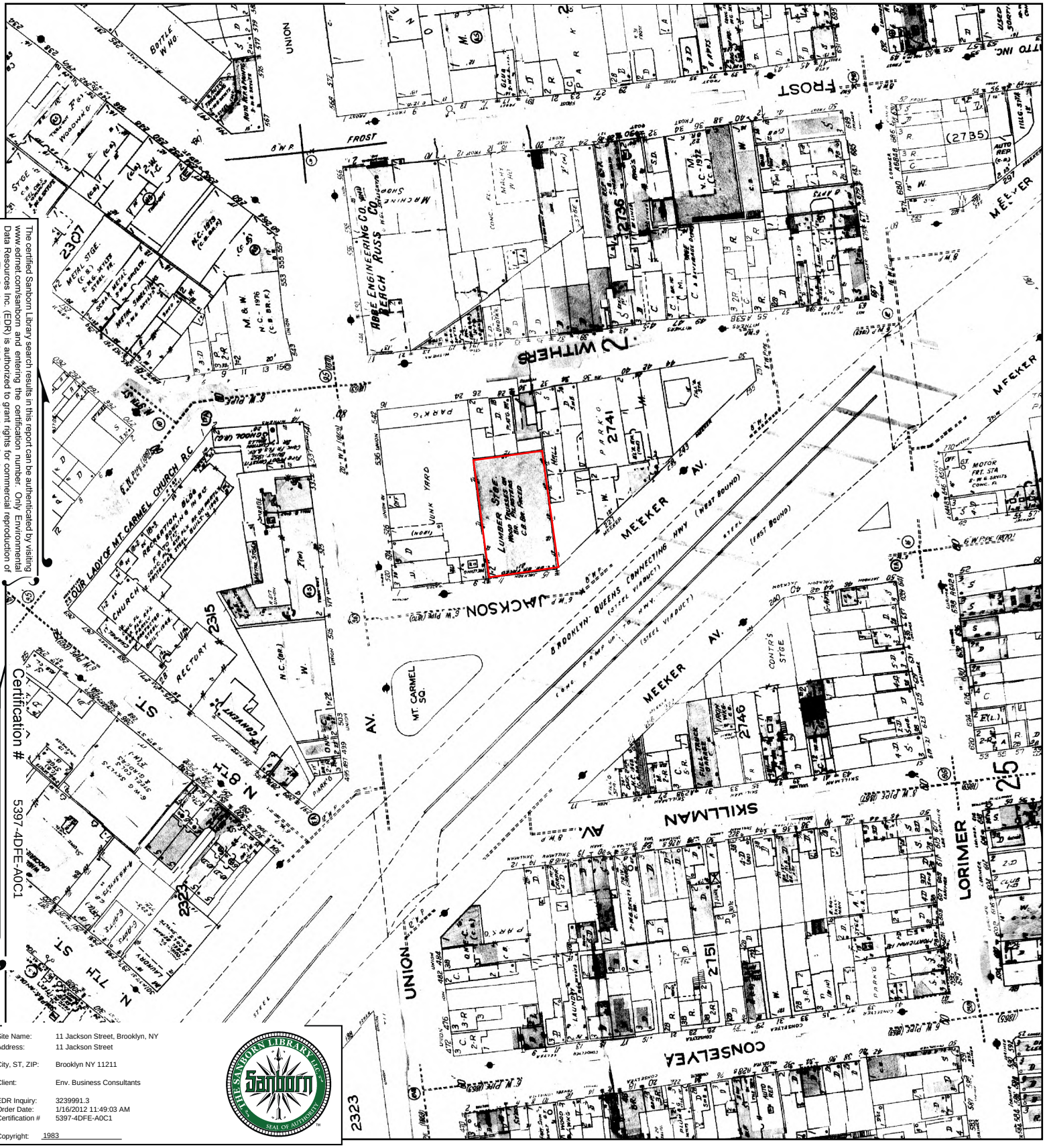


Volume 4, Sheet 28
Volume 4, Sheet 18
Volume 4, Sheet 24

0 Feet 150 300 600

N

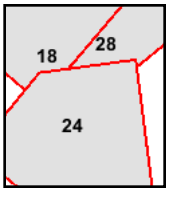
1983 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1983

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

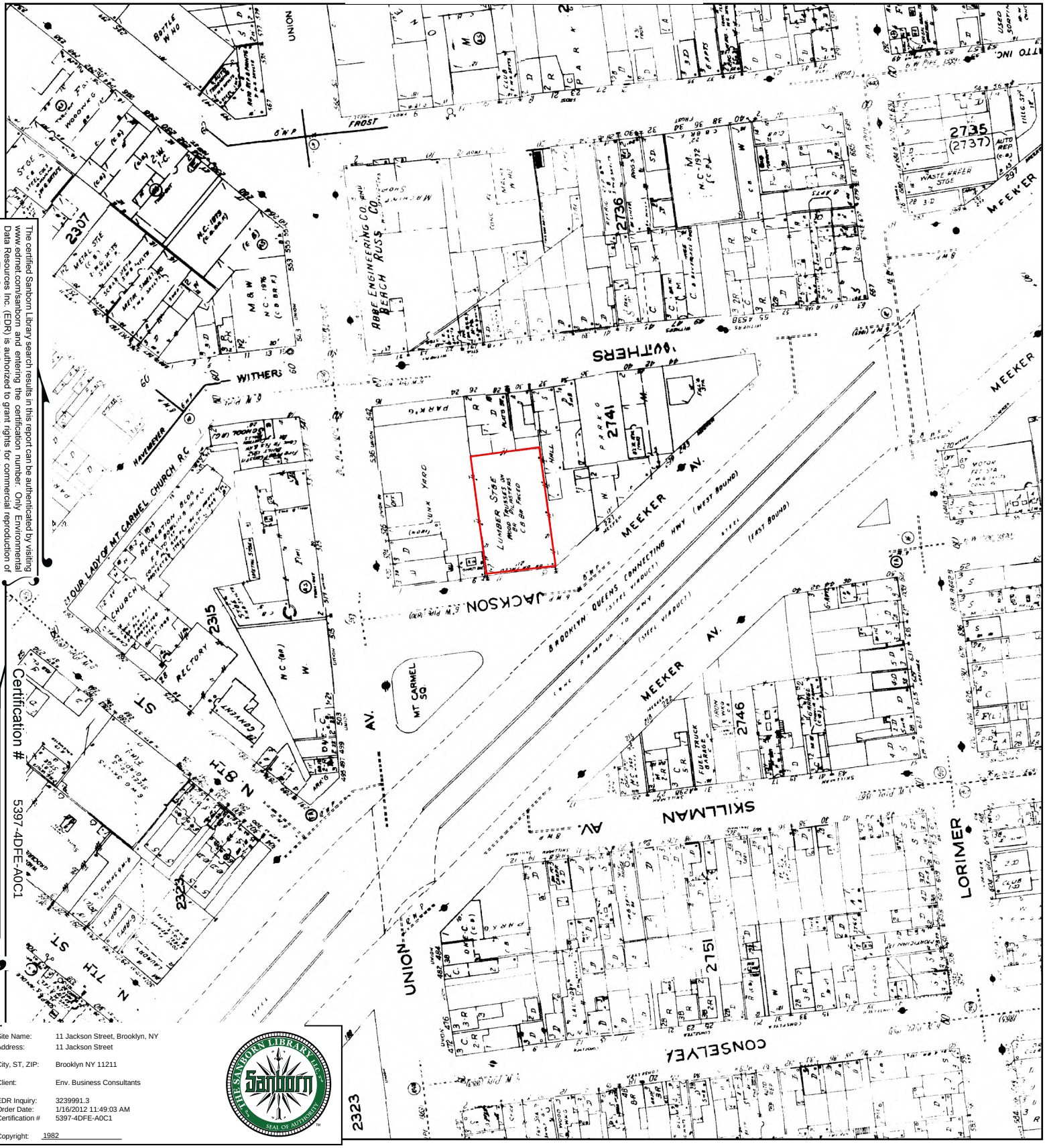


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1982 Certified Sanborn Map

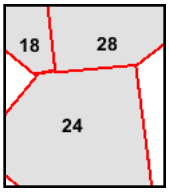


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1982

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

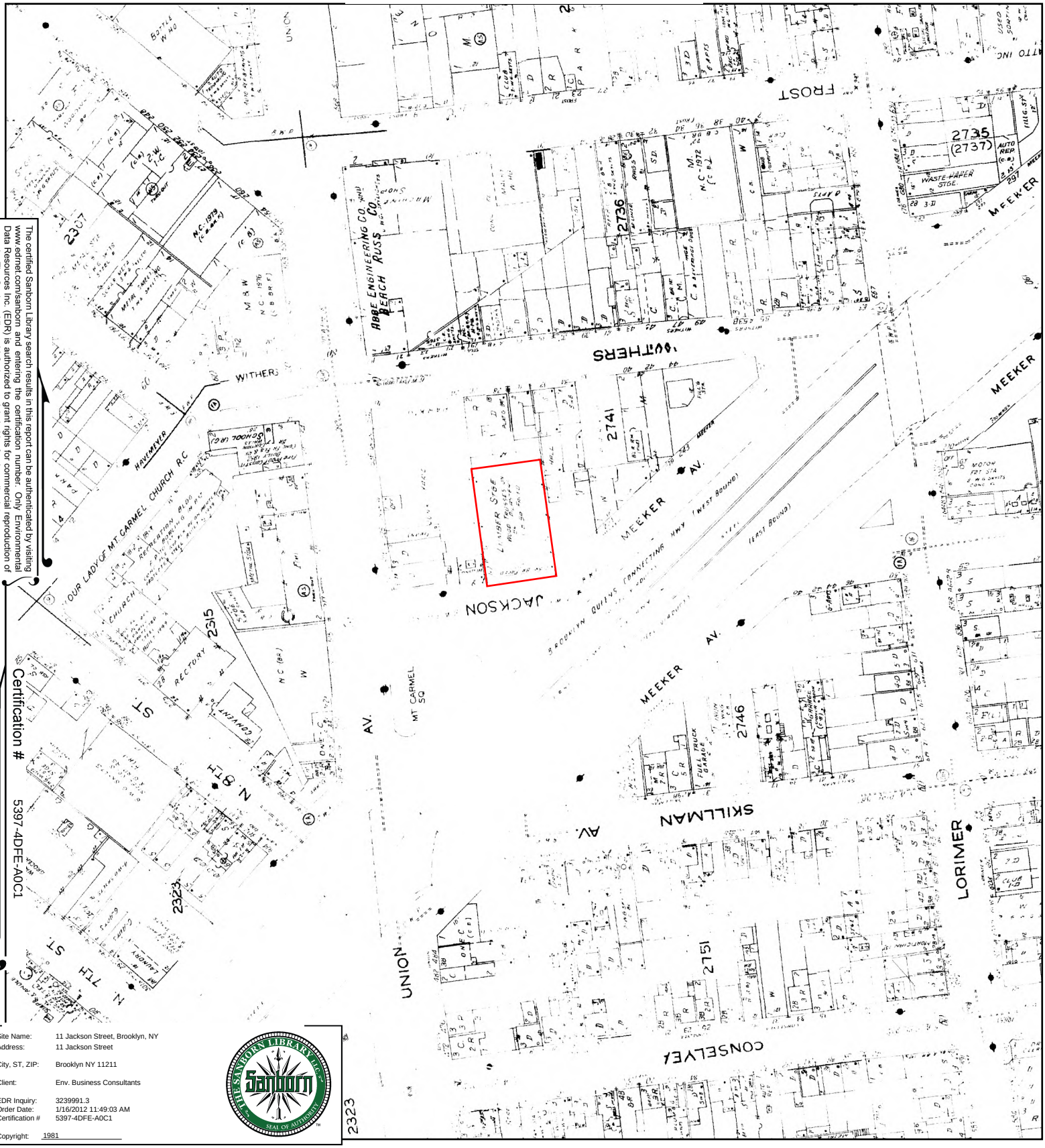


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1981 Certified Sanborn Map

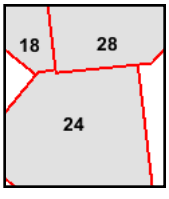


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1981

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

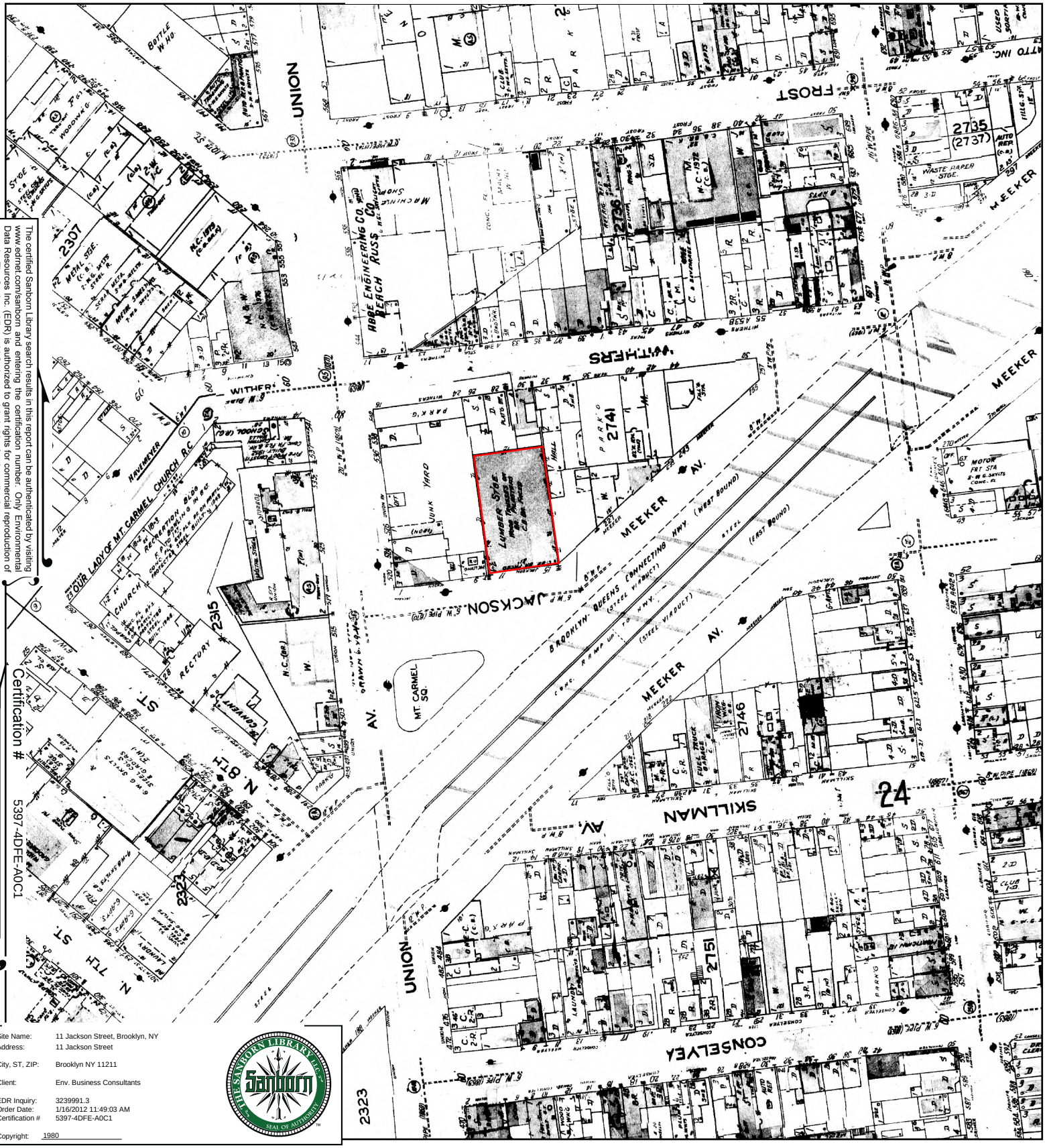


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

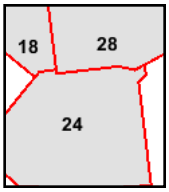
1980 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1980

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

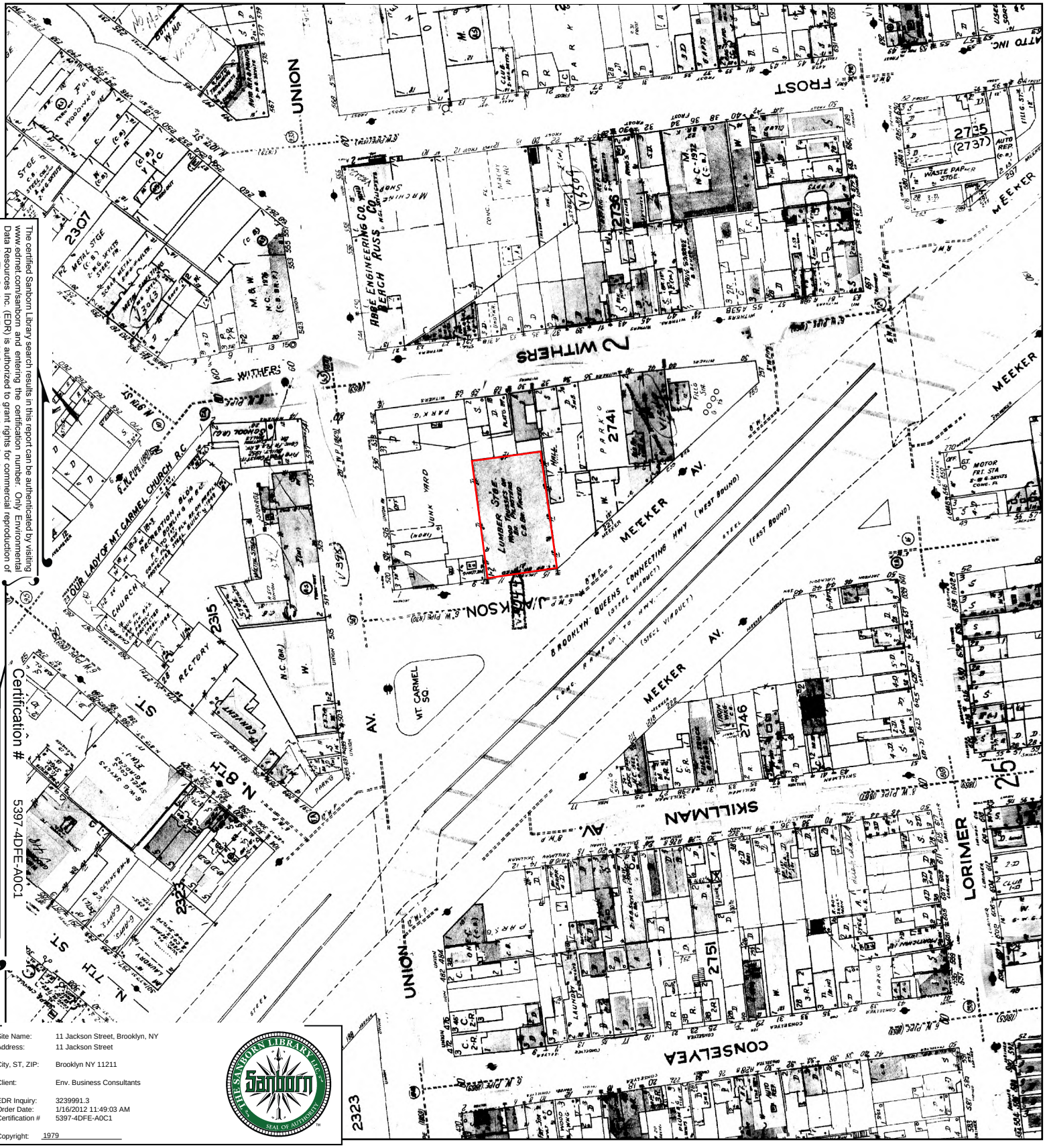


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

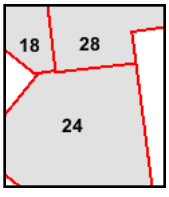
1979 Certified Sanborn Map



Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1979

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

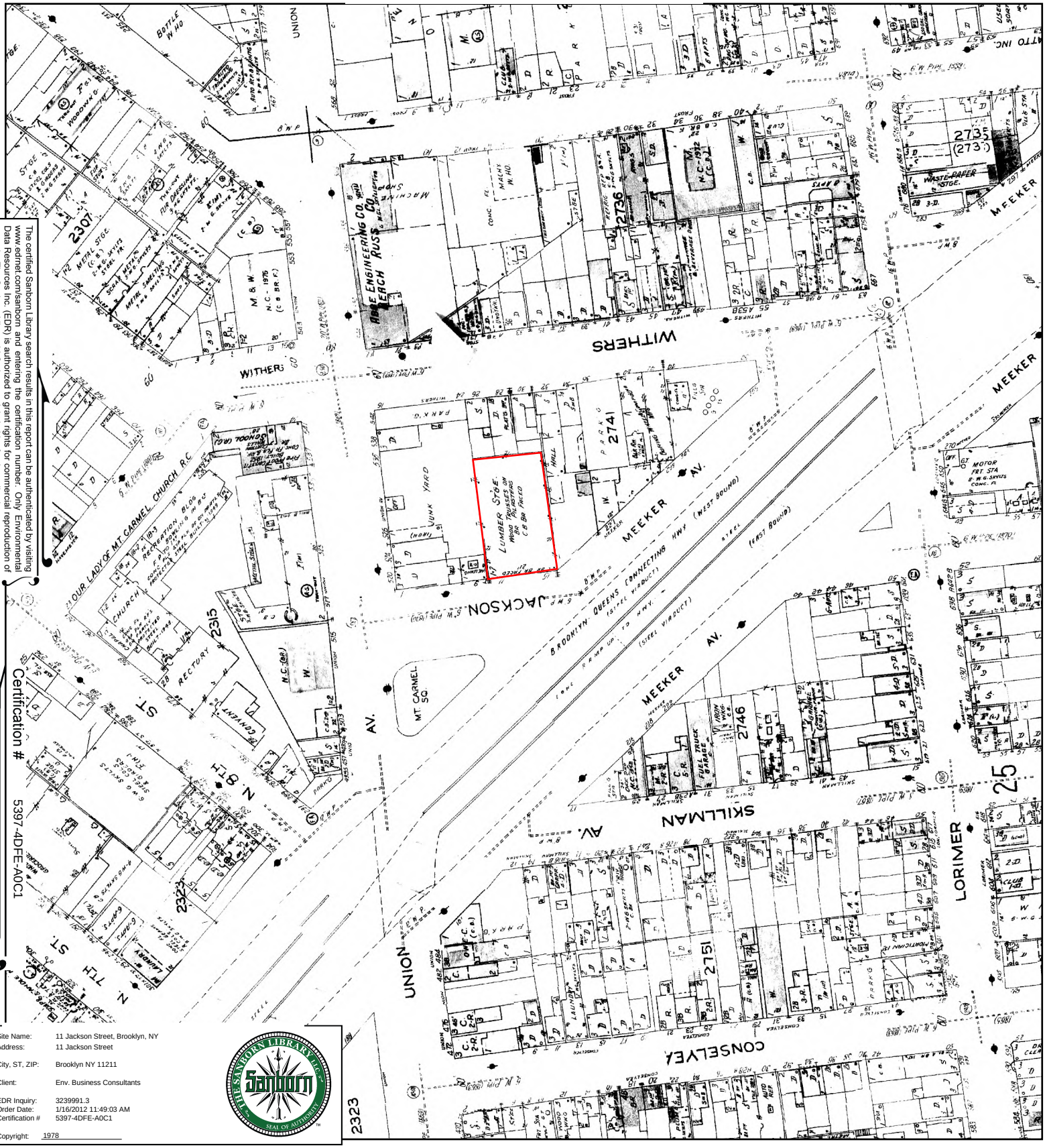


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1978 Certified Sanborn Map

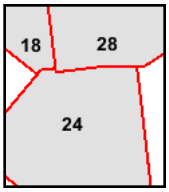


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1978

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

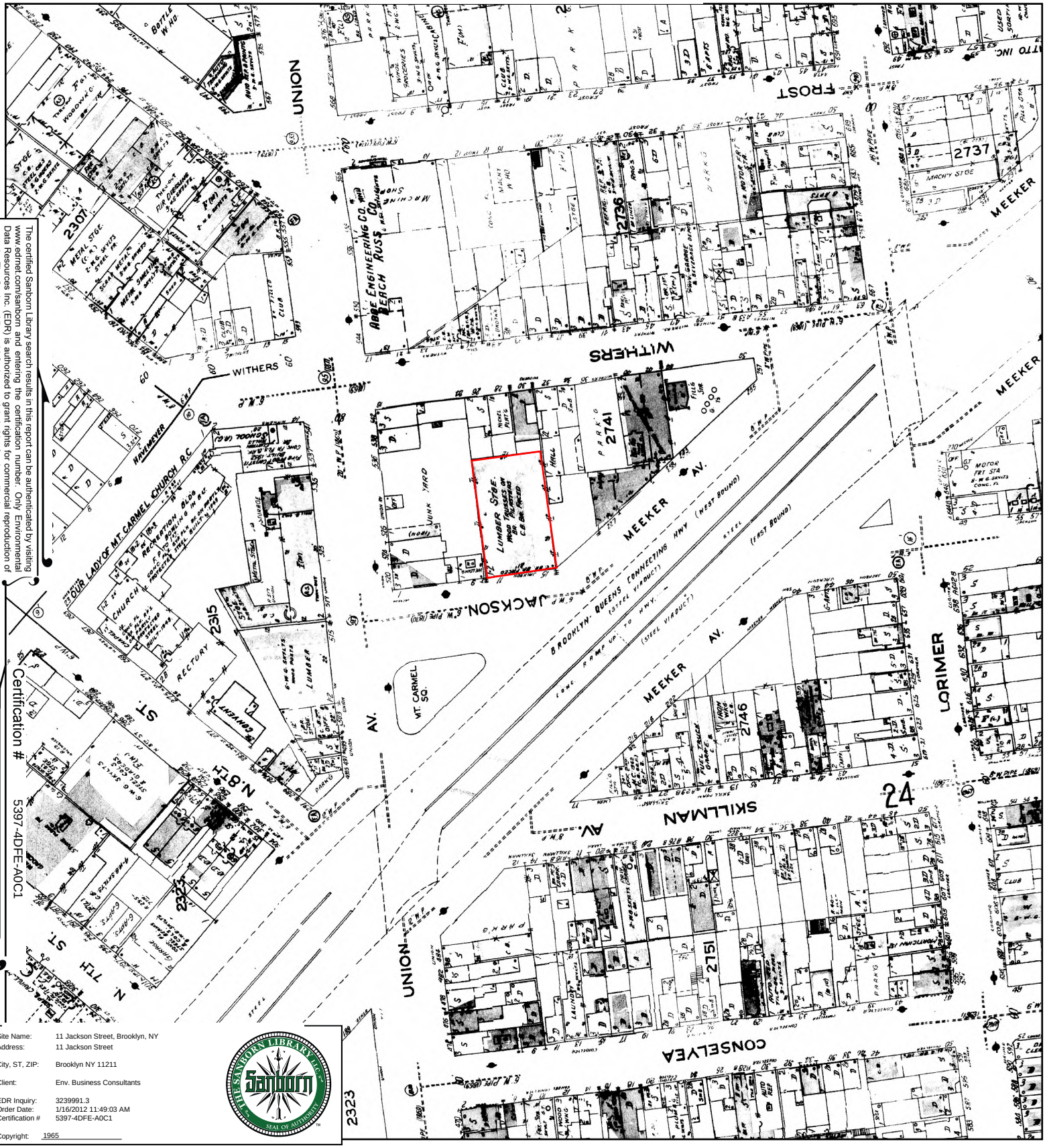


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1965 Certified Sanborn Map

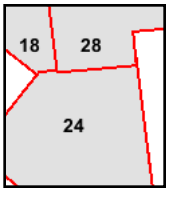


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1965

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

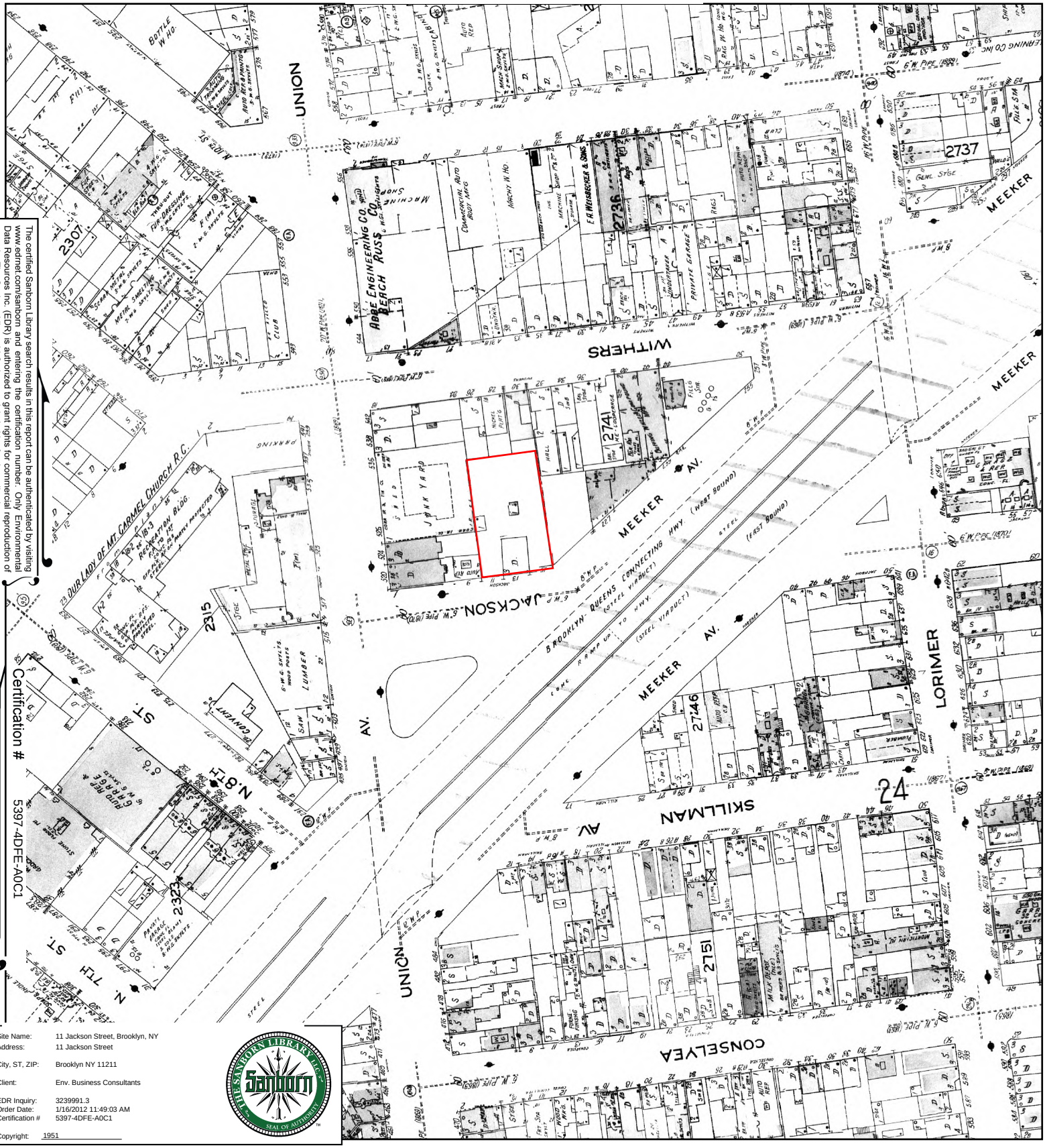


Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

1951 Certified Sanborn Map

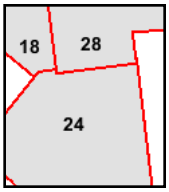


The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1951

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

N

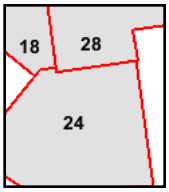
1942 Certified Sanborn Map

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1942

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

0 Feet 150 300 600



Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

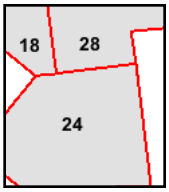
N

1916 Certified Sanborn Map

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1916

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 4, Sheet 28
Volume 4, Sheet 18
Volume 4, Sheet 24

0 Feet 150 300 600

N

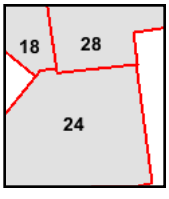
1905 Certified Sanborn Map

The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by The Sanborn Library LLC, the copyright holder for the collection.

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1905

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 4, Sheet 18
Volume 4, Sheet 24
Volume 4, Sheet 28

0 Feet 150 300 600

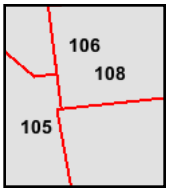
N

1887 Certified Sanborn Map

Certification # 5397-4DFE-A0C1

Site Name:	11 Jackson Street, Brooklyn, NY
Address:	11 Jackson Street
City, ST, ZIP:	Brooklyn NY 11211
Client:	Env. Business Consultants
EDR Inquiry:	3239991.3
Order Date:	1/16/2012 11:49:03 AM
Certification #	5397-4DFE-A0C1
Copyright:	1887

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.



Volume 4, Sheet 105
Volume 4, Sheet 106
Volume 4, Sheet 108
Volume 4, Sheet 108

0 Feet 150 300 600

N

ATTACHMENT C
Health and Safety Plan

11 JACKSON STREET

BROOKLYN, NEW YORK 11211
Block 2741, Lot 47
E-138 CEQR # 04DCP003K

CONSTRUCTION HEALTH AND SAFETY PLAN

JUNE 2013

Prepared for:
JACKSON ESTATES II, LLC
520 Roebling Street, Suite 316
Brooklyn, NY 11211

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
Former Driggs Plywood Corp.
11 to 15 Jackson Street, Brooklyn, New York 11211

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
Former Driggs Plywood Corp.
11 to 15 Jackson Street, Brooklyn, New York 11211

FIGURES

APPENDICES

STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Action at 11 Jackson Street, Brooklyn, New York.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the planned Remedial Action at 11 Jackson Street, Brooklyn, New York to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during remedial activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to excavation, loading and other soil disturbance activities and is based on the best information available. The CHASP may be revised by EBC at the request of Jackson Estates II LLC and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the HASP. Amendments to the HASP are acknowledged by completing forms included in **Appendix B**.

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Ms. Kristen DiScenza	EBC – Project Manager	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000
Ms. Chawinie Miller	Health & Safety Manager	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000
Mr. Kevin Waters	Site Safety Officer	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to

be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

2.0 SITE BACKGROUND AND SCOPE OF WORK

The street address of the subject site is 11 Jackson Street, Brooklyn, New York 11211, but the property spans from 11 to 15 Jackson Street. The subject site is identified as Block 2741, Lot 47 on the Borough of Brooklyn Tax Map. The lot is located in the City of New York and Borough of Brooklyn (Kings County. The lot is located on the north side of Jackson Street, between Union Avenue and Meeker Avenue. Lot 47 is a slightly irregularly shaped lot consisting of approximately 9,360 ft^2. The lot is 72 feet wide along Jackson Street, 75 feet wide in the rear of the lot, and is 130 feet deep.

The entire footprint of the subject site lot is developed with a high, one-story brick building. Two steel rollup garage doors provide access to the interior of the building from Jackson Street. The interior of the building is divided into two separate commercial spaces by a fabricated wall constructed of wood and sheet metal. Signage on the exterior of the building note former or current occupants as "Wei Je Industries, Inc." - a metal railing, iron door, and store front fabricator, and "Nexan" - a tire installer. The tire installer no longer operates within the building, and a charter bus repair facility now operates in the space. The exterior of the building consists of unpainted red brick. The interior consists of an exposed/unpainted concrete slab, exposed/unpainted concrete block exterior walls, and exposed wooden roof rafters that create a slightly domed roof.

The elevation of the property is approximately 16 feet above the National Geodetic Vertical Datum (NGVD). The topography in the immediate area of the property generally slopes upward to the north, south and east. The depth to groundwater beneath the site as inferred from available groundwater maps and topographic elevation is approximately 8 feet below grade. Based on regional groundwater contour maps groundwater flow is expected to be west toward the east river.

2.1 Previous Investigations

2.1.1 Phase I Environmental Site Assessment Report (EBC January 2012)

A Phase I Environmental Site Assessment (ESA) was completed by Environmental Business Consultants (EBC), in January of 2012 for the site. The Phase I ESA noted that the site was developed prior to 1887 as three separate thin lots, each developed with a 3-story residential buildings in the front of the lots, and smaller 2-story dwellings in the rear of the lots. Each of the three lots was labeled with the street numbers 11 Jackson Street, 13 Jackson Street and 15 Jackson Street. The lots remained until the around 1951 when two of the lots were cleared, leaving only the 3-story residential building on 11 Jackson Street. The 3-story building remained until the property was redeveloped sometime between 1951 and 1962 with the same building currently located at the site. All Sanborn maps until the most recent map (2007) label the subject site building as being used for lumber storage but city directory listings list the Driggs Plywood Corporation from only 1965 to 1973. Arnmart Whole Beer Distributers were listed in 1997 and 2000, and “Car Fashion Seat Covers” was listed in 2005.

Based upon reconnaissance of the subject and surrounding properties, interviews and review of historical records and regulatory agency databases, EBC noted the following recognized environmental conditions for the subject site.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

- The use of the subject site as an auto repair facility (tire sales/installation) and charter bus repair facility.

- The use of the subject site as a metal fabrication shop.

EBC recommended performing a Phase II Subsurface Investigation at the subject site to include the collection and laboratory analysis of subsurface soil, groundwater, and sub-slab soil gas samples. However, EBC noted that nearly any development scenario for the site is subject to the E-designation Environmental Review Program administered by the New York City Office of Environmental Remediation due to the hazardous materials "E" designation assigned to the site.

2.1.2 Remedial Investigation, (EBC March 16-20, 2012, May 8, 2013)

The remedial investigation was performed from March 16-20, 2012 and May 8, 2013 in accordance with the Remedial Action Work Plan approved by the NYCOER as part of the E-designation review process. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- Soil sampling and analysis for volatile and semi-volatile organic compounds (VOCs, SVOCs) in soil samples from soil boring locations;
- The installation of groundwater monitoring wells;
- The collection and analysis of groundwater samples for volatile and semi-volatile organic compounds;
- Sampling for non-petroleum contaminants such as pesticides, PCBs and metals in soil and groundwater including the analysis of soil and groundwater samples
- The collection of analysis of subslab soil gas samples for VOCs.

The field work portion of the RI was conducted by Environmental Business Consultants (EBC) from March 16-20, 2012 and May 8, 2013, in accordance with the protocols and methods as established in the approved Remedial Investigation Work Plan).
The results of sampling performed during this RI, The results of the RI identified elevated levels of both tetrachloroethene (PCE) and trichloroethene (TCE) in soil gas above mitigation levels established within the State DOH soil vapor guidance matrix. TCE concentrations in soil gas ranged from 10.4 µg/m3 to a high of 12,300 µg/m3. PCE concentrations ranged from 10.4 µg/m3 to 8,270 µg/m3. TCE concentrations in 5 of the 6 samples obtained and PCE concentrations in 4 of the 6 samples were above the NYSDOH threshold requiring action (monitoring or mitigation).

PCE and TCE were detected within four of the seven shallow (0-2 ft) soil samples retained at the Site and one of the five deeper (4-6 ft) soil samples, however, neither PCE nor TCE were detected within any of the soil samples at a concentration above Unrestricted Use SCOs.

Groundwater was encountered at a depth of approximately 8 feet below grade. No VOCs were detected within the three groundwater samples above NYSDEC groundwater standards.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

However, a low concentration of PCE was detected within one of the groundwater samples at a concentration slightly below the GQS.

SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and ideno(1,2,3-cd)pyrene, were reported above restricted soil cleanup objectives (SCOs) in shallow soil (0-2ft) at all five of the boring locations.

One or more metals including barium, copper, lead and mercury were reported above restricted residential SCOs in shallow soil in all five boring locations. Zinc was reported above unrestricted SCOs at all boring locations. Although elevated SVOCs and metals are commonly associated with historic fill, in this case some of the metals may be related historic site use and SVOC concentrations in one of the borings (>600,000 ug/kg) was considerably above that typically encountered in historic fill.

2.2 Redevelopment Plans

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

The site is to be redeveloped through the new construction of a single 8-story multi-family apartment building. The building will include 44 residential apartments split between studio, 1 and 2 bedroom apartments. The project does not include a basement level. First floor use will include garage space for cars and bicycles, on-site laundry rooms, a lobby and a first floor daycare center.

2.3 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this HASP include the following:

1. Removal of CVOC impacted soil from the property.
2. Excavation of soil/fill exceeding Track 2 - restricted residential SCOs as listed in Table 1 to a depth of 15 feet;
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
4. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of restricted residential SCOs;
5. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
6. Import of materials to be used for backfill and cover in compliance with: (1) chemical

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

limits and other specifications included in Table 1, (2) all Federal, State and local rules and regulations for handling and transport of material.

7. Installation of a sub-slab depressurization system and vapor barrier beneath occupied areas of the building to be constructed on the Site.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
    a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
    b. Work in Pairs. Individuals should avoid undertaking any activity alone.
    c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
    d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
    a Heat Rash (or prickly heat):
        Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
        Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
        Treatment: Remove source or irritation and cool skin with water or wet cloths.

    b. Heat Cramps (or heat prostration)
        Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
        Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
        Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

facility.

c. Heat Stroke

Cause: Same as heat exhaustion. This is also an extremely serious condition.

Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

3.3 Chemical Hazards

"Urban fill" materials, present throughout the New York City area typically contain elevated levels of semi-volatile organic compounds and metals. These "contaminants" are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash and bits of tar and asphalt. Considering the previous sampling results and the past and present use of the site, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyl's (PCBs), and heavy metals such as arsenic, chromium, lead and mercury.

Based on the findings of the Remedial Investigation and the inherent properties of urban fill, the following compounds are considered for the site as potential contaminants: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and heavy metals.

Volatile organic compounds reported to be present in soil, soil gas and/or groundwater include the following:

cis-1,2-dichloroethene	Tetrachloroethene	Trichloroethylene

Semi-Volatile organic compounds reported to be present in soil include the following:

Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(a)pyrene	Chrysene
Benzo(k)fluoranthene	Dibenzo(a,h)anthracene	Ideno(1,2,3-cd) pyrene	Napthalene

Metals reported to be present in soil and / or groundwater include the following

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Arsenic	Barium	Chromium	Copper	Mercury
Lead	Zinc	Magnesium	Manganese	Sodium

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption.

Appendix C includes information sheets for suspected chemicals that may be encountered at the site.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m3 over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 $\mu g/m^3$ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Elevated levels of VOCs were detected in both soil and groundwater samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

- chemical resistant coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of drilling locations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

1 The SSO will be consulted immediately
2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
3 Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	• Continue excavating • Level D protection • Continue monitoring every 10 minutes

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

1-5 ppm Above Background, Sustained Reading	1-10%	• Continue excavating • Go to Level C protection or employ engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustaineed Reading	10-20%	• Discontinue excavating, unless PID is only action level exceeded. • Level C protection or employ engineering controls • Continue monitoring for organic vapors 200 ft downwind • Continuous monitoring for LEL at excavation pit
>25 ppm Above Background, Sustained Reading	>20%	• Discontinue excavating • Withdraw from area, shut off all engine ignition sources. • Allow pit to vent • Continuous monitoring for organic vapors 200 ft downwind.

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less then 5 ppm (see Community Air Monitoring Plan).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

It is expected that an exclusion zone, decontamination zone, and support zone will only be established during the remedial work required to excavate the CVOC hotspot area. A licensed Environmental Contractor with relative hazardous material handling experience and training is required to perform any soil disturbing activities within the hotspots identified within the Remedial Action Work Plan. All onsite workers must provide evidence of OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

6.1 General Site Work

Upon completion of CVOC hotspot remedial activities by an Environmental Contractor, a general excavation contractor may continue with site excavation/grading as needed for basement excavation, shoring, other building requirements, or as necessary to excavate petroleum related VOC contaminated soil as deemed necessary by the Remedial Action Work Plan and/or Project Manager. All onsite employees must have obtained OSHA 24-hour Hazardous Waste Operations and Emergency Response Operations training prior to performing soil disturbing activities.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
Jamaica Hospital Medical Center	(718) 206-6000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(718) 482-4909
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
Site Safety Officer	1-631-504-6000

7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and,

- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager — Ms. Kristen DiScenza (631) 504-6000
- Construction Superintendent — To be added
- Site Safety Officer — Mr. Kevin Waters (631) 504-6000

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**).and information on the chemical(s) to which they may have been exposed (**Appendix C**).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.

- Exit through the decontamination corridor if possible.

- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.

- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.

- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

APPENDIX A

SITE SAFETY ACKNOWLEDGEMENT FORM

DAILY BREIFING SIGN-IN SHEET

Date:_____ Person Conducting Briefing:_____

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_____

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_____

_____

_____

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

APPENDIX B

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #: _____

Site Name: _____

Reason for Amendment: _____

_____

_____

_____

Alternative Procedures: _____

_____

_____

_____

Required Changes in PPE: _____

_____

_____

_____

_____ _____

Project Superintendent (signature) **Date**

_____ _____

Health and Safety Consultant (signature) **Date**

_____ _____

Site Safety Officer (signature) **Date**

APPENDIX C

CHEMICAL HAZARDS

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
C_2HCl_3 / $ClCH=CCl_2$
Molecular mass: 131.4

ICSC # 0081
CAS # 79-01-6
RTECS # KX4550000
UN # 1710
EC # 602-027-00-9
April 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment.	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0081 OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene , hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2007).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
NIOSH REL: Ca See Appendix A See Appendix C
NIOSH IDLH: Ca 1000 ppm See: 79016

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 87°C
Melting point: -73°C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 7.8
Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
Auto-ignition temperature: 410°C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42
Electrical conductivity: 800pS/m

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;
Card has been partially updated in October 2004: see Occupational Exposure Limits, EU Classification, Emergency Response.
Card has been partially updated in April 2010: see Occupational Exposure Limits, Ingestion First Aid, Storage.

ADDITIONAL INFORMATION

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C=CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Separated from metals ,(see Chemical Dangers), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015

Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

Material Safety Data Sheet

cis-1,2-Dichloroethylene, 97%

ACC# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100
Synonyms: cis-Acetylene dichloride.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-59-2	cis-1,2-Dichloroethylene	97	205-859-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

OSHA Vacated PELs: cis-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 201 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 60 deg C @ 760 mm Hg
Freezing/Melting Point:-80 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2800
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 156-59-2: KV9420000
LD50/LC50:
CAS# 156-59-2:
Inhalation, rat: LC50 = 13700 ppm;
.

Carcinogenicity:
CAS# 156-59-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	1,2-DICHLOROETHYLENE
Hazard Class:		3
UN Number:		UN1150
Packing Group:		II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 156-59-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 156-59-2 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 156-59-2: No information available.

Canada - DSL/NDSL

CAS# 156-59-2 is listed on Canada's NDSL List.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/09/1998
Revision #5 Date: 3/16/2007

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

Naphthene
$C_{10}H_8$
Molecular mass: 128.18

ICSC # 0667
CAS # 91-20-3
RTECS # QJ0525000
UN # 1334 (solid); 2304 (molten)
EC # 601-052-00-2
April 21, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61 UN Hazard Class: 4.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0667

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On combustion, forms irritating and toxic gases. Reacts with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
OSHA PEL†: TWA 10 ppm (50 mg/m^3)
NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
NIOSH IDLH: 250 ppm See: 91203

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the blood , resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 218°C
Sublimation slowly at room temperature
Melting point: 80°C
Density: 1.16
g/cm3
Solubility in water, g/100 ml at 25°C:
none

Vapour pressure, Pa at 25°C: 11
Relative vapour density (air = 1): 4.42
Flash point:
80°C c.c.
Auto-ignition temperature: 540°C
Explosive limits, vol% in air: 0.9-5.9
Octanol/water partition coefficient as log Pow: 3.3

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)
NFPA Code: H2; F2; R0;

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

I **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:**

O R T A N T D A T A	**CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004).	Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 536°C Melting point: 164°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish. 	

N O T E S

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730 **INDENO(1,2,3-cd)PYRENE**

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

I

M

P

O

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

R T A N T D A T A	**CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	

N O T E S

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431 **DIBENZO(a,h)ANTHRACENE**

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # GC0700000
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO BEIGE CRYSTALS OR POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 448°C
Melting point: 254 - 256°C
Density: 1.3 g/cm³

Solubility in water:
very poor
Octanol/water partition coefficient as log Pow: 5.9

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

ADDITIONAL INFORMATION

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0721

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

I **M**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

P O R T A N T D A T A	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004). **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 217°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish. 

N O T E S

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0721 **BENZO(k)FLUORANTHENE**

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

I	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation

IMPORTANT DATA	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004). of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
PHYSICAL PROPERTIES	Boiling point: 481°C Melting point: 168°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.12
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. 

N O T E S

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(b)FLUORANTHENE**

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
PALE-YELLOW CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 496°C
Melting point: 178.1°C
Density: 1.4
g/cm³

Solubility in water: none (<0.1 g/100 ml)
Vapour pressure :
negligible
Octanol/water partition coefficient as log Pow: 6.04

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

NOTES

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # CV9275000
EC # 601-033-00-9
October 23, 1995 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0385

BENZ(a)ANTHRACENE

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 2 (as pyrolysis product of organic materials)
(DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water:
none

Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

N O T E S

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

ADDITIONAL INFORMATION

ICSC: 0385 **BENZ(a)ANTHRACENE**

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

Blue powder
Merrillite
Zn
Atomic mass: 65.4
(powder)

ICSC # 1205
CAS # 7440-66-6
RTECS # ZG8600000
UN # 1436 (zinc powder or dust)
EC # 030-001-00-1
October 24, 1994 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•**INHALATION**	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
•**SKIN**	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
•**EYES**		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS GREY TO BLUE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of fumes may cause metal fume fever. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14
Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

N O T E S

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

ICSC: 1205 **ZINC POWDER**

International Chemical Safety Cards

SODIUM

ICSC: 0717

Natrium
Na
Atomic mass: 23.0

ICSC # 0717
CAS # 7440-23-5
RTECS # VY0686000
UN # 1428
EC # 011-001-00-0
April 06, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO contact with water, acid(s) or halogens . NO open flames, NO sparks, and NO smoking.	Special powder, dry sand, NO other agents.
EXPLOSION	Risk of fire and explosion. on contact with acid(s) , halogens , water .		Combat fire from a sheltered position.
EXPOSURE			
•INHALATION	Cough. Sore throat. Burning sensation.	Closed system and ventilation.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Pain. Blisters. Serious skin burns.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Severe deep burns. loss of vision.	Face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Shock or collapse.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Chemical protection suit including self-contained breathing apparatus. Cover the spilled material with dry powder.	Fireproof. Keep under mineral oil. Dry. Well closed.	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. F symbol C symbol R: 14/15-34 S: (1/2)-5 -8-43-45 UN Hazard Class: 4.3 UN Packing Group: I Signal: Danger Flame-Corr In contact with water releases flammable gases which may ignite spontaneously Causes severe skin burns and eye damage

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0717

International Chemical Safety Cards

SODIUM

ICSC: 0717

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
SILVERY SOLID IN VARIOUS FORMS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts violently with water , causing fire and explosion hazard . The substance decomposes rapidly under the influence of air and moisture , forming flammable/explosive gas (Hydrogen - see ICSC0001) .

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

ROUTES OF EXPOSURE:
Serious local effects by all routes of exposure.

INHALATION RISK:

EFFECTS OF SHORT-TERM EXPOSURE:
See ICSC 0360 (Sodium hydroxide)

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: 880°C
Melting point: 97.4°C
Density: 0.97 g/cm³
Solubility in water: reaction
Vapour pressure, Pa at 20°C: negligible
Auto-ignition temperature: 120-125°C

ENVIRONMENTAL DATA

NOTES

Sodium is always kept under mineral oil. Reacts violently with fire extinguishing agents such as water and carbon dioxide .

Transport Emergency Card: TEC (R)-43S1428a
NFPA Code: H3; F3; R2;

ADDITIONAL INFORMATION

ICSC: 0717 **SODIUM**

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

MERCURY

ICSC: 0056

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 0.1 mg/m³ Sh
Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003).
OSHA PEL†: C 0.1 mg/m^3
NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 skin
Other: C 0.1 mg/m^3 skin
NIOSH IDLH: 10 mg/m^3 (as Hg) See: 7439976

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous systemandkidneys. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the central nervous system kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357°C
Melting point: -39°C
Relative density (water = 1): 13.5
Solubility in water:
none

Vapour pressure, Pa at 20°C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056 **MERCURY**

International Chemical Safety Cards

MANGANESE

ICSC: 0174

Mn
Atomic mass: 54.9
(powder)

ICSC # 0174
CAS # 7439-96-5
RTECS # OO9275000
November 27, 2003 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Dry sand, special powder.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Rinse and then wash skin with water and soap.
•EYES		Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from acids. Dry.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0174

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MANGANESE

ICSC: 0174

I	**PHYSICAL STATE; APPEARANCE:** GREY - WHITE POWDER **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

IMPORTANT DATA	Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts slowly with water more rapidly with steam and acids forming flammable/explosive gas (hydrogen - see ICSC0001) causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.2 mg/m³ (as TWA); (ACGIH 2003). MAK: (Inhalable fraction) 0.5 mg/m³; Pregnancy risk group: C; (DFG 2007). OSHA PEL*: C 5 mg/m^3 *Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl and Methyl cyclopentadienyl manganese tricarbonyl. NIOSH REL*: TWA 1 mg/m^3 ST 3 mg/m^3 *Note: Also see specific listings for Manganese cyclopentadienyl tricarbonyl, Methyl cyclopentadienyl manganese tricarbonyl, and Manganese tetroxide. NIOSH IDLH: 500 mg/m^3 (as Mn) See: 7439965	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** The aerosol is irritating to the respiratory tract . **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the lungs and central nervous system , resulting in increased susceptibility to bronchitis, pneumonitis and neurologic, neuropsychiatric disorders (manganism). Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 1962°C Melting point: 1244°C Density: 7.47 g/cm³	Solubility in water: none
ENVIRONMENTAL DATA	This substance may be hazardous in the environment; special attention should be given to aquatic organisms. 	

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The recommendations on this Card also apply to ferro manganese.

ADDITIONAL INFORMATION

ICSC: 0174 **MANGANESE**

International Chemical Safety Cards

MAGNESIUM (POWDER)

ICSC: 0289

Mg
Atomic mass: 24.30

ICSC # 0289
CAS # 7439-95-4
RTECS # OM2100000
UN # 1418
EC # 012-001-00-3 (pyrophoric)
April 12, 2000 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with moisture, acids, halogens and many other substances.	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Do NOT expose to friction or shock. Prevent build-up of electrostatic charges (e.g., by grounding).	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Laboured breathing. Headache. Dullness. Weakness. Fever or elevated body temperature.		
•SKIN			
•EYES	Redness. Pain.	Safety goggles.	
•INGESTION	Abdominal pain. Diarrhoea.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Fireproof. Separated from strong oxidants, acids. Dry.	Airtight. F symbol R: 15-17 S: 2-7/8-43 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2 UN Packing Group: ll

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0289

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MAGNESIUM (POWDER)

ICSC: 0289

I **M**	**PHYSICAL STATE; APPEARANCE:** GREY POWDER	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation.

P O R T A N T D A T A	**PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc. **CHEMICAL DANGERS:** The substance may spontaneously ignite on contact with air or moisture producing irritating or toxic fumes Reacts violently with strong oxidants. Reacts violently with many substances causing fire and explosion hazard. Reacts with acids and water forming flammable/explosive gas (hydrogen - see ICSC0001) causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK not established.	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of fumes may cause metal fume fever. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 1100°C Melting point: 651°C Density: 1.7 g/cm³	Solubility in water: none Auto-ignition temperature: 473°C Explosive limits, vol% in air: see Notes
ENVIRONMENTAL DATA		

N O T E S

Burns with an intense flame. In order to prevent eye injury do not look directly at magnesium fires. Reacts violently with fire extinguishing agents such as water, carbon dioxide and powder. Explosive limits, vol% in air: (LEL) 0.03 kg/m^3.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R2;

ADDITIONAL INFORMATION

ICSC: 0289 **MAGNESIUM (POWDER)**

International Chemical Safety Cards

LEAD

ICSC: 0052

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m^3 (as Pb) See: 7439921

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES		
	Boiling point: 1740°C	Density: 11.34 g/cm3
	Melting point: 327.5°C	Solubility in water: none

ENVIRONMENTAL DATA	
	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment. 

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

ADDITIONAL INFORMATION

ICSC: 0052 **LEAD**

International Chemical Safety Cards

COPPER

ICSC: 0240

Cu
(powder)

ICSC # 0240
CAS # 7440-50-8
RTECS # GL5325000
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0240

International Chemical Safety Cards

COPPER

ICSC: 0240

I

M

P

PHYSICAL STATE; APPEARANCE:
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

O **R** **T** **A** **N** **T** **D** **A** **T** **A**	Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.2 mg/m³ fume (ACGIH 1992-1993). TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993). Intended change 0.1 mg/m³ Inhal., A4 (not classifiable as a human carcinogen); MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005). OSHA PEL*: TWA 1 mg/m^3 *Note: The PEL also applies to other copper compounds (as Cu) except copper fume. NIOSH REL*: TWA 1 mg/m^3 *Note: The REL also applies to other copper compounds (as Cu) except Copper fume. NIOSH IDLH: 100 mg/m^3 (as Cu) See: 7440508	**EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of fumes may cause metal fume fever. See Notes. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

The symptoms of metal fume fever do not become manifest until several hours.

ADDITIONAL INFORMATION

ICSC: 0240 **COPPER**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•**INHALATION**	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•**SKIN**		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•**EYES**	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

I

M

P

PHYSICAL STATE; APPEARANCE:
GREY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

O R T A N T D A T A	**CHEMICAL DANGERS:** Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m^3 See Appendix C NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473 **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation tothe eyesandthe respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

N O T E S

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

ICSC: 0029 **CHROMIUM**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

Barium sulphate
Blanc fixe
Artificial barite
$BaSO_4$
Molecular mass: 233.43

ICSC # 0827
CAS # 7727-43-7
RTECS # CR0600000
October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0827

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts violently with aluminium powder. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 mg/m³ as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m³; (Respirable fraction) 1.5 mg/m³; (DFG 2004). OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH IDLH: N.D. See: IDLH INDEX **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol. **INHALATION RISK:** Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Lungs may be affected by repeated or prolonged exposure to dust particles , resulting in baritosis (a form of benign pneumoconiosis).
PHYSICAL PROPERTIES	Melting point (decomposes): 1600°C Density: 4.5 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

NOTES

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

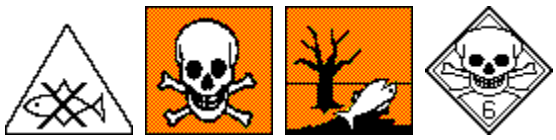
International Chemical Safety Cards

ARSENIC

ICSC: 0013

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X
October 18, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ARSENIC

ICSC: 0013

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.01 mg/m³ as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).
OSHA PEL: 1910.1018 TWA 0.010 mg/m^3
NIOSH REL: Ca C 0.002 mg/m^3 15-minute See Appendix A
NIOSH IDLH: Ca 5 mg/m^3 (as As) See: 7440382

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Sublimation point: 613°C
Density: 5.7 g/cm³

Solubility in water:
none

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

N O T E S

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

APPENDIX D

HOSPITAL INFORMATION AND MAP

FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO._____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

_____

Description of Accident _____

_____

_____

Action Taken _____

_____

_____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

_____

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

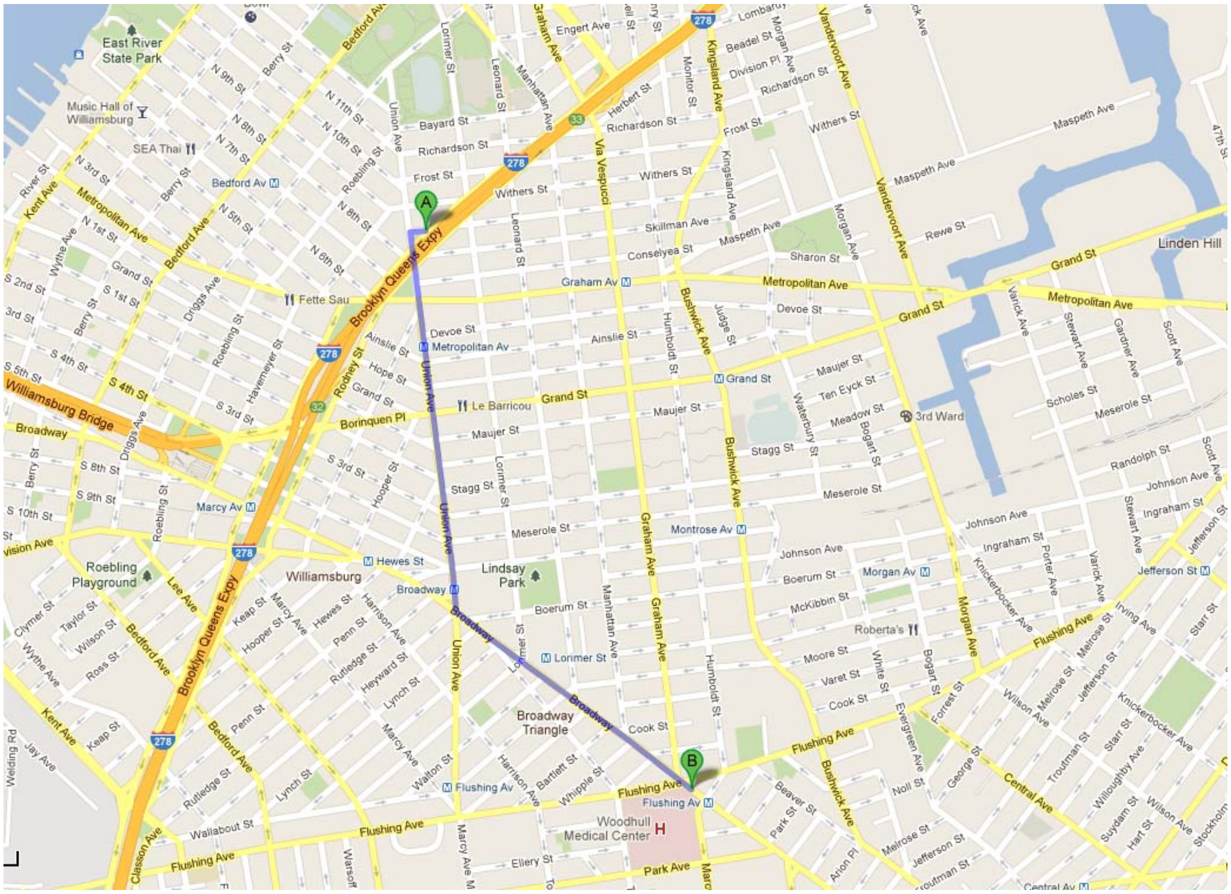
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

Woodhull Medical Center
760 Broadway
Brooklyn, NY 11206
(718) 963-8000

Distance: 1.3 miles Time: 6 minutes (approximate)



Directions

1. Head west on Jackson Street toward Union Avenue
2. Turn left onto Union Avenue
3. Turn left onto Broadway
4. Woodhull Medical Center will be on the right at the intersection of Flushing Avenue and Broadway.

ATTACHMENT D
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
Former Driggs Plywood Corp. Site
11 Jackson Street, Brooklyn, NY

Prepared on behalf of:

JACKSON ESTATES II, LLC
520 Roebling Street, Suite 316
Brooklyn, NY 11211

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN

Former Driggs Plywood Corp. Site
11 Jackson Street, Brooklyn, NY

TABLES

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the approved work plan.

To ensure the successful completion of the project each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Director will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities. As Project Director Mr. Sosik will also serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- conduct periodic field and sampling audits;
- interface with the analytical laboratory to resolve problems; and
- interface with the data validator and/or the preparer of the DUSR to resolve problems.

Kristen DiScenza will serve as the Project Manager and will be responsible for implementation of the Remedial Investigation and coordination with field sampling crews and subcontractors. Reporting directly to the Project Manager will be the Field Operations Officer, Kevin Waters; who will serve as the on-Site qualified environmental professional who will record observations, monitor excavation activities and be responsible for the collection and handling of all samples.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager

.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Operations	Monitoring of Remedial Activities, sample collection and handling	K. Waters, EBC
Project Manager	Implementation of the Remedial Action according to the RAWP	Kristen DiScenza, EBC
Laboratory Analysis	Analysis of soil samples by NYSDEC ASP methods Laboratory	NYSDOH-Certified Laboratory
Data review	Review for completeness and compliance	3rd party validation

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory. Data generated from the laboratory will be used to evaluate contaminants such as metals, semi-volatile organic compounds (SVOCs) and pesticides / PCBs in both historic fills and native soils and chlorinated and other volatile organic compounds (VOCs) in soil. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve detection levels low enough to meet required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP 07/2005).

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Trip Blanks.

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized. laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSDIMSB) Analysis

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of 5% (one for every 20 field samples). The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 - D^2)/2} \times 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Remedial Action Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for one or more of the following parameters: VOCs in soil by USEPA Method 8260, SVOCs in soil by USEPA Method 8270BN, Target Analyte List (TAL) Metals in soil, and pesticides / PCBs in soil by USEPA Method 8081/8082. If any modifications or additions to the standard procedures are anticipated, and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PHONE 631.504.6000
FAX 631.924.2870

4.0 DATA REDUCTION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Note that if waste characterization samples are analyzed they will be in results only format and will not be evaluated in the DUSR.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples if analyzed will be in results only format and will not be evaluated in the DUSR.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

ATTACHMENT E
Community Air Monitoring Plan

COMMUNITY AIR MONITORING PLAN

FORMER DRIGGS PLYWOOD CORP. SITE
11 JACKSON STREET
BROOKLYN, NY

June - 2013

FORMER JACKSON PLYWOOD CORP. SITE

COMMUNITY AIR MONITORING PLAN
TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for the drilling and sampling activities to be performed under a Remedial Action Work Plan (RAWP) at the Former Diggs Plywood Corp. Site. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial activities) from potential airborne contaminant releases resulting from remedial activities at the site.

Compliance with this CAMP is required during all activities associated with soil excavation that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include excavation of soils, stockpiling, loading, and backfilling. This CAMP has been prepared to ensure that remediation activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of construction-related contaminants to offsite areas.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2.0 AIR MONITORING

Chlorinated volatile organic compounds (VOCs), petroleum VOCs and SVOCs, and metals are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during remediation activities is through real-time VOC and air particulate (dust) monitoring.

2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan

3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work 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.

- 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.

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

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remedial activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 6-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam.

4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during excavation and loading activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM_{10}) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ($\mu g/m_3$). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 $\mu g/m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 100 $\mu g/m^3$ 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 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 $\mu g/m^3$ at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 8-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind PM_{10} levels are not more than 150 $\mu g/m^3$ greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 $\mu g/m^3$, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

5.0 DATA QUALITY ASSURANCE

5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

5.3 Data Review

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

APPENDIX A
Action Limit Report

CAMP
ACTION LIMIT REPORT

Project Location: _____

Date: _____ Work Start Time: _____
Work Stop Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: AM _____ PM _____ Wind Direction: AM _____ PM _____

Temperature: AM _____ PM _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: Location: _____ Level Reported: _____

ACTIONS TAKEN

ATTACHMENT F
Citizen Participation Plan

New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan

for

FORMER DRIGGS PLYWOOD CORP. SITE

11 Jackson Street
Brooklyn, Kings County, NY 11211

June 2013

Contents

*** * * * ***

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **Jackson Estates II LLC**
Site Name: **Former Driggs Plywood Corp. ("Site")**
Site Address: **11 Jackson Street, Brooklyn**
Site County: **Kings**
Site Number: **Cxxxxx**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

- Improving public access to, and understanding of, issues and information related to a particular site and that Site's investigation and cleanup process;

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process;

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the Site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the Site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the Site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC website. If this occurs, NYSDEC will inform the public in fact sheets distributed about the Site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;

- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility; and
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the Site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

- **Document repositories** allow the public to access and review project documents including investigation and cleanup work plans and final reports.

The public is encouraged to contact project staff at any time during the Site's investigation and cleanup process with questions, comments, or requests for information. This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the Site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the Site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret

and understand existing environmental information about the nature and extent of contamination related to the Site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the Site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the Site.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html.

Note: The table identifying the citizen participation activities related to the Site's investigation and cleanup program follows on the next page:

Citizen Participation Requirements (Activities)	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repositories	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement:	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report • Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC)	At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the Site. Additional major issues of public concern may be identified during the course of the Site's investigation and cleanup process.

The major issues of concern to the public will be potential impacts of nuisance odors and dust during the removal of affected soil at the Site. Another example of a major issue of public concern would be the impact of increased truck traffic on the surrounding neighborhood. Construction safety issues will also be addressed. In addition, this Site may be located in a potential environmental justice area. Furthermore, it may be determined that translation services may be necessary for fact sheets and public meetings. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP) are required components of the remedial program. Implementation of these plans will be under the direct oversight of the NYSDEC and the New York State Department of Health (NYSDOH).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-site air monitoring for worker protection;
- Perimeter air monitoring for community protection;
- The use of odor, vapor, and dust controls, such as water or foam sprays, as needed;
- Monitoring and control of soil, sediments, and water generated during remediation; and
- Truck routes which avoid residential streets.

The HASP and the CAMP will be prepared as part of the Remedial Action Work Plan (RAWP) and will be available for public review at the document repository as identified in Appendix A (page 11).

Furthermore, the Applicant has prepared a Scoping Sheet for Major Issues of Public Concern which will assist them in identifying any concerns. Experience from similar projects, 311 complaints and other construction projects in the area will help in identifying such issues.

4. Site Information

Appendix C contains a map identifying the location of the Site.

Site Description

The Site to be remediated and redeveloped is located in the Williamsburg section of Brooklyn (Kings County) and is comprised of a single tax parcel totaling 9,360 square feet (0.20 acres). The subject property is located in the City of New York and Borough of Brooklyn (Kings County). The lot has 72 feet of street frontage on Jackson Street and is 130 feet deep.

The lot is currently developed with a vacant one-story brick building occupying the entire lot. According to the NYC Department of Buildings, the current building was constructed in 1965.

The elevation of the Site is approximately 14 feet above the National Geodetic Vertical Datum (NGVD). The area topography gradually slopes to the north. The depth to groundwater beneath the Site, as determined from field measurements, is approximately 8 feet below grade. Based on regional groundwater contour maps, groundwater flow is expected to be northwest toward the East River.

The surrounding land use includes underutilized commercial / vacant properties to the west, multi-family residential buildings to the north, mixed-use residential / retail buildings to the east and the Brooklyn Queens Expressway to the South. There are several schools in the immediate area of the Site including an elementary - intermediate school (Northside Catholic Academy) approximately 450 feet west-northwest of the Site and a high school (Williamsburg Preparatory) approximately 950 feet to the west.

History of Site Use, Investigation, and Cleanup

The Site developed prior to 1887 developed prior to 1887 as three separate thin lots, each developed with a 3-story residential building in the front of the lots, and smaller 2-story dwellings in the rear of the lots. Each of the three lots was labeled with the street numbers 11 Jackson Street, 13 Jackson Street and 15 Jackson Street. The lots remained unchanged until around 1951 when two of the lots were cleared, leaving only the 3-story residential building on 11 Jackson Street. The 3-story building remained until the property was redeveloped in 1951 with the same building currently located at the Site. All Sanborn maps until the most recent map (2007) label the Site building as being used for lumber storage. City Directory listings from 1965 and 1973 identify the Driggs Plywood Corporation at the 11 Jackson Street address. Arnmart Whole Beer Distributers were posted in directory listings from 1997 and 2000, and "Car Fashion Seat Covers" was listed in 2005. It is not known if the beer distributor or car seat cover shop occupied half of the building or the entire building.

At the time of the Phase I inspection half of the building was occupied by a charter bus maintenance / repair garage and half was occupied by a metal fabrication shop.

The Remedial Investigation completed at the Site identified chlorinated volatile organic compounds in soil and soil vapors beneath the building slab. Semi-volatile organic compounds and heavy metals were also found at elevated concentrations in soil beneath the Site.

5. Investigation and Cleanup Process

Application

The Applicant has applied for entry into New York's Brownfield Cleanup Program (BCP) as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the Site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination on-site, and must conduct a qualitative exposure assessment, (a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the Site and to contamination that has migrated from the Site).

The Applicant in proposes that the Site will be used for restricted-residential purposes. To achieve this goal, the Applicant will conduct investigation and cleanup activities at the Site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement (BCA) executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

Investigation

The Applicant has completed a Remedial Investigation before it entered into the BCP. The Applicant will next implement a Remedial Action Work Plan (RAWP). This remedial program will be performed with NYSDEC oversight. The Applicant previously developed a Draft Remedial Action Work Plan, which was subject to public comment.

Remedy Selection

When the Applicant submitted the proposed Remedial Work Plan for approval, the NYSDEC announced the availability of the proposed plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the Site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the FER. NYSDEC then will issue a COC to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the Site after it receives a COC.

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering

controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan (SMP).

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the Site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

To be determined
New York State Department of Environmental Conservation
Division of Environmental Remediation
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

Thomas Panzone
Regional Citizen Participation Specialist
NYSDEC Region 2
Division of Environmental Remediation
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101
Tel: (718) 482-4953

New York State Department of Health (NYSDOH):
To be determined
New York State Department of Health
Bureau of Environmental Exposure Investigation
Empire State Plaza – Corning Tower Room 1787
Albany, New York 12237

Locations of Reports and Information

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

Brooklyn Public Library– Bushwick Branch
340 Bushwick Avenue at Seigel Street.
Brooklyn, NY 11206
718-602-1348

Hours:
Mon 10:00 AM - 6:00 PM
Tue 10:00 AM - 6:00 PM
Wed 10:00 AM - 6:00 PM
Thu 1:00 PM - 8:00 PM
Fri 10:00 AM - 6:00 PM
Sat closed
Sun closed

Appendix B - Site Contact List

Local Government Contacts:

City of New York
Michael Bloomberg
Mayor of New York City
City Hall
New York, NY 10007

Marty Markowitz
Brooklyn Borough President
209 Joralemon Street
Brooklyn, NY 11201

Christopher H. Olechowski
Chair, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, New York 11211

Gerald A. Esposito
District Manager, Brooklyn Community Board 1
435 Graham Avenue
Brooklyn, New York 11211

Stephen Levin
NYC Council Member
33rd District
410 Atlantic Avenue
Brooklyn, NY 11217

Amanda M. Burden
Chair of City Planning (Zoning)
22 Reade St.
Third Floor
New York, NY 10007

New York City Department of Transportation
Brooklyn Borough Commissioner
Attn: Joseph Palmieri
16 Court Street
Brooklyn, NY 11241

Kings County Clerk's Office
Nancy T. Sunshine, County Clerk
Kings Supreme Court Building
360 Adams Street, Room 189
Brooklyn, NY 11201

Hon. Bill de Blasio
Public Advocate
1 Centre Street, 15th Floor
New York, NY 10007
Email: kjfoy@pubadvocate.nyc.gov

Hon. John Liu
Office of the Comptroller
1 Centre Street
New York, NY 10007
Email: intergov@comptroller.nyc.gov

Hon. Daniel Squadron
NYS Senator
250 Broadway Suite 2011
New York, NY 10007

Hon. Michael Miller
NYS Assembly Member
83-91 Woodhaven Boulevard
Woodhaven, NY 11421

Hon. Charles Schumer
U.S. Senator
757 Third Avenue, Suite 17-02
New York, NY 10017

Hon. Michael Gianaris
U.S. Senator
21-77 31st Street
Astoria, NY 11105

Hon. Nydia M. Velazquez
U.S. House of Representatives
266 Broadway, Suite 201
Brooklyn, NY 11211

John Wuthenow
Office of Environmental Planning & Assessment
NYC Dept. of Environmental Protection
96-05 Horace Harding Expressway
Flushing, NY 11373

Dr. Robert Kulikowski
Director
NYC Office of Environmental Coordination
253 Broadway – 14th Floor
New York, NY 10007

Daniel Walsh
NYC Department of Environmental Remediation
100 Gold Street
New York, NY 10038

Local News Media:

The Brooklyn Paper
One Metrotech Center, Suite 1001
Brooklyn, NY 11201
(718) 260-4504

New York Times
620 Eighth Ave.
New York, NY 10018

New York Daily News
450 W. 33 Street
New York, NY 10001

New York Post
1211 Avenue of the Americas
New York, NY 10036-8790

Public Water Supplier:
New York City Department of Environmental Protection
Attn: Hon. Carter Strickland, Commissioner
59-17 Junction Boulevard
Flushing, NY 11373

Schools and Daycare Facilities:

1. Northside Catholic Academy
   Brooklyn, New York United States
   (718) 782-1110

2. Williamsburg Northside School
   70 Havemeyer St New York, NY 11211
   (718) 599-7300

3. Brooklyn Preparatory High School
   257 North 6th Street New York, NY 11211
   (718) 486-2550

4. Brooklyn Preparatory High School
   257 North 6th Street New York, NY 11211
   (718) 486-2550

5. Williamsburg High School for Architecture and Design
   257 N 6th St Brooklyn, New York 11211
   (718) 388-1260

6. Conselyea Preparatory School
   208 N 5th St Brooklyn, New York 11211
   (718) 486-6221

7. P.S. 377 Alejandina B De Gautier
   200 Woodbine Street New York, NY 11221
   718-574-0325

8. Chabad of North Brooklyn
   132 North 5th Street Brooklyn, NY 11211
   (718) 388-0748

9. North Side Catholic Academy St Vincent
   180 N 7th St Brooklyn, New York 11211
   (718) 384-3496

10. Automotive High School: Brooklyn Automotive Hs
    Brooklyn New York, NY, United States
    (718) 218-2100

11. Williamsburg Charter School
    424 Leonard St Brooklyn, NY 11222
    (718) 218-9812

12. J Ericsson Jr High School
    424 Leonard Street Brooklyn, NY 11222
    (718) 782-2527

13. AHRC New York City: Francis of Paola Early Learning Center
    201 Conselyea Street New York, NY 11211
    (718) 782-1462

14. P.S. 132 the Conselyea School
    320 Manhattan Ave Brooklyn, NY 11211
    (718) 599-7301
15. Bushwick United Headstart
    178 Leonard St Brooklyn, NY 11206
    (347) 296-8150

16. Edward Bush Public School 18
    Brooklyn, New York
    (718) 387-324

17. 573 Metropolitan Avenue
573 Metropolitan Ave Brooklyn, New York 11211
(347) 844-9963

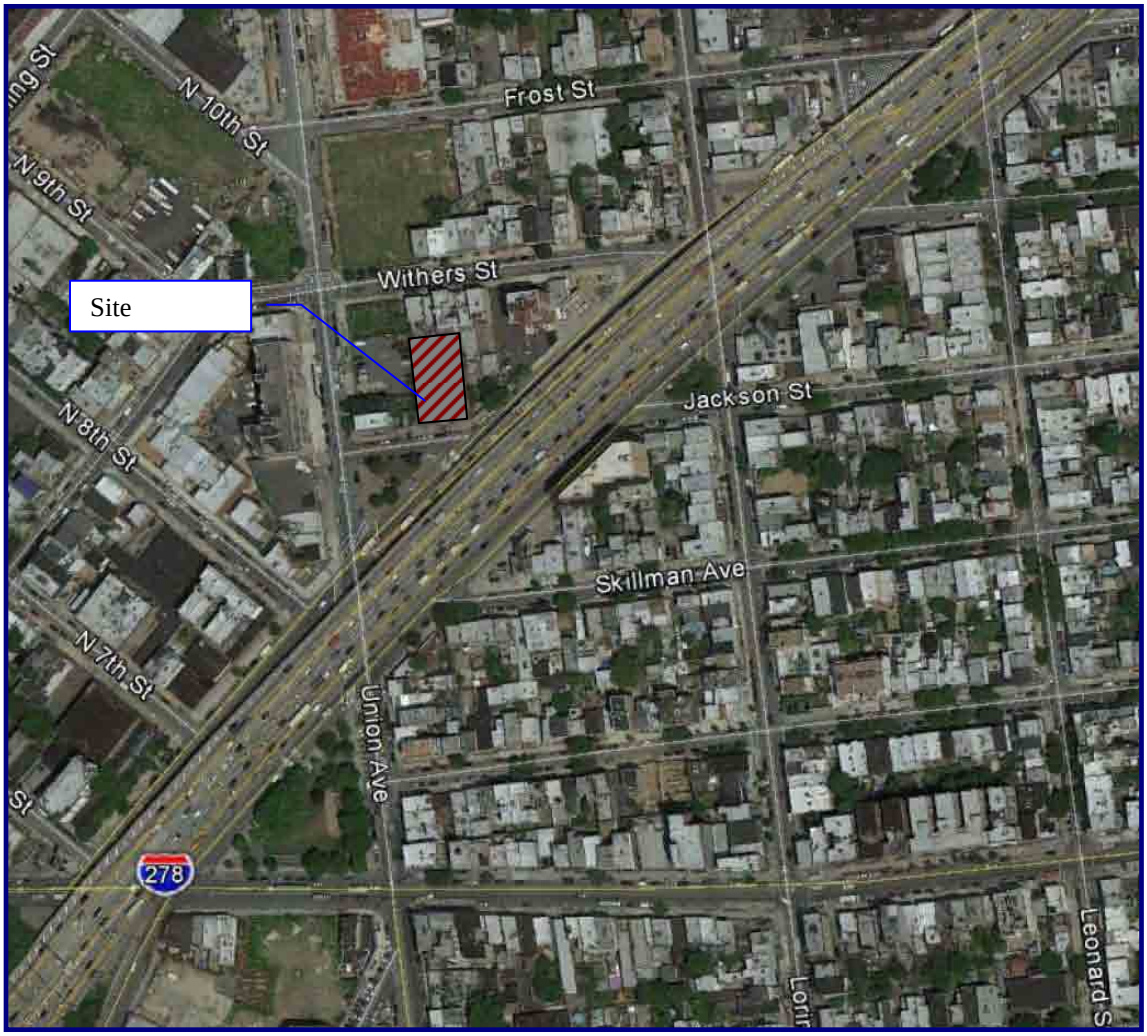
Community, Civic, Religious and other Educational Institutions

Open Space Alliance of North Brooklyn
79 North 11th Street
Brooklyn, NY 11211

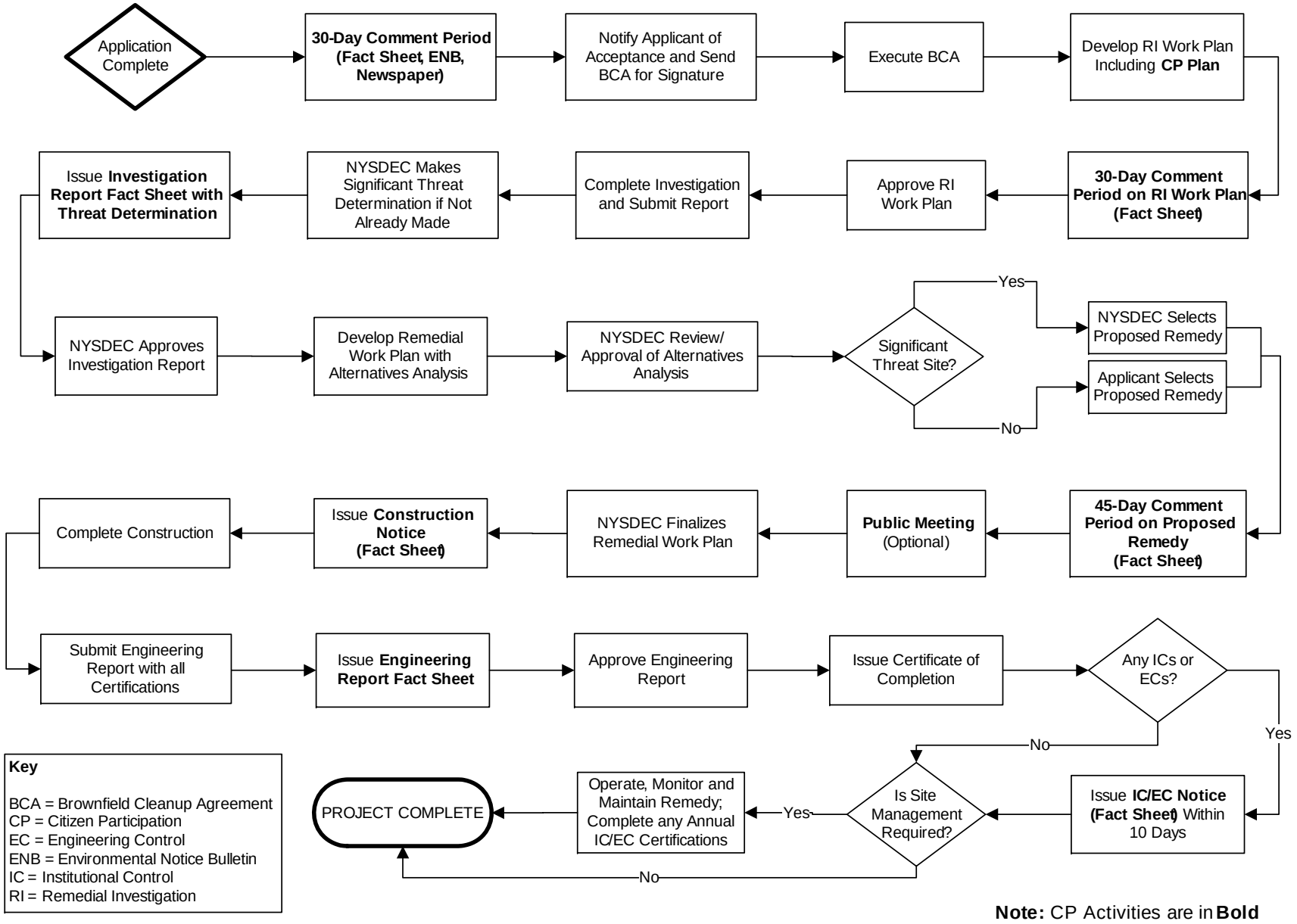
Brooklyn Chamber of Commerce
25 Elm Place, Suite 200 2nd Floor
Brooklyn, NY 11201

New York City Housing Authority
250 Broadway
New York, NY 10007
Attn: Sheila Stainback, Media Relations

Appendix C - Site Location Map



Appendix D– Brownfield Cleanup Program Process



Note: CP Activities are in **Bold**

ATTACHMENT G
Resumes

EBC

ENVIRONMENTAL BUSINESSS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

Professional Experience

20 years

Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

Areas of Expertise

- Brownfields
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

Professional Certification

- Professional Geologist, NH
- Professional Hydrogeologist, WA
- Licensed Site Professional (LSP), MA (in progress)
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor

Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

PROFILE

Mr. Sosik has 20 years of experience in contaminant release management. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

Recently Mr. Sosik has been engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

SELECTED PROJECTS

Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

Water Treatment Plant EIS - Focused EIS - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

Advanced Residential Communities, Rockville Centre, NY

Brownfield Project – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

Former Temco Uniform site, West Haverstraw, NY

Brownfield Project – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

Grovick Properties, Jackson Heights, NY

Brownfield Project – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a

Charles B. Sosik, PG, PHG, Principal

supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

Metro Management, Bronx, NY

Brownfield Project – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

Brandt Airflex, NY

Technical Consulting Services - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

Jet Fuel Investigation - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identifled remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

KeySpan – Former LILCO Facilities, Various NY Locations

Pesticide Impact Evaluation - Developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

Former Computer Circuits (Superfund) Site, Hauppauge, NY

CERCLA RI/FS - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

Sun Oil, Seaford, NY

Remediation Consuliting Services & Project Management - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

Con Edison, Various Locations, NY

Hydrogeologic Consulting Services - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

Keyspan - Tuthill Substation, Aqueboque, NY

Accelerated Site Characterization - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

NYSDEC Spill, East Moriches, NY

Spill Release Analysis - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA

Charles B. Sosik, PG, PHG, Principal

model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

Fate & Transport Modeling - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

IPM Pesticide Study - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

Petroleum Spills Investigation & Remediation - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

Exposure Assessment - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

Property Development - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

Site Characterization / Source Identification - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

Site Characterization / Remedial Planning - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

Site Assessment - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

EBC

ENVIRONMENTAL BUSINESSS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

EXPERT WITNESS TESTIMONY AND DEPOSITIONS

Fact Witness -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

Expert Witness / Expert Report for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005)

Expert Witness / Fact Witness for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

Expert Witness – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial date July/2007

Expert Witness / Fact Witness for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site. (Expert Statement of Fact – October 2005).

Expert Witness for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Currently under investigation and data collection.

Expert Witness for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

Expert Witness - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August/2002

Expert Witness - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July, 2008.

Expert Witness for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiffs property located in Cedarhurst, NY. (expert opinion submitted to lead counsel on March 6, 2009).

Expert Report - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June/2000.

MODELING EXPERIENCE (PARTIAL LISTING)

PROJECT	MODEL	APPLICATION
Riverhead Water District, Riverhead, NY	MODFLOW, MODPATH	Remediation system design to intercept MTBE plume and prevent continued impact to municipal well field.
NYSDEC - Region 1, Holbrook, NY	MODFLOW, MODPATH	Simulate transport of MTBE plume to predict future impact.
NYSDEC - Region 1, East Moriches, NY	HSSM	Evaluate release scenario and start date of petroleum spill in support of cost recovery by NYS AG office.
AMOCO, Deer Park, NY	HSSM	Estimate release amount, start date and spill scenario to evaluate the potential for mass unaccounted for
Keyspan Energy, Nassau/Suffolk Counties Substations	PRZM	Estimate mass load of simazine used at 211 electric substations and screen sites according to potential for human health and ecological impacts.
Saboneck Golf Club, Southampton NY	PRZM	Estimate mass load of proposed pesticides on new golf course to evaluate acceptability under an IPM program.
Suffolk County Department of Public Works (SCDPW) Scavenger Waste Treatment Plant, Yaphank, NY	DYNFLOW, DYNTRAC	Evaluate time-transport and nitrogen impact on local river system.
SCDPW SUNY Waste Water Treatment Plant, Stony Brook, NY	DYNFLOW, DYNTRAC	Determine outfall location and time-transport of nitrogen from proposed upgrades to an existing wastewater treatment plant
Water Authority of Great Neck North Great Neck, NY	MODFLOW, MODPATH, MT3D	Review of modeling study performed by EPA to evaluate potential future impact to Well field from PCE plume. Identified serious flaws in model construction and implementation, which invalidated conclusions

PUBLICATIONS

Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply (14th Annual Conference on Contaminated Soils Proceedings, 1998)

Transport & Transformation of BTEX & MTBE in a Sand Aquifer (Groundwater Monitoring & Remediation 05/1998)

Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island (Petroleum Hydrocarbons Conference Proceedings, 1999)

Field Applications of the Hydrocarbon Spill Screening Model (HSSM) (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)

Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation (Cincinnati, 02/2000)

Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island (American Geophysical Union, San Francisco, 12/1996)

Analysis and Simulation of the Gasoline Spill at East Patchogue, New York (American Geophysical Union, San Francisco, 12/1998)

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

ARIEL CZEMERINSKI, P.E.

Mr. Czemerinski is a New York State Professional Engineer and CEO of AMC Engineering PLLC an EBC affiliate. Mr. Czemerinski has with 16 years of experience in the chemical and environmental areas. Areas of expertise include environmental compliance, permitting, remedial system design, process and plant safety, and management of a production facility. Mr. Czemerinski is a Registered Professional Engineer in NY, IN, IL, and MI.

Professional Experience
EBC: January 2007
Prior: 20 years

Education
Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990. Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements and Environmental Impact Assessments under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Transfer Station Permitting and Compliance
- Chemical Process Design and Optimization
- Wastewater Treatment Systems and Permitting, SPEDES, Air
- Zoning Regulations and Permitting
- Safety and environmental training

Professional Certification

- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Chawinie Miller, Project Manager / Industrial Hygienist

Professional Experience
EBC: March 2013
Prior: 7.5 years

Education
Bachelor of Science, Environmental Health and Safety, Stony Brook University, NY

Areas of Expertise
- Phase I / Property Condition Assessments
- Occupational Health and Safety Sampling
- Indoor Air Quality (IAQ) Investigations
- Mold Investigations and Remediation
- Soil and Ground Water Investigations
- Noise Studies

Professional Certification
- OSHA 40-hr HAZWOPER
- NYS Asbestos Inspector
- NYC Asbestos Investigator
- OSHA 10-hr Construction Health and Safety
- Hazard Analysis and Critical Control Point (HACCP) Certified

PROFILE

Ms. Miller has 7.5 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Ms. Miller has conducted Phase Is and Property Condition Assessments for commercial, industrial, and residential properties in New York, New Jersey and Connecticut. In addition, Ms. Miller has conducted various IAQ, asbestos, mold and occupational health and safety sampling investigations for a variety of city, state, federal and private clients.

PREVIOUS EXPERIENCE

The Louis Berger Group, New York, New York
Industrial Hygienist, 2008-2013

AEI Consultants, Jersey City, New Jersey
Environmental Scientist, 2005-2008

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Kevin Waters, Hydrogeologist

Professional Experience
EBC: October 2010
Prior: 5 years

Education
Bachelor of Science, Geology, State University of New York, Stony Brook

Areas of Expertise
- Field Operations
- Phase II and RI Implementation, Site Characterization Studies
- Health & Safety Monitoring and Oversight
- Waste Characterization / Soil Management
- Site Logistics

Professional Certification
- OSHA 40-hr HAZWOPER
- OSHA 8-hr HAZWOPER Supervisor

PROFILE

Mr. Waters has 7 years experience as an environmental consultant and has worked on a wide range of environmental projects. Mr. Waters has conducted Phase II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York.

Mr. Waters' field experience includes soil, air and groundwater sampling, operations and maintenance of groundwater remediation systems, tank removals, spill management and closure, and oversight of monitoring well installations. In addition, Mr. Waters has prepared reports for both regulatory and client use.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Field Hydrogeologist, 2003-2008

SELECT PROJECT EXPERIENCE

Project:	Former Gas Station / car wash to mixed use affordable housing / commercial
Location:	Bronx, NY, Southern Boulevard
Type:	NYS BCP, NYC E-Site Hazmat, Former gas station / gar wash
Contamination:	Petroleum - Gasoline
Role:	Field Operations Manager, Health and Safety Officer

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

Kevin Waters, Hydrogeologist

SELECT PROJECT EXPERIENCE

Project:	Former Uniforms for Industry Site – Richmond Hill Senior Living Residences / Richmond Place
Location:	Jamaica Ave, Richmond Hill Queens, NY
Type:	NYS BCP, NYC E-Site Hazmat, Noise, Former industrial Laundry
Contamination:	Chlorinated Solvents, Historic Fill, Petroleum - Fuel oil/Mop oil
Role:	Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project:	Rikers Island – West Intake Facility
Location:	NYC Department of Corrections, Rikers Island, NY
Type:	Municipal Construction Project
Contamination:	Hazardous levels of lead, heavy metals in Historic fill
Role:	Field Operations Manager, Health and Safety Monitoring and Field Oversight

Project:	Residential Redevelopment Project
Location:	Williamsburg Section of Brooklyn, Wallabout Street
Type:	NYC E-Designation Site
Contamination:	Hazardous levels of lead, heavy metals, SVOCs in Historic fill
Role:	Implement RI Work Plan, Supervise sample collection in all media

ATTACHMENT H
BCP Signage Specifications

SIGNS FOR REMEDIAL PROGRAMS

Instructions

Signs are required at sites where remedial activities are being performed under one of the following remedial programs: State Superfund, Voluntary Cleanup Program (VCP), Brownfield Cleanup Program (BCP), Environmental Restoration Program (ERP), Brownfield Opportunity Area (BOA) Program (note: activities under this program would be for investigation). The cost of the sign will be borne by the parties performing the remedial activities based on the legal document the activities are being performed under (i.e. volunteers/participants would pay 100% of the cost under the BCP; municipalities would be reimbursed for 90% of the cost under the ERP).

Sign Requirements

Size: **Horizontal format - 96" wide by 48" high**

Construction Materials: **Aluminum or wood blank sign boards with vinyl sheeting.**

Inserts: **"Site Name", "Site Number", "Name of Party Performing Remedial Activities" and "Municipal Executive".**
Indicate position, size and topography for specific inserts.

Color Scheme: **Copy surrounding DEC logo - "NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION" - PMS 355**

DEC logo: **PMS 301 Blue**
PMS 355 Green

Text:

Program (choose one):	**PMS 301**
Brownfield Cleanup Program	
Voluntary Cleanup Program	
Brownfield Opportunity Areas Program	
Petroleum Remediation Program	
State Superfund Program	
1996 Clean Water/Clean Air Bond Act - Environmental Restoration Program	
Site Name, Site Number, Party Performing Remedial Activities	**PMS 355**
Names of Governor, Commissioner, Municipal Executive	**PMS 301**
Transform the Past.....Build for the Future	**PMS 355**

Type Specifications: **All type is Caslon 540, with the exception of the logotype.**
Format is: center each line of copy with small caps and initial caps.

Production Notes: **96" wide x 48" high aluminum blanks will be covered with vinyl sheeting to achieve background color. Copy and logo will be silk screened on this surface.**

See attached format

New York State Brownfields Cleanup Program

Former Driggs Plywood Corp. Site
BCP Site No. C-XXXXXX
Jackson Estates II LLC

Governor Andrew M. Cuomo
NYSDEC Commissioner Joe Martens
Mayor Michael R. Bloomberg

Transform the Past. Build for the Future.

ATTACHMENT I
Estimated Remedial Costs

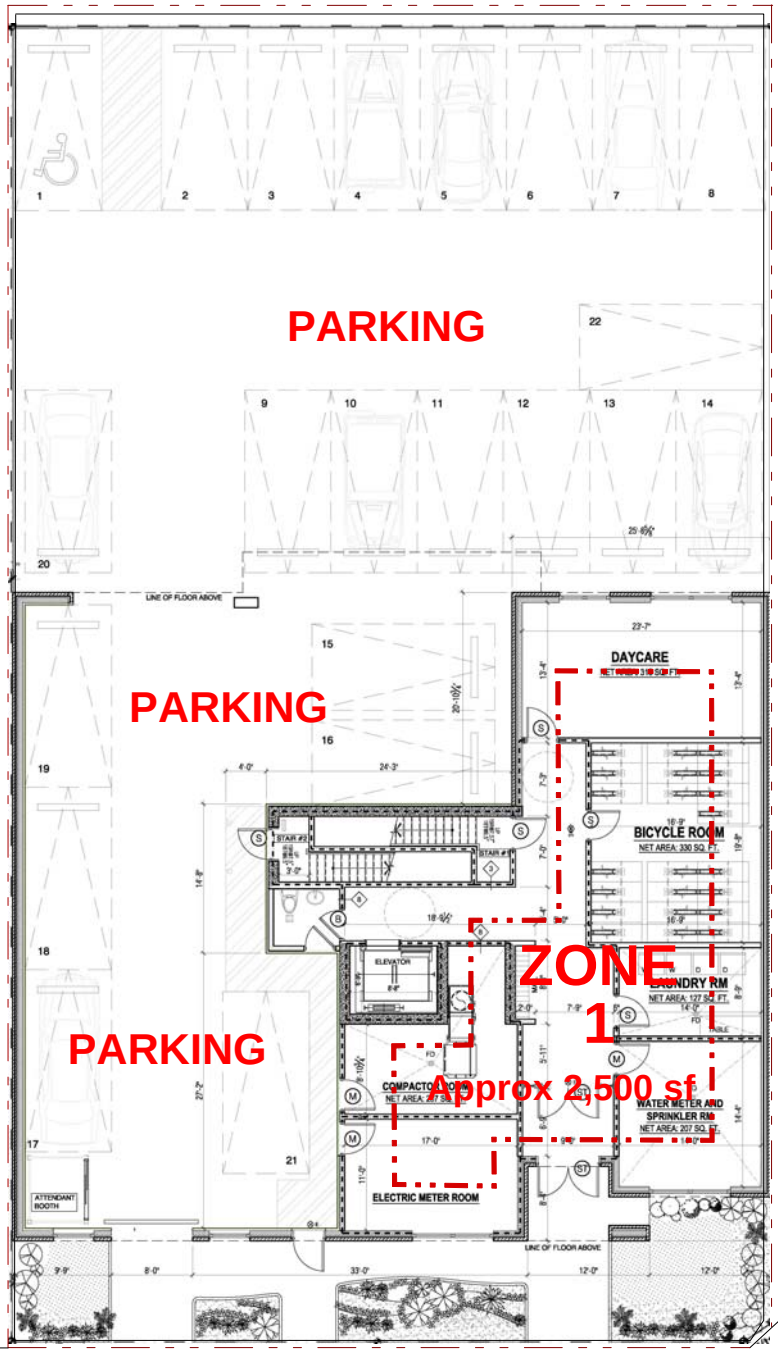
TABLE 1
FORMER DRIGGS PLYWOOD CORP.
Brooklyn, NY

Summary of Project Costs

NYS Brownfields Cleanup Program
Costs by Task

TASK	Alternative 1 - Track 1	Alternative 2 - Track 2
BCP Entry Documents	$ 31,700.00	$ 31,700.00
Remedial Work Plan, Remedy Scoping & Coordination	$ 69,702.00	$ 69,702.00
Remedial Program Implementation	$ 776,622.50	$ 290,152.00
Final Engineering Report, Site Management Plan & IC/ECs	$ 100,950.00	$ 100,950.00
Site Management - Operation and Maintenance Program	$ 109,250.00	$ 109,250.00
Subtotal	$ 1,088,224.50	$ 601,754.00
15% Contingency	$ 163,233.68	$ 90,263.10
Total	**$ 1,251,458.18**	**$ 692,017.10**

ATTACHMENT J
SSDS and Vapor Barrier Specifications



SCALE

0 10 20

1 Inch = 20 feet

SIDEWALK

JACKSON STREET

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

FORMER DRIGGS PLYWOOD CORP.

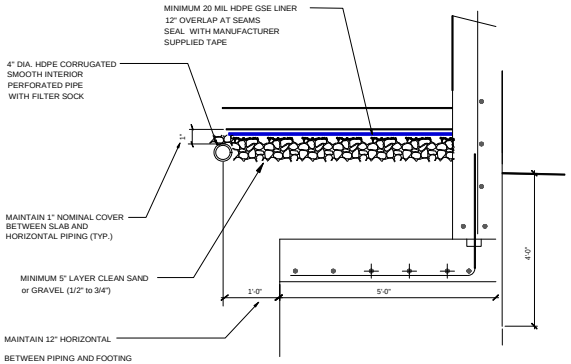
11 TO 15 JACKSON STREET, BROOKLYN, NY 11211

SUBSLAB DEPRESSURIZATION SYSTEM LAYOUT

NOTES:

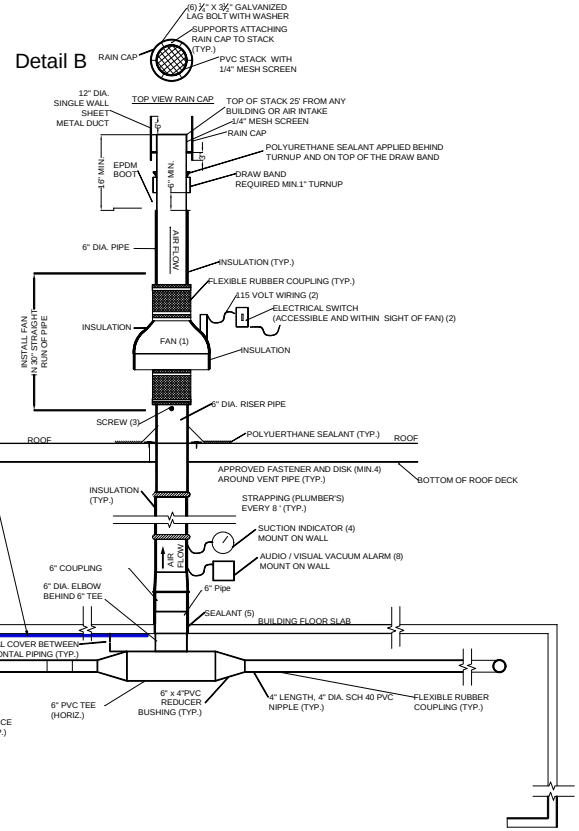
1. FAN TO BE RADONAWAY HIGH-FLOW IN-LINE FAN, MODEL RP 265, OR APPROVED EQUAL.
2. FAN AND ON/OFF SWITCH TO BE HARD-WIRED TOGETHER TO 115 VOLT CIRCUIT.
3. SECURE RUBBER COUPLING WITH SCREW TO PREVENT FAN ASSEMBLY FROM SLIPPING DOWN VERTICAL PIPE.
4. DWYER MAGNAHELIC DIAL TYPE VACUUM GAUGE MODEL 2002-M OR APPROVED EQUAL.
5. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM C920.
6. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE WITH SMOOTH INTERIOR WATERWAY. ADS N-12 OR APPROVED EQUAL.
7. WRAP 4" HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NW4 OR APPROVED EQUAL.
8. EBC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE.

Detail A

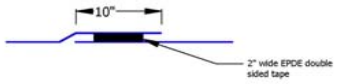


N.T.S.

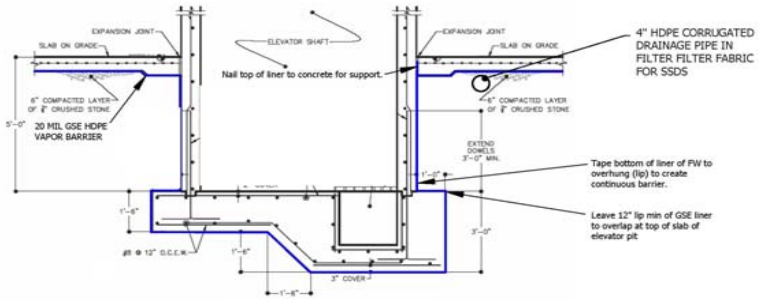
Detail B



Detail C



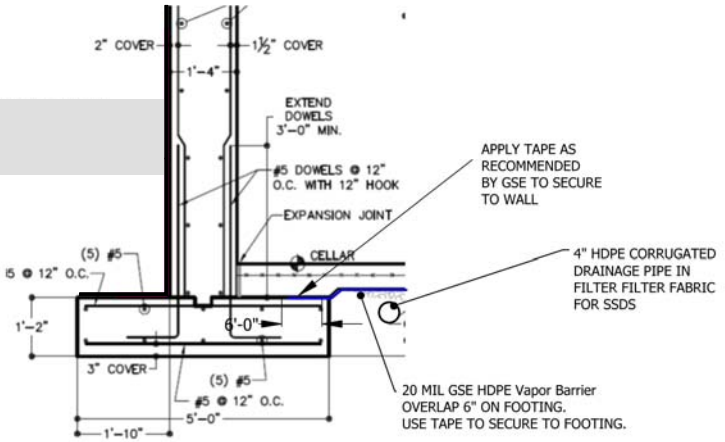
20 mil HDPE liner Overlap Detail



EVEVATOR PIT DETAIL

Detail D

Detail E



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631.924.2870

FORMER DRIGGS PLYWOOD CORP.

11 JACKSON STREET, BROOKLYN, NY

SUB SLAB DEPRESSURIZATION SYSTEM DETAILS

Vapor Barrier Design and Installation

A vapor barrier is being recommended for this project as a preventative measure. This section includes the specifications and guidelines for installing a below concrete slab sheet vapor barrier. The vapor barrier will extend throughout the area to be occupied by the new multi-use building to be constructed on the site. Vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

A vapor retarder or barrier, by definition, is a material or assembly of materials that resists vapor diffusion through it. For this project the sheet material will consist of a black high-density polyethylene (HDPE) film, 20 mil thick.

ASTM references for vapor barriers include the following:

1. ASTM E 1745-97 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs."

2. ASTM E 1643-98 "Standard Practice for Vapor Barriers."

Materials
The minimum values for the HDPE film will meet the following:

Property	Test Method	Minimum Values
Thickness, mil (mm)	ASTM D 5199	20
Density, g/cm3	ASTM D 1505	0.94
Carbon Black Content, %	ASTM D 1603, mod.	2.0
Tensile Properties (each direction)	ASTM D 6693	
Strength at Yield, lb/in. (kN/m)		22
Strength at Break, lb/in. (kN/m)		44
Elongation at Yield, %	(1.3" gauge length)	10
Elongation at Break, %	(2.0" gauge length)	500
Tear Resistance, lb (N)	ASTM D 1004	5
Puncture Resistance, lb (N)	ASTM D 4833	26
Notched Constant Tensile Load, hours	ASTM D 5397, app.	400
Oxidative Induction Time, min.	ASTM D 3895	100

The manufacturer of the specified liner is: GSE LINING TECHNOLOGY, INC.

1. All joints in the HDPE sheeting will be sealed with either a tape seal or a weld seal. The tape seal consists of a butyl mastic self-adhering tape, 2 inch (50 mm) wide, compatible with the sheet material.
2. The weld seal consists of an extrudate rod or bead, compatible with sheet material.

Preparation for the installation of the vapor barrier membrane is as follows:

3. Do not install vapor retarder/barrier until items penetrating it are in place.
4. Rake, trim, and tamp surfaces over which membrane is to be installed.
5. Substrates must be regular and smooth with no gaps or voids greater than 0.5 inches (12 mm).
6. The substrate must be free of loose aggregate and sharp protrusions.
7. The substrate does not need to be dry, but standing water must be removed.

Membrane Installation

Place the membrane HDPE film side to the substrate with printed coating side up facing towards the concrete pour. Lay membrane with seams perpendicular to and lapped in direction of concrete pour.

End laps should be staggered to avoid a build-up of layers. Accurately position succeeding sheets to overlap the previous sheet 3 inches (75 mm). Ensure that the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap.

If manufacturer recommends sealing overlaps with tape, proceed with the following steps:

8. Secure overlaps to the bottom sheet with tape.

9. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. During cold or damp conditions, the tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.

10. If manufacturer recommends sealing overlaps by welding, weld overlap seams according to manufacturer's instructions.

11. Penetrations through the membrane such as utility conduits, can be sealed either using the tape and liquid membrane method or the extrusion weld method.

Procedures for sealing penetrations using the tape and seal method include the following:

12. Scribe membrane tight to the penetration.
13. If the membrane is not within 0.5 inches (12 mm) of the penetration, apply tape to cover the gap.
14. Wrap the penetration with tape by positioning the tape 0.5 inches (12 mm) above the membrane.
15. Mix and apply Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the membrane and tape.

Procedures for sealing penetrations using the extrusion weld method include the following:

Scribe membrane tight to the penetration.

16. Perform extrusion weld techniques according to manufacturer's instructions.

Protection

Protect membrane from damage until permanent covering is in place.

Membrane Repair
The membrane can be repaired using either the tape method or the weld method.

The procedure to repair the membrane using the tape method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 12 inches.

- Seal with tape.

The procedure to repair the membrane using the weld method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 6 inches. Seal with extrusion weld.

Inspection
Upon completion of the installation of the membrane, the Contractor shall coordinate an inspection with the Engineer or its designated representative. The membrane shall not be covered until the Contractor receives written approval from the Engineer.

Pouring of Concrete
It is recommended that concrete be poured within 56 days of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

Technical Note

Permeability For GSE Geomembranes

Due to its chemical structure, polyethylene is an (essentially) impermeable substance. The material is made up of very long molecules. There does exist, however, molecular voids (sometimes referred to as "free space") among the individual polyethylene chains. The existence of these spaces is recognized when we say polyethylene is essentially impermeable. Permeation may exist when, for instance, the pressure behind the permeant is very high or the permeant's molecular size is very small. However, the degree of permeation exhibited is difficult to determine using currently available test procedures. As a result, test results frequently reflect the inaccuracy of the procedure rather than the permeation of the material. Testing of GSE HDPE performed by an independent laboratory produced the following results.

Test	ASTM Method	Results
Methane Permeability	D 1434	2.0 x 10-6 mL/cm²·s
Water Vapor Permeability	E 96	1.7 x 10-9 mL/cm²·s

It must be emphasized that different chemicals will permeate at different rates due to differences in molecular shape, polarity and phase (gas or liquid). For example, the relatively small water molecule (atomic weight 18) will more easily permeate the polyethylene matrix as compared to a large molecule such as cyclohexanol (atomic weight 94).

The molecules' polarity must also be considered (recall the adage "like dissolves like"). Polyethylene is a non-polar molecule, therefore other non-polar molecules will permeate the matrix better. Examples of these molecules are hydrocarbons - especially those such as octane, pentane and hexene. The permeation of these are therefore greater than for polar molecules such as water.

A sometimes overlooked factor when reviewing permeation data is that most permeameters apply pressure to encourage permeation. In geotechnical and environmental applications, geomembranes are not subjected to the high pressures of potential permeants as they are in a permeation laboratory test. The lack of a driving force greatly diminishes actual permeation since the gaseous molecules find an easier path to follow than through the polyethylene liner. Also, because of the high pressures required to force permeants through polyethylene, failure of the permeameter is common. This is commonly in the form of a test apparatus leak. Such leaks can result in erroneous results.

TN006 PermeabilityGeomem R03/17/06

North America	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
Asia Pacific	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
Europe & Africa	GSE Lining Technology GmbH	Hamburg, Germany		49 40 767420	Fax: 49 40 7674234
Middle East	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889

www.gseworld.com

Technical Note

Chemical Resistance For GSE Geomembranes

GSE geomembranes are made of high quality, virgin polyethylene which demonstrates excellent chemical resistance. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. It is this property of (HDPE) high density polyethylene geomembranes that makes it the lining material of choice.

In order to gauge the durability of a material in contact with a chemical mixture, testing is required in which the material is exposed to the chemical environment in question. Chemical resistance testing is a very large and complex topic because of two factors. First, the number of specific media is virtually endless and second, there are many criteria such as tensile strength, hardness, etc. that may be used to assess a material's resistance to degradation.

The chemical resistance of polyethylene has been investigated by many people over the past few decades. We are able to draw from that work when making statements about the chemical resistance of today's polyethylene geomembranes. In addition to that, many tests have been performed that specifically use geomembranes and certain chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for. As a result of these factors, GSE published a chemical resistance chart, demonstrating general guidelines.

Polyethylene is, for practical purposes, considered impermeable. Be aware, however, that all materials are permeable to some extent. Permeability varies with concentration, temperature, pressure and type of permeant. The rates of permeation are usually so low, however, that they are insignificant. As a point of reference, polyethylene is commonly used for packaging of several types of materials. These include gasoline, motor oil, household cleaners (i.e. bleach), muratic acid, pesticides, insecticides, fungicides, and other highly concentrated chemicals. Also, you should be aware that there are some chemicals which may be absorbed by the material but only when present at very high concentrations. These include halogenated and/or aromatic hydrocarbons at greater than 50%; their absorption results in swelling and slight changes in physical properties such as increased tensile elongations. This includes many types of fuels and oils. Recognize that this action, however, does not affect the liner's ability to act as a barrier for the material it is containing.

Since polyethylene is a petroleum product, it can absorb other petroleum products. Like a sponge, the material becomes slightly thicker and more flexible but does not produce a hole or void. However, unlike a sponge, this absorption is not immediate. It takes a much longer time for a polyethylene liner to swell than it does for a sponge. The exact time it takes for swelling to occur depends on the particular constituents and concentrations of the contained media. However, a hole would not be produced. Also, this absorption is reversible and the material will essentially return to it's original state when the chemical is no longer in contact with the liner.

With regard to typical municipal landfills in the United States, legally allowable levels of chemicals have been demonstrated to have no adverse affect on polyethylene geomembrane performance. The very low levels of salts, metals and organic compounds do not damage polyethylene. A double-lined containment with a leachate (leak detection) removal system effectively prevents any significant, continuous exposure of the secondary membrane to these materials and for practical purposes makes the total liner system even more impermeable.

North America	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
Asia Pacific	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
Europe & Africa	GSE Lining Technology GmbH	Hamburg, Germany		49 40 767420	Fax: 49 40 7674234
Middle East	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889

www.gseworld.com

Technical Note

Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only. This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information.

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
A			
Acetic acid	100%	S	L
Acetic acid	10%	S	S
Acetic acid anhydride	100%	S	L
Acetone	100%	L	L
Adipic acid	sat. sol.	S	S
Allyl alcohol	96%	S	S
Aluminum chloride	sat. sol.	S	S
Aluminum fluoride	sat. sol.	S	S
Aluminum sulfate	sat. sol.	S	S
Alum	sol.	S	S
Ammonia, aqueous	dil. sol.	S	S
Ammonia, gaseous dry	100%	S	S
Ammonia, liquid	100%	S	S
Ammonium chloride	sat. sol.	S	S
Ammonium fluoride	sol.	S	S
Ammonium nitrate	sat. sol.	S	S
Ammonium sulfate	sat. sol.	S	S
Ammonium sulfide	sol.	S	S
Amyl acetate	100%	S	L
Amyl alcohol	100%	S	L
Aniline	100%	S	L
Antimony trichloride	90%	S	S
Arsenic acid	sat. sol.	S	S
Aqua regia	HCI-HNO3	U	U
B			
Barium carbonate	sat. sol.	S	S
Barium chloride	sat. sol.	S	S
Barium hydroxide	sat. sol.	S	S
Barium sulfate	sat. sol.	S	S
Barium sulfide	sol.	S	S
Benzaldehyde	100%	S	L
Benzene	—	L	L
Benzoic acid	sat. sol.	S	S
Beer	—	S	S
Borax (sodium tetraborate)	sat. sol.	S	S
Boric acid	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U
Bromine, liquid	100%	U	U
Butane, gaseous	100%	S	S
1-Butanol	100%	S	S
Butyric acid	100%	S	L
C			
Calcium carbonate	sat. sol.	S	S
Calcium chlorate	sat. sol.	S	S
Calcium chloride	sat. sol.	S	S
Calcium nitrate	sat. sol.	S	S
Calcium sulfate	sat. sol.	S	S
Calcium sulfide	dil. sol.	L	L
Carbon dioxide, gaseous dry	100%	S	S
Carbon disulfide	100%	L	U
Carbon monoxide	100%	S	S
Chloracetic acid	sol.	S	S
Carbon tetrachloride	100%	L	U
Chlorine, aqueous solution	sat. sol.	L	U
Chlorine, gaseous dry	100%	L	U
Chloroform	100%	U	U
Chromic acid	20%	S	L
Chromic acid	50%	S	L
Citric acid	sat. sol.	S	S

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
Copper chloride	sat. sol.	S	S
Copper nitrate	sat. sol.	S	S
Copper sulfate	sat. sol.	S	S
Cresylic acid	sat. sol.	L	—
Cyclohexanol	100%	S	S
Cyclohexanone	100%	S	L
D			
Decahydronaphthalene	100%	S	L
Dextrine	sol.	S	S
Diethyl ether	100%	L	—
Dioctylphthalate	100%	S	L
Dioxane	100%	S	S
E			
Ethanediol	100%	S	S
Ethanol	40%	S	L
Ethyl acetate	100%	S	U
Ethylene trichloride	100%	U	U
F			
Ferric chloride	sat. sol.	S	S
Ferric nitrate	sol.	S	S
Ferric sulfate	sat. sol.	S	S
Ferrous chloride	sat. sol.	S	S
Ferrous sulfate	sat. sol.	S	S
Fluorine, gaseous	100%	U	U
Fluorosilicic acid	40%	S	S
Formaldehyde	40%	S	S
Formic acid	50%	S	S
Formic acid	98-100%	S	S
Furfuryl alcohol	100%	S	L
G			
Gasoline	—	S	L
Glacial acetic acid	96%	S	L
Glucose	sat. sol.	S	S
Glycerine	100%	S	S
Glycol	sol.	S	S
H			
Heptane	100%	S	U
Hydrobromic acid	50%	S	S
Hydrobromic acid	100%	S	S
Hydrochloric acid	10%	S	S
Hydrochloric acid	35%	S	S
Hydrocyanic acid	10%	S	S
Hydrofluoric acid	4%	S	S
Hydrofluoric acid	60%	S	L
Hydrogen	100%	S	S
Hydrogen peroxide	30%	S	L
Hydrogen peroxide	90%	S	U
Hydrogen sulfide, gaseous	100%	S	S
L			
Lactic acid	100%	S	S
Lead acetate	sat. sol.	S	—
M			
Magnesium carbonate	sat. sol.	S	S
Magnesium chloride	sat. sol.	S	S
Magnesium hydroxide	sat. sol.	S	S
Magnesium nitrate	sat. sol.	S	S
Maleic acid	sat. sol.	S	S
Mercuric chloride	sat. sol.	S	S

- Continued -

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
Mercuric cyanide	sat. sol.	S	S
Mercuric nitrate	sol.	S	S
Mercury	100%	S	S
Methanol	100%	S	S
Methylene chloride	100%	L	—
Milk	—	S	S
Molasses	—	S	S
N			
Nickel chloride	sat. sol.	S	S
Nickel nitrate	sat. sol.	S	S
Nickel sulfate	sat. sol.	S	S
Nicotinic acid	dil. sol.	S	—
Nitric acid	25%	S	S
Nitric acid	50%	S	U
Nitric acid	75%	U	U
Nitric acid	100%	U	U
O			
Oils and Grease	—	S	L
Oleic acid	100%	S	L
Orthophosphoric acid	50%	S	S
Orthophosphoric acid	95%	S	L
Oxalic acid	sat. sol.	S	S
Oxygen	100%	S	L
Ozone	100%	L	U
P			
Petroleum (kerosene)	—	S	L
Phenol	sol.	S	S
Phosphorus trichloride	100%	S	L
Photographic developer	cust. conc.	S	S
Picric acid	sat. sol.	S	—
Potassium bicarbonate	sat. sol.	S	S
Potassium bisulfide	sol.	S	S
Potassium bromate	sat. sol.	S	S
Potassium bromide	sat. sol.	S	S
Potassium carbonate	sat. sol.	S	S
Potassium chlorate	sat. sol.	S	S
Potassium chloride	sat. sol.	S	S
Potassium chromate	sat. sol.	S	S
Potassium cyanide	sol.	S	S
Potassium dichromate	sat. sol.	S	S
Potassium ferricyanide	sat. sol.	S	S
Potassium ferrocyanide	sat. sol.	S	S
Potassium fluoride	sat. sol.	S	S
Potassium hydroxide	10%	S	S
Potassium hydroxide	sol.	S	S
Potassium hypochlorite	sol.	S	L
Potassium nitrate	sat. sol.	S	S
Potassium orthophosphate	sat. sol.	S	S
Potassium perchlorate	sat. sol.	S	S
Potassium permanganate	20%	S	S
Potassium persulfate	sat. sol.	S	S
Potassium sulfate	sat. sol.	S	S
Potassium sulfite	sol.	S	S
Propionic acid	50%	S	S
Propionic acid	100%	S	L
Pyridine	100%	S	L
Q			
Quinol (Hydroquinone)	sat. sol.	S	S
S			
Salicylic acid	sat. sol.	S	S
Silver acetate	sat. sol.	S	S
Silver cyanide	sat. sol.	S	S
Silver nitrate	sat. sol.	S	S
Sodium benzoate	sat. sol.	S	S
Sodium bicarbonate	sat. sol.	S	S
Sodium biphosphate	sat. sol.	S	S
Sodium bisulfite	sol.	S	S
Sodium bromide	sat. sol.	S	S
Sodium carbonate	sat. sol.	S	S
Sodium chlorate	sat. sol.	S	S
Sodium chloride	sat. sol.	S	S
Sodium cyanide	sat. sol.	S	S
Sodium ferricyanide	sat. sol.	S	S
Sodium ferrocyanide	sat. sol.	S	S
Sodium fluoride	sat. sol.	S	S
Sodium hydroxide	40%	S	S
Sodium hydroxide	sat. sol.	S	S
Sodium hypochlorite	15% active chlorine	S	S
Sodium nitrate	sat. sol.	S	S
Sodium nitrite	sat. sol.	S	S
Sodium orthophosphate	sat. sol.	S	S
Sodium sulfate	sat. sol.	S	S
Sodium sulfide	sat. sol.	S	S
Sulfur dioxide, dry	100%	S	S
Sulfur trioxide	100%	U	U
Sulfuric acid	10%	S	S
Sulfuric acid	50%	S	S
Sulfuric acid	98%	S	U
Sulfuric acid	fuming	U	U
Sulfurous acid	30%	S	S
T			
Tannic acid	sol.	S	S
Tartaric acid	sol.	S	S
Thionyl chloride	100%	L	U
Toluene	100%	L	U
Triethylamine	sol.	S	L
U			
Urea	sol.	S	S
Urine	—	S	S
W			
Water	—	S	S
Wine vinegar	—	S	S
Wines and liquors	—	S	S
X			
Xylenes	100%	L	U
Y			
Yeast	sol.	S	S
Z			
Zinc carbonate	sat. sol.	S	S
Zinc chloride	sat. sol.	S	S
Zinc (II) chloride	sat. sol.	S	S
Zinc (IV) chloride	sat. sol.	S	S
Zinc oxide	sat. sol.	S	S
Zinc sulfate	sat. sol.	S	S

Specific immersion testing should be undertaken to ascertain the suitability of chemicals not listed above with reference to special requirements.

NOTES:

(S) Satisfactory: *Liner material is resistant to the given reagent at the given concentration and temperature. No mechanical or chemical degradation is observed.*

(L) Limited Application Possible: *Liner material may reflect some attack. Factors such as concentration, pressure and temperature directly affect liner performance against the given media. Application, however, is possible under less severe conditions, e.g. lower concentration, secondary containment, additional liner protections, etc.*

(U) Unsatisfactory: ***Liner material is not resistant to the given reagent at the given concentration and temperature. Mechanical and/or chemical degradation is observed.***

(–) Not tested

sat. sol. = *Saturated aqueous solution, prepared at 20°C (68°F)*

sol. = *aqueous solution with concentration above 10% but below saturation level*

dil. sol. = *diluted aqueous solution with concentration below 10%*

cust. conc. = *customary service concentration*

TN032 ResistChart R03/17/06

North America	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
Asia Pacific	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
Europe & Africa	GSE Lining Technology GmbH	Hamburg, Germany		49 40 767420	Fax: 49 40 7674234
Middle East	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889

www.gseworld.com